Halifax
19-27 September
2005

Abridged final report with resolutions and recommendations

Joint WMO/IOC Technical Commission for Oceanography and Marine Meteorology

Second session

World Meteorological Organization
Weather • Climate • Water

WMO-No. 995

Weather • Climate • Water

REPORTS OF RECENT WMO CONSTITUENT BODY SESSIONS

Congress and Executive Council

929 — **Executive Council**, fifty-third session, Geneva, 5–15 June 2001
932 — **Thirteenth World Meteorological Congress**, Proceedings, Geneva, 4–26 May 1999
945 — **Executive Council**, fifty-fourth session, Geneva, 11–21 June 2002
960 — **Fourteenth World Meteorological Congress**, Geneva, 5–24 May 2003
961 — **Executive Council**, fifty-fifth session, Geneva, 26–28 May 2003
972 — **Fourteenth World Meteorological Congress**, Proceedings, Geneva, 5–24 May 2003
977 — **Executive Council**, fifty-sixth session, Geneva, 8–18 June 2004
988 — **Executive Council**, fifty-seventh session, Geneva, 21 June–1 July 2005

Regional associations

934 — **Regional Association III** (South America), thirteenth session, Quito, 19–26 September 2001
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954 — **Regional Association I** (Africa), thirteenth session, Mbabane, 20–28 November 2002
981 — **Regional Association II** (Asia), thirteenth session, Hong Kong, China, 7–15 December 2004
987 — **Regional Association IV** (North America, Central America and the Caribbean), fourteenth session, San José, 5–13 April 2005
991 — **Regional Association VI** (Europe), fourteenth session, Heidelberg, 7–15 September 2005

Technical commissions

931 — **Joint WMO/IOC Technical Commission for Oceanography and Marine Meteorology**, first session, Akureyri, 19–29 June 2001
938 — **Commission for Climatology**, thirteenth session, Geneva, 21–30 November 2001
941 — **Commission for Atmospheric Sciences**, thirteenth session, Oslo, 12–20 February 2002
947 — **Commission for Instruments and Methods of Observation**, thirteenth session, Bratislava, 25 September–3 October 2002
951 — **Commission for Agricultural Meteorology**, thirteenth session, Ljubljana, 10–18 October 2002
953 — **Commission for Aeronautical Meteorology**, twelfth session, Montreal, 16–20 September 2002
955 — **Commission for Basic Systems**, extraordinary session, Cairns, 4–12 December 2002
979 — **Commission for Hydrology**, twelfth session, Geneva, 20–29 October 2004
985 — **Commission for Basic Systems**, thirteenth session, St. Petersburg, 23 February–3 March 2005

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NOTE

The designations employed and the presentation of material in this publication do not imply the expression of any opinion whatsoever on the part of the Secretariat of the World Meteorological Organization concerning the legal status of any country, territory, city or area, or of its authorities, or concerning the delimitation of its frontiers or boundaries.

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GENERAL SUMMARY OF THE WORK OF THE SESSION

1. OPENING OF THE SESSION (agenda item 1)

1.1 The second session of the Joint WMO/IOC Technical Commission for Oceanography and Marine Meteorology (JCOMM) was opened by Ms S. Narayanan, co-president of the Commission, at 10 a.m. on Tuesday, 19 September 2005, in the World Trade and Convention Centre in Halifax, Canada. The co-president asked the participants to stand in silence for one minute as a mark of respect for the victims of recent natural disasters, in particular the Indian Ocean tsunami, typhoon *Talim*, and hurricane *Katrina*.

1.2 Ms Narayanan recalled the first session of JCOMM (Akureyri, Iceland, 19-29 June 2001) (JCOMM-I) which had decided on the structure and terms of reference of the Management Committee and the subgroups. She noted that, during the first intersessional period, JCOMM had built the structure, undertaken many key activities and established strong links with other organizations that had helped launch the Commission and its ambitious work programme. The present session was to review the achievements and lessons from the past and to approve a work plan to advance JCOMM during the next intersessional period. Ms Narayanan called for the active participation of Members/Member States to make JCOMM an excellent example of how well two bureaucracies could forge an organization and be cited as a model for other such collaborations.

1.3 On behalf of the Intergovernmental Oceanographic Commission (IOC) of United Nations Education, Scientific and Cultural Organization (UNESCO), the Assistant Director-General of UNESCO and the Executive Secretary of IOC, Mr P. Bernal, welcomed the delegates to the second session of JCOMM. He expressed his sincere appreciation to the Government of Canada, to the Meteorological Service and to the Department of Fisheries and Oceans of Canada, for having offered to host the session and for the excellent facilities and support services.

1.4 In noting the recent devastating ocean-generated natural disasters, such as the Indian Ocean tsunami resulting from a substantial earthquake off the Sunda Trench, hurricane *Katrina* and the subsequent storm surge, Mr Bernal emphasized the importance of warning systems for the protection of humanity from those hazards, and noted that the work of JCOMM bore directly on the improvement of those warning systems for all the regions of the world.

1.5 Mr Bernal recalled that JCOMM was a new, daring way of organizing cooperation between two different United Nations organizations, which had been approved by Thirteenth Congress (Geneva, Switzerland, 4–28 May 1999) and the Twentieth IOC Assembly (Paris, France, 29 June–8 July 1999). He noted that JCOMM was an intergovernmental body of experts and the major advisory body to the two parent Organizations on all technical aspects of operational marine meteorology and oceanography, and that the Members/Member States should apply and implement the plans, proposals, regulations and guidance which were provided by the Commission.

1.6 The Executive Secretary IOC noted that, in the IOC, JCOMM was seen as making an important contribution to finalizing the implementation of the Global Ocean Observing System (GOOS), which was the main "flagship" programme of IOC. The concept of GOOS included the development of observational networks which integrated in situ and remote-sensed data streams and could sustain end-to-end services providing information about the ocean's physics, chemistry and biology to a wide variety of users. He further emphasized that, although a significant part of the driving force for GOOS came from science and technology, the main impetus for its completion came from the tangible benefits to society. Most of all, JCOMM needed to contribute to sustainable development with the best tools that science and technology could provide, to achieve the common goal for the international community of eliminating poverty and securing human life.

1.7 Mr Bernal recalled the JCOMM terms of reference, and highlighted the charge to JCOMM to propose to WMO and IOC a realistic work plan for the next four years to implement the observational oceanic networks required to complete the ocean component of the Global Climate Observing System (GCOS) as the first priority. A clear metric of performance to deliver on that priority was essential. He noted that the plans, infrastructure and political engagement for completing the building of the ocean component of the GCOS were today in place, not solely because of the creation of JCOMM but through the work of the IOC and WMO communities for over 30 years. Mr Bernal stressed that those plans should become the first component of the Global Earth Observation System of Systems (GEOSS) that should be implemented immediately, avoiding any duplication or unnecessary competition in the process. He assured the session of the full support of the Joint Secretariat, and called for appropriate actions by JCOMM to undertake that work.

1.8 The Executive Secretary IOC then underlined the importance of capacity-building activities to ensure the full involvement of all maritime countries in JCOMM. He noted the existence of an imbalance in institutional arrangements at the national level, among the meteorology, oceanography and terrestrial ecosystems communities. In the context of developing end-to-end services to reduce risks for daily operations in the maritime and coastal environment, those institutions, particularly in the developing world, needed to build and improve their capacity to address successfully requirements for public good services. Building capacity would extend the ability to generate additional economic benefits by developing links to private specialized organizations capable of adding value

and tailoring public service information for a wide range of clients and private users.

1.9 In concluding, Mr Bernal assured the Commission of the full support of the Secretariat and wished delegates a successful session.

1.10 On behalf of the Government of Canada, Mr L. Murray, the Deputy Minister of the Department of Fisheries and Oceans (DFO), welcomed the delegates to Canada. In noting that JCOMM had successfully brought together the marine meteorological and oceanographic communities for a common purpose to find the most effective ways of using and sharing their collective resources, he stressed that building a strong programme demanded strong partnerships among Member States around the world.

1.11 Mr Murray recalled that Canada's landmass stretched from the Atlantic Ocean to the Pacific, and north to the Arctic. Canadian development – economically, socially and culturally – was highly dependent on the sea and its resources, a relationship that remained to the present day. He noted that Canada took a keen interest in understanding the atmosphere and oceans and used that understanding to improve services to citizens. That was also the challenge faced by JCOMM. Mr Murray then indicated that Canada was taking a leading role in the development of JCOMM as well as many relevant programmes/projects in WMO and IOC, such as the chairpersonship of IOC and the International Oceanographic Data and Information Exchange (IODE) as well as the co-presidency of JCOMM during the last intersessional period. He then referred to Canada's Oceans Action Plan, which was dedicated to managing ocean activities in a holistic, integrated way. That, coupled with the DFO's regular work to manage Canada's fisheries, demanded the best observations and data management possible and enabled Canada to remain a strong supporter of international initiatives like JCOMM. In closing, Mr Murray expressed the pleasure of Canada in hosting the present session and associated JCOMM Scientific Conference, and wished participants a productive meeting and an enjoyable stay in Halifax and in Canada.

1.12 On behalf of the World Meteorological Organization (WMO), Mr M. Jarraud, Secretary-General, welcomed the delegates and expressed his appreciation to the Government of Canada for hosting the session in the historic city of Halifax, and for the excellent arrangements made to ensure the success of the session. He then thanked the co-presidents of JCOMM, Mr J. Guddal and Ms S. Narayanan, for their leadership of the Commission, as well as to the chairpersons and members of the JCOMM programme areas, expert teams and rapporteurs, for the outstanding work that they had accomplished since the first session of JCOMM.

1.13 Mr Jarraud recalled the origins of the partnership between WMO and IOC, traced back to the mid-1950s when UNESCO and WMO collaborated in the field of oceanography at the request of the United Nations, which had taken on a new dimension with the establishment of IOC in 1960. JCOMM had been born from that long-standing partnership in order to coordinate worldwide marine meteorological and oceanographic services and their supporting observational, data management and capacity-building programmes. JCOMM operated as a WMO technical commission, as defined in the WMO General Regulations, and as a major IOC subsidiary body, as defined in the IOC Statutes, encompassing the activities of the former WMO Commission for Marine Meteorology (CMM) and the Joint IOC/WMO Committee for the Integrated Global Ocean Services System (IGOSS).

1.14 Mr Jarraud noted that JCOMM was an exciting and challenging approach to operational oceanography and marine meteorology, through interdisciplinary and inter-agency cooperation. He emphasized that JCOMM should further be seen as a sign of cooperation between oceanographers and meteorologists, and that it should take a leading role in the pursuit of common objectives for the benefit of the whole maritime community.

1.15 The Secretary-General noted that WMO and IOC, working through JCOMM, had a continuing and major joint responsibility in assisting the National Meteorological and Oceanographic Agencies of developing countries in strengthening their marine observing, communications and services systems, and in supporting a wide variety of applications. In doing so, he emphasized the need for greater involvement of developing countries in the scientific and technical work of the Commission, as well as the need for support to those Members/Member States. He noted that the strategy for making that challenge a reality should be through synergies among governments, the international community, academia and the private sector. Mr Jarraud then noted that the primary issues for the Commission also included operational marine and ocean products and services, marine environmental protection and management, especially in coastal areas, and marine risk prevention and management.

1.16 Mr Jarraud recalled the suffering in all those countries which had been devastated by the tsunami that had hit Indian Ocean littoral countries on 26 December 2004, as well as various other natural disasters during the past year, which had resulted in considerable loss of life and socio-economic impacts. He emphasized the role of WMO's global system of warnings of extreme weather events which had reduced and mitigated the loss of life and property, and referred specifically to WMO's new Natural Disaster Prevention and Mitigation Programme (DPM). He noted that, with regard to tsunamis, WMO's Global Telecommunication System (GTS) and interconnected National Meteorological and Hydrological Services (NMHSs) held tremendous potential for the timely and reliable exchange of related warnings and messages among the appropriate organizations. He further noted that WMO had been actively joining forces with IOC in the framework of the United Nations International Strategy for Disaster Reduction (ISDR) in ensuring that the Indian Ocean Tsunami Warning and Mitigation System (IOTWS) would soon become a reality.

1.17 The Secretary-General then recalled the International Polar Year (IPY, 2007–2008), which would be organized under the auspices of WMO and the International Council for Science (ICSU), as well as the development of the GEOSS which was underway in an intergovernmental framework. He further informed the Commission of the establishment of the WMO Space Programme (WMOSP) by Fourteenth Congress (Geneva, 5-14 May 2003), to support its requirement for a composite observing system, which would be fundamental to meteorology and oceanography in meeting the demands of sustainable development in the twenty-first century.

1.18 In conclusion, Mr Jarraud emphasized that the challenge for WMO and IOC would be to contribute to meeting the objectives of their respective Members'/Member States' national development plans and those of the major international strategies, as well as striving for sustainable development and promoting scientific advances in marine meteorology and oceanography. Consequently, he indicated that active participation of Members/Member States in the Commission's work throughout the intersessional period was essential, keeping in mind that JCOMM should strive for an appropriate balance in the composition of its working groups and the appointment of its rapporteurs. Within WMO and IOC's traditional spirit of cooperation, Mr Jarraud assured the Commission of his continued commitment to support and strengthen the work of JCOMM, and wished all the delegates an enjoyable stay in Halifax and a most successful and productive session.

1.19 Ms W. Watson-Wright, the Assistant Deputy Minister for Science, Department of Fisheries and Oceans and Canadian representative to IOC, joined in welcoming the delegates to Canada and to Halifax. She recalled that the first intersessional period had emphasized the building of infrastructure, tools and linkages with other organizations, and emphasized the importance of clear directions and instructions for the JCOMM team. She assured the session of Canada's participation in developing a realistic work plan for JCOMM and in the implementation of JCOMM in the next intersessional period.

1.20 Ms W. Watson-Wright drew the Commission's attention to Canada's key role in the development of JCOMM to date, through contributions of expertise, databases, products and services. She noted that Canada had received significant benefits in all areas of marine science in return. Ms Watson-Wright emphasized that the concept of JCOMM was an excellent national model for the delivery of marine science and products and services. Many countries, including Canada, had established similar coordination. She also recognized the importance of linkages among departments, particularly in marine science, and reminded the Commission of the strong collaboration between the Department of Fisheries and Oceans, Environment Canada and the Department of National Defence in the area of coupled ocean-atmosphere-ice modelling as an excellent example of national activities similar to those being undertaken by JCOMM. Ms Watson-Wright concluded by assuring JCOMM of Canada's support.

1.21 Mr M. Everell, Assistant Deputy Minister of the Meteorological Service of Canada and Permanent Representative of Canada with WMO, expressed his pleasure at hosting the session jointly with the Department of Fisheries and Oceans, which was an example of Canada's commitment to the value of cooperation and to the goals of JCOMM.

1.22 Mr Everell noted that to realize fully the benefits of the advances made in monitoring networks, prediction models, and data management required that data and knowledge be converted into information that could be used to help make decisions. He stressed the importance of delivering relevant and reliable services to users. He noted that the focus of the current meeting was to develop a work plan for the next four years with measurable goals, and that JCOMM should respond to challenges in three key areas: the design and implementation of marine hazard warning systems; the development of integrated meteorology-ocean observing requirements to support the Group on Earth Observation (GEO) process; and the adaptation of services to meet new user demands as a result of climate change. He concluded his address by wishing the Commission a productive meeting.

1.23 Mr J. Guddal, co-president of the Commission, expressed his pleasure at having the second session in Canada, which held a position as a leading country in the development of operational oceanography and marine meteorology. He recognized the forthcoming centennial celebration of the discovery of the North West Passage by Roald Amundsen in 1906, as a symbolic event in the peaceful interaction between the two sides of the Atlantic Ocean. He acknowledged the excellent interaction between meteorology and oceanography and wished the Commission a fruitful second session.

1.24 Following the long tradition within WMO technical commissions to recognize formally selected individuals who had undertaken outstanding work over many years, certificates of outstanding service to JCOMM were awarded by Mr Bernal to:

(*a*) Mr V. Swail (Canada), in recognition of his outstanding contribution over more than 20 years to the refinement of marine climatological data processing and application, and to the development of wind wave and storm surge modelling, forecasting, verification and service provision;

(*b*) Mr N. Smith (Australia), in recognition of his outstanding contribution over more than 15 years to the development of operational oceanography, in particular in the preparation of the design for an ocean observing system for climate, through the work of the Ocean Observations Panel for Climate (OOPC) and the OceanObs99 Conference (Saint Raphaël, France, 18-22 October 1999), and in the development and implementation of the Global Ocean Data Assimilation Experiment (GODAE).

1.25 There were 127 participants in the session. Those included representatives of 42 Members of WMO and/or Member States of IOC, 10 international

organizations and a number of invited experts. The list of participants is given in Appendix A to this report.

2. ORGANIZATION OF THE SESSION (agenda item 2)

2.1 CONSIDERATION OF THE REPORT ON CREDENTIALS (agenda item 2.1)

At the first plenary meeting, the representative of the Secretary-General of WMO presented a brief report on delegations whose credentials had been found valid. That report was accepted by the Commission. It was decided not to set up a Credentials Committee.

2.2 ADOPTION OF THE AGENDA (agenda item 2.2)

2.2.1 The provisional agenda was adopted without amendments at the first plenary meeting, on the understanding that, at any time during the session, additions or alterations could be made.

2.2.2 The Commission took that opportunity to recall the decisions taken by the last Executive Council of WMO regarding document preparation for sessions of constituent bodies. It had requested that best WMO and IOC practices be considered in the field of document preparation and be applied to JCOMM-III document preparation.

2.3 ESTABLISHMENT OF COMMITTEES (agenda item 2.3)

NOMINATION COMMITTEE

2.3.1 To facilitate the election of the officers of the Commission, a Nomination Committee was established consisting of the principal delegates of Brazil, Canada, Chile, China, New Zealand, Nigeria and the United Kingdom. Ms J. Trotte (Brazil) was elected chairperson of the Nomination Committee.

WORKING COMMITTEES

2.3.2 Two working committees were established to deal with specific agenda items:

(*a*) Committee A to deal with agenda items 5, 7, 9, 10, 13, 14.2 and 14.3. Messrs P. Dexter (Australia) and P. Keeley (Canada) were elected co-chairpersons;

(*b*) Committee B to deal with agenda items 4, 6, 8, 11 and 12. Messrs J-L. Fellous and P. Dandin (France) were elected co-chairpersons.

The session decided to deal with agenda items 14.1, 15, 16 and 17 in plenary, chaired by the co-presidents of the Commission.

COORDINATION COMMITTEE

2.3.3 In accordance with WMO General Regulation 28, a Coordination Committee was established consisting of the co-presidents, the co-chairpersons of the working committees, and the representatives of the Secretary-General of WMO and the Executive Secretary IOC.

SESSIONAL GROUPS

2.3.4 To facilitate the discussion of specific agenda items, two sessional groups with open membership were established:

(*a*) A sessional group on budget and resources, chaired by the co-president, Ms S. Narayanan, to initiate dialogue on the important question of the resources necessary for the work of JCOMM, including both human and regular budget support as well as extra-budgetary contributions;

(*b*) A sessional group on structure, chaired by Mr G. Holland (Canada), to review the existing JCOMM structure, recommend possible changes and facilitate the appointment of the chairpersons and members of expert teams and rapporteurs.

RAPPORTEUR FOR AGENDA ITEM 16

2.3.5 To assist in the review of past resolutions and recommendations relevant to JCOMM, Mr F. Gerard (France) was appointed Rapporteur for agenda item 16.

2.4 OTHER ORGANIZATIONAL MATTERS (agenda item 2.4)

Under the present agenda item, the Commission decided on its working hours for the duration of the session. It was agreed that, in accordance with WMO General Regulation 112, no minutes of the session would be prepared, but that statements by delegations might be reproduced and distributed as and when requested.

3. REPORT BY THE CO-PRESIDENTS OF THE COMMISSION (agenda item 3)

3.1 The Commission noted with interest the report of the co-presidents of JCOMM, Ms S. Narayanan and Mr J. Guddal, covering both achievements during the past intersessional period and priorities for the next four years. The Commission expressed its appreciation to the co-presidents for their comprehensive and informative report. It thanked most sincerely the co-presidents, other members of the Management Committee, the chairpersons and members of the expert teams and panels, and the rapporteurs, for the considerable work they had achieved during the intersessional period. It looked forward with optimism to the future of JCOMM, as a mechanism for the international coordination of operational oceanography and as a manifestation of the strong partnership and commonality of interest between meteorology and oceanography.

3.2 The Commission expressed its considerable appreciation for the substantive achievements during the past intersessional period by all the groups reporting to JCOMM. It noted that the formation of JCOMM itself, and the work already achieved since its establishment, had clearly demonstrated that, at the international/intergovernmental level, the appropriate mechanism was now in place to enhance cooperation and coordination and facilitate the achievement of common goals. Greater details of achievements during the past four years were recorded under subsequent agenda items, but the Commission noted in particular a number of highlights during the intersessional period, namely:

(*a*) Increased integration among the three ship-based observation programmes;

(*b*) Enhanced service associated with sea-ice, marine pollution, waves and storm surges;
(*c*) Added value in the area of data management, in close collaboration with IODE and the WMO Information System (WIS);
(*d*) A special seminar celebrating the 150th anniversary of the Brussels Maritime Conference of 1853 and second JCOMM Workshop on Advances in Marine Climatology (Brussels, Belgium, 17-22 November 2003);
(*e*) OceanOps 04 (Operational Metocean Products and Services in Support of Maritime Safety and Environmental Management (Toulouse, France, 10-15 May 2004) showcasing the advances in the development of operational ocean products and services;
(*f*) The Workshop on New Technical Developments in Sea and Land Level Observing Systems (Paris, France, 14-16 October 2003) which provided a forum for presenting results of critical intercomparison studies and new technologies for the Global Sea-level Observing System (GLOSS);
(*g*) Production of standardized performance reports for the observation system, with significant milestones in the global drifting buoy array (completed in 2005) and by Argo (over two thirds of their floats in 2005);
(*h*) Workshops for Port Meteorological Officers.

3.3 The Commission further noted the comments made by the co-presidents that much work remained to be done, and supported the priority areas as outlined by the co-presidents for JCOMM work and development during the coming four years. Those included:

(*a*) Global coverage of the in situ networks, and recognition that that could be achieved with the present level of resources;
(*b*) Clear objectives for marine services incorporating new and existing products that would serve a wide variety of users;
(*c*) Enhanced capacity of Members/Member States as well as ways and means of sustaining the expertise and activities;
(*d*) Development and implementation of a fully-integrated data management system capable of delivering high-quality data and products across the spectrum of marine meteorological and oceanographic observations;
(*e*) Increased focus on natural disaster reduction and development of a comprehensive natural marine hazards warning system;
(*f*) Comprehensive review of JCOMM organization and priorities to ensure a well-integrated system that would deliver needed products and services and that would be monitored, evaluated and revised on an ongoing basis;
(*g*) Establishment of an inventory of current products and services and development of new products and services based on user requirements;
(*h*) Increased integration among all JCOMM programme areas and with other programmes and organizations, such as other United Nations agencies, GOOS Regional Alliances (GRAs) and with the private sector.

Further discussion on both the achievements and future work priorities for JCOMM was recorded under subsequent agenda items, and in particular a detailed work plan was considered under agenda item 15.

3.4 The Commission strongly supported the concept and work of JCOMM to date, and noted and supported the recommendations and priorities for future JCOMM work outlined in the report. In addition, it considered that the following issues were of particular importance:

(*a*) Support for natural disaster reduction, in particular for the establishment of a comprehensive marine natural hazards warning system, encompassing tsunamis, storm surges and many other such marine hazards, in which JCOMM was already involved in a number of important ways;
(*b*) Input into the IPY, and in particular its follow-up, to ensure that the systems put in place for the IPY were continued on a long-term, sustained basis;
(*c*) Implementation of a coordinated and coherent approach to capacity-building, within the context of the existing JCOMM Capacity-building Strategy, including a range of regional projects and activities, with some emphasis on storm surge modelling and services;
(*d*) Development of the economic case for operational oceanographic products and services, to assist in the strengthening of such activities at the national level;
(*e*) Some possible re-organization of the substructure of the Commission, to enhance coordination and integration across the programme's structure, as well as cost-effectiveness in programme implementation;
(*f*) Enhanced synergy with other groups and activities in WMO and IOC, including those of GOOS, GCOS, IODE and WIS;
(*g*) Work to ensure the long-term maintenance of the observing system;
(*h*) Development of an integrated ocean data management system, coordinated with IODE and WIS.

The Commission agreed that requirements for specific activities should be discussed under the relevant agenda item.

4. SCIENTIFIC INPUT AND REQUIREMENTS (agenda item 4)

4.1 CLIMATE RESEARCH AND PREDICTION (agenda item 4.1)

4.1.1 The Commission noted with interest and appreciation the report by the chairperson of the GCOS GOOS WCRP OOPC, Mr D. Harrison, covering the overall objectives of the Panel, the strategy adopted in meeting them and, in particular, aspects of that strategy relevant to JCOMM. It recognized that, as the primary scientific body for providing advice on requirements for ocean data for climate and related physical ocean systems, the OOPC was the scientific partner of JCOMM in the development of an operational ocean observing system. The Commission therefore welcomed the opportunity to review the work of the Panel and its place in the JCOMM's overall objectives and strategy.

4.1.2 The Commission noted that the recommendations of the OOPC focused on data and information

products to serve climate forecasting, assessment and research, but that those networks also provided the foundation of global operational oceanography. It noted that the ocean community had produced a widely-agreed and endorsed plan for the next 5 to 10 years, incorporated into the *Implementation Plan for the Global Observing System for Climate in support of the UNFCCC* (GCOS No. 92, WMO/TD-No. 1219), and that that Plan required that JCOMM play a major role.

4.1.3 The Commission agreed that there were at least six significant issues with relevance to JCOMM identified as key actions in that Plan:

(*a*) Full implementation (with global coverage at the recommended density) of the recommended ocean surface and subsurface observing networks. Many of those were organized under JCOMM, and others, such as Argo, had links with the Observations Coordination Group (OCG) to help OCG maintain global coverage. For climate monitoring and research, observing activities should adhere to the GCOS Climate Monitoring Principles which provided best practices for the planning, operation and management of observing networks to ensure high quality climate data;

(*b*) Designation and support of national Agents for Implementation for the ocean observation system, establishment of effective partnerships for implementation between ocean research and operational communities and their funding agencies, and improved coordination of national planning efforts;

(*c*) Timely, free and unrestricted data exchange by all players of the oceanic Essential Climate Variables (ECVs), and the adoption of comprehensive data management procedures, including real-time transmission of data to allow for ongoing and consistent quality control for climate purposes and for use in operational systems. In the longer term, IODE and JCOMM, in cooperation with WIS, should develop an ocean data transport system for the free and open exchange of data between data centres and data users;

(*d*) Establishment and adoption of international standards for metadata for the essential ocean climate variables. Improved metadata collection, real-time dissemination and archiving standards were of particular importance to the JCOMM VOSClim project, but applied to all JCOMM networks, JCOMM should cooperate with IODE in the establishment and implementation of those standards;

(*e*) Encouragement and assistance in the coordination of the development and implementation of enhanced and more cost-effective communication technologies from remote observing platforms, including two-way communications;

(*f*) Adoption of an internationally-coordinated approach to the development of integrated global climate products. As far as possible, those products should incorporate past data covering at least the last 30 years in order to serve as a reference for climate variability and change studies. A number of ocean analysis and reanalysis efforts were carried out within the framework of GODAE. JCOMM, in collaboration with the World Climate Research Programme (WCRP) and other research activities, should develop plans for, and coordinate the construction of, climate-quality historical datasets for use in those efforts. JCOMM would also be an important partner in the assembly of an ocean surface current analysis.

4.1.4 The Commission noted that as observing technology matured and as product development proceeded, the recommendations for the initial system would also evolve, eventually incorporating new variables. It noted that the sustainability of the initial system would be a major challenge, and that there were currently no national commitments to a World Ocean Watch analogous to the World Weather Watch.

4.1.5 The Commission requested its Management Committee to coordinate among the appropriate programme areas the implementation of those and other actions referred to JCOMM by the OOPC.

4.2 Operational users (agenda item 4.2)

4.2.1 The Commission recalled that it was the responsibility of JCOMM to review and respond to the requirements of operational users for in situ marine meteorological and oceanographic data. Such operational users included, inter alia, operational meteorology (global and regional numerical weather prediction, nowcasting, synoptic meteorology), operational oceanography, and its own marine services components. A basic tool to discharge that responsibility was the Committee on Earth Observation Satellites (CEOS)/WMO database that gave the consolidated requirements for both in situ and satellite derived observational data in support of all WMO Programmes, including joint WMO/IOC Programmes such as GOOS and GCOS. The Commission reviewed extracts from that database relating to operational meteorology, and agreed that the Observations and Data Management Programme Areas should continue to address those requirements as part of their ongoing work programmes, in coordination with the Commission for Basic Systems (CBS) as appropriate.

4.2.2 The Commission recognized that the database should also contain a subset relevant to marine meteorology and operational oceanography, which would allow an accurate assessment of how well the existing in situ ocean observing system was addressing JCOMM's own service requirements for such data. The Commission noted with appreciation that some progress had been achieved towards that goal and requested the Services Programme Area Coordinator to ensure that eventually a clear set of observational data requirements to support marine meteorological and operational oceanographic products and services be finalized and included in the database.

4.2.3 The Commission further recalled that it had decided, at its first session, that JCOMM should participate in the CBS Rolling Requirements Review process. It noted with appreciation that the JCOMM In Situ

Observing Platform Support Centre (JCOMMOPS) and the JCOMM Satellite Rapporteur had participated in the work of appropriate CBS expert teams and had contributed on behalf of JCOMM to that process. It requested that that work be pursued, through one or more experts designated by the co-presidents, and that the existing statement of guidance relating to marine user requirements be updated, published as a JCOMM technical report and widely distributed.

4.3 COASTAL ISSUES (agenda item 4.3)

4.3.1 The Commission noted with interest and appreciation the report by the co-chairpersons of the GOOS Coastal Ocean Observations Panel (COOP), Messrs T. Malone and A. Knap. They stated that COOP had recently completed the Strategic Implementation Plan for the Coastal Module of GOOS. It recognized that a large majority of users of marine meteorological and oceanographic data, products and services operated in coastal or near-shore areas, and welcomed the opportunity to review the work of COOP.

The Plan called for the establishment of a Global Coastal Network (GCN) measuring a small suite of common variables using common standards, established a sparse network of reference and sentinel stations, and linked basin and ecosystem scales of variability and change.

It also called for the establishment of regional coastal ocean observing systems, which were already being developed in the GRAs and national GOOS programmes.

4.3.2 The Commission noted the endorsement by the seventh session of the Committee for the Global Ocean Observing System (Paris, 4-7 April 2005) of four recommendations of particular relevance to the work of the Commission:

(*a*) Incorporate the coordinated implementation of the physical variables of the coastal module of GOOS into its work programme;
(*b*) Prepare options for the inclusion of relevant 'non-physical' common variables, products and services;
(*c*) Consider modalities of interaction between the JCOMM global implementation and the various regional implementation mechanisms;
(*d*) Establish a fully-integrated JCOMM-GOOS Capacity-building Coordination Group.

4.3.3 The Commission re-stated its willingness to consider, as appropriate, coordinating the implementation of non-physical observations and data products required by the coastal module of GOOS on a global basis. It noted that, as with the global (basin-scale) module of GOOS, the specifications of techniques and protocols for observations, data management and products should be demonstrated by pilot projects. Such projects could be carried out independently by the GRAs or jointly with JCOMM.

4.3.4 The Commission recommended the establishment of a joint ad hoc JCOMM Management Committee/GOOS Scientific Steering Committee (GSSC) Task Team to work during the intersessional period in collaboration with GRAs and national GOOS programmes to recommend:

(*a*) A process for taking on the common geophysical variables measured by the GLOSS Core Network (GCN);
(*b*) Options for managing the "non-physical" common variables, products and services;
(*c*) Mechanisms for:
  (i) Coordinating the development of the Regional Coastal Ocean Observing System (RCOOS) and the GCN as an integral part of GOOS and GEOSS;
  (ii) Coordinating development of the coastal modules of GOOS and the Global Terrestrial Observing System (GTOS);
(*d*) Procedures for implementing pilot projects as recommended in the Strategic Implementation Plan for the coastal module of GOOS;
(*e*) Recommend procedures for building capacity based on priorities established by GRAs and national GOOS programmes.

4.4 OTHER (agenda item 4.4)

No other scientific input or requirements were noted at the session, but the Commission nevertheless requested the Management Committee to keep general ocean data requirements under constant review.

5. MARINE METEOROLOGICAL AND OCEANOGRAPHIC SERVICES (agenda item 5)

5.1 REVIEW OF THE WORK OF THE COMPONENT GROUPS AND EXPERT TEAMS (agenda item 5.1)

SUMMARY

5.1.1 The Commission noted with interest the comprehensive report of the Services Programme Area Coordinator and chairperson of the Services Coordination Group, Mr P. Parker, on the work accomplished within the Services Programme Area (SPA) during the past intersessional period, as well as proposals for future activities and developments. It expressed its considerable appreciation to Mr Parker, to the chairpersons of the expert teams (Messrs H. Savina, V. Swail and V. Smolyanitsky), to the rapporteurs (Messrs P. Daniel and Y. Tourre), and to all the members of the expert teams and ad hoc task teams, for their considerable efforts and support provided to the Commission.

5.1.2 The Commission recognized that there had been significant progress by the SPA and its Expert Teams on Maritime Safety Services (ETMSS), Wind Waves and Storm Surges (ETWS) and Sea-ice (ETSI) and its Rapporteurs on Marine Pollution Emergency Response Support System (MPERSS). All the teams had been especially effective in addressing their work plans, as well as additional tasks which had required attention or been passed to the SPA by the Management Committee. OceanOps 04 and the first meeting of the ad hoc Task Team on MPERSS (Toulouse, 10-15 May 2004) had provided valuable opportunities for consideration of the further development of new oceanographic products and services in support of maritime safety and environmental management, the redesign of the JCOMM Electronic Products Bulletin, and the development of an approach

to the implementation of MPERSS. The Services Coordination Group held its second session, also in Toulouse, immediately following OceanOps 04 and the MPERSS meeting, at which the overall work of the Programme Area was reviewed, actions taken on a number of outstanding issues, and several recommendations developed for JCOMM-II, including the future structure and work of the SPA.

Expert Team on Maritime Safety Services

5.1.3 The Commission noted with appreciation that considerable progress had been made by ETMSS against its work plan, including in particular specific issues referred to the team by JCOMM-I. In that context, major results achieved included:

(*a*) The preparation of complementary guidelines for National Meteorological Services (NMSs) issuing marine meteorological forecasts and warnings for broadcast via the international NAVTEX service. A recommendation for the inclusion of those guidelines in the *Manual on Marine Meteorological Services* (WMO-No. 558) was considered for adoption by the Commission under agenda item 9;

(*b*) The guidelines on the coordination of meteorological safety information provided for shipping in the Baltic Sea through NAVTEX had been finalized by the countries concerned, and had subsequently been approved at the session of WMO Regional Association VI (Europe) in September 2005, for inclusion in Part II of the *Manual on Marine Meteorological Services*;

(*c*) Guidelines for the inclusion of visibility and sea state information in marine weather forecasts and warnings had been prepared. Since those were relatively minor, and had been considered previously, they had already been introduced into the *Manual on Marine Meteorological Services*;

(*d*) A Global Maritime Distress and Safety System (GMDSS) Web site had been developed and implemented by *Météo-France* (http://weather.gmdss.org), and had been in operation for more than a year, with considerable success. An e-mail access to GMDSS bulletins on that Web site was also being developed (http://www.meteo.fr/marine/navimail). The Commission expressed its particular appreciation to *Météo-France* for that major contribution to JCOMM and to maritime safety;

(*e*) The survey questionnaire for monitoring of marine meteorological services was reviewed, revised and distributed as previously and was made available on the GMDSS Web site. The results of the 2004 survey were considered by the Commission under agenda item 5.3;

(*f*) Both WMO Regional Associations I (Africa) and VI (Europe) had adopted the new common subareas for Metarea II and Metarea III (W) as proposed, and those were now included in the *Manual on Marine Meteorology* as well as in *Weather Reporting* (WMO-No. 9) Volume D – Information for Shipping.

5.1.4 At the same time, the Commission noted that there were issues for the ETMSS which were either of a long-term nature or were of the sort for which rapid solutions were difficult to obtain. In particular, the project to improve the GMDSS through the expansion of services to providing products in graphical format via the Inmarsat SafetyNet service had been under way for several years, but had yet to achieve any of the objectives or expectations placed upon it. However, the Commission stressed the continuing importance of relaying graphical information to users and of ensuring the continuation of that product, but agreed that the optimal means of achieving that had still to be identified.

5.1.5 The Commission agreed that the focus should include on demand basic products and services related to safety via the Internet and high frequency radio. The Commission also noted that high frequency radio would continue to be an important means of dissemination to non-GMDSS vessels for some time to come. The provision of graphics remained a priority activity of the Commission and it urged the ETMSS to continue to give the project its full attention in the coming intersessional period.

5.1.6 With regard to the GMDSS Web site, the Commission noted with interest that feedback from the maritime community indicated that there was a growing demand for radio navigational warnings to be reproduced on the Web site, so that they might be accessed at any time. During its eighth session in May 2003, the International Maritime Organization (IMO) International NAVTEX and SafetyNET Coordinating Panel had had a similar analysis to that made by ETMSS for the GMDSS Web site: it was not envisaged that such a service for navigational warnings would replace the standard services, SafetyNET and NAVTEX, but would provide a valuable additional service, as there was no doubt that any additional method of dissemination of safety information was welcomed. The Commission therefore requested ETMSS to liaise with the International Hydrographic Organization (IHO) and IMO, with a view to coordinating the use of the common URL (http://weather.gmdss.org) for the provision of both meteorological and navigational warning information in real-time via the Web site.

5.1.7 The Commission recalled its discussions at JCOMM-I regarding the possible designation of Kenya as a Preparation Service for SafetyNet broadcasts for Metarea VIII. Following considerable discussions and interactions, involving Kenya, France (La Réunion) and Mauritius, some progress had been achieved in developing formats, transmission times and related details, to effect the implementation of Kenya as a Preparation Service for sub-area 8A7, and some pre-operational trials had taken place. The Commission expressed its appreciation for that work and urged that it be continued, so that Kenya might soon be considered as an operational Preparation Service for Metarea VIII (S).

5.1.8 In terms of strategic issues affecting the development of maritime safety services, the Commission recognized that those were likely to be influenced by issues such as:

(*a*) Saturation of available spectrum/severely limited bandwidth for additional SafetyNet satellite weather and NAVTEX broadcasts;

(*b*) Mounting pressure on high frequency radio services (voice and fax) worldwide due to cost pressures, leading to withdrawal of services while replacement services and arrangements had not been developed;
(*c*) Difficulties with the development of non-radio broadcast services for graphical products, while there was an explosion in the range of potential new products and decision support, based on digital forecast production techniques using high resolution numerical modelling systems;
(*d*) Increasing needs by industry for more detailed and focused maritime safety information reflecting rising pressure on economic performance of shipping and the intention to operate in marginal conditions to gain advantage;
(*e*) Growth in private sector suppliers of marine environmental information services, probably supplying shipping through services similar to those of the Electronic Chart Display Information System (ECDIS), which might or might not be coordinated through intergovernmental mechanisms.

5.1.9 The Commission further recognized that there were external factors, to which JCOMM would have little option but to adapt. Some projects were already showing signs of a certain degree of intractability as a result of those factors, and would need to be re-evaluated. Problems with the format of NAVTEX messages being too long had been addressed through the introduction of abbreviations but it was expected that the problem with the volume of information to be sent through NAVTEX would again become apparent. In that context, the Commission agreed that there was a major requirement for the ETMSS to continue its work in support of JCOMM regarding maritime safety services interacting with IMO and IHO. Action in that regard was taken under agenda item 14.1. The Commission also noted the necessity of paying additional attention to activities of National Services on coastal zones, such as operational support for low tonnage vessels (low tonnage cargo, fishing, recreational, etc.), which were not equipped with the GMDSS facilities. In addition, the Commission noted that increasing economic activities, including oil and gas production within the coastal and shelf zones, required constant monitoring of evolving needs and techniques for marine services. That was especially important for possible future amendments to the *Manual on Marine Meteorological Services*.

Expert Team on Wind Waves and Storm Surges

5.1.10 The Commission noted with appreciation the work achieved by the Expert Team on Wind Waves and Storm Surges (ETWS) during the intersessional period in the implementation of its work plan, including the specific issues and actions referred to it by JCOMM-I. Significant progress had been made towards the goals and objectives identified for ETWS, in spite of the continuing stresses on resources of the key personnel involved in ETWS, together with major changes in the staffing of senior positions in the Secretariat.

5.1.11 The Commission was informed that, in support of the JCOMM Technical Reports that were being prepared by ETWS, on wind wave forecast verification activities and assimilation of satellite data into wind and wave models, and to provide appropriate content for the dynamic part to the *Guide to Wave Analysis and Forecasting* (WMO-No. 702), a series of questionnaires had been distributed to Members/Member States, with copies to IOC Action Addressees and JCOMM Focal Points. Specifically, the questionnaires had collected information on operational/pre-operational wind wave models and storm surge models and their products, and on surface wind, wind wave and storm surge hindcast data bases. The technical report on wave forecast verification activities had been completed and was awaiting publication. In addition, a short summary of the Global Wave Climatology Atlas, based on the results of the ERA-40 reanalysis project, had been completed and would be made available on the JCOMM Web site, as part of the dynamic part of the *Guide to Wave Analysis and Forecasting*.

5.1.12 The Commission noted with interest that the ETWS chairperson had been the programme co-chairperson for the eighth International Workshop on Wave Hindcasting and Forecasting, held at Oahu, Hawaii, from 14 to 19 November 2004. As approved by the JCOMM Management Committee, that meeting had been co-sponsored by JCOMM and attended by many of the ETWS members. The Workshop had been a substantial success, and made many important contributions to the work of the ETWS. It had been intended that the Workshop preprint volume and the scientific presentations would be published on CD-ROM as a JCOMM Technical Report. The preprints were online at: http://www.oceanweather.net/8thwave. Initial planning for the ninth Waves Workshop in 2006 was already under way.

5.1.13 With regard to specific items in the ETWS workplan, the Commission noted with appreciation the following achievements:

(*a*) The *Guide to Wave Analysis and Forecasting* had been revised and updated, and made available on the JCOMM Web site;
(*b*) A table of contents for a guide to storm surge forecasting had been prepared;
(*c*) The development of technical advice on wind waves and storm surges was under way and was an ongoing activity of ETWS;
(*d*) The development of technical advice and support to Members/Member States on wave and storm surge modelling, forecasting and services, including a review of boundary layer winds, was also an ongoing project of ETWS. Further work would be undertaken following a full analysis of the results of the questionnaires (see general summary paragraph 5.1.11). That also applied to an analysis of techniques for, and benefits of, the inclusion of satellite data in wind and wave models;
(*e*) A technical report was in preparation on variations of long return period waves caused by long-term climate trends;
(*f*) The Workshop on Wind Wave and Storm Surge Analysis and Forecasting for Caribbean countries

had been organized by ETWS and hosted by Canada in Dartmouth from 16 to 20 June 2003. JCOMM had also co-sponsored the eighth International Workshop on Wave Hindcasting and Forecasting (see general summary paragraph 5.1.12);

(*g*) The questionnaires noted above would provide the information required to update the Catalogue of Wave and Surge Models. That catalogue would then be available online within the dynamic parts of the *Guides*;

(*h*) The ETWS was continuing to provide advice to Members/Member States on development of wave and surge services;

(*i*) The questionnaires would similarly provide the information required for an inventory of hindcast wind wave and surge climatologies, again as part of the *Guides*;

(*j*) The ETWS had continued to monitor projects in order to verify operational wind wave model output. A JCOMM technical report on the wave model verification project had been completed and would be published shortly. Work was under way to expand the project by increasing the number of participating centres;

(*k*) The verification project was also being expanded to consider the quality of spectral wave forecasts;

(*l*) A further questionnaire had been distributed to identify operational storm surge model outputs, with the results to be available online within the dynamic part of the forthcoming guide to storm surge forecasting. A verification project would be implemented at a later date.

No request had yet been received for the ETWS to provide expert assistance to the IOC/IHO/WMO Project on Storm Surge Disaster Reduction in the Northern Indian Ocean area. However, it was anticipated that that situation might evolve considerably as a consequence of the tsunami disaster which hit the coast of Sumatra on 26 December 2004.

5.1.14 The Commission agreed that the work of the ETWS continued to be of considerable importance to Members/Member States, with many ongoing major projects, and that ETWS should therefore be re-established for the coming intersessional period. Priority activities for ETWS for the present period included the preparation of a guide to storm surge forecasting, verification and intercomparison of existing wave forecasting models in different regions, support as appropriate in the establishment of multi-hazard warning systems, and strengthening its activities in training, in close cooperation with capacity-building activities. Action to effect that decision was taken under agenda item 14.1.

5.1.15 The Commission particularly urged the ETWS to complete preparation of a guide to storm surge forecasting during the coming intersessional period. It noted that the guide should raise attention to the need to address the vulnerability of coastal areas exposed to storm surges, and to forecasting not only hazards but risks, which resulted from the combination of a hazard with a vulnerability. That could be done in chapter eight on surge disaster preparedness and should take advantage of existing knowledge and know-how among WMO and IOC Programmes. That would also be in accordance with the increasing practice of NMSs to use and deliver warning and risk hazard maps. A formal recommendation in that regard, based on the table of contents prepared by ETWS during the last intersessional period, was adopted by the Commission under agenda item 5.4.

Expert Team on Sea Ice

5.1.16 The Commission noted with appreciation the work achieved by the Expert Team on Sea Ice (ETSI) during the intersessional period in the implementation of its workplan, including the specific issues and actions referred to it by JCOMM-I. It recognized that, as with the other expert teams, ETSI continued to respond to both general and specific tasks by:

(*a*) Providing advice to the JCOMM Services Coordination Group (SCG) and other components of JCOMM, as required, on issues related to sea-ice and ice-covered regions;

(*b*) Reviewing and advising on scientific, technical and operational aspects of sea-ice observations and forecasting, including WMO technical publications, overseeing operations of the Global Digital Sea Ice Databank (GDSIDB), and coordinating service development and training;

(*c*) Maintaining existing, establishing or outlining new linkages with major international programmes and projects, including the Baltic Sea-ice Meeting (BSIM), the International Ice Charting Working Group (IICWG), GOOS/GCOS, IHO, IPY, etc.

5.1.17 The Commission noted that the ETSI strategy and work plan which had initially been developed at JCOMM-I had been revised by the first session of the Services Coordination Group (SCG-I) (Geneva, 3-6 April, 2002), had been discussed by correspondence between ETSI members in 2001-2002 and had been agreed in complete form at the first session of the Expert Team on Ice-Sea (ETSI-I) and the ninth session of the Global Digital Sea Ice Data Bank (GDSIDB-IX) (Buenos Aires, Argentina, 21-25 October 2002). The ETSI-II/GDSIDB-X sessions (Hamburg, Germany, 15-17 April 2004) had reviewed activities and the implementation of the work plan and had agreed on ongoing and new action items for the current intersessional period as well as in the lead up to the IPY 2007/2008. Two ad hoc sessions of the ETSI, combined with the third meeting of the IICWG (Tromso, Norway, 14-16 November 2001) and the fourth meeting of IICWG (St Petersburg, Russian Federation, 7-11 April 2003), were also held during the intersessional period.

5.1.18 The Commission noted that national activities of ice services represented on the ETSI were reviewed regularly in progress reports covering several items of the ETSI Action Sheet, including data acquisition and delivery and training. The current mandates of national ice services commonly met two main objectives:

(*a*) To provide operational and forecast support for marine activities in ice-covered waters, to ensure their safety and to protect the polar environment;

(*b*) To provide knowledge of sea-ice environments sufficient to support environmental sciences, including climate research and the development of informed policies.

The Commission noted the growing number of requests from the user community for integrated sea-ice information products, and to that end endorsed further development of the coupled sea-ice-ocean-atmosphere numerical model approach being adopted by some NMHSs.

5.1.19 The Commission was pleased to note that substantial progress had been made in recent years in training in the science of ice analysis and forecasting:

(*a*) The National Ice Centre had developed a computer-based training system for ice analysis;

(*b*) The Canadian Ice Service had continued to develop its "Ice University" concept;

(*c*) The Danish Meteorological Institute had improved and adjusted to the specific needs of the Greenland Ice Service through training of ice analysts;

(*d*) The Argentine Navy Meteorological Service had continued its Antarctic Navigation Course for Argentine Antarctic personnel and professional sailors on sea-ice and iceberg recognition;

(*e*) The Arctic and Antarctic Research Institute had hosted, in cooperation with the Alfred Wegener Institute for Polar and Marine Research and the Norwegian Polar Institute, the joint German-Russian Otto Schmidt Laboratory and the Norwegian-Russian Fram Laboratory, to support the education of graduate and post-graduate students in polar geography and oceanography.

5.1.20 The Commission noted the substantial progress made on work on the *WMO Sea-Ice Nomenclature* (WMO-No. 259). ETSI activities on the topic had comprised amendments to the existing publication; corrections to national English/French/Russian/Spanish equivalents; the development of an electronic version (menu: 4 languages, alphabetic/subject order, XML-style, search), which had been available since November 2004 on the Internet (http://www.aari.nw.ru/gdsidb/XML/nomenclature.asp); ongoing work on a new WMO *Sea-Ice Nomenclature* including an Illustrated Glossary of Sea-Ice Terms (to be finalized before IPY 2007-2008); and lastly, a comprehensive work undertaken by the experts from the Canadian Ice Service to extend the coding of sea-ice melting to identify ice decay and the associated strength of the ice, further agreed to be incorporated into the new *Sea-Ice Nomenclature*. It was intended that the final version of the nomenclature would be ETSI's contribution to the IPY 2007-2008. The Commission noted that the Secretariat had introduced the stated amendments and corrections, requested it to distribute the amended publication to relevant Members/Member States and to make the new electronic version of the *Sea-Ice Nomenclature* available through the JCOMM Web site.

5.1.21 The Commission noted with satisfaction that, in close cooperation with the IICWG, ETSI experts had prepared for publication two JCOMM Technical Report Series documents – S*IGRID 3: A Vector Archive Format for Sea Ice Charts* (WMO/TD-No. 1214) and the *Ice Chart Colour Code Standard* (WMO/TD-No. 1215). Another publication *Sea Ice Information Services in the World* (WMO-No. 574) would to be revised by the ETSI on an annual basis and be issued in electronic form in the JCOMM Technical Report Series It had been compiled in a revised form in April 2005. Noting the importance of a standard scheme for sea-ice charts, the Commission encouraged the adoption and use of those publications by national ice services and recommended including a reference to the first two documents in the *Manual on Marine Meteorological Services* (WMO-No. 558), which was considered for adoption by the Commission under agenda item 9.

5.1.22 The Commission was informed that the recent session of GDSIDB had provided an overview of sea-ice historical data processing in national services, including the preparation of historical archives structured on the basis of operational sea-ice products, quality control, climate data applied in operational practice, requests from the users for historical ice products, etc. The session had discussed and adopted a comprehensive work plan for the Steering Group of the GDSIDB for the next intersessional period, which would be included in the overall JCOMM work plan. The GDSIDB had, until recently, held 7- or 10-day period mapped ice data for the Arctic since March 1950 and for the Antarctic since January 1973. GDSIDB ice charts from the 1970s could serve as ground-truth for SSM/I products (based on a comprehensive usage of all available sources of ice information and expert knowledge) or could form a unique source of ice conditions and climate for the pre-1978 period. During 2002-2003 the first blending technique for Northern hemisphere GDSIDB charts had been developed and implemented at the Arctic and Antarctic Research Institute. The Commission supported the ETSI-II/GDSIDB-X recommendation that, to ensure that future assessments of the accuracy of sea-ice observations for GCOS were complete, the JCOMM Secretariat should maintain close coordination between ETSI and GCOS with respect to sea-ice observations. In that context, the Commission agreed that the ETSI should be designated as the responsible body for information on, and assessment of, sea-ice as an ECV and, in cooperation with the GDSIDB Steering Group, should proceed with its work on comparison between the historical ice charts collection and passive microwave (SSM/I and AMSR) products in order to lower uncertainties in climatic sea-ice statistics.

5.1.23 The Commission was pleased to note that, in response to JCOMM Management Committee's recommendations, the ETSI had discussed the implications of the forthcoming IPY for the ETSI, the GDSIDB and national ice services in general, and had agreed on specific actions, including the provision of tailored support from GDSIDB centres with regard to ice climate normals and data archival during the IPY. By early 2004 two letters of intent had been drafted and submitted to the IPY Committee on operational sea-ice aspects "improved sea ice forecasting through data assimilation" (leader –

IICWG) and on sea-ice data collection and dissemination: 'International Polar Year (IPY) Data and Information Service (DIS) for Distributed Data Management' (leader – WDC A for glaciology). Further discussion on JCOMM involvement in the IPY is given under agenda item 11.2.

5.1.24 The Commission agreed that the ETSI continued to provide essential support to Members/Member States in the specialized area of sea-ice and should therefore be re-established for the coming intersessional period. Priority activities for the team for that period included close cooperation with the major international sea-ice programmes and projects, in particular BSIM and IICWG; advice on integrated sea-ice products and coupled sea-ice-ocean-atmosphere numeric models; new initiatives for the provision of tailored support for the IPY, including ice climate normals and data archival; and ongoing work as the international body responsible for ice information standards, in particular for the Ice Objects register in ECDIS in cooperation with the IHO and for information and assessment of sea-ice as an ECV under GCOS. Action to re-establish the team and its work plan was taken under agenda item 14.1.

Marine pollution related services and the implementation of the Marine Pollution Emergency Response Support System (MPERSS)

5.1.25 The Commission recalled that two days of OceanOps 04 (Toulouse, 10-15 May 2004) had been devoted to marine pollution related products and services. That had then been followed by a session of the ad hoc Task Team on MPERSS, established by SCG-I following proposals expressed by JCOMM-I. A number of issues/recommendations relating to MPERSS had been raised at OceanOps 04. Those included an improved understanding and modelling of metocean variables, in particular surface current, and the maintenance and enhancement of metocean monitoring systems relevant to the implementation of MPERSS.

5.1.26 The Commission noted that the ad hoc task team had reviewed the status of implementation of MPERSS, based on the reports presented by participants (representatives of the Area Meteorological and Oceanographic Coordinators (AMOCs)) and the results of the questionnaire survey on the AMOCs conducted in April 2004 as a follow-up to the first survey conducted in March 2001. While the ad hoc task team noted the important progress in implementation of MPERSS, in particular Areas V and XV, it also recognized that some AMOCs continued to experience difficulties. Recognizing that the core information to be provided by AMOCs was basic meteorological information such as wind, wave and air temperature, and that contacts with supporting services and marine pollution authorities had been strengthened, the ad hoc task team had agreed that MPERSS had already been substantially implemented as far as meteorological components were concerned.

5.1.27 The Commission noted that the ad hoc task team had thoroughly reviewed the MPERSS system plan (Annex to Recommendation 2 (CMM-XI)), taking into account the recommendations raised at the 1998 International Seminar/Workshop on the Marine Pollution Emergency Response Support System (MARPOLSER98) (Townsville, Australia, 13-18 July 1998), JCOMM-I and OceanOps 04, and had developed a revised version. The SCG had subsequently endorsed the revised version as proposed, with some additional modifications, as well as with certain amendments based on the input to be given by the International Maritime Organization (IMO). The SCG had agreed that the operational status of MPERSS should be reported to the WMO and IOC Executive Councils and to the IMO Marine Environment Protection Committee (MEPC), as well as to JCOMM-II, and that the revised system plan should be recommended for inclusion in the *Guide to Marine Meteorological Services* (WMO-No. 471). In addition, the SCG had proposed that the operational MPERSS should in the future be monitored and managed by an Expert Team of the SPA, similar to the ETMSS. In view of the growing requirements for meteorological and oceanographic information and services to support search and rescue at sea, and the similarity of much of this information to that required for MPERSS, the SCG had further proposed that the terms of reference for the new expert team should also cover search and rescue support.

5.1.28 The Commission expressed its appreciation to the MPERSS Rapporteur, the members of the ad hoc task team, and the AMOCs, for their efforts to implement and further develop MPERSS. It agreed that the system could now be considered operational. It also agreed with the proposal to include the system plan and other relevant details in the *Guide to Marine Meteorological Services*. Specific action in that regard was taken under agenda item 10. The Commission further agreed to the establishment of an ongoing Expert Team on Marine Accident Emergency Support (ETMAES), and action in that regard was taken under agenda item 14.1.

5.1.29 The Commission noted with appreciation that a Web site dedicated to MPERSS had been developed and hosted by *Météo-France* (http://www.maes-mperss.org). The Web site included basic information such as what is MPERSS, what was available under MPERSS, contact points in AMOCs, together with specific examples. At the same time, AMOCs had been encouraged to make available detailed information on their MPERSS operations, and specifications of available models, in an appropriate manner, such as on their own Web sites, where possible.

Operational information publications

5.1.30 The Commission recalled that WMO had published *Weather Reporting* (WMO-No. 9), which was the reference publication on the existing facilities and services available in the operation of the World Weather Watch (WWW). Volume D - Information for shipping of that publication included Meteorological Broadcast Schedules for Shipping and other Marine Activities, Coastal Radio Stations Accepting Ships' Weather Reports and Oceanographic Reports, Specialized Meteorological Services, etc. That publication was now available on CD-ROM, and also on the WMO Web site, and updated

information was being disseminated by the *Operational Newsletter*, which was published on a monthly basis and distributed to WMO Members electronically.

5.1.31 The Commission recalled that there had been an ongoing and urgent requirement on JCOMM to thoroughly review the contents and structure of the publication in the light of the expected target audience, the relevance of the information provided, and capabilities for regular updating. The Commission agreed that the publication was of value to many potential users outside NMS, provided the information contained in it was relevant, up-to-date, and easily accessible.

5.1.32 The Commission therefore noted and agreed with the decision by the SCG, that Volume D should be maintained in essentially its existing format, but with revised content. It requested the Secretariat to take the appropriate actions to implement that decision, as detailed in the report of SCG-II.

Tsunami warning services

5.1.33 With regard to the recent tsunami event and accompanying human and environmental tragedy in the Indian Ocean region, as discussed in detail under agenda item 11.5, the Commission recognized that that had demonstrated, among other things, the overwhelming importance of having in place operational, robust and accurate tsunami warning services, as well as the need for interdisciplinary and inter-organizational cooperation to implement and run such services on a 24/7 basis. While the rapid development and implementation of global tsunami warning services was rightly being undertaken under the auspices of IOC, in particular on the basis of its leadership and experience of the International Tsunami Warning System in the Pacific (ITSU), there was nevertheless an important role for WMO and NMS in that process and in tsunami warning services in general, since it was clear that many NMSs in maritime countries had national responsibilities for some aspects of the tsunami warning process. In addition, it was also clear that a future tsunami warning system must be developed as part of a more comprehensive marine multi-hazard warning system, encompassing, for example, storm surges, tropical cyclones, extreme waves, etc. All those strongly implied a future role for JCOMM in that process.

5.1.34 In that context, the Commission reviewed possible actions by JCOMM, in cooperation with IOC's Intergovernmental Coordination Group for the Tsunami Warning System in the Indian Ocean (ICG/IOTWS) and the International Coordination Group for the Tsunami Warning System in the Pacific (ICG/ITSU), in both the short- and medium-term, to assist in the process of putting in place effective, robust and comprehensive tsunami early warning services in all ocean basins. It agreed that JCOMM could potentially contribute to the ongoing efforts for the dissemination of tsunami advice and warnings at the national level, and requested the SPA to liaise with the existing tsunami warning and mitigation support activities of both IOC and WMO to determine the appropriate approach to that contribution. The Commission agreed that the dissemination of tsunami warnings to mariners should be coordinated by ETMSS, especially regarding the GMDSS, in liaison with IMO and IHO.

5.1.35 In addition, the Commission realized the potential long-term contribution of JCOMM and the value of developing proposals relating to the construction and operation of a more comprehensive marine multi-hazard warning system. JCOMM already coordinated significant elements of such a system, and therefore could contribute directly to that process, through the SPA. That system would realize many economies relative to distinct warning systems as at present. The system would also require cooperation among a number of United Nations and other agencies, which were already contributing to the existing warning systems. The Commission requested the SCG to provide the necessary input to that process during the new intersessional period, as appropriate. Further discussion on those issues was recorded under general summary paragraph 11.5.

Brussels 150

5.1.36 The Commission recalled that JCOMM-I had supported a proposal to convene a special event to commemorate the Brussels Maritime Conference of 1853, which had been the first international meteorological conference and the precursor of international cooperation and coordination in operational meteorology and oceanography. That conference had led more or less directly to the first International Meteorological Congress in Vienna in 1873 and to the establishment of the International Meteorological Organization, the predecessor of WMO. The Commission was pleased to note that an International Seminar had taken place in Brussels from 17 to 18 November 2003 under the patronage of HM King Albert II of Belgium and in association with the second JCOMM International Workshop on Advances in Marine Climatology, CLIMAR-II, in commemoration of the 1853 Conference.

5.1.37 The Commission noted that the seminar had included historical reviews of the 1853 Conference and of the development of operational marine meteorology and oceanography, leading to the establishment of JCOMM and the Global Ocean and Climate Observing Systems. It had also covered burgeoning issues in operational ocean observations, and the role of existing programmes and institutions in dealing with those, and had concluded with a vision of operational oceanography and marine meteorology, based on the lessons learned since 1853. Displays of equipment highlighting the development of meteorological and oceanographic instrumentation, as well as displays of other historical material, such as old logbooks and reports, had also formed part of the seminar. Altogether, 17 papers had been presented, and those papers, together with a list of participants, had been included in *An International Seminar to Celebrate the Brussels Maritime Conference of 1853 – An Historical Perspective of Operational Marine Meteorology and Oceanography – Proceedings* (WMO/TD-No. 1226). The Commission expressed its

considerable appreciation to all concerned with the preparation and conduct of the session, in particular the Royal Meteorological Service of Belgium, and its Director, Mr H. Malcorps, for their substantial efforts in organizing and hosting the seminar in such an excellent fashion.

Future structure of the SPA

5.1.38 The Commission considered that the existing structure of the SPA had worked well during the current intersessional period and therefore agreed that no major modifications were required, apart from the transformation of the MPERSS Task Team into an Expert Team on Marine Accident Emergency Support (ETMAES), as noted above. At the same time, some relatively minor amendments to the various terms of reference had been suggested by the SCG, as detailed in the resolution considered under agenda item 14.1, with which the Commission agreed.

5.2 Future development of products and services (agenda item 5.2)

Review of the results of and actions arising from OceanOps 04

5.2.1 The Commission noted with interest and appreciation that, following proposals made at JCOMM-I, OceanOps 04 – Operational metocean products and services in support of maritime safety and environmental management – that had taken place in Toulouse, France, in May 2004. The Commission expressed its particular appreciation to *Météo-France* for hosting the symposium so effectively, as well as to the other sponsors (Australian Bureau of Meteorology, the National Centre for Space Studies (France), the National Scientific Research Centre (France), the Centre of Documentation, Research and Experimentation on Accidental Water Pollution (France), the French Research Institute for Exploitation of the Sea, the European Organization for the Exploitation of Meteorological Satellites, the National Oceanic and Atmospheric Administration (United States) and the Office of Naval Research (United States) for their support. The symposium had been attended by some 150 participants from 30 countries, and the programme had included 30 keynote and 65 contributed papers, covering topics such as user requirements, observing systems, environmental management, climate forecasting, ocean modelling and forecasting, and various aspects of marine pollution emergencies. The objectives of the symposium had covered three basic themes: users' needs, implementation of products, and the future of the JCOMM Electronic Products Bulletin (JEB). In addition, the symposium also covered issues relevant to MPERSS. The proceedings of the symposium were being published as a JCOMM Technical Report.

5.2.2 The Commission recognized that issues of direct relevance to JCOMM: operational ocean products and services, the integrated observing system, and the future of the JEB, had been raised in the papers presented to OceanOps 04, and that those had been summarized in the rapporteurs' reports of the sessions, which had been included as an annex to the report of SCG-II. In the discussion session which had concluded the symposium, and at which the rapporteurs' reports had been presented, a broad framework for follow-up by JCOMM had been recommended. That framework had subsequently been endorsed by SCG-II, which had established a Task Team on the Development of Operational Ocean Products under JCOMM. The framework recognized in particular that, in general, what were likely to be classified as new JCOMM products were products being made available for intermediate users, except in clear cases of public good products (e.g. Maritime Safety Services).

5.2.3 The Commission noted that, in the light of the large number of operational or quasi-operational real-time ocean and marine products which were becoming available, as demonstrated at OceanOps 04, and with a view to eventually developing formal guidance material under JCOMM for operational ocean products and services, the task team had been requested to prepare for JCOMM-II draft proposals relating to the further development of operational oceanographic products and services under JCOMM, taking into consideration the following specific issues:

(*a*) Standardization of presentation and delivery formats, nomenclature, etc;
(*b*) Classification of needs according to users;
(*c*) Detailed specifications for such user requirements;
(*d*) Criteria for selection of branded JCOMM products;
(*e*) Data and metadata directories related to products;
(*f*) Consideration of multi-disciplinary and non-physical products (chemical, biological, ecosystem) under JCOMM;
(*g*) Data, products and services, and capacity-building as appropriate for developing countries.

The GODAE Symposium

5.2.4 The Commission noted with interest the results of the Second Global OceanData Assimilation Experiment (GODAE) Symposium (GODAE in Operation: Demonstrating Utility, St Petersburg, United States, 1-3 November 2004), which it recognized as a natural follow-on to OceanOps 04, both in reinforcing the concept and reality of operational oceanography, and in helping to delineate the way forward for JCOMM in addressing the major issues in the provision of ocean products and services to a range of users on an operational basis, somewhat similar to operational meteorology. The Commission in particular was of the view that together the results and recommendations of OceanOps 04 and the GODAE Symposium had provided a clear vision of the direction to be taken by JCOMM in facilitating and coordinating the implementation of operational oceanographic products and services, as well as the issues to be addressed in achieving that goal.

Recommendations on ocean product development

5.2.5 The Commission was informed that several members of the JCOMM Task Team on Ocean Product Development had participated in the GODAE

Symposium, which had provided an opportunity to prepare a first draft of its report. That draft had been reviewed and further developed by the full task team, and the recommendations reviewed by the JCOMM Management Committee at its fourth session (Paris, 9-12 February 2005). The Commission noted the recommendations of the task team, and endorsed the actions on them as proposed by the Management Committee. Those recommendations were included in the annex to Recommendation 2 (JCOMM-II), considered formally under agenda item 5.4.

5.2.6 The Commission recognized that the issue of the possible future formal designation of 'JCOMM products' was closely linked with the status of the former IGOSS Specialized Oceanographic Centres (SOCs), and of possible future JCOMM SOCs. In that context, the Commission noted that the Management Committee had not yet been able to develop any formal conclusion or recommendation regarding the existing SOCs, and requested the Committee to continue its work on that topic. At the same time, the Commission agreed that, while some international structure would eventually be required, that would not necessarily involve formal product centres, except in support of developing countries, as recommended by the task team. It recognized that such a process may evolve naturally, but it would need an active process of planning and international oversight to ensure long-term maintenance of operational data and product availability, quality and standards. It was also recognized that, in some cases, national agencies might benefit from a formal international designation of centres, to help secure funding for ongoing operational and product preparation and dissemination.

5.2.7 The Commission agreed that the further development and implementation of operational oceanographic products and services under JCOMM, in particular as a natural response and follow-on to GODAE, represented a priority issue for the Commission during the next intersessional period. It therefore agreed on the need for a formal recommendation on that topic, and action in that regard was taken under agenda item 5.4.

The JCOMM Electronic Products Bulletin

5.2.8 The Commission recalled that one of the objectives of OceanOps 04 had been to provide material and ideas for the further development of the JCOMM Electronic Products Bulletin and for its long-term maintenance. In that context, the Commission noted and supported the recommendations of the Management Committee, OceanOps 04 and the SCG, that the JEB was valuable, but that it was not sustainable any longer in its existing form. A plan was therefore required for its development in the future, as a user-friendly Web portal to existing operational products classified as JCOMM products. That was particularly true in the light of the large number of new products now available on the Web portal. That plan should also take into account the proposals for overall JCOMM ocean product development, as discussed in the preceding paragraphs of the present report. To that end, the Commission supported the decision of the SCG to establish a Task Team on Restructuring the JEB, at the same time recognizing that its work was dependent on the follow-up to the recommendations on JCOMM ocean product development outlined above. The Commission therefore re-established a task team and added terms of reference for the new JEB which would be a sub-element of a broader outreach programme to be coordinated with the development of future JCOMM operational products. A full set of the terms of reference and resource requirements would be reviewed by the Management Committee in 2006.

5.3 Other service issues (agenda item 5.3)

Marine meteorological services monitoring programme

5.3.1 The Commission recalled that development of a marine meteorological services (MMS) monitoring programme had been initiated by the former Commission for Marine Meteorology (CMM) in 1981. The outline for a monitoring programme had subsequently been prepared, adopted by CMM-IX, and distributed to WMO Members for action in April 1985. Subsequent sessions of CMM had reviewed the results of those surveys, reiterated their value to WMO Members, and endorsed their continuation.

5.3.2 The Commission recalled that that MMS monitoring and review process had been continued by the first session of JCOMM in 2001. The Commission had endorsed the findings of the survey conducted in 2000, recommended to WMO Members to take appropriate actions based on those results, and requested the Expert Team on Maritime Safety Services to prepare a new survey, for distribution by the Secretariat in 2004, with the results to be made available to JCOMM-II.

5.3.3 In that context, the Commission noted with interest the results of that monitoring survey, coordinated by the Secretariat, with the questionnaires distributed to ships' masters through national PMOs as well as via the JCOMM and GMDSS Web sites. The survey had generated a total response of 308 questionnaires completed by ships' masters and returned directly to the WMO Secretariat, together with another 209 responses processed through the Japan Meteorological Agency (JMA). The Commission expressed its appreciation to the PMOs and the ships' masters for their efforts to assist NMSs to enhance their marine services.

5.3.4 The Commission noted and agreed with the general findings of the survey, and requested that the tabulated analysis of the responses, together with the detailed comments by ship's masters and the full list of ships whose masters had responded, be distributed to NMS by the Secretariat, and also be made available on the JCOMM, JCOMMOPS and GMDSS Web sites. The Commission agreed that that response highlighted the importance the marine user community placed on the availability of high quality MMS. It recognized in particular that there remained considerable room for improvement with regard both to the quality and

content of services, and also their coverage and timeliness in some oceanic regions, and encouraged NMS to take corrective action in areas of identified weakness.

5.3.5 In doing so, the Commission noted in particular:

(*a*) GMDSS information: The reception of GMDSS information via Inmarsat SafetyNET was judged to be excellent, whereas the reception via NAVTEX was seen to require some improvement. An examination of the specific comments indicated geographical areas where improvements would have a significant beneficial effect for mariners. Suggested items requiring attention were concentrated in the areas of: (1) additional coverage in neglected marine areas; and (2) improved transmission reliability for existing stations;

(*b*) Storm and Gale Warnings: Although clarity, accuracy and timeliness of warnings were judged to be quite good, there appeared to be a decline in the satisfaction with the overall performance in this area;

(*c*) Weather bulletins: Comments in that area were a direct reflection of those noted above: a desire for improved positional information and lead-time in forecasting movement. The areas of clarity, accuracy and timeliness were judged to be quite good, as was the additional area of terminology, but again the results indicated an overall decrease in perceived quality;

(*d*) Broadcasts of information in graphical form (e.g. radio-facsimile): The usefulness of the facsimile broadcasts received the highest positive response of any field reported (94 per cent). Conversely, in the areas of quality of reception and readability, it received the lowest percentage of good responses, between good and fair. The consensus among mariners was that facsimile broadcasts as well as other graphic products were extremely useful, and improved delivery systems could obviate most of the criticisms levelled at the current service;

(*e*) Land Earth Stations: A small number of delays and refusals were reported involving certain LES.

5.3.6 As a follow-up to those results, the Commission agreed on the need to continue maintaining a systematic long-term global MMS monitoring programme, based on the questionnaire and response format presently in use. It recommended that that format should be reviewed again for currency and applicability of content by the Expert Team on Maritime Safety Services prior to its distribution by the Secretariat to national PMOs for onward distribution to ships' masters. The Commission requested the ETMSS to investigate the feasibility of expanding the survey to non-GMDSS users. The Commission further decided to keep in force Recommendation 1 (CMM-XI) on that subject. The Commission further recommended that the expert team continue to make the survey available via the relevant JCOMM Web sites (including JCOMMOPS), and to publicize that availability amongst mariners as much as possible.

5.3.7 The Commission invited Members/Member States to carefully review the results of the survey, which were provided as a background document on the results of the MMS monitoring in 2004–2005, including the comments and suggestions made by the users, particularly those that had been repeated from previous surveys, and to take appropriate measures to correct identified deficiencies. In the context of the value that mariners placed on graphical information, the Commission urged that the provision of graphical products to mariners, both GMDSS and non-GMDSS, be undertaken as a priority project for the ETMSS. At the same time, it strongly requested NMSs to continue their support to radio facsimile broadcast facilities, which provided vital products to mariners. The Commission also stressed that JCOMM-related services should relate to 'basic safety' information only, leaving others to develop and make available any 'extra value' services.

5.4 Formal decisions or recommendations proposed for the Commission
(agenda item 5.4)

The Commission approved the text for the final report of JCOMM-II relating to the whole of general summary paragraph 5. The Commission also adopted Recommendation 1 (JCOMM-II) — Guide to storm surge forecasting (general summary paragraph 5.1.15) and Recommendation 2 (JCOMM-II) — The development of operational oceanographic products and services under JCOMM (general summary paragraph 5.2.5).

6. Observing systems (agenda item 6)

6.1 Review of the work of the component groups, expert teams and rapporteurs
(agenda item 6.1)

General

6.1.1 The Commission noted with interest the comprehensive report of the Observations Programme Area Coordinator and chairperson of the Observations Coordination Group, Mr M. Johnson (United States), on the work accomplished within the Observations Programme Area (OPA) during the past intersessional period, as well as proposals for future activities and developments. It expressed its considerable appreciation to Mr Johnson, to the chairpersons of the three implementation panels – Messrs D. Meldrum (United Kingdom), G. Ball (Australia) and M. Merrifield (United States), to the Satellite Rapporteur – Mr H. Kawamura (Japan), and to all the members of the panels, task teams, and action groups, for their considerable efforts and support that they had provided to the Commission, as well as for the substantial progress achieved over the past four years.

Data Buoy Cooperation Panel (DBCP)

6.1.2 The Commission noted that the Data Buoy Cooperation Panel (DBCP), by virtue of its pivotal role in the international coordination of drifting buoy and deep-ocean moored buoy networks, and through its eight

Action Groups, constituted a major component of the JCOMM Observations Programme Area. The Panel was served by a full-time Technical Coordinator funded through the voluntary contributions of some Members/Member States. The DBCP terms of reference had been changed in 2001 to reflect its reporting to JCOMM, and it had recently updated its implementation strategy to take into consideration the latest developments with regard to user needs expressed by GOOS, GCOS and the WWW, and the requirements of the 10-year GEOSS Implementation Plan.

6.1.3 The Commission noted with appreciation the dramatic increase in the number of drifting buoys reporting on the GTS in the last two years (i.e. 716 in April 2003, 1 043 in April 2005), and the contributions by Members/Member States to establish the network of 1 250 drifting buoys as of the present session, in line with OOPC requirements. It thanked Members/Member States for the additional commitments that had been made to achieve that and for their continuing support. In April 2005, 270 drifting buoys had reported barometric pressure (compared to a target of 700), including about 78 in the Southern Ocean (compared with a target of 90), and the Commission encouraged Members/Member States to deploy more drifters with barometers to meet that target.

6.1.4 The Commission also noted with appreciation the recent extension of the Tropical Atmosphere Ocean (TAO) Array in the Indian Ocean (3 moorings in April 2005, with more than 30 planned) as well as the distribution of salinity data on the GTS from 25 moorings in the Pacific Ocean. It noted that the TAO/TRITON Array in the Pacific Ocean now included 67 buoys while the PIRATA array in the Equatorial Atlantic Ocean included 13 moorings. PIRATA was now in a consolidation phase, intended to demonstrate the utility of the data for climate forecasting and operational oceanography. The southwest extension of PIRATA was now in place and the southeast and northeast extensions were under review.

6.1.5 The Commission noted that in order to maintain the drifter array at a level of 1 250 units, the DBCP was heavily dependent upon the availability of deployment opportunities both by ship and by air, especially in the Southern Hemisphere. It urged Members/Member States to consider what deployment opportunities they might offer, and to convey that information to JCOMMOPS, which was acting as a focal point in that regard.

Data Telecommunication

6.1.6 The Commission noted with appreciation that many Local User Terminals (LUTs) had been connected to the CLS/Service Argos network of regional receiving stations. Data collected in near-real-time via those stations were processed through the standard Argos system and GTS distribution chain. The percentage of data received within one hour of collection by the satellite had increased since 2003 from 20 per cent to 70 per cent, due primarily to the recent development of the Argos network of regional receiving stations, and improvements in Internet connectivity.

6.1.7 The Commission noted recent changes with regard to Argos Tariff policy, and particularly the new pilot project which had been negotiated at the 24th Argos Joint Tariff Agreement meeting (Chennai, India, 25-27 October 2004). The new rules and cost structure had permitted a dramatic increase in the number of drifter deployments and data collection during 2005.

Data management

6.1.8 The Commission was pleased to learn that the FM 94-XII Ext. BUFR code had been successfully implemented within the Argos GTS sub-system in July 2003. All buoys which had reported on the GTS from Service Argos in FM 18-XII BUOY format were now reporting in both formats, i.e. BUOY and BUFR. Buoy data would continue to be distributed in BUOY format for an undefined period, probably several years.

6.1.9 The Commission noted with appreciation that a Web-based buoy metadata collection scheme had been implemented at JCOMMOPS for global use, and thanked the European Action Group for its financial contribution to that effort. It noted that an OCG proposal for real-time distribution of metadata for sea-surface temperature (SST) and temperature profile data had been discussed and agreed upon by the DBCP. An ad hoc working group was being established by JCOMM and a workshop would be organized in 2006 to eventually establish a pilot project to implement a practical solution to the problem of metadata.

Vandalism

6.1.10 The Commission noted with concern that acts of vandalism against data buoys continued to be a problem and had often resulted in loss of instruments. The Commission agreed that actions that had been taken by the DBCP in the last few years to prevent vandalism should be ongoing. Those included provision of: (i) a vandalism leaflet via the DBCP Web site; (ii) information to mariners; and (iii) information through other international organizations or commissions such as IMO, the Food and Agriculture Organization of the United Nations (FAO) and IHO.

Instrument development and evaluation

6.1.11 The Commission recalled that instrument evaluation was conducted through the DBCP evaluation group, and that the group also dealt with standardization aspects of instrumentation, including recommendations for Argos message formats, and propositions for new technological developments. The latter included the storm buoy (higher resolution data transmitted during storms), and the smart buoy (increasing buoy life-time by transmitting data only when required) concepts.

6.1.12 The Commission noted that, in an endeavour to minimize accidents and satisfy health and safety requirements, the seventeenth session of the DBCP (Perth, Australia, 22-26 October 2001) had made safety recommendations regarding moored buoy design and maintenance operations, including at sea. The

Commission urged buoy operators and manufacturers to follow those recommendations (http://www.dbcp.noaa.gov/dbcp/safety.html).

Information Exchange

6.1.13 The Commission noted that the DBCP maintained information on its current activities, status, and mode of operations through its Web site and through the JCOMMOPS Web site as well as through the technical document series made available via CD-ROM. It noted that scientific and technical workshops systematically organized in conjunction with DBCP annual meetings had proved successful in establishing useful communication between buoy operators, scientific and operational users, manufacturers, and satellite data telecommunication providers.

Technical Coordinator

6.1.14 The Commission expressed its appreciation to the DBCP for developing and coordinating buoy networks. It agreed that the Panel's technical coordinator position was essential for the success of the Panel's activities, thanked those Members/Member States already contributing to the support of the position, and urged them to continue their existing contributions or new Members/Member States to consider contributing. At the same time, the Commission agreed with the recommendations of the Management Committee that new, longer term solutions for JCOMMOPS funding as a whole should be investigated to ensure the continuity of the position of technical coordinator of the DBCP and the IGOSS Ship-of-Opportunity Programme (SOOP). It asked the Secretariats to investigate the feasibility with Members/Member States and to report to the Management Committee (see also discussions under general summary paragraph 6.4).

Ship Observations Team (SOT)

6.1.15 The Commission noted with appreciation the achievements of its Ship Observations Team (SOT), made up of the Voluntary Observing Ship Panel (VOSP), the Automated Shipboard Aerological Programme Panel (ASAPP), and the Ship-of-Opportunity Programme Implementation Panel (SOOPIP). The challenge for the SOT was to maintain, coordinate and, wherever possible, integrate those programmes to support a developing range of well-defined operational and research applications.

6.1.16 The Commission agreed that the SOT had been effectively working towards establishing a truly coordinated global ship-based observing programme, which now provided an efficient mechanism for integrating and streamlining environmental monitoring from volunteer ships and supported efforts to enhance the quantity and quality of ship-based meteorological and oceanographic observational data.

SOOPIP

6.1.17 The Commission noted that the work of the SOOPIP had suffered from an increase in the cost of XBT probes. At the same time, strong recommendations had been made in 1999 by the OOPC and Climate Variability and Predictability (CLIVAR) Upper Ocean Thermal Review for SOOPIP to migrate its mode of operations from broadcast (low density) to line mode with 51 clearly identified frequently repeated and high density lines. The transition to line mode had begun during the last intersessional period in parallel with Argo implementation. The Commission noted with appreciation that the Upper Ocean Thermal (UOT) plan had proved successful as most of the SOOPIP lines were now operated in the recommended mode and the number of XBT probes deployed yearly had begun to rise again, reaching approximately 23 000 in 2004 compared with 18 500 in 2003. However, the Commission noted with concern that 14 UOT lines were still under-sampled in 2004. It agreed that efforts remained to be made in order to identify enough resources to operate the programme at full speed and to recruit ships on all required lines. The Commission noted that SOT and OCG had recommended that JCOMM established a trust fund for consumable expenditures (see general summary paragraph 6.3.13) and adopted a recommendation to that effect (general summary paragraph 6.6). The Commission noted with appreciation that the SOT was organizing an International Indian Ocean XBT training workshop in Goa, India, to build capacity and encourage participation in the region.

VOS

6.1.18 The Commission recognized that the Voluntary Observing Ship (VOS) had traditionally been a nationally based effort, with individual countries each maintaining a VOS fleet within the WMO VOS scheme. The inclusion of VOS under SOT had provided the opportunity to better coordinate and promote VOS activities at an international level, to the benefit of all VOS programmes. Through the work of the VOS Panel and the task teams, good progress had been made to improve global monitoring and reporting procedures for VOS. Measures had been introduced to enhance the communication between PMOs as well as VOS Focal Points.

6.1.19 The Commission noted that, whilst the vast majority of SHIP reports were still prepared manually by ship's officers, many ships now used electronic logbook software to compile observations, e.g. TurboWin, SEAS, and that there had been a steady increase in the number of automated shipboard systems.

6.1.20 The Commission strongly supported the excellent work done by PMOs, which underpinned the VOS programme. The VOS Panel sought to strengthen their role by providing guidance on how to recruit more ships to VOS and VOSClim, how to improve the quality of SHIP data, and by addressing issues relating to day-to-day PMO operational concerns such as security and port access.

VOSClim

6.1.21 The Commission recalled that the primary objective of the VOSClim Project was to provide high

quality ship-based marine meteorological data and associated metadata to serve as a reference dataset to support global climate studies, and that the VOSClim Project was developing best practices which should be adopted more widely within the Voluntary Observing Fleet. It noted that 113 ships had been recruited by December 2004 and that it was envisaged that the VOSClim target of 200 ships should be attained by mid-2006 at the current recruitment rate. Slower than expected implementation was, to some extent, due to PMO resource limitations and because of the many changes in the project's focal points during the previous year. One goal of VOSClim was to assess data quality of instruments used on the VOS. The expertise of the PMOs in recruiting suitable ships and in responding to quality monitoring issues was recognized as being essential to the success of the project. Real-time transmission of the project's observations, and real-time monitoring through the VOSClim Real Time Monitoring Centre (RTMC), established at the UK Met Office, had been operating efficiently. However, there remained some problems to overcome with respect to the collection of the delayed mode project data and their subsequent transfer from the Global Collecting Centres (GCCs) to the US National Climate Data Center (NCDC), which was acting as the Data Assembly Center (DAC) for the project. The Commission noted that the VOSClim Project had now been established as a SOT VOS Panel Task Team, chaired by Ms S. North (United Kingdom). The SOT VOSClim Task Team would replace the VOSClim Project management team. The task team would evaluate the added value of VOSClim data, make recommendations with regard to the project's future, and consider whether the lessons learned from VOSClim could be used to improve overall VOS data quality.

6.1.22 The Commission noted that the VOSClim target of 200 ships had been defined by practical rather than scientific considerations. It asked the Management Committee to ensure that an appropriate group of experts undertook a scientific review of the requirements for the VOSClim and VOS programs, for use in both numerical weather prediction and in climate studies, and reported back to the next session of the Commission.

ASAPP

6.1.23 The Commission recalled that the Worldwide Recurring ASAP Project (WRAP) had been established in early 2001 by the Automated Shipboard Aerological Programme (ASAP) Panel as a means to enhance the availability of atmospheric profile data from remote ocean areas, in particular in the Southern Hemisphere, and that the project had been warmly welcomed by JCOMM-I. The project had been implemented and maintained as a collaborative effort involving the Australian Bureau of Meteorology, the UK Met Office and the National Oceanic and Atmospheric Administration (NOAA, United States), with the project leader, Mr G. Mackie (United Kingdom), funded through the ASAP Trust Fund. The Commission noted with appreciation that two ships had completed several voyages under WRAP during the intersessional period and that the soundings taken in the Indian Ocean, when available, had been shown to have had a significant impact on upper air analyses.

6.1.24 At the same time, the Commission noted with regret that a decision had been taken in mid-2005 to discontinue WRAP. That decision had been influenced by several factors, including the difficulties in recruiting and maintaining ships on the desired route, the low volume of upper-air data in relation to the time and money invested, and the unwillingness of other Members/Member States to participate in and contribute to the project. While appreciating the reasons for that decision, the Commission nevertheless expressed its regret at its termination, and reiterated its belief in the value of in situ upper air profile data from the Southern Hemisphere oceans, in support of NWP, GCOS and research programmes such as the Observing System Research and Predictability Experiment (THORPEX). It expressed its considerable appreciation to the WRAP participants for the work they had undertaken throughout the lifetime of the project, and requested the Ship Observations Team to continue to monitor the possibilities for its re-establishment at some future date, with enhanced support from a greater number of Members/Member States.

6.1.25 The Commission was pleased to note that the EUMETNET ASAP programme (E-ASAP) was commissioning new ASAP units on ships crossing the North Atlantic and Mediterranean areas, and was gradually integrating the existing European national ASAP ships into its programme. Six E-ASAP operated ships had provided 1 970 soundings in 2004 and a total of 13 European ASAP-operated ships had provided 3 950 soundings in 2004. It had established a target of 18 operating ships providing 5 800 soundings per year by 2006. It was noted that every year, 90 per cent of ASAP units were operating in the North Atlantic, with a recent increase in units operating in the Western Mediterranean.

CROSS-CUTTING ISSUES AND INTEGRATION

6.1.26 The Commission noted with appreciation that the SOT had addressed a number of cross-cutting and integration issues, oriented to ensuring the most effective and efficient use of volunteer ships as marine observation platforms, to allow the incorporation of new programmes and their requirements, and ultimately to contribute to achieving the goals of JCOMM itself. Such issues included:

(*a*) "Volatility" in ship routing operations and recruitment, plus coordination of ship greetings and inspections. A Task Team on VOS Recruitment and Programme Promotion had been established. A single page recruitment flyer, recruitment PowerPoint presentation, and a generic SOT Certificate of Appreciation had been produced. Mailing lists for the SOT, VOS, PMOs, and VOSClim had been created;

(*b*) Information exchange had been encouraged, particularly regarding instrument development and data applications. Web sites had been established, including for the SOT, hosted by JCOMMOPS; the VOS, hosted by the Australian Bureau of Meteorology; and the VOSClim, hosted by the United States' National Climate Center;

(*c*) The need for standardization on methods, data processing and data management had been recognized and solutions proposed. Task Teams on: (i) Instrument Standards; and (ii) Coding had been established;

(*d*) A Task Team on Metadata for the *International List of Selected, Supplementary and Auxiliary Ships* (WMO-No. 47) had been established and recommendations made, particularly regarding content and format of national submissions to the publication as well as the format of a revised version. Action on that issue was taken under agenda item 10. The Commission strongly encouraged VOS operators to ensure that up-to-date metadata were regularly provided to the WMO Secretariat in the latest version, and that metadata were correctly formatted;

(*e*) The SOT had recognized that measurements of non-geophysical measurements, such as chemical and biological, should now also be considered by the SOT;

(*f*) Liaison and coordination with the ocean carbon community had begun, and especially with the International Ocean Carbon Pilot Project (IOCCP);

(*g*) The SOT had been working with other JCOMM teams on the definition of performance metrics;

(*h*) A Task Team on SOT Coordination had been established and action proposed. JCOMMOPS was providing full coordination to SOOP, and it was proposed that it could provide some coordination to the SOT as a whole (see general summary paragraph 6.4);

(*i*) A Task Team on Satellite Telecommunication System Costs had been established and draft proposals made (see discussion under general summary paragraph 7).

6.1.27 The Commission agreed that the SOT was providing essential support for the deployment of drifting buoy and Argo profiling floats and recommended that a good level of coordination between the different components of the observing system under the OPA was necessary.

6.1.28 The Commission agreed that maintaining an efficient and stable network of PMOs was paramount to the success of the SOT implementation. It requested the Secretariat and the co-presidents to continue to keep the IOC and WMO governing bodies informed of the high importance of the PMO network so that they could convey that message to Members/Member States at an appropriate level.

6.1.29 The Commission noted with great concern that security issues arising from availability of ships' locations via public Web sites had already led to the loss of ships from national VOS fleets, and had already resulted in BBXX messages being stopped from distribution on the GTS. It urged its Members/Member States to take action urgently to prevent ship positions being made available via the Internet, including contacting the relevant organizations/companies and informing them of the security risk involved, or other solutions involving the chain of communications to the GTS. JCOMM and SOT needed to develop a plan of action to stop leakages of real-time ship positions, while at the same time maintaining the flow of critical meteorological and oceanographic information to honest mariners, scientists, and service providers, and to monitor the effectiveness of those actions.

6.1.30 The Commission noted with appreciation the continued development of automation and integration of ship-based observing systems as well as electronic logbook software, e.g. SAMOS, AVOS, BATOS, MILOS, MINOS, Automet, SEAS, Turbowin. It encouraged Members/Member States to continue those developments.

6.1.31 The Commission agreed that pilot projects would have to be considered for the design and evaluation of new observation programmes, such as the IOCCP for pCO2 and the Global Ocean Surface Underway Project (GOSUD) for sea surface salinity monitoring programmes.

6.1.32 The Commission praised the efforts of the SOT to integrate its observing system in such an impressive way during the last intersessional period while recognizing that operating the ship-based observing system was increasingly difficult due mainly to: (i) reduced availability of ships; (ii) security issues; (iii) lack of resources; and (iv) telecommunication costs. It urged Members/Member States to continue and strengthen their support to the different national components of the SOT.

Global Sea Level Observing System Group of Experts (GLOSS)

6.1.33 The Commission recognized the major importance of GLOSS, both to a variety of operational activities in Members/Member States and to global climate studies, and noted the progress made as an international coordination mechanism for global high quality sea level observations together with important elements for: (i) assisting in maintaining the GLOSS Core Network of tide gauges of 290 stations; (ii) training in sea level measurements and analysis; (iii) development of scientific and technical training material on various sea level aspects; and (iv) facilitation of the provision of tide gauges and geodetic equipment to developing countries.

6.1.34 The Commission noted that the present status of the GLOSS implementation, as measured in terms of data delivery from the GLOSS Core Network of stations, was reported annually by the Permanent Service for Mean Sea Level (PSMSL). An 'operational' station from a PSMSL viewpoint meant that mean sea level monthly and annual values had been received and checked as far as possible, and had been included in the databank (http://www.pol.ac.uk/psmsl/gloss.status/status_oct2004.

html). The Commission further noted that a more elaborate status summary was provided in the GLOSS Adequacy Report from 2003 (http://unesdoc.unesco.org/images/0013/001302/130292e.pdf), with progress being measured primarily in terms of data return for the various GLOSS data streams. Although the numbers had changed slightly since 2003, the overall conclusions given in the Adequacy Report were still valid, as summarized below:

(*a*) More than 55 Member States had contributed data to GLOSS;

(*b*) About 60 per cent of the GCN was considered operational, with similar percentages for the various sub-networks (see the Adequacy Report for detailed assessments);

(*c*) Real-time (daily) data were available from approximately 76 GLOSS stations;

(*d*) Fast (monthly) data were available from approximately 114 GLOSS stations;

(*e*) There had been considerable growth in the number of GLOSS stations that were linked to the Global Positioning Systems (GPS) or to the Doppler Orbitography and Radiopositioning Integrated by Satellite (75 at the time of the Adequacy Report);

(*f*) Historical data rescue activities had increased data holdings (over three million additional hourly data points were added through initiatives from the NOAA alone).

6.1.35 The Commission noted that GLOSS depended upon the work of data centres that were funded primarily from national resources. It acknowledged with appreciation those centres which were playing important international as well as national roles, including the PSMSL in the United Kingdom; University of Hawaii Sea Level Center in the United States which provided GLOSS and CLIVAR with "fast" and "delayed-mode" coordination; and the British Oceanographic Data Centre (BODC), which provided GLOSS and CLIVAR delayed-mode coordination.

Highlights of GLOSS activities

6.1.36 The Commission noted with appreciation the many productive training courses, expert visits and other activities including provision of tide gauges that had taken place over the past intersessional period. Those included: three training courses; a GLOSS Assessment Report; three technical expert visits; one GLOSS technical workshop and contributions to a number of conferences and related meetings; an update to *IOC Manuals and Guides No. 14*; multilingual versions of the GLOSS brochure, and the establishment of GLOSS Web sites for Africa and South America; the provision and installation of four new tide gauges in Brazil, Ghana and Mozambique; as part of the Ocean Data and Information Network for Africa Project, ODINAFRICA III, the eventual installation of some 12-15 tide gauges, many at GLOSS Core Network sites in Africa; and the implementation of a joint project with IODE for a data archaeology survey of sea level records.

Future GLOSS activities

6.1.37 The Commission noted that a major new activity in the next four years would be coordinating the installation and upgrade of tide gauges in the Indian Ocean as part of the Indian Ocean Tsunami Warning System, using funds from Finland and ISDR. It further noted that GLOSS would continue to assist with advice and coordination on the sea level aspects of the ODINAFRICA III project and would explore opportunities under the International Polar Year 2007-8 programme to help Member States upgrade the Arctic and Antarctic tide gauge networks, with many of the gauges that would be installed to contribute to GOOS and GCOS.

6.1.38 The Commission noted with interest that, in association with the provision of tide gauges, several training courses were being planned, including those as part of the OdINAFRICA project and the Indian Ocean Tsunami Warning System activity.

Argo

6.1.39 The Commission noted with interest the current status of the Argo profiling float project, a pilot project of OOPC, GODAE, GCOS, and GOOS and a part of the integrated global ocean observation strategy. Argo was a global network of profiling floats, surfacing and measuring temperature and salinity, in most cases profiling up to 2 000 metres every 10 days, and transmitting their data in real-time. It was important for climate research, short-term ocean forecasting, and for ocean model development. It was designed to have a global 3° resolution coverage in the ice-free oceans, with 3 000 active floats when complete.

6.1.40 The Commission was pleased to note that Argo had made tremendous progress during the intersessional period. Shortly before the session in September 2005, it had reached a milestone with 2 000 profiling floats reporting, 66 per cent of the designed network, and a truly global coverage including large parts of the Southern Hemisphere. Eighteen countries had participated in the Argo project by providing floats, and over 30 countries had participated through the provision of logistical or scientific support to the project.

6.1.41 The Commission noted that the Argo network was already making important contributions to climate research (in some parts of the world's oceans there were now more Argo profiles than historical hydrographic profiles), short-term ocean forecasting through the use of Argo data in GODAE forecasting models, and to coupled ocean-atmosphere weather forecasting systems. The Argo project had met its goal of providing real-time data access, with 95 per cent of floats reporting their data on the GTS, 85 per cent within 24 hours of the profile. This was part of an entire data management and quality control system developed for Argo.

6.1.42 The Commission recognized that maintenance of the completed array would require constant deployment in all regions of the world's oceans of about 800 floats per year, and encouraged Members/Member States to maintain or increase their level of support to the Argo project.

6.1.43 The Commission recalled that Argo was managed as an internationally coordinated pilot project by the Argo Steering Team (http://www.argo.net), and that it maintained close links with the JCOMM Observations Programme Area via the Coordinator and the Coordination Group. The Commission also noted the close cooperation between Argo and JCOMM through the Argo Information Centre, located at JCOMMOPS. The Argo Information Centre, among other tasks, had a successful record of cooperation with the SOT for deployment opportunities.

6.1.44 The Commission recognized that the Argo project would be ready to make the transition from a pilot project to a sustained part of the ocean observing system during the coming intersessional period. It noted that most Argo deployments relied and would continue to rely on research funding, and it urged Members/Member States to seek the means to continue long-term sustained funding of such deployments. The Argo project was requested to report on the use and benefits of Argo data. This would be of value in making the case for sustained funding for Argo.

6.2 Remote sensing (agenda item 6.2)

WMO Space Programme (WMOSP)

6.2.1 The Commission noted with interest that Fourteenth Congress had established a new major cross-cutting Programme, the WMO Space Programme (Resolution 5 (Cg-XIV)), in response to the expansion in the availability of satellite data, products and services and in recognition of the increase in responsibilities for WMO in that area. Fourteenth Congress had considered that the scope, goals and objectives of the new WMO Space Programme should respond to the considerable growth in the utilization of environmental satellite data, products and services within the expanded space-based component of the Global Observing System (GOS) that now included appropriate research and development (R&D) environmental satellite missions. Fourteenth Congress had also supported the WMO Space Programme Long-term Strategy reviewed at the third session of the Consultative Meetings on High-level Policy on Satellite Matters (Geneva, 3-4 February 2003).

6.2.2 Fourteenth Congress had agreed that the main thrust of the WMO Space Programme Long-term Strategy should be:

"To make an increasing contribution to the development of the WWW GOS, as well as to the other WMO-supported Programmes and associated observing systems (such as AREP's GAW, GCOS, WCRP, HWR's WHYCOS and JCOMM's implementation of GOOS) through the provision of continuously improved data, products and services, from both operational and R&D satellites, and to facilitate and promote their wider availability and meaningful utilization around the globe."

6.2.3 The Commission noted that the main elements of the WMO Space Programme Long-term Strategy had been agreed as follows:

(*a*) Increased involvement of space agencies contributing, or with the potential to contribute to, the space-based component of the GOS;
(*b*) Promotion of a wider awareness of the availability and utilization of data, products — and their importance at levels 1, 2, 3 or 4 — and services, including those from R&D satellites;
(*c*) Considerably more attention to be paid to the crucial problems connected with the assimilation of new data streams in nowcasting, numerical weather prediction systems, reanalysis projects, monitoring climate change, chemical composition of the atmosphere, as well as the dominance of satellite data in some cases;
(*d*) Closer and more effective cooperation with relevant international bodies;
(*e*) Additional and continuing emphasis on education and training;
(*f*) Facilitation of the transition from research to operational systems;
(*g*) Improved integration of the space component of the various observing systems throughout WMO Programmes and WMO-supported Programmes;
(*h*) Increased cooperation amongst WMO Members to develop common basic tools for utilization of research, development and operational remote sensing systems;
(*i*) Additional emphasis on recommendations for data management for satellite data.

6.2.4 The Commission also noted that Fourteenth Congress had considered the progress and results from the sessions of the Consultative Meetings on High-level Policy on Satellite Matters. Fourteenth Congress had stressed that the WMO user community and space agencies should be represented at the highest level at those sessions. Those Consultative Meetings would continue to provide advice and guidance on policy-related matters and would maintain a high-level overview of the WMO Space Programme. Fourteenth Congress had agreed that CBS should continue the lead role, in full consultation with the other technical commissions, for the new WMO Space Programme.

6.2.5 The Commission noted that the WMO Space Programme Implementation Plan for 2004-2007, as contained in Section 4 and Annex III to the report of the fourth session of the WMO Consultative Meetings on High-level Policy on Satellite Matters, had been approved by the fifty-sixth session of the WMO Executive Council (Geneva, 8-18 June 2004) and that the Implementation Plan had provided further details on the WMO Space Programme Long-term Strategy as approved by Fourteenth Congress in the WMO 6LTP.

6.2.6 The Commission noted with appreciation that WMO, through its WMOSP, had acted as a catalyst in greatly improving the utilization of satellite data and products. The Virtual Laboratory (VL) for Education and Training in Satellite Meteorology had already made a considerable impact through its 'Centre of Excellence'. The Commission was pleased to see the integration of the new R&D constellation into education and training activities. It also noted that the WMO Space Programme

Long-term Strategy and associated implementation plan had provided for increased utilization of the VL to the benefit of Members/Member States, especially for fuller exploitation of R&D data, products and services, as well as those from new and existing operational meteorological satellite systems.

6.2.7 The Commission noted that the fifty-sixth session of the WMO Executive Council had strongly supported the development of the space component of an integrated global observing system and had requested the CBS, as a matter of urgency, especially in light of the emerging new activity for a Global Earth Observation System of Systems (GEOSS), to further its development through its role as lead technical commission for the WMOSP, in consultation with all other relevant WMO and co-sponsored bodies.

IOC Remote Sensing Strategy

6.2.8 The Commission noted with interest that the twenty-second session of the IOC Assembly had called for a strategy on the use of remote sensing in oceanography (Resolution XXII-13), in recognition of the need for developing countries to have access to, and to make more use of, the data from Earth observation satellites. At its thirty-seventh session, the IOC Executive Council had endorsed a 'Plan for the Use of Remote Sensing in Oceanography by Developing Countries'. The Commission noted that the plan to improve the use of remote sensing in oceanography had six main elements:

(*a*) Sponsored attendance of developing country representatives at space-based conferences;
(*b*) Sponsored course in remote sensing techniques, for developing countries;
(*c*) Support for regional development of remote sensing for IOC programme applications;
(*d*) International coordination of capacity-building activities with space agencies;
(*e*) Development of training materials;
(*f*) Leveraged financial support for capacity-building initiatives in remote sensing.

6.2.9 The Commission noted with interest that the IOC, in partnership with CEOS, the Integrated Observing Strategy (IGOS) partners and the UNESCO Crosscutting Project on Remote Sensing in Africa, had sponsored a number of activities to further that plan, including supporting the UNESCO Bilko Project on Developing Training Capacity for Coastal and Marine Remote Sensing and the UNESCO Remote Sensing Project in Africa; several regional training courses (e.g., satellite altimetry, Kenya 2004; Pan Ocean Remote Sensing Conference, Chile 2004; ICSU's Committee on Space Research, Morocco 2005); and grants for travel, research and fellowships. The Commission welcomed that information on IOC activities, and encouraged JCOMM to support as appropriate IOC activities to facilitate access to, and application by, Member States of data from ocean satellites.

JCOMM involvement and actions

6.2.10 The Commission noted with interest and appreciation the report of the JCOMM Satellite Rapporteur, Mr H. Kawamura (Japan), recognizing that over the past two decades, satellite remote sensing had become a mature technology for the measurement of many ocean variables. The role of ocean satellites in an ocean observing system for climate had been clearly stated at OceanObs99. Subsequently, the IGOS Partnership had published its 'Ocean Theme' document to plan the transition from research to operational environmental prediction of the oceans, which was critically linked to the availability of operational ocean satellites.

6.2.11 The Commission recognized that many potential users of satellite-derived information were located in coastal areas, and that the role of the GOOS Regional Alliances was crucial in facilitating the access and application of ocean satellite data by such users. Applications in coastal areas, in particular, required satellite products with high spatial resolution and rapid delivery times, which imposed additional requirements on the satellite operators.

6.2.12 The Commission noted and supported the significant role played by the rapporteur during the intersessional period with regard to the Coordination Group for Meteorological Satellites (CGMS). In particular, the rapporteur had ensured that a new permanent CGMS activity considered the IOC's satellite data requirements, including those of the GOOS Regional Alliances as noted above. The Commission further noted with appreciation the work undertaken by the rapporteur, in conjunction with the JCOMMOPS Coordinator, to develop a statement of guidance on how well the observing system, in situ and space-based, had met the data requirements for marine services (see agenda item 4.2).

6.2.13 With regard to the coming intersessional period, the Commission supported the proposal by the Management Committee to establish a Cross-cutting Team on JCOMM Satellite Data Requirements, consisting of four satellite experts, each responsible for one Programme Area (PA) (two for OPA), and reporting directly to the Management Committee (see agenda item 14.1).

6.3 Status of the in situ observing system, including enhancements since JCOMM-I and additional enhancements needed to match requirements (agenda item 6.3)

6.3.1 The Commission noted that there was significant international momentum for the implementation of a composite global observing system consisting of: (1) the in situ networks; (2) continuous satellite missions; (3) data and assimilation subsystems; and (4) system management and product delivery. After wide consultation with the ocean observing system community, a five-to-ten year implementation plan for a global ocean observing system for climate had been published in the GCOS *Implementation Plan for the Global Observing System for Climate in support of the UNFCCC* (GCOS-92) (WMO/TD-No. 1219). The plan had been endorsed by the UNFCCC and Chapter 5 on the Ocean Climate Observing

System endorsed as the "ocean backbone" of the Global Earth Observation System of Systems (GEOSS). A fundamental requirement detailed by GCOS-92 was the global coverage of the in situ networks. The Commission noted that at the time of JCOMM-I in 2001, the total global system had been 34 per cent complete. By JCOMM-II in 2005 the system had been 55 per cent complete.

6.3.2 The Commission recognized that although the backbone system specified in GCOS 92 had been designed to meet climate requirements, marine services in general would be greatly improved by the implementation of the global coverage called for by that design. The Commission noted that the system would support global weather prediction, global and coastal ocean prediction, marine hazard warning, marine environmental monitoring, and many other non-climate uses. It further noted that JCOMM had been identified as the implementing agent, or a contributing implementing agent, for 21 of the specific actions listed in Chapter 5 of GCOS-92, and that those specific actions provided an excellent roadmap to guide the OPA work. The Commission recommended, therefore, that the OPA work plan should be based on implementing the ocean and relevant atmospheric actions in GCOS-92 for the next intersessional period. The GCOS-92 goals incorporated those goals that the JCOMM OPA and Argo had been pursuing for the past four years — global coverage by the moored and drifting buoy arrays, profiling floats, tide gauge stations, and ship-based networks (plus continuous satellite missions).

6.3.3 The Commission also acknowledged that continuity in the observing system was of central importance for climate applications, accepted the GCOS *Climate Monitoring Principles* as best practice, and noted that the work of the DBCP, SOT, and GE-GLOSS would be conducted in accordance with the GCOS *Climate Monitoring Principles* wherever possible. The Commission also noted the importance of oceanographic and meteorological observations carried out at coastal stations. Those observations were essential for the analysis and development of prognostic products for risk assessment and prevention and mitigation of hazards affecting the populations and economies of coastal states. Development of that information was one of JCOMM's objectives for the OPA during the next intersessional period.

6.3.4 The Commission noted that tide gauge stations and moored buoys for tsunami and storm surge warnings were also a priority for the international global observing system. Opportunities for JCOMM OPA support to the international marine hazard warning system included real-time reporting from GLOSS tide gauge stations, coordinated deployment of ocean buoys and floats, and the use of common platforms and logistics infrastructure for multiple observational purposes. The Commission recommended that implementation of observational components in support of the international comprehensive marine hazard warning system should also be the main requirement driving the OPA work plan over the next four years (see agenda item 11.5 for related action).

6.3.5 The Commission recognized that, in addition to linkage with the Argo programme, it was now clear that JCOMM needed to coordinate with several other global programmes for efficient and effective observing system implementation. The OPA was developing those links, and maintaining appropriate coordination would be important over the next four years with the International Ocean Sustained Interdisciplinary Timeseries Environment Observation System (OceanSITES) programme, the International Ocean Carbon Coordination Project (IOCCP), and the international comprehensive marine hazards warning system.

6.3.6 The Commission acknowledged with appreciation the major milestone that had been achieved by the DBCP in 2005, with the global drifting buoy array reaching its design goal of 1 250 buoys in sustained service, thus becoming the first component of the GOOS to be completed. The DBCP deployed Global Drifter 1250 on 18 September 2005 from Halifax, and the Commission acknowledged with appreciation the special deployment ceremony and celebration that had been held just prior to JCOMM-II to commemorate that significant milestone and offered its particular thanks to NOAA, Service Argos, the Canadian Meteorological Oceanographic Society and Canada for hosting that historic event.

System-wide monitoring and performance reporting

6.3.7 The Commission noted that a major challenge for the OPA had been to develop easy-to-understand performance reports that could help in evaluating the effectiveness of the observing system and help in efforts to convince governments to provide the funding needed to meet global implementation targets. It further noted that it would not be possible to achieve global coverage of the Earth's oceans with existing resources. Governments needed to commit additional resources if JCOMM was to achieve global coverage. The Commission noted with appreciation that JCOMMOPS and the OPA were working to develop standard base maps showing required global coverage against what was presently in place, to evaluate observing system status and effectiveness, and to develop summary reports illustrating how advancements toward global coverage improved the adequacy of the observational information.

6.3.8 The Commission noted that a standard map projection and colour coding had been accepted by the OPA for reporting system status and progress. The Commission encouraged all Members/Member States to use those conventions to map their JCOMM contributions.

6.3.9 The Commission noted that, in addition to platform statistics calculated by JCOMMOPS, quarterly performance reports were now available for sea-surface temperature, sea-surface salinity, temperature profiles, and salinity profiles. The OPA was working to incorporate reports for other ocean variables that had been specified by GOOS and GCOS, and access to those reports was available via JCOMMOPS at http://www.jcommops.org/network_status.

6.3.10 The Commission noted with interest that a demonstration project was underway to routinely report observing system monitoring and performance metrics in cooperation with the GOOS Project Office of IOC. A consolidated Progress Report with contributions from countries was available at http://www.jcommops.org/network_status, which listed the 64 countries and the European Union that maintained elements of the composite ocean observing system, and the number of in situ platforms and expendables contributed by each country. JCOMM Members/Member States were invited to routinely review that report and provide corrections as needed via e-mail to opa@jcommops.org. It was further noted that the observing system contributions were included in that report if they provided data to the international community in accordance with WMO and IOC data policies; elements that did not share data freely and openly were not included in that report.

6.3.11 The Commission noted that a Web page was under development that would provide a single entrance portal to link to all Web sites being maintained by counties contributing to the implementation of the global ocean observing system. That single entrance portal was intended to illustrate to users the 'system of systems' that was being implemented by JCOMM and its partners. The Commission noted that that portal to national centre Web sites was available through the JCOMMOPS access point at htt:p//www.jcommops.org/network_status. It encouraged Members/Member States to review the Web site and provide corrections as needed to opa@jcommops.org.

Funding to meet implementation targets

6.3.12 The Commission acknowledged that JCOMM should help in efforts to convince governments to provide the funding needed to meet global implementation targets. It recognized that global coverage could not be achieved with the resources that were presently being applied. It recalled that the baseline GCOS-92 system was only 55 per cent complete, and that much work remained to be done and additional resources were needed. The Commission recognized that one way that the OPA could help was to develop easy to understand statistics and reports that the decision-makers would be able to use to justify new funding, and encouraged the continuation of the OPA's efforts in that regard.

6.3.13 The Commission noted that the OPA had suggested a special project to help finance the expansion of the ocean system. The establishment of a common fund for consumables would initially focus on XBTs but other expendables could be added in time. The Commission noted that the provision of ship time as well as expendables was necessary to build developing countries' contributions to the GOS. The need for countries to support the SOOP XBT programme had been a concern of JCOMM-I, particularly the fact that countries were beginning to divert resources from the XBT programme to pay for other new programmes such as Argo. It recalled that Recommendation 2 (JCOMM-I) – Resources for Ship-based Observations, had strongly recommended that Members/Member States which should "increase the resources committed to supplying expendables for ship observations in support of international implementation plans".

6.3.14 The Commission adopted Recommendation 3 (JCOMM-II) for the establishment and management of a JCOMM Trust Fund to provide a simple mechanism to help more counties contribute to the international observing system and complete the global XBT network.

6.4 JCOMMOPS development (agenda item 6.4)

6.4.1 The Commission noted with appreciation that the development of JCOMMOPS had been conducted efficiently since its formal establishment at JCOMM-I. It recalled that JCOMMOPS was based on existing DBCP, SOOP and Argo international coordination mechanisms, and included the Argo Information Centre (AIC). It had a staff of two based in Toulouse, who were employed by IOC and funded by voluntary contributions from Member States. The Commission agreed that the infrastructure put in place and the synergy between the DBCP and SOOP Technical Coordinator on the one hand, and the Argo Technical Coordinator on the other hand, had permitted rapid and cost-effective development of numerous Web-based monitoring tools using modern technology, such as dynamic Web pages linked to a comprehensive database, and a Geographical Information System.

6.4.2 The Commission agreed that JCOMMOPS provided essential day-to-day technical support as well as programme status and monitoring information facilitating: (i) decision-making by programme managers; and (ii) implementation and operations of major JCOMM components of the operational or pre-operational in situ ocean observing system. It agreed that the Centre also acted as a portal (i.e. relay) for observational programme information which was also available elsewhere.

6.4.3 The Commission recalled that, at its first session, it had requested the OCG to consider the benefits and efficiencies that could be realized by extending the terms of reference of JCOMMOPS to include support for VOS and ASAP. The Commission agreed with the conclusions and recommendations of the OCG to that effect.

6.4.4 The Commission also agreed that JCOMMOPS could act as host location for information developed by the Satellite Rapporteur and Task Team on Satellite Data Requirements as well as for satellite information. The Commission therefore agreed to change JCOMMOPS Terms of Reference to reflect that, bearing in mind that such services could only be made available provided that additional resources were committed.

6.4.5 The Commission agreed that JCOMMOPS should eventually be given institutional visibility and financial support. To that end, the Commission agreed in principle to investigate the feasibility of funding JCOMMOPS development and operations through a dedicated JCOMM Trust Fund instead of through the DBCP, SOOP and Argo, and asked the Observations Coordination Group and the Secretariats to investigate

that during the next intersessional period. It endorsed a review of JCOMMOPS activities and the submission of a report at JCOMM-III.

6.4.6 The Commission expressed its considerable appreciation to the DBCP, SOOP and Argo, and especially those Member States which were contributing to their respective trust funds to provide the resources required to operate the proposed centre. It strongly recommended that Member States continue to fund JCOMMOPS, and in particular the DBCP/SOOP and Argo Technical Coordinator positions. The Commission also invited VOS and ASAP sub-panels or SOT Member States to investigate making contributions to the proposed trust fund when established. It endorsed the proposal to change JCOMMOPS Terms of Reference and adopted Recommendation 4 (JCOMM-II) on the subject.

6.5 Instrument standardization and calibration (agenda item 6.5)

6.5.1 The Commission recalled that JCOMM-I had "a*greed that there was a developing requirement to establish properly resourced procedures for evaluating and possibly accrediting instrumentation and procedures used operationally by JCOMM observing system components……. In a similar vein, the Commission recognized a need to work towards implementation of mechanisms to ensure that data collected by observing system operators conformed to agreed upon basic standards, formats, and levels of data quality*.". JCOMM-I had requested the Management Committee to address those issues during the intersessional period.

6.5.2 The Commission was pleased to note, that in response to the request from JCOMM-I, and following subsequent advice from the Management Committee, the SOT had discussed the subject in detail at its first, second and third sessions (Goa, India, 25 February-2 March 2002, London, 28 July-1 August 2003 and Brest, 7-12 March 2005, respectively). In order to address the various issues identified during those discussions, and to prepare some definitive advice for JCOMM, the SOT had established a small ad hoc task team, comprising representatives from its different panels as well as from the DBCP, to:

(*a*) Compile information on existing activities, procedures and practices within JCOMM relating to instrument testing, standardization, calibration and intercomparison, as well as the standardization of observation practices and procedures;

(*b*) Communicate with manufacturers regarding new technologies and recognized equipment problems using guidance contained in existing guides including the WMO *Guide on Instruments and Methods of Observation* (WMO-No. 8);

(*c*) Prepare a JCOMM Technical Report containing that information, to be made widely available through relevant Web sites (JCOMM, JCOMMOPS, VOS, DBCP, SOOP, SOT);

(*d*) Provide guidance on testing and the calibration and intercomparison of marine meteorological and oceanographic observing systems;

(*e*) Liaise closely with the WMO Commission for Instruments and Methods of Observation (CIMO), both in the compilation of the information and also in assessing what additional work in that area might be required under JCOMM;

(*f*) Liaise closely with IOC in the preparation of a wider compilation of existing instrumentation and observing practices standards in oceanographic observations in general, with a view to JCOMM making an appropriate contribution.

6.5.3 In addition, the SOT had recognized that operational programmes required that users could be assured of certain levels of documented data quality, and that the data would be easily accessible and in standard formats. That had implications for data standardization between and across the separate panel activities. It was recognized that in many cases there were successful quality monitoring and standard data assurance procedures in operation in each programme, such as the marine surface data monitoring undertaken by the UK Met Office on behalf of CBS, and data quality monitoring by the Global Temperature Salinity Profile Programme (GTSPP) for SOOP, and the ASAP monitoring by the European Centre for Medium-Range Weather Forecasts (ECMWF) and *Météo-France*, and through the European Meteorological Services Network (EUMETNET), E-Surfmar and E-ASAP programmes. However, there was a need to ensure that appropriate documentation on those was made easily available and accessible across the JCOMM Programme Areas. Another issue related to data quality assurance for complementary observations, and how to integrate monitoring and assessment generally under JCOMM.

6.5.4 The Commission supported the approach adopted by SOT, and requested that the study being undertaken should be completed as soon as possible, with the results published as a JCOMM Technical Report, as proposed. The Commission also agreed with the additional considerations noted in general summary paragraph 6.5.3 above, which it agreed cut across all JCOMM Programme Areas. It therefore requested the Management Committee to address again that issue, with a view to providing a broader input from JCOMM in support of the wider IOC study.

6.6 Formal decisions or recommendations proposed for the Commission (agenda item 6.6)

The Commission approved the text for the final report of JCOMM-II relating to the whole of agenda item 6. The Commission also adopted Recommendation 3 (JCOMM-II) – Consumables for Ship-Based Observations (see general summary paragraph 6.3.14) and Recommendation 4 (JCOMM-II) – New Terms of Reference for JCOMMOPS (see general summary paragraph 6.4.4).

7. Data management (agenda item 7)

7.1 Review of the work of the component groups and expert teams (agenda item 7.1)

General

7.1.1 The Commission noted with interest the comprehensive report by the Chairperson of the Data

Management Programme Area (DMPA), Ms S. Lin (China), on the work accomplished by the DMPA during the intersessional period and the proposals for future activities and developments. It expressed its appreciation to Ms Lin, to the chairpersons of the Expert Teams, Messrs N. Mikhailov and M. Mietus, and to all the members of the Expert Teams, for their considerable efforts and support to the Commission.

7.1.2 The Commission noted that the first session of the Data Management Coordination Group (DMCG) (Paris, 22-25 May 2002), had reviewed the issues addressed at JCOMM-I in its field of interest, as well as existing and planned data management mechanisms and practices. Special emphasis had been put on international programmes' requirements for JCOMM end-to-end data management, the implementation of data management, priority issues and the DMPA work plan, and the matters for urgent actions decided at JCOMM-I.

7.1.3 The Commission noted with satisfaction that the National Marine Data and Information Service (NMDIS, China), had agreed to establish an Ocean Data Acquisition System (ODAS) metadata management centre and to manage the global surface current database. The ODAS Metadata Centre had been set up at the World Data Centre for Oceanography (Tianjin, China). The Centre had developed the ODAS metadata database and provided Web-based operating tools (software), together with a users' guide for the collection and inputting of ODAS metadata (http//jcomm.coi.gov.cn). The DBCP information had been collected automatically and translated into ODAS metadata and had been made available on the Internet. By June 2003, the global surface current data had been transferred from the UK Met Office to NMDIS, which had analysed 5 127 577 global surface current data values from the time series 1854-1998, spread into 12 files according to the month.

7.1.4 The Commission noted with appreciation the growing cooperation between the DMPA and other data management activities, including the Future WMO Information System (now simply called WIS), several IODE activities and projects, the United States Data Management and Communications Subsystems (DMACs) and the EU European Directory of Permanent Observation Systems (EDIOS), etc. In that regard, the Commission urged that due attention be given to the development and implementation of relevant new technologies. The Commission recommended that the DMPA together with IODE maintain a permanent list of oceanography and marine meteorology data management initiatives as a way of promoting complementarity and synergy.

7.1.5 The Commission recognized that a comprehensive JCOMM Data Management Strategy was still lacking at the end of the first intersessional period and decided that the task of developing such a strategy should be given the highest priority within the DMPA. It charged the DMCG to make that its top priority, and specific action on the issue was taken under agenda items 7.3 and 7.7.

7.1.6 The Commission noted with concern the low level of interaction and coordination between the two DMPA expert teams and requested the DMPA Coordinator, assisted by the Management Committee, to encourage synergies between the two teams in the future.

7.1.7 The Commission urged the DMPA to promote its activities, products and services so as to reach its full user audience potential and requested that special attention be paid to developing countries. The Commission noted with regret that JCOMM's visibility and awareness at the national level was also very low and urged IOC and WMO to promote JCOMM at all relevant levels.

7.1.8 The Commission noted that the IODE programme had been set up in 1961 and since then had become well-established at the national level through its National Oceanographic Data Centres (NODCs). The Commission re-iterated that IODE, through its network of NODCs should play a leading role in the JCOMM data management activities. Accordingly, the Commission stressed that the IODE NODCs, as JCOMM data management focal points, should strengthen collaboration with WMO NMHSs at the national level.

JCOMM/IODE Expert Team on Data Management Practices (ETDMP)

7.1.9 The Commission noted with appreciation that progress had been made by the ETDMP in some areas of its work plan. The ETDMP had agreed on a work plan based on three pilot projects: (i) metadata management; (ii) data assembly, quality control and quality assurance; and (iii) the development of an End-to-End Data Management Project (E2EDM) prototype, after having defined the overall vision of the end-to-end data management process. The prototype had been developed and provided for the integration of distributed real-time and delayed-mode ocean and marine meteorological data, as well as access to the aggregated data. It now included several data providers. The demonstration of the E2EDM prototype was welcomed by the Commission with interest and satisfaction. The Commission recommended that Members/Member States should participate actively in the pilot ETDMS during the next intersessional period.

7.1.10 The Commission welcomed the ETDMP work plan for 2006–2007 that included, inter alia, the development of the JCOMM/IODE E2EDM Implementation Plan, continuation of the pilot projects, and cooperation with other programmes in the E2EDM field.

7.1.11 With regard to cooperation and integration between IODE and the JCOMM DMPA, the Commission recalled that the second session of the Management Committee (Paris, 5-8 February 2003) had proposed to the seventeenth session of the IOC Committee on International Oceanographic Data and Information Exchange (Paris, 3-7 March 2003) that the ETDMP and the IODE Group of Experts on Technical Aspects of Data Exchange (GETADE) be merged into a single Joint JCOMM/IODE Expert Team on Data Management Practices, on the grounds that both groups had very

similar terms of references. The session had agreed with the proposal and had adopted Recommendation IODE XVII.3, which had subsequently been endorsed by the IOC Assembly through Resolution XXII-8. The Commission expressed satisfaction with that decision but called for more integration between IODE and the JCOMM DMPA to ensure the best possible use of IODE expertise, to avoid duplication of effort, and to maximize the impact of the scarce funds available to IODE and JCOMM.

7.1.12 The Commission noted that several JCOMM activities were now dealing with end-to-end data management systems including metadata components. The Commission noted further that several national and international projects were also developing end-to-end data management systems. The Commission urged the DMPA to ensure integration within JCOMM and to establish cooperation with relevant national and international projects to avoid duplication of work.

7.1.13 The Commission noted that the terms of reference of ETDMP were too extensive when compared to the available human and financial resources, and recommended that ETDMP should work through task teams that had a specific focus and limited lifespan, so that completion of their tasks would be better assured. In addition the Commission stressed the need for continuity in membership of ETDMP to assure completion of its tasks. Such task teams should also be allowed to attract specific expertise as relevant to their terms of reference. The Commission tasked the Management Committee to investigate that matter further and take the necessary action whilst bearing in mind the decisions taken under agenda item 14.1.

7.1.14 Furthermore, the Commission recommended that standards be developed in close collaboration with projects or programmes such as Argo, DBCP and SPA.

Expert Team on Marine Climatology

7.1.15 The Commission noted with appreciation the results of the first session of the Expert Team on Marine Climatology (ETMC) (Gdynia, Poland, 7-10 July 2004). ETMC had proposed that the existing data management systems and resources be developed in order to improve marine climatological data management and services. It recognized that the VOSClim project was a good example of an E2EDM system operated by the Global Collecting Centres. ETMC had reviewed the following: international maritime meteorological tape (IMMT) and minimum quality control standards (MQCS); the BUFR template for ship and buoy data; electronic logbooks; the Marine Climatological Summaries Scheme (MCSS); data archival; the *WMO Ship Catalogue* (WMO-No. 47); contributions and requirements of the World Climate Programme (WCP) and other climate-related programmes; climate change detection monitoring and indices; and manuals, guides, and other technical publications. The Commission noted that progress has been made on some of those activities since that meeting, and took action as follows:

(*a*) Modifications to the IMMT and MQCS had been developed, and those were adopted under agenda item 9;

(*b*) Modifications to the *WMO Ship Catalogue* had been developed and agreed, and those were adopted under agenda item 10;

(*c*) Requested CBS to review and, if necessary, revise the BUFR template for ship data, based on the findings of ETMC on that issue;

(*d*) Endorsed the proposal from SOT and ETMC, supported by the Management Committee, that, instead of the reduced wind at 10 m, the original wind data should always be reported in ship meteorological reports, including those generated by electronic logbooks.

7.1.16 The Commission noted with satisfaction the success of the Second JCOMM Workshop on Advances in Marine Climatology (CLIMAR-II) held in Brussels, Belgium, from 17 to 22 November 2003, in conjunction with the celebration of the 150th anniversary of the landmark Brussels Maritime Conference of 1853, under the High Patronage of His Majesty King Albert II. More than 80 people from 20 Members/Member States from all WMO Regional Associations had attended. Presentations at CLIMAR-II had been incorporated into a JCOMM Technical Report (WMO/TD-No. 1199), and a selection of papers entitled 'Advance in Main Climatology' had been published in a special issue of the *International Journal of Climatology* Vol. 25, No. 7, 15 June 2005. That formed an update to the dynamic part of the *Guide to the Application of Marine Climatology* (WMO-No. 781), which originated at the First Workshop on Advances in Marine Climatology (CLIMAR99) held in Vancouver, Canada, from 8 to 15 September 1999. Among the recommendations from CLIMAR-II, available in full on the workshop Web site (http://www.cdc.noaa.gov/coads/climar2/recs.html) and publicized in a workshop report in the *WMO Bulletin*, had been the recommendation to hold a CLIMAR-III in 2007.

7.1.17 The Commission expressed its sincere appreciation to the Organizing Committee for CLIMAR-II, especially to Mr S. Woodruff (United States), chairperson of the committee, for its excellent organization of the workshop. The Commission expressed its appreciation to Belgium for hosting the event, and to the International Journal of Climatology and its Guest Editor, Mr S. Gulev, for the special issue. The Commission agreed that the workshop had been valuable and that similar workshops should continue to be held in the future. It therefore agreed to the proposal that a third self-funded workshop, CLIMAR-III, should take place in 2007. It requested the DMPA Coordinator and the Secretariats to proceed with the organization of the workshop at an appropriate time.

7.1.18 The Commission noted that the work carried out by ETMC was strongly focused on marine meteorology. It urged the ETMC to include in its work plan for the intersessional period an examination of how both oceanographic climatologies and ice climatologies could be coordinated so as to be seen as an integrated product.

7.2 IODE ISSUES (agenda item 7.2)

STRUCTURAL ISSUE

7.2.1 The Commission expressed its appreciation to Ms L. Rickards (United Kingdom), chairperson of IODE, for her excellent presentation. The Commission recalled that the fourth session of the JCOMM Management Committee had made the following statement on data management:

> "The JCOMM Management Committee recognized that considerable overlap and potential duplication still exist between the activities of the JCOMM Data Management Programme Area and the IODE, in spite of the merging of JCOMM ETDMP and IOC GETADE, the co-sponsoring of the data management pilot projects, and the transferring of the responsibility for the secretariat support for JCOMM data management to the IODE secretariat. Furthermore, it is no longer sufficient to provide access to data in real-time, near-real-time and/or delayed mode, but at many access times with version controls and often integrated with other data types (atmospheric and oceanic). Thus the original distinction of JCOMM providing real-time data and integrated products and services in marine meteorology and oceanography, while IODE deals with delayed-mode data, is no longer appropriate.
>
> The JCOMM Management Committee at its fourth meeting in Paris, February 2005 recommended closer collaboration between JCOMM and IODE data management activities and eventual merger of IODE and the JCOMM DMPA activities. It would immediately enhance the JCOMM operational oceanographic data management capability to match its operational observations and services capabilities. It would ensure that the data management facilities developed as parts of the IODE will evolve so as to serve also new operational ocean data requirements developed in the future as part of JCOMM. It would preclude possible duplication of efforts regarding data and metadata models, transport protocols, discovery methods, etc. It would likely reduce the use of resources (financial and human) relative to the present situation, both in JCOMM and IODE.
>
> IOC at 35th session of its Executive Council through its resolution EC-XXXV.2 mandated the development of an IOC data management strategy, building on the results of the current IODE review. The JCOMM Management Committee recommends that IOC give serious consideration to the merger of IODE with the JCOMM DMPA, and to the development of the necessary steps to be taken to facilitate a smooth transition."

7.2.2 The Commission noted that the 18th Session of the IODE Committee (Ostend, Belgium, 26-30 April 2005) had noted that statement and "recognized that any merger between IODE and JCOMM DMPA activities must be considered with great care". The session had further stated "that this is a matter that needs careful study and consideration and recommended that this be included in the preparations of the IOC Data Management Strategy". In that connection, the Commission considered that a first priority was for the JCOMM Management Committee and the DMPA Coordinator to engage with the IOC process to develop a data management strategy document that could serve as a guide for complementary progress among relevant programmes sponsored separately by WMO and IOC, or jointly by JCOMM (see general summary paragraph 7.3.7 for further discussion on data management strategies issues). The Commission noted that, despite many similarities, there also existed differences between the scope of the JCOMM DMPA and IODE and that matters unique to IODE should continue to be addressed by IODE.

REVIEW OF THE OTHER RESULTS OF AND ACTIONS ARISING FROM THE 18TH SESSION OF IODE

7.2.3 The Commission noted with appreciation information on the first JCOMM/IODE joint capacity- building event. The joint JCOMM/GOOS Panel for Capacity-building, working jointly with IODE, had organized the "Combined Modeling and Data Management Training Workshop" from 5 to 10 September 2005 at the IOC Project Office for IODE, Ostend, Belgium. The event had attracted participants from countries in the Indian Ocean, Africa, and Central America regions. The main objectives of the training course were: (i) to enable participants to implement national services for warnings of wind waves and storm surges; and (ii) to develop close interaction and clear understanding between ocean numerical modellers and ocean data managers. The workshop had also been observed by IODE data management trainers, with a view to the development of a modelling curriculum in the Ocean Teacher IODE training tool. The Commission further noted that the workshop had been considered a first step in the development of a series of JCOMM/IODE/GOOS workshops. The Commission welcomed the proposed inclusion in Ocean Teacher of a general coastal ocean circulation model, capable of assimilating data from a wide range of operational sources, including satellite data and global- or basin-scale models. The Commission recommended the organization of similar events by JCOMM, IODE and GOOS.

7.2.4 The Commission noted the results of the IODE review, which had been based on three primary sources of feedback from the ocean science community:

(*a*) A questionnaire developed by the review team;
(*b*) A priority survey of ocean data and information managers; and
(*c*) A survey of the oceanographic research community. The review team had noted that the feedback had resulted in a positive assessment of IODE activities and its data centre system.

A great majority of the respondents had believed that the objectives of the IODE Programme were still appropriate. IODE was considered beneficial to the marine science community. IODE data centres were seen to be compiling a vast amount of data to which they were applying quality control and providing access in a few common standard formats. On the other hand, there was an almost total consensus that the IODE Programme needed a major overhaul to better fulfil the changing data and user requirements. Although the basic data centre system was appreciated, it needed to be further developed with the latest information technology. The Commission further noted with appreciation the decisions taken by the session to implement the recommendations of that review.

7.2.5 The Commission noted with satisfaction information on the official inauguration of the IOC Project Office for IODE. The Commission recommended the active use of the Project Office for joint JCOMM/IODE activities and adopted Recommendation 5 (JCOMM-II) to that effect (see agenda item 7.7). The Commission noted that the Project Office offered considerable opportunities for JCOMM. The Commission invited IODE to jointly develop a 'Virtual Laboratory' at the Project Office. That would enable trainees, trainers and operators anywhere in the world to access and navigate data streams, access oceanographic and meteorological data, run and validate forecast and hindcast models, and provide the necessary follow-up and expert backstopping for training courses and workshops.

7.2.6 The Commission noted with appreciation the achievements of the IODE Group of Experts on Biological and Chemical Data Management and Exchange Practices (GE-BICH), presented at the eighteenth session of IODE. The group had proposed pilot projects relating to the testing of different systems of distributed querying based on XML (DiGIR and BioCASE) with XML schemas other than Darwin Core and ABCD (using metadata and distributed taxonomic name lists as data types). The Commission further noted a suggestion made at the session by the JCOMM co-president, Ms S. Narayanan, that the JCOMM Secretariat should consider supporting financially the activities of GE-BICH Pilot Projects, as JCOMM's mandate relating to non-physical variables was consistent with GE-BICH's Terms of Reference.

7.2.7 The Commission noted with great appreciation the success of the IODE capacity-building programme that included (i) the establishment of the Ocean Data and Information Networks (ODIN): ODINAFRICA, ODINCARSA (Caribbean and South America) and ODINCINDIO (Central Indian Ocean region); and (ii) the development of the OceanTeacher training system. The Commission noted that the ODIN networks had not only assisted in the establishment of national oceanographic data and information management centres, but had also fostered close cooperation between national stakeholders, and promoted indigenous research, as well as regional cooperation. The ODIN approach had also strongly urged NODCs to focus on user products and services. The Commission recommended that those initiatives be fully utilized for JCOMM capacity-building and invited IODE to jointly develop relevant activities in that regard. The Commission further noted the need to support those activities as joint JCOMM/IODE activities.

7.3 JCOMM involvement in wider WMO and IOC data management activities, IOC/WMO data policies, IOC data management strategy (agenda item 7.3)

WMO Information System (WIS)

7.3.1 The Commission expressed its sincere appreciation to Mr G-R. Hoffmann, chairperson of the Intercommission Coordination Group on WMO Information System (ICG-WIS), and vice-president of the WMO Commission for Basic Systems for his excellent presentation. The Commission recalled that, at JCOMM-I, it had recognized the importance of the work being undertaken in WMO, coordinated by the CBS, to develop a vision for the Future WMO Information System (FWIS) to meet WMO requirements for real-time and non-real-time data exchange cost effectively, as well as a project plan and implementation plan for the improved, integrated information system. The Commission had further recognized that the Inter-Programme Task Team on FWIS, established by CBS to address that task, was considering important issues that were likely to affect operational oceanography and marine meteorology, and had therefore requested the DMCG to ensure that JCOMM was adequately represented on that task team. Mr D. Thomas (Australia) had, since 2003, kindly undertaken that representation on behalf of JCOMM. Mr Thomas was supported by many contributors, including Messrs S. Foreman (Met Office, United Kingdom) and N. Mikhailov (chairperson of ET/DMP, Russian Federation). In 2004, the WMO Executive Council had decided (Resolution 2 (EC-LVI)) to establish an Inter-Commission Coordination Group (ICG) on WIS, to strengthen mechanisms for coordinating issues between the technical commissions in view of the wide ranging nature of its work. The ICG-WIS had held its first session in Geneva from 12 to 14 January 2005. Mr Thomas had agreed to continue to represent JCOMM on the ICG, whose membership also included, inter alia, Mr L. Dantzler (Ocean, United States), which thus ensured a broad expertise in the group for the communication and data exchange needs of the oceanographic community.

7.3.2 The Commission noted with interest that, during the past intersessional period, the WIS and its related data management elements had continued to be a key activity for WMO. Major developments included drafting of a core WMO Metadata Profile and initiating investigations into key word and feature catalogues required for metadata interoperability and discovery. In addition to the ETDMP work on E2EDM progress, other projects furthering the WIS concept included the trial of a Virtual (distributed) Global Information System Centre (VGISC) in Europe and trials for secure data exchange across Asia and Pacific countries via the Internet utilizing secure IP/VPN technology. Assessment of data exchange requirements of WMO Programmes had led to consideration of other data exchange developments of interest to the ocean community, including the Earth System Global Resource Information Database (GRID), the European Data Grids for Process and Product Development using Numerical Simulation and Knowledge Discovery (SIMDAT) project, and DMACS. The Commission also noted the decision of CBS to develop recommended practices for data exchange formats and procedures such as NetCDF, OPeNDAP and HDF, following a recommendation from the ICG-WIS.

7.3.3 The Commission noted with appreciation that Mr Thomas, in his role as the JCOMM representative on

(F)WIS, had worked with the ICG to ensure coordination between relevant activities in JCOMM/IODE and WIS, in particular the ET/DMP pilot projects of:

(*a*) 'Metadata';
(*b*) 'Data Tagging & Quality Control'; and
(*c*) 'End to End Data Management (E2EDM)'.

The CBS Inter-programme Task Team (ITT) had met for the last time in Geneva from 22 to 24 September 2004, where it had consolidated the work of the task team and commissions. The first session of the ICG had reviewed the work of the ITT as well as the various technical commission requirements, including those of JCOMM. Resulting recommendations, considered and endorsed by the Meeting of Presidents of Technical Commissions (Geneva, 31 January-1 February 2005), and acted upon by CBS at its thirteenth session (St Petersburg, Russian Federation, 23 February-3 March 2005) included the formation of an Inter-programme Expert Team on Metadata and Expert Teams on WIS Communications and Structure and on WIS Global Information System Centres (GISCs) and Data Collection and Processing Centres (DCPCs).

7.3.4 The Commission agreed that the work of ICG, and the ongoing development of WIS, continued to be of considerable significance to JCOMM, and that close liaison between ETDMP, DMCG and the WIS projects should continue. In order to affect that liaison and strengthen the collaboration with CBS in that respect, appropriate experts from JCOMM/IODE should be nominated for the CBS expert teams, especially those relating to metadata and XML, which were fundamental to data discovery and exchange. It requested the DMPA Coordinator, in close coordination with the chairperson of IODE, to arrange for that representation, as well as for the ongoing representation of JCOMM on the ICG.

7.3.5 The Commission noted that ICG and the EC had stressed that significant further work was required from the individual WMO Programmes, as well as through a common effort, to consolidate a comprehensive and consistent status of data exchange and data management requirements, as well as a mapping of information functions of programme centres to the functional components of WIS. ICG had emphasized that the success of WIS was dependent on pilot projects related to various WMO Programmes that would be actively supported by volunteering Members. The Commission stressed the need for close cooperation between WIS, JCOMM (and IODE) to avoid duplication between WIS and some of the DMPA activities, and for possible future consideration of an integrated system.

7.3.6 The Commission further noted that the fifty-seventh session of the WMO Executive Council (Geneva, 21 June-1 July 2005), noting that the qualifier "Future" in the name "Future WMO Information System (FWIS)" was no longer adequate, as the concept has been progressing to the implementation phase, had agreed to use the name 'WMO Information System (WIS)' instead of 'Future WMO Information System (FWIS)'.

IOC Data Management Strategy

7.3.7 The Commission recalled that the first session of the JCOMM Management Committee, (Geneva, 6-9 February 2002) had called for the development of an IOC integrated data management strategy, encompassing all programmes. In order to assist with that task, the Management Committee had further requested IODE to carry out an assessment of data and data product requirements of existing oceanography and marine meteorology programmes/projects, and evaluate whether those were currently being met by the various data centres. The IOC Executive Council had subsequently adopted Resolution EC-XXXV.2 – IOC Strategic Plan for Oceanographic Data and Information Management, which inter alia had established a Task Team on the Development of an IOC Strategic Plan for Oceanographic Data and Information Management and defined its terms of reference. Progress in the IODE review had been a contribution to the work of the task team, which had met for the first time at UNESCO Headquarters on 23 June 2003. The meeting had formulated a draft statement on the vision, rationale, principles/objectives and elements of governance for the IOC Data Management Strategy, summarised in the task team session report: (http://ioc3.unesco.org/iode/contents.php?id=193).

7.4 Future developments in support of identified requirements (agenda item 7.4)

The Commission recognized it had discussed or would discuss future developments in support of identified requirements under other agenda items, as the need arose.

7.5 Infrastructure (agenda item 7.5)

7.5.1 The Commission recognized that JCOMM data management infrastructure included codes and formats for both real-time and delayed mode data exchange, communication facilities for data collection, data exchange and data delivery, and the monitoring of data quality and data flow. The following general summary paragraphs briefly review the current status of those topics in the context of the work of JCOMM, including specific actions implemented during the past intersessional period.

Codes and formats

7.5.2 The Commission recalled that relevant codes and formats included the existing GTS alphanumeric marine codes (SHIP, BUOY, BATHY, TESAC, TRACKOB, TEMP SHIP, WAVEOB) and table driven codes (BUFR and CREX), together with delayed mode exchange formats such as IMMT and SIGRID. The Commission further recalled that CBS was no longer accepting modifications to the alphanumeric codes, as part of its overall strategy to migrate to the table driven codes BUFR and CREX. In that context, the Commission noted with appreciation that CBS, at its thirteenth session, had:

(*a*) Recommended a number of additions to BUFR/CREX tables for coding oceanographic data, in

particular buoy data, for full operational use on 2 November 2005, with the use of those new entries already taking place in a pre-operational manner; that recommendation was subsequently approved by the WMO Executive Council;

(*b*) Recommended additions for new editions of both BUFR and CREX, in particular, to include definitions of international sub-categories; those new editions would be implemented operationally from 2 November 2005, with the new and old editions operating in parallel until 2012;

(*c*) Implemented BUFR/CREX templates for the transmission of data from XBT/XCTD, subsurface profiling floats, and surface drifting buoys;

(*d*) Begun validation of new templates for the transmission of synoptic data from sea stations (essentially SHIP data) in BUFR/CREX.

The Commission further noted with appreciation that, as foreshadowed at JCOMM-I, the GTS transmission in BUFR of data from surface drifting buoys had begun in 2003, with the parallel transmission of the same data in BUOY code continuing for the time being.

7.5.3 The Commission recognized that the table-driven codes offered great advantages compared to the traditional alphanumeric codes in that they were universal and flexible and could be easily expanded to satisfy all observational requirements, including national needs for specific data exchange. In that regard, it particularly recognized the potential value of BUFR for the GTS exchange of new oceanographic data as the need arose. It therefore requested the Observations and Data Management Coordination Groups to keep the requirements for such exchange under close review, and to initiate actions for the BUFR encoding and distribution of new oceanographic data at the appropriate time. It also urged the Argo community to implement BUFR encoding and GTS distribution of profiling float data from the project as soon as possible, using the new templates developed by CBS for that purpose as noted above.

7.5.4 The Commission recalled that an updated version of the IMMT format (IMMT-2) had been adopted by JCOMM-I and was now included in the WMO *Manual on Marine Meteorological Services* (WMO-No. 558). That format was used for the international, delayed mode, exchange of marine climatological data, in particular under the Marine Climatological Summaries Scheme (MCSS). The Commission recalled further that a slightly revised version of the format (IMMT-3), including some additional information required by the VOSClim Project, had been prepared by the Expert Team on Marine Climatology (see also agenda item 7.1). It agreed that that version of the format should be adopted and eventually replace IMMT-2, with a global implementation date of 1 January 2007, so as to allow sufficient time for MCSS Contributing Members, Global Collecting Centres and Responsible Members to prepare for the change. However, the Global Collecting Centres and Contributing Members participating in the VOSClim project were requested to implement IMMT-3 as soon as possible in support of VOSClim. Specific action on that issue was taken under agenda item 9.

7.5.5 The Commission recalled that the SIGRID code, for the delayed-mode exchange and archival of sea-ice data in digital form, had been adopted by CMM-X (Paris, 6-17 February 1989) as an annex to the WMO *Manual on Marine Meteorological Services*. A shortened version of that code (SIGRID-2) had subsequently been developed by the former Subgroup on Sea Ice, to facilitate the digitization and archiving of historical sea-ice chart data. The Commission noted with appreciation that a further updated version, SIGRID-3, had been prepared by the Expert Team on Sea Ice, and published as *SIGRID-3: a vector archive format for sea ice charts* (WMO/TD-No. 1214) (see also discussions under agenda item 5.1).

7.5.6 The Commission recalled that the twelfth session of CMM (Havana, Cuba, 10-20 March 1997) had requested the then Subgroup on Marine Climatology to consider the development of a comprehensive metadata base for Ocean Data Acquisition Systems (ODAS), including moored and drifting buoys, offshore platforms, etc., and taking into account existing international catalogues. JCOMM-I had subsequently adopted a format for that metadata base, through Recommendation 1 (JCOMM-I), – Ocean Data Acquisition System (ODAS) Metadata Format, and had requested one or more interested Members/Member States to consider hosting the archive. The Commission was pleased to note that, subsequently, China had offered to host that metadata base, and was in the process of developing the necessary structures to accept the metadata. At the same time, the DBCP Technical Coordinator, in conjunction with the Global Drifter Center (United States) and the European Group on Ocean Stations (EGOS) — an Action Group of the DBCP, and with funding support from EGOS, had developed a buoy metadata collection scheme to operate through JCOMMOPS. The Commission was pleased to note that development work for that scheme had been completed, and that collected metadata were being made available by JCOMMOPS through FTP, using dedicated XML files. Those same metadata would also be provided to the ODAS database operated by China as soon as that was technically possible. The Commission expressed its considerable appreciation to all concerned for those valuable developments.

Communications

7.5.7 The Commission recalled that there were now several marine telecommunication facilities available for the collection and transmission of meteorological and oceanographic data from ships at sea. Some of those systems were terrestrially based, such as the traditional HF/MF services through the coastal radio stations, while others made use of satellite technology. Those latter included the Inmarsat system, Argos and the International Data Collection System (IDCS) using the geostationary meteorological satellites. In addition, new satellite systems such as Iridium had considerable potential for the broadband collection of meteorological and

oceanographic data from ocean platforms, as well as for two-way communication with those platforms.

7.5.8 The Commission recognized that the availability of coastal radio stations for the collection of ships' meteorological and oceanographic observations had declined rapidly, with ships making almost exclusive use of the Inmarsat system to relay their reports to shore. The Commission further recognized that, as a consequence, the number of SHIP reports collected by coastal radio stations had decreased to a negligible level.

7.5.9 The Commission recognized that a range of Inmarsat systems (A, C, mini-C and Fleet F77) now offered low-cost transmission media for relaying meteorological and oceanographic data from ship to shore, and that the use of the Code 41 short dialling procedure ensured that the cost of the transmission was charged to a NMS rather than the ship. Virtually all ships subject to the International Convention for the Safety of Life at Sea (SOLAS) were now equipped with Inmarsat-C, including the great majority of the VOS. The Commission recognized that not all land earth stations (LES) carried the Code 41 facility or had an agreement with the local NMS for its use, with the full list of LES with Code 41 available for use in VOS reporting being maintained on the WMO Web site. At the same time, the Commission reiterated its concern that the cost burden for the collection of VOS reports via Inmarsat was carried by a relatively small number of NMS. The Commission also recognized that there was a marked lack of uniformity among LES and their associated NMSs regarding the policy for accepting ship reports using Code 41, with restrictions being applied in some cases, which had resulted in loss of valuable data. It supported the request from the SOT that the tabulated, Code 41, LES listing on the WMO Web site should also include information on the status of such restrictions, and that all LES service providers should be encouraged to accept Code 41 observations without restrictions.

7.5.10 With regard to the costs of observational data collection through Inmarsat, the Commission noted with interest that SOT had addressed that issue in some detail, through a specially established Task Team on Satellite Communication System Costs. In addition to the costs issues noted above, the costs problem was being further exacerbated by the growing use of ship-borne Automatic Weather Station (AWS) systems sending hourly observations, by the migration to BUFR coded observations, and by the growth in TEMP messages being sent by ASAP ships using Code 41. In addition the problem was not being helped by the fact that Code 41 LES were operated by a relatively small number of companies, and because of the tendency of some ships to restrict their transmissions to certain LES and suppliers. In response, the SOT had reviewed a number of options to reduce individual cost burdens, including possible cost-sharing schemes, and had requested further advice on the issue from the JCOMM Management Committee and the WMO Executive Council. The Commission noted that the Executive Council had not generally been receptive to the cost-sharing concept, had agreed that solutions might best be found on a regional basis, and had requested further detailed information. Subsequently, a regional solution for Europe had been formulated by the European Surface Marine Programme (E-SURFMAR) and E-ASAP, while SOT had again reviewed further possible global solutions, without any final resolution. The Commission supported SOT's efforts, including the re-establishment of a Task Team on Telecommunication Costs, and requested that the Management Committee be kept informed of developments and other possible solutions to the problem, with a view to eventually presenting possible alternatives to the Executive Council for consideration.

7.5.11 The Commission, having noted the foregoing and having reviewed Recommendation 8 (CMM-XI) - The collection of meteorological and oceanographic information using Inmarsat, decided that that recommendation was now outdated, and should no longer be kept in force. At the same time, however, it urged that close coordination should continue among JCOMM, IMO, the International Mobile Satellite Organization (IMSO) and Inmarsat Ltd., with a view to ensuring the full utilization of new developments in Inmarsat technology.

7.5.12 The Commission recognized that the Argos system remained the primary mechanism for the collection and location of data from remote unmanned ocean platforms (drifting and moored buoys and floats), as well as from some ships and remote land stations. In particular, Argos, in contrast to alternative systems, had provided, through its GTS Processing Subsystem, extensive ground processing facilities, which had included simple automatic quality control checks as well as encoding in standard WMO code forms and subsequent GTS distribution. Non-commercial users of the Argos system had benefited from a favourable tariff rate, which had been negotiated each year with Collection-Localization-Satellites (CLS) Service Argos during a meeting on the Joint Tariff Agreement.

7.5.13 The Commission noted with interest and appreciation that CLS/Service Argos was continuing to enhance its facilities and services. Such enhancements, either recently implemented or imminent, included improved satellite coverage and timeliness; higher system capacity and data rates; wider bandwidth; the processing of profiling float data; a BUFR encoder within the GTS Subsystem (implemented in 2003); other GTS processing enhancements to address additional data buoy and Argo float requirements; and 2-way communication with platforms (initially achieved with the short-lived ADEOS-2 satellite, and to be reactivated with METOP-1 in 2006). Further new features being brought online included a capability to process data from other satellite systems (including Iridium) through the Argos GTS processing facility. The Commission agreed that the Argos system was likely to remain a major global facility for the collection and location of data from remote ocean platforms for many years to come. It thanked in particular the DBCP and its technical coordinator for their efforts in working with CLS/Service Argos to

enhance the value and responsiveness of the Argos system to users and their requirements.

7.5.14 The Commission noted with appreciation the continuing availability of the IDCS for the collection of data from remote ocean platforms, and expressed its appreciation to the meteorological satellite operators for that service. It urged Members/Member States to consider making use, where appropriate, of that valuable component of the overall marine data collection system, recognizing that there remained unused data collection capacity on all the geostationary meteorological satellites participating in the IDCS, and that the system was available for the collection of many types of environmental data, including sea level observations.

7.5.15 The Commission recognized that there were a number of commercial satellite communication systems, either already operational or planned, which were potentially of use for the collection of data from automated marine platforms. The Commission was particularly pleased to note the progress being made in the use of the Iridium system, which offered a potential for real-time interactive communications at high data rates and a new approach to data acquisition, management and distribution. There was now an oceanographic community of Iridium users, and a plan for a reduced tariff and technical support for oceanographic and other non-profit users. The Commission recognized the potential benefits of Iridium and other new systems, and urged users to ensure that data collected were made available to the GTS, one method being to make use of the facilities being developed by CLS/Service Argos to allow formatting and GTS distribution of the data collected by those systems. The Commission further agreed on the importance of keeping abreast of developments with those new systems and requested that the results of the DBCP annual review of new communications systems should be made widely available within JCOMM, including through the JCOMMOPS Web site.

7.5.16 The Commission recognized that GTS continued to be the primary mechanism for the real-time global exchange of marine data and products. At the same time, it was clear that advanced facilities and procedures, including, in particular, those based on the Internet and Information and Communication Technology, were being increasingly used in both meteorology and oceanography for such exchange. It noted that the CBS was already involved in studying the use of such technologies as part of WWW and had already developed guidance material and recommendations, as both a part of, and a complement to, the GTS. The Commission agreed that it was essential for JCOMM to be part of, and contribute to, that work, in view of the need to ensure the implementation and use of optimal facilities and procedures for real-time marine data exchange. It therefore requested the Management Committee and the DMCG to ensure an appropriate JCOMM participation in the CBS activities related to data exchange.

Monitoring

7.5.17 The Commission noted with interest the existence of data quality control tools developed by *Météo-France* in the framework of E-SURFMAR, the surface marine observation programme of the European Meteorological Services Network Composite Observing System (EUMETNET/EUCOS). That complemented the monitoring undertaken by the UK Met Office on behalf of CBS. The tools had been used widely by PMOs and data buoy operators and had contributed to the increase in the quality of surface marine observations.

7.5.18 The Commission noted with appreciation that the UK Met Office had continued to monitor the quality of surface marine data received over the GTS as SHIP, BUOY and BUFR reports, in fulfilment of its formal role as CBS monitoring centre for surface marine data quality, and that it had expanded that activity to meet the needs of VOSClim. The Commission was pleased to learn that that concerted monitoring and follow-up had resulted in a measurable reduction in the number of ships whose reports on the GTS showed persistent errors. It thanked the UK Met Office for its monitoring work and urged that that activity, and the coordinated follow-up, should continue in the future.

7.5.19 The Commission recalled with appreciation that, in addition to that CBS monitoring, the DBCP had for a number of years been operating a set of GTS quality control guidelines for data on the GTS in BUOY code. Those guidelines, which were included in the *Guide to the Global Observing System* (WMO-No. 488), involved a joint effort by operational meteorological and oceanographic centres, buoy operators and CLS/Service Argos, coordinated by the DBCP technical coordinator. The operation of the guidelines, coupled with model enhancements, had resulted in substantial reductions in RMS differences between buoy reports and first guess model fields.

7.5.20 The Commission further recalled with appreciation that both the ASAP Panel and the SOOP Implementation Panel, working in conjunction with appropriate meteorological and oceanographic data and analysis centres, also regularly monitored the quality of subsurface and upper-air sounding data and took remedial action as necessary. In the case of SOOP, the technical coordinator had provided both the focus and also a coordination mechanism for monitoring and follow-up. The Commission recognized the importance of all that monitoring to both real-time and delayed mode data users, and urged that it be continued in the future.

7.5.21 The Commission recognized that monitoring of the flow of all types of marine data on the GTS was undertaken within the context of general WWW/GTS monitoring, as part of exercises coordinated on a regular basis by the WMO Secretariat. The results of that monitoring were communicated to WMO Members and other interested institutions and agencies, with follow-up again being coordinated through the Secretariat. In addition, the Commission noted with appreciation the monitoring undertaken by *Météo-France*, as a Specialized Oceanographic Centre of the former IGOSS, of the GTS exchange of data in SHIP, BUOY, BATHY and TESAC code forms, with reports being published on a monthly basis. As a part of that monitoring, diagnostic charts were prepared,

that compared data received from all sources containing specific variables (air pressure and temperature, sea-surface temperature and surface wind) with the WWW requirements for those data on a 500 x 500 km square basis. Such monitoring tools allowed the immediate identification of data sparse ocean areas and facilitated appropriate follow-up actions, such as additional buoy deployments. The Commission thanked *Météo-France* for that work, and requested that it continue, with the results being made available through JCOMMOPS.

7.5.22 The Commission agreed that such monitoring tools were of considerable value to platform operators, data users and the Secretariats alike, and that that value would be further enhanced if the analyses could be extended to cover other marine variables, including sub-surface. It noted with appreciation that JCOMMOPS was continuing to liaise with *Météo-France* and other data centres on that issue, with a view to extending the monitoring tools and the display of information.

7.5.23 The Commission recalled with appreciation that both Germany and Japan had continued to undertake regular monitoring of the exchange of different types of marine data, again originated under the auspices of the former IGOSS. It acknowledged the value of that monitoring for a number of applications and user groups, and requested that it continue.

Marine XML (eXtensible Markup Language)

7.5.24 The Commission noted that the International Council for the Exploration of the Sea (ICES)/IOC Study Group on the Development of Marine Data Exchange Systems Using XML (SGXML) had finished its assignment in 2004. It had concentrated its three-year effort on metadata standards, parameter dictionaries and generic data structures for use in an XML-based language. The final report of the SGXML had provided important pointers when considering the next steps for improving marine data exchange. The IOC/IODE MarineXML Web site (http://www.marinexml.net) should provide a forum for resources such as schemas, manuals and software. That would include both directly hosted resources and links to resources hosted and maintained elsewhere. The links between those resources would be managed as an ontology to show what was available, how it was being used and which organizations were engaged.

7.5.25 The Commission further noted the main conclusions and recommendations of the MarineXML EC project and SGXML:

(*a*) The need for consolidation of metadata terminology;
(*b*) The need for explicit oceanographic extensions to existing standards;
(*c*) Ability to combine metadata holdings from distributed sources;
(*d*) Adoption of the British dictionary as the marine community standard and the creation of a structure and procedures to manage the dictionary;
(*e*) Further examination of XML-based biological systems;
(*f*) The IODE Project Office should serve as the host and focal point for MarineXML;
(*g*) All MarineXML work should be compliant with the ISO standards register;
(*h*) Continued work on dictionary development.

7.5.26 The Commission recalled that the JCOMM/IODE ETDMP Task Team had developed the global XML-scheme draft and tested it as a basic component of the E2EDM prototype, and that XML technology was being used in the Ocean Biogeographic Information System. Recognizing the advantage of using XML for the exchange of oceanographic data within the IODE and JCOMM systems and the importance of XML as a standard for data interchange on the Internet, the Commission welcomed the decision of the eighteenth session of IODE to recommend the establishment of a MarineXML Steering Group with the following terms of reference:

(*a*) To establish a Pilot Project to set up an 'ISO 19100 series of standards' compliant standards register (possibly in collaboration with IHO), to be hosted by the IODE Project Office;
(*b*) To monitor and assist XML development activities in other IODE/JCOMM groups, such as ETDMP, GEBICH and the Steering Group for Marine Environmental Data Inventory (SG-MEDI).

7.6 OIT project and other special projects (agenda item 7.6)

Ocean Information Technology (OIT) Project

7.6.1 The Commission recalled that the Ocean Information Technology (OIT) Project had been conceived at JCOMM-I to be "a major, concerted effort with an efficient and effective, comprehensive data and information management system as the goal. We are seeking a 21st Century solution that takes advantage of leading technology and methods. The data and management system will be user driven and, in this case, the users will comprise a mix of ocean science, non-ocean science, operational agencies, commercial and private enterprise users, and the general public." The rationale for OIT was based upon the:

(*a*) Demand for effective telecommunications;
(*b*) Need for common standards, practices and protocols (metadata management);
(*c*) Need for data and product services matched to the participants and users of GOOS data;
(*d*) Need for innovative data inquiry, access and delivery mechanisms; and
(*e*) Need for intraoperability and interoperability.

The Steering Team for the OIT Pilot Project met for its first session in Brussels, Belgium, on 29 November 2002. Detailed presentations had been made on data management in other programmes or projects such as GOOS, IODE, the DMACS of the United States Integrated and Sustained Ocean Observing System, Argo, the World Ocean Circulation Experiment (WOCE) Data System and GODAE. It had been concluded that OIT would benefit from close interaction with national/regional initiatives in general, and with DMACS in particular. The team had identified five specific components for the OIT Pilot Project:

(*a*) Metadata management;

(*b*) Data circulation and communication;
(*c*) Data assembly, quality control and quality assurance;
(*d*) Archival;
(*e*) The user interface.

The team had further recommended that OIT, as a JCOMM initiative, should be co-sponsored by GOOS, JCOMM and IODE. The session had developed an Action Plan based upon the agreed action items arising from that session and had assigned tasks to each member of the team.

7.6.2 The Commission noted that OIT had been further discussed at the seventh session of the IODE. That session had agreed that the OIT Pilot Project was an important contribution to the resolution of ocean data management issues and to the enhancement of overall capacity and functionality. The IODE Committee had agreed that the overall scope and objectives of the project were both relevant and appropriate as an IODE activity and had endorsed it as a component of the IODE work plan. The Committee had also welcomed the emphasis on quality control and data assembly and agreed that a jointly-sponsored workshop (IODE, JCOMM, GODAE) should be convened to discuss issues of quality control and data assembly, as part of the Global Ocean Data Archaeology and Rescue (GODAR) quality control meeting, initially planned for July/August 2004 and now scheduled for 2007.

7.6.3 The Commission noted with regret the lack of recent activity for the OIT Project and recommended to the IODE Officers and the JCOMM DMCG to reconsider the OIT Project action items in view of the recent activities of the JCOMM/IODE ETDMP and to discuss at the next JCOMM Management Committee meeting a revised ETDMP work plan for implementation. The Commission further recommended that funds be found to complete the activities of the OIT Project.

Global Temperature and Salinity Profile Programme (GTSPP)

7.6.4 The Commission noted with satisfaction that the GTSPP continued to develop capabilities and deal with greater volumes of data. The number of ocean profiles transmitted in real-time was about 400 000 in 2004 and growing. Between 2002 and 2003, the number of delayed mode profiles entering the GTSPP archive had increased by about 36 000 profiles. The bulk of the data came from the late 1990s and from 2003, but records had been added from all years back to 1990. The GTSPP archive contained a little over 1.7 million stations from 1990 to the end of 2003. Of those, about half were present in real-time forms (the delayed mode versions had not arrived) particularly for data from the more recent years. The timeliness of real-time data delivery continued to improve. Data from Argo floats constituted a significant proportion of TESAC messages and it was the goal of Argo to provide those data to the GTS within 24 hours of data collection. By the end of 2002, about 54 per cent of data were meeting the target while at the end of 2004 that had risen to 85 per cent.

7.6.5 The Commission further noted that GTSPP had continued to develop in response to evolving needs. The Commission recalled that at the last SOT meeting, and in the 2002 Annual Report, it had been noted that a strategy was under development for attaching a single unique identifier to both the real-time and delayed mode versions of XBT data. GTSPP had produced a preliminary report and continued to monitor those results to test how well the unique identification scheme performed in allowing an unequivocal match of real-time to delayed mode profiles even when the profiles appeared to be different.

7.6.6 The Commission noted with satisfaction that GTSPP was contributing to OPA of JCOMM through the production of the metrics for temperature and salinity profile sampling in support of OPA. GTSPP was an active contributor and partner in a number of other international programmes: the monitoring of the real-time GTS data was an important contribution to Argo. GTSPP was a contributor to the CLIVAR programme, and was also collaborating with GODAE.

7.6.7 The Commission noted the future directions of the GTSPP work: regular reconciliation between the archives, which was planned for 2005; the provision of data in format conforming to the way the Argo data appeared in the Global Data Assembly Centres (GDACs); the provision of hard copies of GTSPP data that could be sent to interested clients (the monthly updates of the GTSPP CD or DVD would be available online); continuation of the assessment of the usefulness of a unique data identifier to link real-time and delayed mode versions of data; extension of the links to the GTSPP data dictionary to that maintained by the BODC; and collaboration with CLIVAR and GODAE. The Commission expressed appreciation for the results and future plans of the GTSPP Programme. The Commission recommended that GTSPP should participate more widely in ETDMP pilot projects, carrying out the function of GTSPP data source under the E2EDM system prototype.

Global Ocean Surface Underway Data Project (GOSUD)

7.6.8 The Commission noted with satisfaction that the GOSUD Project had continued to develop its capability to manage the surface data collected by ships. The GOSUD had produced a Users' Manual that explained the primary data format used by the project. A second manual describing the recommended quality control procedures for the real-time data had also been produced. Those major developments had taken place at the GDAC in Brest. In 2003, GDAC had begun making data available from an FTP server, and in 2004 a Web server had become available. The volume of data available on that server continued to grow.

7.6.9 The Commission noted that collaboration had been established between the Shipboard Automated Meteorological and Oceanographic Systems (SAMOS) Project (formerly the High Resolution Marine Meteorology Project) and GOSUD. CLIVAR had expressed interest in GOSUD in order to better organize and archive data. The JCOMM OPA had started a project

to produce quarterly reports on data that had been collected to meet OOPC targets for an ocean climate observing system.

7.6.10 The Commission appreciated that efforts would be made to ensure that new operations became routine. At the same time, cooperation between the SAMOS project and GOSUD activities would streamline the handling of data and permit the integration of surface oceanographic and meteorological observations. The real-time exchange of surface ocean data was limited by the present character code form TRACKOB. It would be necessary to use BUFR for real-time exchange on the GTS and GOSUD was, therefore, working towards a BUFR template for TRACKOB data. As that developed, a framework would become available for exchanging many other kinds of surface observations in a single BUFR message. The products derived directly from the observations were an important goal for GOSUD. The Commission encouraged all concerned to find a way to disseminate the data collected on the GTS and called for new data providers. It expressed satisfaction with the progress achieved by the GOSUD Project and strongly encouraged new organizations to participate in the project. The Commission recommended that GOSUD should participate more widely in ETDMP pilot projects, carrying out the function of GOSUD data source under the E2EDM system prototype.

7.7 Formal decisions or recommendations proposed for the Commission (agenda item 7.7)

The Commission approved the text of the final report of JCOMM-II relating to the agenda item 7 as given above. The Commission also adopted Recommendation 5 (JCOMM-II) – IOC Project Office for IODE, and Recommendation 6 (JCOMM-II) – JCOMM Data Management Strategy.

8. Capacity-building (agenda item 8)

8.1 Review of ongoing activities and achievements (agenda item 8.1)

8.1.1 The Commission noted with interest the comprehensive report of the Capacity-building Programme Area (CBPA) Coordinator and chairperson of the Capacity-building Coordination Group (CBCG), Ms M. Andrioli (Argentina), on JCOMM capacity-building activities during the past intersessional period, as well as proposals for future activities and developments. It expressed its considerable appreciation to Ms M. Andrioli and to the chairperson of the Task Team on Resources (TTR), Mr S. Priamikov (Russian Federation), as well as to all the members of the coordination group and the task team, for their efforts and support provided to the Commission.

Capacity-building requirements survey

8.1.2 The Commission noted with appreciation that, since 2000, the CBCG had conducted surveys of national requirements for JCOMM-related capacity-building within the six WMO Regional Associations (RAs). The results of those surveys would be used to determine overall priorities for capacity-building. Those priorities would then form the basis for the work of the TTR to merge requirements with potential funding; to determine a strategy for matching requirements with the resources; and to identify gaps in those resources. The Commission agreed on the importance to JCOMM of those surveys and expressed concern at the limited number of answers received. It requested the Secretariat to use a more formal approach in the future. It further requested that work should continue to ensure that the requirements of all potential participants in JCOMM were included and that the eventual results (priorities) should focus on broad-based regional or common national requirements, rather than specific national or agency interests.

8.1.3 As an extension of that approach, the Commission agreed that emphasis should be put on the concept of regional cooperative development projects. It therefore welcomed the preparation by Ms R. Folorunsho (Nigeria) of a draft project proposal on Storm surge monitoring; hindcasting and forecasting in the Gulf of Guinea of the eastern central Atlantic. Such storm surges occurred annually during the months of April to May and August to October, and were caused by the superposition of high astronomical tides and swell reaching over four metres. The Commission agreed that the proposal fitted very well within the broader context of the global programme for natural disaster mitigation, to which JCOMM was eager to contribute (see agenda item 11.5).

Cooperation with IODE

8.1.4 The Commission noted that a close working relationship had been established between CBPA and IODE during capacity-building activities, in particular with Ocean Teacher, which aimed at providing training tools for oceanographic data and information exchange. Those tools were used during IODE training courses but could also be used for self-training and continuous professional development. Ocean Teacher comprised two components:

(*a*) The IODE resource kit, which contained a range of marine data management and information management materials, including software, quality control and analysis strategies, training manuals, and relevant IOC documents. It also provided a broad spectrum of background information on global data and information archiving activities, specifications for data storage in standard formats, and the software tools to perform many quality control, sub-setting, and analysis procedures;

(*b*) The resource kit training manual, which was a collection of outlines, notes, examples, and miscellaneous documents used in conjunction with the resource kit to organize training programmes in marine data and information management. Those training programmes were designed for the instruction of ocean data and information managers of newly established IODE national agencies and Marine Information Centres.

The Commission noted with appreciation that, in order to ensure that Ocean Teacher could meet some JCOMM training requirements, the CBCG had appointed Ms R. Folorunsho (Nigeria) as its representative on the Steering Group for Ocean Teacher.

8.1.5 Furthermore, the Commission noted with appreciation the combined JCOMM/IODE/GOOS modelling and data management workshop held in Ostend, Belgium, from 2 to 10 September 2005. That event had been aimed at bringing modellers and ocean data managers together to explain how their work was complementary and mutually dependent in providing operational services and products. It had focused on developing countries, with one session devoted to setting up a numerical model and preparing model output and another on the use of in situ data to validate the models. The Commission expressed satisfaction at the collaboration with IODE and considered that the IODE project ODINAFRICA should be taken as an example of success in capacity-building activities.

Evaluation of JCOMM capacity-building

8.1.6 The Commission noted with interest that the CBCG, in collaboration with its TTR, had developed a methodology to assess the effectiveness of JCOMM-related training courses, workshops and/or seminars, and to monitor large-scale regional cooperative development projects related to JCOMM. As far as the aforementioned training events were concerned, that evaluation was based on the use of various questionnaires, such as:

(*a*) A questionnaire to be filled out by participants, at the end of each event, the main objective of which was to obtain their immediate reaction on the usefulness and effectiveness of the event, which would enhance participation in JCOMM activities and obtain feedback and additional ideas for further improving such events in the future;

(*b*) A questionnaire to be filled out by lecturers and organizers of those events, also at the end of each event, the main objective of which was to obtain their immediate reaction and specific comments with regards to the level of participation and any difficulties encountered, to be used for future improvements of similar events;

(*c*) A questionnaire to be filled out by participants and/or the institution to which they belonged some time after the event (e.g. one year), the main objective of which was to find out to what extent the JCOMM capacity-building programme had been beneficial to the participant and/or his/her institution, and to obtain feedback on the long-term benefit of the programme.

The Commission agreed that those questionnaires should be used in the future to evaluate all JCOMM training events. It further recognized that the effectiveness of such evaluations depended very much on appropriate Secretariat follow-up and therefore requested the Secretariat to work closely with the Management Committee to perform the required assessments.

8.1.7 With regard to large-scale projects, the Commission recognized that extensive monitoring and evaluation was very much a part of the whole project formulation and implementation process. The evaluation itself should involve the donors, the recipients and the executing agencies. Such evaluations assisted the recipients to develop functional work plans, helped in adjusting the project during its implementation and could assist in future new project design, as well as possible changes in donor policies. The Commission agreed on the importance of that evaluation process to JCOMM-initiated projects, while at the same time recognizing that the evaluation process was largely outside the remit of JCOMM itself.

Regional activities

8.1.8 The Commission expressed satisfaction that the South East Asian Centre for Atmospheric and Marine Prediction (SEACAMP) had reached operational status. Its Web site (http://intranet.mssinet.gov.sg/seacamp/) provided, in addition to storm warnings, analyses and forecasts of atmospheric and marine variables such as surface wind, mean sea level pressure, precipitation, waves, swell, sea level elevation and ocean currents, temperature and salinity at various depths. Demonstration projects under development, at national and regional level, included coastal modelling for safe navigation, oil spill and other marine pollution modelling, and the development of early warning and guidance for marine hazards such as tsunamis, storm surges, etc. The SEACAMP project remained dynamic, aiming at:

(*a*) Establishing expertise in marine meteorology and physical oceanography for ASEAN countries;

(*b*) Being staffed by suitable ASEAN specialists who would be given further training and tools, and charged with the tasks of tool/model development, monitoring, analysis and prediction. Future work at SEACAMP would be applied, with research tailored to primary users needs;

(*c*) Being self-sustaining, with future costs and data acquisition systems provided through contributions by ASEAN or target countries.

The Commission encouraged the Centre to continue to develop and expand its work, and agreed that the SEACAMP programme demonstrated an excellent approach to JCOMM development at the regional level.

8.1.9 The Commission recalled that the Western Indian Ocean Marine Applications Project (WIOMAP) aimed to contribute to the sustainable management and exploitation of marine and land resources through more efficient short-, medium- and long-term planning in the region. That would be achieved through improved ocean predictions and weather and climate forecasts, based on the enhancement of coastal and open ocean observing systems. The project would focus on capacity-building of national institutions to enable them to take advantage of modern technology in ocean monitoring and new developments in ocean modelling. WIOMAP would ensure that ocean observations in the Western

Indian Ocean, in support of GOOS and GCOS, were sustained and utilized for wide research and operational applications. The products generated by Specialized Regional Marine Application Centres and disseminated through an enhanced communication system would contribute substantially to improving the welfare of the population in the region in terms of poverty alleviation and food security.

8.1.10 The Commission noted with appreciation that the project proposal was in its final stage of preparation and had, in particular, benefited from a review and comments by TTR. It agreed that the project should be given a high priority in the coming years. It therefore requested that the document be finalized, with the assistance of TTR, and distributed to the heads of potential participating agencies as soon as possible, in order to seek their formal approval of the document and of their agencies' willingness to participate in the project. As soon as such agreements by participating agencies were received by the Joint Secretariat, one country, on behalf of all participants, would submit the agreed project document to potential funding agencies. The Commission recalled that Mauritius, through the Mauritius Oceanography Institute and the Mauritius Meteorological Services, had already jointly agreed, at the second Implementation Planning Meeting for the WIOMAP Project (Grand Bay, Mauritius, 1 November 2002), to act as the submitting country for the project, and expressed its thanks to Mauritius for that contribution.

8.1.11 The Commission noted with appreciation that the following training events had taken place during the past intersessional period, either directly under or associated with JCOMM:

(*a*) Workshop on South China Sea storm surge, waves and ocean circulation forecasting (with the WMO Tropical Cyclone Programme – TCP) (Hanoi, Viet Nam, 21-24 January 2002);
(*b*) Training course on sea level observation and analysis (Valparaiso, Chile, 7-8 April 2003) organized by GLOSS in collaboration with the *Servicio Hidrografico y Oceanografico de la Armada de Chile*;
(*c*) Wave and storm surge forecasting for Caribbean countries (Halifax, Canada, 23-27 June 2003);
(*d*) Two regional modelling workshops held in cooperation with TCP, one in Kuantan, Malaysia, from 15 to 19 September 2003, and the other hosted by the State Oceanic Administration in Beijing, China, from 25 to 29 July 2005;
(*e*) Port Meteorological Officers, (London, United Kingdom, 23-25 July 2003), and planned and funded for Hamburg, Germany, late in 2005 or 2006;
(*f*) Training course on sea level observation and analysis (Kuala Lumpur, Malaysia, 19-20 February 2004), organized by GLOSS in collaboration with the Department of Surveying and Mapping of Malaysia.

8.1.12 The Commission further noted with appreciation the following assistance activities provided within the framework of GLOSS:

(*a*) A technical expert visit to Iran in March 2004 to provide advice on the national tide gauge network (sponsored by the Norwegian Hydrographic Office);
(*b*) A technical expert visit to the Red Sea countries in December 2004;
(*c*) Installation of a new pressure gauge in Takoradi, Ghana (the gauge was donated by the National Institute of Oceanography of India and the installation was carried out by two National Institute of Oceanography scientists);
(*d*) Provision of two new tide gauges to Mozambique (through the Proudman Oceanographic Laboratory, United Kingdom), to be installed in early 2005 by the South African Hydrographic Service;
(*e*) Provision of a gauge to Brazil (through the Proudman Oceanographic Laboratory, United Kingdom), to be installed at Cananéia in early 2005;
(*f*) Provision of a grant for one Nigerian scientist to obtain training in the installation and operation of a modern radar gauge purchased by Nigeria, to be installed at the GLOSS station in Lagos.

Proposed merger with the GOOS Capacity-building Panel

8.1.13 The Commission noted that, in view of the close relationship between JCOMM and GOOS, especially in the field of capacity-building, it had been suggested that the JCOMM CBCG and the GOOS Capacity-building Panel could be merged. It was envisaged that the merged group would be able to develop the capacity-building needed to ensure the growth, development, sustenance and evolution of operational marine meteorology and oceanography within GOOS, thereby improving and expanding operational marine data and products available to marine management and services worldwide and directly contributing to the objectives of JCOMM. In addition, such a merger would avoid duplication of effort and hopefully save some funds for coordination and capacity-building activities. The Commission noted with appreciation that the proposal had been approved by the Management Committee at its third session (Geneva, 17-20 March 2004), as well as by the GOOS Steering Committee at its seventh session (Brest, 26-29 April 2004).

8.1.14 The Commission expressed the view that capacity-building activities would be best implemented on a regional basis, as already mentioned under general summary paragraph 8.1.3, particularly with respect to taking advantage of, and collaborating with, the GRAs. It emphasized the use of regional bodies and GRAs' Secretariats to coordinate and facilitate common requirements in a region, from training through to the establishment of operational systems.

8.1.15 Regarding the proposed new structural arrangements for capacity-building activities, the Commission considered it important to meet the following objectives to:

(*a*) Establish and ensure excellent coordination of capacity-building with Programme Areas of

Observations, Data Management, and Services;
(*b*) Take maximum advantage of the Capacity-building Programmes of WMO, IOC, and other appropriate organizations.

8.1.16 To achieve those goals, the Commission took the view that it had to reconsider the arrangements agreed upon by JCOMM-I regarding capacity-building in that:

(*a*) The Management Committee and the GOOS Scientific Steering Committee should appoint a Rapporteur on Capacity-building in each of the other three PAs, entrusted with:
  (i) Identifying capacity-building requirements within each PA brought from countries ;
  (ii) Integrating such requirements;
  (iii) Forwarding the requirements through the Management Committee to IOC, WMO, and other organizations as necessary;
  (iv) Evaluating the progresses achieved;
(*b*) The Task Team on Resources should:
  (i) Assist groups, countries, and regions in identifying potential donors and developing capacity-building proposals;
  (ii) Report to the Management Committee and the GSSC.

8.1.17 The Committee noted with appreciation that the chairperson of the GSSC had agreed in principle with those arrangements, on the grounds that they might streamline the activities in the field of capacity-building and decrease the number of related meetings. Action to implement those arrangements was taken under agenda item 14.1. Consequently, the Commission decided not to re-establish the Capacity-building Coordination Group/GOOS Capacity-building Panel.

8.2 JCOMM AND GOOS CAPACITY-BUILDING STRATEGIES, IN THE CONTEXT OF THE WIDER WMO AND IOC CAPACITY-BUILDING PROGRAMMES (agenda item 8.2)

8.2.1 The Commission noted that Mr J. Guddal, JCOMM co-president, and Ms M. Andrioli (Argentina), CBPA coordinator, had participated in the IOC Expert Workshop on Drafting an Implementation Plan for the IOC Strategy for Capacity-building (Paris, 9-11 March 2005). They had taken that opportunity to make presentations of the JCOMM capacity-building strategy as well as of some ongoing and future JCOMM capacity-building projects. The workshop had agreed, inter alia, to define the vision to which the IOC strategy was directed as follows: "To establish networks of scientists, managers and other practitioners working with regional mechanisms, to create demand-driven science and provide operational services for the benefit of all humanity." The Commission recognized that JCOMM had a clear role to play within such a vision and expressed satisfaction that the twenty-third session of the IOC Assembly (Paris, 21-30 June 2005) had endorsed that wording.

8.2.2 The Commission further noted with appreciation that, within the IOC strategy, it had been clearly stated that ongoing regional projects that addressed key regional concerns would be the primary vehicles for capacity-building, which was also an essential part of JCOMM and GOOS strategies. Similarly, emphasis had been put on priorities to address training in the preparation and use of operational products, applications of remote sensing data and use of robust models, in order to communicate results rapidly to decision-makers and thus make the case for national contributions to long-term monitoring, which was also in line with JCOMM and GOOS priorities. Lastly, on the grounds that partnerships were essential in achieving the aforementioned vision, and to try to make the best possible use of scarce resources, as well as to increase coordination and improve efficiency, the IOC strategy had taken into consideration the existing capacity-building strategies of JCOMM, GOOS and its COOP.

8.2.3 With regard to WMO capacity-building and similar programmes, the Commission noted with appreciation the synergy created by working with the Commission for Agricultural Meteorology (CAgM) and the TCP on projects such as the Marine Impacts on Lowland Agricultural and Coastal Resources (MILAC) projects, which was discussed in more detail under agenda item 11.5.

8.3 PROPOSALS FOR SPECIFIC CAPACITY-BUILDING ACTIVITIES IN THE NEXT FOUR YEARS (agenda item 8.3)

8.3.1 The Commission noted that the CBCG, in view of the specific needs of the maritime countries of the African continent identified through the CB requirements survey, had recommended that their primary efforts should be focused on enhancing or creating capacity in that particular region of the globe. That had led to the following list of priority activities:

(*a*) The JCOMM/IODE/GOOS capacity-building event, noted under general summary paragraph 8.1.5;
(*b*) Project proposal on storm surge monitoring, hindcasting and forecasting in the Gulf of Guinea of the eastern central Atlantic, noted under general summary paragraph 8.1.3;
(*c*) In close cooperation with the OPA Coordinator, support to the XBT Training Workshop taking place in Mombasa, Kenya, in 2005;
(*d*) The development of a project to establish an early warning system to mitigate flooding and earthquake effects on the African coast.

With reference to the latter, the Commission agreed it would form a regional component of the global effort towards mitigating natural disasters (see agenda item 11.5).

8.3.2 Regarding GLOSS-related activities, the Commission noted that implementation of the ODINAFRICA III project, funded by the Government of Flanders (Belgium) through a grant to IOC, had started in late 2004. Work Package 2 under that project entitled 'The Coastal Observing System' would provide funds for tide gauge acquisition, installation and sea level training activities for Africa. It was expected that a total of 12-15 gauges could be established over the 2005-2008 time period with that funding. Many of the gauges would be

installed at GLOSS Core Network stations in Africa. Furthermore, there were plans for a GLOSS training course at the JMA in the first half of 2006. Additional training courses were being planned as part of the programmes on tide gauge installations/upgrades in the Indian Ocean and as part of the ODINAFRICA III project.

8.3.3 More generally, the Commission noted that JCOMM's capacity-building activities would pursue the development outline project proposals based on its surveys of WMO Regions and GRAs, and would focus on coordinating the different regional bodies' requirements for assistance in various kinds of capacity-building activities, ranging from training events to the establishment of operational systems such as WIOMAP. The Commission emphasized that the capacity-building activities should pay particular attention to developing criteria for the selection of capacity-building activities to be supported.

8.3.4 The Commission noted with appreciation plans by Australia to provide technical assistance to build the capacity of relevant Indian Ocean and south-western Pacific countries in tsunami monitoring, early warning and associated emergency management. It also welcomed the offer by the Bolivarian Republic of Venezuela to provide academic and training support to countries in the Caribbean region, as well as the efforts undertaken by the Permanent Commission for the South Pacific (CPPS), as an example of a regional contribution to JCOMM. The Commission further applauded the undertaking by China to develop software that would make full use of remote sensing data and to share that software with others. It also took note of the training possibilities offered by the Russian Federation through its Arctic and Antarctic Research Institute, in collaboration with institutions from Germany, Norway and others. The Commission also noted with appreciation the statement made by the representative of the Partnership for Observation of the Global Oceans (POGO) that POGO would welcome a closer partnership with JCOMM capacity-building activities. The Commission also took note of the requests for assistance from Kenya, Myanmar, Sudan and Turkey.

8.4 Resources to support JCOMM capacity-building (agenda item 8.4)

8.4.1 The Commission recalled that some limited regular budget funds were available during each intersessional period, through both WMO and IOC, to support small numbers of short-term training courses, long-term fellowships and expert missions relating to JCOMM. However, to fully implement the identified capacity-building requirements of the Commission, including large-scale regional or national projects, recourse would have to be made to external funding support. In that context, the Commission recognized that greater use could be made of the Voluntary Cooperation Programmes of WMO and IOC, which in principle could support a number of JCOMM requirements, including training events, fellowships and the supply of both hardware and software. In addition, the work of the TTR was of great potential value to both JCOMM and GOOS in identifying possible external funding sources and in the preparation of project documents likely to be attractive to such sources.

8.4.2 The Commission noted that the first session of the TTR (Paris, 3-4 February 2003) had recognized that its primary initial task was to survey and analyse potential funding sources/agencies for JCOMM capacity-building, and, based on that information, to compile a comprehensive catalogue. The catalogue could include details of their priorities, regions of interest, formats, mechanisms for decisions, funding parameters (dollar limits, duration, award criteria), deadlines, project details, constraints, reporting and evaluation procedures, etc. The analysis would also prove valuable not only to GOOS and other IOC and WMO capacity-building programmes but also to other international organizations, from the same perspective. To that end, the TTR had commenced the development of a key-word searchable database that would allow the location on the Internet of detailed information about those potential funding sources, and the assessment of their possible relevance to JCOMM. The next step would be to make a survey of donor agency Web sites, using those categories and key words as basic search criteria. The TTR had proposed that that should be undertaken by a consultant. The Commission agreed that that procedure was appropriate to its requirements and requested the TTR to make a cost evaluation of the required consultancy work. The Joint Secretariat was requested to identify the necessary funding to implement the project, since it was agreed that it would be very useful to have a list and analysis of funding agencies with the potential to support JCOMM capacity-building projects.

8.5 Formal decisions or recommendations proposed for the Commission (agenda item 8.5)

The Commission approved the text for the final report of JCOMM-II relating to the whole of agenda item 8 as given above.

9. Review of technical regulations of interest to the commission (agenda item 9)

9.1 The Commission recalled that, under agenda item 5.1, it had agreed to adopt some amendments to the *Manual on Marine Meteorological Services* (WMO-No. 558) and Annex VI to the WMO Technical Regulations, to add complementary guidelines for NMSs issuing marine weather forecasts and warnings via NAVTEX, including a list of common abbreviations to be used in such broadcasts, as well as a recommendation for NMSs on guidelines for sea-ice charts. It therefore adopted Recommendations 7 (JCOMM-II) and 8 (JCOMM-II) to effect that decision. The Commission further recalled that, under agenda item 7.1, it had agreed to amend the IMMT format and MQCS, in particular to cover additional requirements of the VOSClim Project, with those new versions of IMMT (IMMT-3) and MQCS (MQCS-V)

and to replace the existing versions from 1 January 2007. It therefore adopted Recommendation 9 (JCOMM-II) to that effect. No further modifications to relevant parts of the WMO Technical Regulations were considered necessary.

9.2 The Commission recognized the value of the WMO Technical Regulations, in particular the *Manual on Marine Meteorological Services*, in ensuring the provision of high quality and timely services to marine users, as well as in assisting and guiding NMSs in that regard. It further recognized that the services required by users increasingly involved oceanographic variables and products, and that oceanographic institutes and agencies were becoming more involved in the preparation and dissemination of oceanographic services, and recalled its discussions under agenda item 5.2 on that topic. In that context, it agreed that there would very likely be a requirement in the near future for a set of regulations, or at least guidance material, relating to the preparation and provision of oceanographic products and services, to be adopted by both WMO and IOC. It therefore requested both the Services Programme Area Coordinator and the Management Committee to keep that issue under close review, with a view to the possible preparation of such regulations or guidance, for consideration by JCOMM-III.

10. GUIDES AND OTHER TECHNICAL PUBLICATIONS (agenda item 10)

GUIDE TO MARINE METEOROLOGICAL SERVICES (WMO-No. 471)

10.1 The Commission recalled that, under agenda item 5.1, it had discussed in detail the Marine Pollution Emergency Response Support System (MPERSS), agreed that the system could now be regarded as operational, and further agreed that details of the system, as modified by the SCG, should be incorporated into the *Guide to Marine Meteorological Services*. It adopted Recommendation 10 (JCOMM-II) to effect that decision. The Commission also recalled that, under agenda item 9, it had adopted a recommendation to incorporate modifications to the international marine meteorological tape format and minimum quality control standards into both the *Manual* and *Guide*.

OTHER WMO GUIDES

10.2 The Commission noted with appreciation that, as recommended in Recommendation 11 (JCOMM-I), a selection of the papers from CLIMAR99 had been published as the dynamic part of the *Guide to the Applications of Marine Climatology* (WMO-No. 781), in *Advances in the Applications of Marine Climatology - The Dynamic Part of the WMO Guide to the Applications of Marine Climatology*, (WMO/TD-No. 1081). A different process had been followed with the papers presented to CLIMAR-II (Brussels, Belgium, 17-22 November 2003), whereby a selection of those papers had been published in a special issue of 'Advances in Marine Climatology' of the *International Journal of Climatology*, Vol. 25, No. 7, 15 June 2005.

10.3 The Commission further noted with appreciation that, as requested at JCOMM-I, the *Guide to Wave Analysis and Forecasting* (WMO-No. 702) had been made available on the JCOMM Web site in PDF, while the Expert Team on Wind Waves and Storm Surges had initiated the preparation of a dynamic part to the *Guide*, based on an initial survey questionnaire and along the same lines as the dynamic part of the *Guide to the Applications of Marine Climatology* discussed above, to be finalized during the coming intersessional period. In addition, the Commission recalled that, under agenda item 5.1, it had agreed on the requirement for the preparation of a Guide to Storm Surge Forecasting, as well as a draft table of contents for that Guide (see Recommendation 1 (JCOMM-II).

10.4 The Commission recalled its discussion recorded in general summary paragraphs 5.1.20 and 5.1.21 relating to guidance material in the field of sea-ice. It endorsed the importance of the continuation of that work.

INTERNATIONAL LIST OF SELECTED SUPPLEMENTARY, AND AUXILIARY SHIPS (WMO-No. 47)

10.5 The Commission recalled that the *International List of Selected, Supplementary and Auxiliary Ships* contained details of the names, call signs, layout, types of instrumentation and methods of observation used on VOS. The publication relied on the regular submission of metadata from NMSs operating VOS programmes, nominally on a quarterly basis. The publication was formerly printed annually, but, since about 1999, had been available electronically on the WMO Web site. Until recently the electronic version had been updated very infrequently, which had been noted with concern at the SOT and VOSClim sessions held in London in July 2003. The Commission recognized that, whilst it was the timely availability of the current ship metadata that was of particular concern to VOS operators, there was also a need to maintain a digital archive of historical metadata for use with climate datasets, to allow the identification and correction of spurious climate signals that may result from changes in VOS instrumentation.

10.6 The Commission agreed that the *International List of Selected, Supplementary and Auxiliary Ships* was an important tool for VOS operators as it:

(*a*) Greatly assisted in identifying the status of foreign ships;
(*b*) Identified which ships, through their omission from the list, could be targeted for possible VOS recruitment; an up-to-date version would reduce the chance of multi-recruitment by more than one NMS and avoid unnecessary ship visits by PMOs;
(*c*) Assisted PMOs when preparing to visit a foreign VOS vessel;
(*d*) Identified which ships could be targeted as possible deployment vessels for buoys and floats.

In addition, accurate details about the method of observation and instrument type, instrument exposure, instrument calibration dates and ship layout, were vital

if the objectives and desired accuracies of VOSClim were to be achieved.

10.7 In that context, the Commission reviewed the recommendations of the Task Team on Metadata for the *List* that had been established at the second session of the SOT (SOT-II) (London, 28 July-1 August 2003). The proposals and recommendations from the task team had subsequently been reviewed and agreed by the first session of ETMC (ETMC-I) (Gydnia, Poland, July 2004) and later approved at SOT-III (Brest, 7-12 March 2005). The Commission:

(*a*) Noted with approval the changes developed and implemented by SOT, in accordance with the authority provided by the former CMM through Recommendation 9 (CMM-XII) and after consultation with the Expert Team on Marine Climatology, to the contents of the existing code tables associated with the *International List of Selected, Supplementary and Auxiliary Ships*;

(*b*) Adopted Recommendation II (JCOMM-II) to implement modifications to the definitions and details of the fields (and format), and to initiate the preparation, by SOT, of an XML version for the future exchange of the metadata for that publication;

(*c*) Noted with approval the adoption by SOT of a semi-colon delimited format for the immediate current exchange of the metadata;

(*d*) Agreed that SOT should be the subsidiary body of JCOMM responsible for the future maintenance of the *International List of Selected, Supplementary and Auxiliary Ships*, in consultation as appropriate with the Expert Team on Marine Climatology and other relevant bodies, including user groups.

JCOMM Technical Reports

10.8 The Commission noted with appreciation that a total of 15 publications in the new JCOMM Technical Report series had been prepared and published (see http://www.jcommweb.net) during the past intersessional period, together with six publications in the DBCP Technical Document series and annual updates to the DBCP Implementation Strategy. The majority of those publications were available for downloading from the JCOMM Web site, in both Word document and PDF formats. A small number of printed copies had also been prepared. Some of the publications had been prepared as CD-ROM only, because of cost considerations. As previously, those publications had covered a variety of topics, ranging over the whole of JCOMM's Programme, and included the proceedings of major workshops and seminars such as CLIMAR-II and Brussels 150, the eighth International Workshop on Wave Hindcasting and Forecasting (Oahu, Hawaii, 14-18 November 2004), as well as consolidated national reports for different JCOMM groups, and training workshop presentations.

JCOMM Meeting Reports

10.9 The Commission noted with appreciation that the final reports from all JCOMM meetings had been published in the special JCOMM Meeting Report series (http://jcommweb.net), with 28 such reports having appeared during the past intersessional period. As well as being distributed to meeting participants and a limited number of other recipients in hard copy form, all those reports had also been made available in electronic form (Word document and PDF) for downloading from the JCOMM Web site. The Commission recognized the value of that service and urged all JCOMM Members and others to visit the JCOMM Web site regularly to review, consult and download the meeting reports, as appropriate.

GLOSS publications

10.10 The Commission noted with appreciation a number of GLOSS publications during the past intersessional period, including Group of Expert reports, status reports, manuals, proceedings, technical expert visit reports, and the two latest GLOSS Training Course reports (Valparaiso, Chile, 7-17 April 2003 and Kuala Lumpur, Malaysia, 9-20 February 2004). It noted that all those publications were available on the Internet (http://www.pol.ac.uk/psmsl/programmes/gloss.info.html). The Commission supported that work by the GLOSS community, undertaken with the assistance of the Permanent Service for Mean Sea Level (PSMSL), and urged that it be continued.

Other technical publications

10.11 The Commission also appreciated the fact that, through the WMO *Bulletin*, international meteorological and oceanographic communities were being kept up-to-date on the activities of both WMO and IOC relevant to JCOMM. It requested the Secretariat to continue preparing and publishing those summaries, which appeared in the *Bulletin* as programme notes. The Commission also expressed appreciation for the longer articles directly relevant to JCOMM and its activities, which appeared in the *Bulletin* from time to time (such as the article in the July 2004 edition on the legacy of the First GARP Global Experiment (FGGE) for the ocean observing system), as well as for the special issue of the *Bulletin* published in July 2005, that had focused on "The oceans and the atmosphere" and coupled modelling. The Commission further noted with appreciation that articles relating to the work of JCOMM had been published from time to time in publications such as *World Climate News*, and various external journals. It encouraged both JCOMM Members and the Secretariat to continue to prepare and submit such articles whenever possible, in view of the international exposure they provided for the work of the Commission.

Brochures, pamphlets and other outreach material

10.12 The Commission noted with appreciation that the Management Committee had agreed on a design for a JCOMM logo that had been prepared by Mr P. Dos (*Météo-France*), and which was now used extensively on JCOMM publications and Web sites. It offered its particular thanks to Mr Dos and to *Météo-France* for their support in that regard, and agreed that the logo

provided an excellent symbolic representation of the Commission and its work, and helped to foster greater external recognition of JCOMM. The Commission further noted with appreciation that a descriptive JCOMM *Brochure* had been prepared by the Management Committee and published in four languages (English, French, Russian and Spanish). It offered its particular thanks to the Australian Bureau of Meteorology for undertaking the printing of the *Brochure*, which was also available in electronic form (in all four languages) for downloading via the JCOMM Web site. The Commission also offered its thanks to the DBCP and to the ASAP Panel for producing updated versions of their respective brochures during the intersessional period. It recognized the continuing value of those brochures in helping to promote different aspects of JCOMM's work amongst a wider community and urged that they be continued, revised and expanded as necessary.

GOOS publications

10.13 The Commission recognized that a large number of technical documents relevant to its own work had been published by IOC in support of GOOS. It noted that most existing GOOS documents, publications and reference material were listed on the GOOS Web site (http://ioc.unesco.org/goos/). A great part of those documents (and all the recent ones) were downloadable. The Commission expressed its appreciation to the GOOS Project Office for making them available to the JCOMM community.

Web sites

10.14 The Commission noted with appreciation that both branches of the JCOMM Secretariat (in IOC and WMO) were maintaining dedicated, cross-linked JCOMM Web sites, which were in turn linked to a number of other Web sites dedicated to specific aspects of the Commission's work, including in particular JCOMMOPS and the Argo Information Centre (AIC), DBCP, GMDSS, SOOP and VOS. All those Web sites (except the AIC) featured the JCOMM logo in a prominent position, enabling easy recognition of the relationship of the Web site and its content to JCOMM. The Commission offered its particular thanks to the agencies and organizations which had undertaken to establish and maintain those Web sites, including the Australian Bureau of Meteorology (VOS), CLS/Service Argos (JCOMMOPS and AIC), the French Institute of Research for Development (IRD) (SOOP), *Météo-France* (GMDSS and MPERSS), NOAA (DBCP) and the Japan Meteorological Agency (summary reports of all CMM and CBS sessions). A full list of the URLs for all Web sites supporting or directly related to JCOMM and its work was given in Annex I of the present report. The Commission recognized the important role that those Web sites were playing in the rapid and efficient dissemination of data and information, including documents and technical publications. It also recognized their potential for direct communication and interaction among JCOMM Members/Member States and other experts on a range of technical and related topics. Such interaction could occur, for example, through mailing lists, discussion groups and direct feedback to Web sites. The Commission, therefore, strongly encouraged the further development of the Web sites, in particular those maintained by the Secretariat for JCOMM, which were essential tools in the implementation of JCOMM programme activities.

Future technical publications

10.15 The Commission agreed that all those technical publications and related outreach materials had provided very valuable support to Members/Member States in implementing their marine-related activities and urged that publication of such reports and documents should be continued during the coming intersessional period.

11. Relationship with other programmes/bodies of WMO and IOC (agenda item 11)

11.1 GOOS and GCOS (agenda item 11.1)

Global Climate Observing System (GCOS)

11.1.1 The Commission noted with interest and appreciation the report by the chairperson of the Global Climate Observing System (GCOS), Mr P. Mason (United Kingdom). It welcomed the development, under GCOS leadership, of the Implementation Plan for the Global Observing System for Climate in Support of the UN Framework Convention on Climate Change (GCOS-92). The plan had been submitted to the Conference of the Parties (COP) to the United Nations Framework Convention on Climate Change (UNFCCC) at its tenth session in December 2004 and had been supported by the COP through decision 5/CP.10. The plan called for some 131 actions over the next 5 to 10 years to address the critical issues relating to global observing systems for climate, namely: improving key satellite and in situ networks for atmospheric oceanic and terrestrial observations; generating integrated global climate analysis products; enhancing the participation of least developed countries and Small Island Developing States; improving access to high-quality global data for essential climate variables; and strengthening national and international infrastructure.

11.1.2 The Commission noted that GCOS-92 had been written with the broad involvement of, and consultation with, the scientific community, including ocean scientists and marine meteorologists. Many of the actions involved the technical commissions explicitly as 'Agents for Implementation' of the actions, including 21 specific actions requiring the support of JCOMM. Furthermore, the plan emphasized the need for the parties to engage in a number of 'key actions' to:

(*a*) Complete and sustain the initial global oceanic observing system for climate;

(*b*) Designate and support national Agents for Implementation for implementing that system;

(*c*) Establish effective partnerships between their ocean research and operational communities towards implementation;

(*d*) Engage in timely, free and unrestricted data exchange;
(*e*) Ensure climate quality and continuity for essential ocean satellite observations.

More specifically, the key actions included:

(*a*) Providing global coverage of the surface network by implementing and sustaining the GCOS baseline network of tide gauges and by enhancing the drifting buoy array, the Tropical Moored Buoy network, the VOS network, and a globally-distributed reference mooring network;
(*b*) Providing global coverage of the subsurface network by implementing and sustaining the Argo profiling float array, systematic sampling of the global ocean full-depth water column, fully implementing SOOP XBT transoceanic sections, extending and maintaining a network of ocean reference sites;
(*c*) Operating a satellite altimetry system. The Commission supported the plan as a major step in the full implementation of the global observing system for climate and agreed to participate fully in implementing the relevant actions. It also encouraged Members to support implementation of the plan on an individual basis.

11.1.3 The Commission noted with appreciation the report on progress in the implementation of the initial climate observing system submitted to SBSTA-22 by the GCOS and GOOS secretariats. It welcomed the collaborative efforts between GCOS, UNFCCC COP and SBSTA towards improving global climate observing systems. The Commission urged Members to be actively involved within their countries in preparing detailed reports on systematic observations to the UNFCCC and to ensure that the contributions of JCOMM were represented in those reports.

11.1.4 The Commission noted with satisfaction the resolution adopted by the fifty-sixth session of the WMO Executive Council that strongly urged the continuation of efforts to establish and maintain the full Argo network, recognizing the importance of in situ observations of the oceans to the implementation of GCOS. The Commission also noted that the thirty-seventh session of the IOC Executive Council (Paris, 23-29 June 2004) had instructed the Executive Secretary of IOC to take, through the GOOS Project Office, all measures necessary to implement those elements of GOOS that directly contributed to GCOS, and that the twenty-third session of the IOC Assembly had urged Member States to incorporate elements of GCOS-92 into their own national ocean observing plans.

11.1.5 The Commission welcomed the coordination between GCOS and its partners in the preparation of the GEO Implementation Plan so that the implementation plan prepared by GCOS was largely the climate component of the GEO plan. That had greatly assisted the inclusion of the initial oceanic observing system in the GEO planning and had resulted in a single set of actions suggested for JCOMM by both plans.

11.1.6 The Commission fully supported the engagement and refinement of the actions within the implementation plans prepared by GCOS and by GEO into the activities of the relevant JCOMM coordination groups prior to the session and encouraged Member States to work towards implementation of the required actions to the maximum extent possible.

Global Ocean Observing System (GOOS)

11.1.7 The Commission noted with appreciation and interest the reports of the chairperson of the GOOS Scientific Steering Committee (GSSC), Mr J. Field (South Africa) and the chairperson of the Intergovernmental IOC-WMO-UNEP Committee for the Global Ocean Observing System (I-GOOS) Mr F. Gérard (France). It acknowledged the considerable progress in the development of GOOS during the past intersessional period. That included both the enhancement of the marine observing systems of the world, especially the climate component of the ocean observing system, and a full review and revised terms of reference for GOOS, I-GOOS, and GSSC. The Commission recalled that it had already reviewed the requirements by the two GOOS scientific and technical advisory panels: OOPC for climate research and prediction and the COOP for coastal issues, under agenda items 4.1 and 4.3, respectively. It therefore agreed to review its relationship to GOOS from a more general standpoint and to highlight some of the actions and issues to maximize the efforts of both GOOS and JCOMM towards the implementation of the ocean component of the global observing system within GEOSS.

11.1.8 The Commission agreed that one of the key roles of GOOS was to collect, analyse and state, as precisely and completely as possible, user requirements for a global ocean observing system. It accepted the requirements and recommended actions of the GCOS Implementation Plan (GCOS-92) for the global module of GOOS, noting that those had been developed jointly by GOOS, GCOS, and WCRP. It noted the need to continue development of similar requirements and recommended actions for the global component of the GOOS coastal module. GOOS should also develop plans for observations and products to meet those requirements. Such plans might include actions by countries or groups of countries (for example, GRAs) for research, pilot projects and other pre-operational activities, to set the path for a long-term, sustained, adequate observing system, and data product preparation and dissemination schemes.

11.1.9 The Commission agreed that, following the successful completion of such activities, JCOMM would then take responsibility for the incorporation of appropriate new, proven elements into the operational observing system, and for their maintenance and coordination with other JCOMM observations and products. The Commission recognized that those activities required the development and use by JCOMM of a suite of observing system performance metrics, as discussed in detail under agenda item 6.

11.1.10 The Commission further recognized that, in addition to ongoing expansion to fully address requirements, the operational observing system was also likely to evolve in three ways:

(*a*) Changing user requirements would require changes to the system;
(*b*) New research and developments would offer improvements in sensors, communications and techniques leading to better data and products;
(*c*) New users with new requirements would have to be accommodated.

The Commission agreed that the evolution of the system should be the joint responsibility of JCOMM and GOOS, working in close collaboration with OOPC and the wider research and user communities, and would rely on the participation of countries working regionally through the GRAs. Some of the changing user requirements might be accommodated by JCOMM; some might require pilot projects or other pre-operational efforts by GOOS. Because JCOMM was overseeing operational system elements, it would be in a better position to learn of developments that would result in improved system performance and to implement such improvements, with user feedback. On the other hand, GOOS, through the participating countries and GRAs, would seem better positioned to become aware of new users with new data and product requirements. In those cases, GOOS would again encourage countries and/or GRAs to carry out pilot projects and pre-operational activities to develop observations and data products in readiness for implementation, normally by JCOMM, on a sustained basis. The Large Marine Ecosystem projects of the World Bank Global Environmental Facility provided opportunities to develop coastal elements of GOOS in many developing countries.

11.1.11 The Commission welcomed the consolidation of the GOOS and JCOMM capacity-building efforts as a necessary step in the evolution and implementation of GOOS through JCOMM, and requested its co-presidents to continue their close collaboration with the GOOS community. Bearing in mind the requirement-setting and resource mobilization roles of I-GOOS, the Commission agreed that, in the coming intersessional period, JCOMM should work closely with I-GOOS, through the Management Committee and the I-GOOS Board (consisting of the I-GOOS chairperson and vice-chairperson), in developing a business case for operational oceanography, with a view to enhancing GOOS implementation, coordinated under JCOMM and effected through national agencies.

11.2 Other joint WMO/IOC Programmes (WCRP, IPY) (agenda item 11.2)

World Climate Research Programme (WCRP)

11.2.1 The Commission recalled that many of the operational observing systems had begun as part of the research activities of the World Climate Research Programme (WCRP), including the Tropical Ocean and Global Atmosphere Programme (TOGA) and the World Ocean Circulation Experiment (WOCE). It noted that future operational systems were likely to be based on measurements which were now being developed and tested under the auspices of research projects such as the WCRP Climate Variability and Predictability (CLIVAR) Project. The Commission acknowledged the critical need for effective two-way communication between JCOMM and WCRP. Several existing groups were already working towards that goal, most specifically the OOPC, jointly sponsored by GOOS, WCRP and GCOS, and the scientific bodies which steered activities such as Argo, moored arrays, drifting buoys, GODAE and time series stations. All of those activities had strong representation from the WCRP projects. However, the Commission recognized the further need to integrate those efforts and provide a single source for interaction with JCOMM and other ocean climate observing activities.

11.2.2 The Commission noted the establishment of a CLIVAR Global Synthesis and Observations Panel (GSOP), and was informed that GSOP, which had met for the first time in Boulder, United States, from 10 to 12 November 2004, had focused on requirements for ocean reanalysis and that a preliminary list of requirements for data, data management and data products in support of ocean reanalysis for climate was being developed. One of GSOP's role was to ensure that operational systems were designed and run in such a way as to optimize their benefit for climate research and to take advantage of the latest scientific findings. In that regard, GSOP would consider a review of the Upper Ocean Thermal network, in cooperation with OOPC, at its next meeting.

11.2.3 The Commission was further informed of the need for greater integration at the WCRP level and that the Joint Scientific Committee for the WCRP was developing a strategic framework for the next ten years, which focused on Coordinated Observation and Prediction of the Earth System (COPES). COPES had been designed to improve synergy across the WCRP member projects in areas such as data management and to promote activities of central importance to WCRP's aims. The ultimate goal was seamless prediction of the climate system from seasonal to centennial timescales. Whilst the implementation of COPES was largely based on existing infrastructure, two overarching groups had been set up to facilitate the synthesis of activities in key areas, namely a WCRP Modelling Panel and a WCRP Observations and Assimilation Panel (WOAP). An initial focus for WOAP would be the promotion of the reprocessing of satellite data streams, and feedback had been requested from GSOP on the reprocessing needed and for which satellite-derived ocean data.

11.2.4 The Commission requested its co-presidents to work with the OOPC to ensure appropriate ongoing two-way communication between JCOMM and the WCRP.

International Polar Year (IPY) 2007-2008

11.2.5 The Commission noted that Fourteenth Congress had approved the holding of the International Polar Year 2007-2008. It also noted that the IOC Executive Council at its thirty-seventh session had

instructed the Executive Secretary to inform ICSU and WMO of IOC's interest in joining the proposed ICSU/WMO Joint Committee and in developing a plan for IOC's participation in the science initiatives of the IPY, including ways in which the IOC-led efforts might be integrated into the different programmes and projects being developed under the IPY.

11.2.6 The Commission recognized that the successful implementation of the IPY required strengthening of the technical and logistical infrastructure for operations and research during the preparation and implementation of the IPY, the establishment of a data management structure based on WWW and IODE experience, and the further development of forecasting techniques. It stressed that observing networks established or improved during the IPY period should be maintained operationally to provide data for detection and prediction of climate change.

11.2.7 The Commission agreed that the comprehensive datasets and scientific results obtained from the successful implementation of the IPY would serve as a basis for further development of environmental monitoring in polar regions. The IPY would also provide a valuable contribution to the assessment of climate change and its impact in polar regions and its results should be used to make recommendations to governmental agencies and the socio-economic sector.

11.2.8 The Commission noted the substantial progress made in IPY planning and preparation, including the establishment of the IPY Joint Committee (JC) responsible for the scientific planning, coordination, guidance and oversight of the IPY on which both IOC and WMO were well-represented; the establishment of the IPY International Programme Office (IPO) providing secretariat support to the JC activities; and the establishment of the Open Consultative Forum to provide a platform for IPY planning and preparation and for the exchange of information with the JC on IPY development.

11.2.9 The Commission noted with deep appreciation the significant investment made by the Government of Canada in providing support for the implementation of IPY. It was also pleased to note that Japan, the Russian Federation, the United Kingdom, the United States, and other countries involved in scientific research and operational activities in polar regions had developed comprehensive plans of their participation in the IPY.

11.2.10 The Commission was informed that, among 75 scientific projects endorsed by the IPY JC, about 20 were closely related to polar oceanography including ocean circulation, coasts and margins, and atmosphere-ocean-ice interaction. Recognizing that the JCOMM OPA could substantially contribute to the successful implementation of those projects, the Commission requested the OPA Coordinator to establish contact with Project Steering Committees set up within the projects, and to assist in the promotion of the IPY projects.

11.2.11 The Commission noted with satisfaction that the status of IPY preparation had been discussed at sessions of the JCOMM Management Committee (2004 and 2005) and that the Committee had provided a valuable contribution to the IPY planning process. It also noted the need to extend the observational network in the region in order to assure the enhancement of meteorological and ice services for navigation in the Polar regions. It noted the lack of broadcast coverage in the Arctic by Inmarsat, which did not allow navigators full access to GMDSS information. The Commission considered that it would be highly desirable that the JCOMM PAs strengthen their efforts to extend the products and services relayed to users.

11.2.12 The Commission recognized that a potential legacy of the IPY would be the expansion and maintenance of long-term high latitude observing systems, including underpinning research. For that legacy to become a reality, it would be necessary for JCOMM to coordinate the maintenance of any such observing system elements. It agreed that JCOMM would take on such responsibility if requested to do so by GCOS and GOOS. The Commission noted, however, that there were no points of contact at present representing Arctic or Antarctic activities with which GCOS or GOOS could effectively plan for future observing systems. The Commission, therefore, recommended the establishment of both an Arctic GOOS and a Southern Ocean GOOS GRA. Those groups would provide appropriate foci for planning and supporting the development and long-term maintenance of observing systems in those two regions. The Commission noted that the GOOS Steering Committee had recognized a potential value in the creation of an Arctic GRA as well as good potential scientific and technological value in coordinated activities in the Arctic region. The GCOS Implementation Plan (GCOS-92) had also called for the establishment of an Arctic GRA. Following discussions during I-GOOS in April 2005, the European Global Ocean Observing System (EuroGOOS) Secretariat had taken the lead in forming an Arctic GRA.

11.2.13 The Commission was informed of the results of the first session of the Intercommission Task Group (ITG) on the IPY (Geneva, 4-6 April 2005), established by the WMO Executive Council to coordinate WMO activities relating to the IPY. It noted with appreciation that Mr I. Frolov (Russian Federation) and Mr S. Pendlebury (Australia), as representatives of JCOMM in the group, had provided substantial contributions to its work and to the preparation of the group's recommendations. The Commission noted the ITG recommendations relating to JCOMM areas of responsibility and agreed:

(*a*) To refer the issues of improving observational systems and services in the Arctic and the Antarctic to the Observation and Services PAs; and

(*b*) To request the Expert Team on Sea Ice to provide tailored services and information support including guidance materials to the IPY by national ice services and GDSIDB centres, and to cooperate with DBCP, the International Arctic Buoy Programme (IABP) and the International Programme for Antarctic Buoys (IPAB), in their implementation during the IPY.

11.3 Other WMO Programmes (agenda item 11.3)

11.3.1 The Commission noted the Progress/Activity Report on the Instruments and Methods of Observation Programme, and, in particular, the significant achievements in the WMO Intercomparison of High Quality Radiosonde Systems (February 2005, Mauritius) and WMO Intercomparison of Rainfall Intensity (RI) Gauges (France, Italy, Netherlands, September 2004-June 2005), and requested that the results be finalized as soon as possible and be made available to Members, the private instrument sector and the scientific community.

11.3.2 It was noted that the fifty-seventh session of the WMO Executive Council had requested the Secretary-General to consider implementation of the WMO Intercomparisons, which were essential for those WMO Programmes demanding accurate and homogenous measurements in accordance with the Commission for Instruments and Methods of Observation (CIMO) Plan, namely, the WMO Field Intercomparisons of Rainfall Intensity Gauges and the WMO Combined Intercomparison of Thermometer Screens/Shield in conjunction with Humidity Measuring Instruments.

11.3.3 Referring to the successful collaboration of WMO and COST-720 in the WMO Intercomparison of High Quality Radiosonde Systems, the Commission noted that the Executive Council had requested the president of CIMO to seek active collaboration with relevant international programmes and organizations, such as EUMETNET, European Cooperation in the Field of Scientific and Technical Research (COST), the International Bureau of Weights and Measures (BIPM) and ISO on CIMO activities.

11.3.4 Significant progress had been made in updating the WMO *Guide to Instruments and Methods of Observation* (WMO-No. 8). In that regard, the Commission also noted the Executive Council's request to the Secretary-General to publish an electronic version of the *Guide* in English in mid-2006 and a hardcopy version in late 2006.

11.3.5 The Commission noted the launching of the United Nations Decade of Education for Sustainable Development (UNDESD) in 2005 and the request to the Secretary-General to continue to undertake actions on public education in order to make the professions of meteorology and hydrology more attractive to the public and in schools.

11.3.6 The Commission noted the progress being made in the implementation of the new measures taken by the Secretary-General to ensure the highest possible level of effectiveness and fairness of the Education and Training Fellowships Programme.

11.3.7 The Commission noted the request to the Secretary-General to continue the organization of specialized training events taking into account the ongoing scientific advances and priority training requirements that had been identified for specialized subjects such as Public Weather Awareness and Services, Climate Change, Marine Meteorology, Disaster Prevention and others.

11.4 Other IOC Programmes (agenda item 11.4)

11.4.1 The Commission noted that it had already reviewed its relationship with IODE under agenda item 7.2, the IOC data exchange policy under agenda item 7.3 and would review its relationship with the International Coordination Group for the Tsunami Warning System in the Pacific (ITSU) and other tsunami-related activities of IOC under agenda item 11.5.

11.5 Natural disaster reduction (agenda item 11.5)

Tsunami warning and a more comprehensive natural marine hazards warning system

11.5.1 The Commission noted with appreciation the extensive work carried out jointly by IOC, WMO and ISDR towards the establishment of an Indian Ocean Tsunami Warning and Mitigation System (IOTWS), in response to the devastating tsunami that had taken place on 26 December 2004, which had claimed the lives of nearly 200 000 people. Taking into consideration the experience of the IOC in the Pacific region through its ICG/ITSU, the countries of the region had requested IOC to lead the United Nations' efforts to establish the IOTWS. The Commission was informed that the system would build national capacity to:

(*a*) Assess national tsunami risk (hazard assessment);
(*b*) Establish national/regional warning centres against local/regional/basinwide tsunamis (warning guidance);
(*c*) Promote education/preparedness and risk reduction against tsunami hazard (mitigation and public awareness).

The Commission noted with appreciation that, from the start, IOC had collaborated closely with WMO and ISDR, combining the specific expertise of each agency. The Commission was informed that elements of IOC action included:

(*a*) The establishment of a governance system for the IOTWS;
(*b*) The strengthening of a core observational network, based upon the GLOSS sea level system;
(*c*) Capacity-building.

11.5.2 With regard to the development of a governance system, the Commission noted:

(*a*) The first and second International Coordination Meetings for the Development of a Tsunami Warning and Mitigation System in the Indian Ocean within a Global Framework (Paris, 3–8 March 2005; and Grand Baie, Mauritius, 14–16 April 2005, respectively);
(*b*) Adoption of Resolution XXIII-12 by the twenty-third session of the IOC Assembly, establishing the Intergovernmental Coordination Group for the Indian Ocean Tsunami Warning and Mitigation System (ICG/IOTWS);
(*c*) The organization of the first session of the ICG/IOTWS in Perth, Australia, from 3 to 7 August 2005. That session had elected the ICG/IOTWS Officers and had also established six intersessional

working groups dealing with a wide range of technical issues. In addition, the Government of Australia had offered to host the Secretariat of the ICG/IOTWS in Perth.

Furthermore, Germany, Japan and Norway had offered staff support for the establishment of a Tsunami Unit at IOC Headquarters in Paris. Additional support had been offered to IOC by Belgium, Canada, Finland, France, Ireland, Israel, Italy, Norway and the United States.

11.5.3 The core system observational network had involved the provision, as from April 2005, of a "tsunami advisory information service" by the Pacific Tsunami Warning Center (PTWC) and JMA, and the upgrading of existing, or installation of new sea level gauges in the Indian Ocean. In that regard, substantial support had been received from Finland and from several other donors through the first United Nations Office for Coordination of Humanitarian Affairs (UNOCHA) Flash Appeal. Considerable progress had also been made with the planning of capacity-building activities: national assessment missions had been undertaken to 16 countries (Bangladesh, Comoros, Indonesia, Kenya, Madagascar, Malaysia, Mauritius, Mozambique, Myanmar, Oman, Pakistan, Seychelles, Somalia, Sri Lanka, United Republic of Tanzania and Thailand). Those missions had aimed at:

(*a*) Informing national stakeholders on the requirements (organizational, infrastructural and human resources) for the establishment and operation of a Tsunami Warning System (TWS);
(*b*) Assessing the available resources;
(*c*) Promoting the establishment of national coordination committees involving the widest possible group of stakeholders;
(*d*) Identifying capacity-building needs.

Those missions had been undertaken in partnership or cooperation with IOC, WMO, ISDR, the International Federation of Red cross and Red Crescent Societies (IFRC), the Asian Disaster Reduction Center (ADRC), the United States Geological Survey (USGS) and NOAA. The results of those missions would be used to identify common requirements at the sub-regional and regional level. Those would be used to prepare a comprehensive capacity-building action plan during the second session of the ICG/IOTWS, planned to be held in Hyderabad, India, from 14 to 16 December 2005.

11.5.4 The Commission stressed the importance of public awareness and preparedness and noted with appreciation the planned development of Tsunami Teacher, a comprehensive information and training resource for the media, education systems, governments, community groups and the private sector. The Commission further urged WMO and IOC to cooperate in that area to ensure long-term awareness and preparedness.

11.5.5 The Commission noted with appreciation the considerable financial support provided by many countries through the UNOCHA Flash Appeal, through IOC or through bilateral support to Indian Ocean countries.

11.5.6 The Commission complimented the Secretariats of IOC and WMO for their rapid and effective response to the request by the Indian Ocean countries as well as other United Nations agencies to develop the IOTWS. That had clearly shown that, if resources were made available, national commitments were made, and priorities were set within the implementing agencies, such an ambitious undertaking was realistic.

11.5.7 The Commission was further informed that the twenty-third session of the IOC Assembly had also established Intergovernmental Coordination Groups for the Caribbean and adjacent regions, and for the Northeast Atlantic and Mediterranean.

11.5.8 The Commission acknowledged also:

(*a*) The timely response of WMO and IOC in identifying and offering their relevant core capabilities to the development of the IOTWS;
(*b*) The coordinated efforts of WMO with IOC and the ISDR Secretariat;
(*c*) WMO's commitment to support, through its infrastructure and technical capabilities, the development of tsunami early warning and mitigation systems in other regions at risk, including the Caribbean and adjacent regions, the north-eastern Atlantic, and the Mediterranean region.

11.5.9 The Commission acknowledged that the planned upgrading of the GTS to support tsunami related information and warnings would be a critical contribution to the IOTWS. It noted that WMO had held a Multidisciplinary Workshop on the Exchange of Early Warning and Related Information Including Tsunami Warnings in the Indian Ocean in Jakarta, Indonesia, from 14 to 15 March, 2005, during which a detailed plan had been developed to upgrade the GTS and 13 countries in need of equipment upgrades had been identified including:

(*a*) Asia: Bangladesh, Indonesia, Maldives, Myanmar, and Sri Lanka;
(*b*) Arab Region: Yemen;
(*c*) Africa: Comoros, Djibouti, Kenya, Madagascar, Seychelles, Somalia, and Tanzania.

The Commission also noted that GTS Expert Team visits to the NMHSs in those countries to identify specific GTS equipment needs were due to be completed by the end of September 2005. The Commission noted that WMO would hold a GTS expert meeting at WMO Headquarters (Geneva, 17-19 October 2005) to develop a concrete and prioritized plan for updating the GTS in those countries.

11.5.10 The Commission acknowledged that most of the NMHSs in the Indian Ocean Rim had been designated by their respective governments as focal points for the receipt of interim tsunami advisory information. The Commission appreciated WMO activities to enhance the multi-hazard national warning alert mechanisms provided through NMHSs to support around-the-clock dissemination of tsunami warnings to authorities, the general public and mariners, and strongly supported WMO's collaboration with UNESCO-

IOC and ISDR in that area. In that regard, the Commission urged IOC and WMO Members/Member States to integrate, into their legislative framework, relevant arrangements for tsunami and other coastal hazards awareness and preparedness.

11.5.11 The Commission stressed the need for tsunami early warning systems to be developed using a marine multi-hazard approach for all regions at risk. The Commission noted WMO's plans to hold a multi-hazard symposium in early 2006 as a first step toward such an approach. The Commission acknowledged the accomplishments of the WMO TCP and the role of NMHSs in tropical cyclone monitoring and forecasting and wave and storm surge forecasting. The Commission further noted the importance of closer collaboration among meteorological, hydrological, and oceanographic communities to enhance disaster risk management capabilities in coastal zones.

11.5.12 The Commission noted the critical importance of developing effective public education and outreach programmes, to help communities understand their risks and enable community-level preparedness and response. The Commission noted particularly the initiatives and activities of the WMO Public Weather Service Programme (PWSP) in collaboration with the WMO DPM and other major WMO programmes, to develop education and public outreach programmes and related multi-hazard educational modules. Those had targeted various stakeholders, including the authorities, media, schools and the public, and had been delivered through the NMHSs to enhance public safety and security.

11.5.13 The Commission urged stronger cooperation and collaboration between IOC in support of marine multi-hazard warning systems including tsunami. It also took note of the establishment by GEO, of a working group on tsunamis.

11.5.14 The Commission recalled that a major focus within the international community in recent years had been on natural disaster reduction, and noted that the tsunami catastrophe of 26 December 2004 in the Indian Ocean had strongly underlined the urgent need for improved coordinated capabilities to provide tsunami warnings. The Commission noted that 90 per cent of all natural disasters were of hydrometeorological origin, and noted that IOC and WMO had complementary contributions to make in ensuring an operational, robust and accurate tsunami warning system, as part of a more comprehensive marine multi-hazard warning system. The Commission recognized that JCOMM could significantly contribute to certain aspects of that process.

11.5.15 The Commission noted that there were a number of components in JCOMM's structure that could contribute to the development of a tsunami warning system as part of a more comprehensive marine multi-hazard warning system. Specifically, the Commission acknowledged that the Observations and Services Programme Areas could make contributions to natural disaster reduction. The OPA's role included the GLOSS network and its upgrading and further development; the possible addition of tsunami related sensors to existing ocean data collection platforms; and capitalizing on the synergies within SOT and DBCP in the deployment and use of multi-purpose deep ocean moorings for marine hazard detection (see agenda item 6). The SPA's role included strengthening existing services to disseminate safety-related warnings, and assisting Members/Member States to develop expertise in storm surge and wave modelling (see agenda item 5), through the Expert Team on Maritime Safety Services, and the Expert Team on Wind Waves and Storm Surges, respectively.

11.5.16 The Commission reviewed possible actions by JCOMM in support of IOTWS and ITSU and other future regionally-based coordination groups for tsunami warning and mitigation, and requested the co-presidents and especially the Observations and Services Programme Areas to contribute as appropriate to the establishment and/or maintenance of those systems. As an existing coordination mechanism and interface between WMO and IOC comprising meteorologists and oceanographers, JCOMM provided a natural umbrella mechanism for such a marine multi-hazard warning system. That could be realized, inter alia, by supporting the participation of relevant technical experts in sessions of the ICG/ITSU and ICG/IOTWS, as well as through national support for JCOMM-related activities and facilities that could contribute to the national and regional tsunami warning and mitigation systems. The Commission stressed, however, that JCOMM should avoid duplication of other organizations' ongoing activities.

11.5.17 The Commission also reviewed other specific JCOMM contributions within a wider framework of cooperation for tsunami and marine-related natural disaster reduction, and requested the co-presidents to work with the Management Committee to ensure the effective coordination of those JCOMM activities within a global framework as appropriate:

(*a*) Analysis of the potential for existing marine platforms and deployment facilities to contribute to a tsunami and other marine hazards early warning network;

(*b*) Contribution to the development of guidance material for Members/Member States relating to the components and operations of a marine hazards warning service;

(*c*) Coordination with IMO and IHO to ensure the dissemination of tsunami warnings and related information through GMDSS communications facilities for maritime safety;

(*d*) Enhancement of the GLOSS network through the upgrading of some of the existing GLOSS stations to tsunami monitoring standard;

(*e*) Coordination of an effective link for the exchange and dissemination of early warnings, and contribution to the development of a fast warning system, especially in maritime safety, utilizing both existing and new transmission facilities in order to reach the public and the relevant mitigation mechanisms;

(*f*) Coordination with JCOMMOPS on the arrangements for ocean platform deployments and

maintenance, which should be used to provide extensive logistic and related support for tsunami detection networks.

The Commission adopted Recommendation 12 (JCOMM-II) on that topic.

Marine Impacts on Lowland Agriculture and Coastal Resources (MILAC)

11.5.18 The Commission noted that the inter-agency project on MILAC aimed at reducing the impact of natural disasters in coastal lowlands due to tropical cyclones, which often caused severe damage to the coastal-zone population, agriculture, freshwater sources, environment, and infrastructure in general. The core goal of MILAC was the forecasting or hindcasting of storm surges and waves caused by tropical cyclones and leading to inundation and other forms of damage, starting with a socio-economic analysis and a consequent choice of strategy to meet user needs. MILAC had been endorsed by the governing bodies of both WMO and IOC, and had subsequently been reviewed and adopted by the Indian Ocean Observing System (IOGOOS). As envisioned, MILAC projects would be developed in multiple regions with each region prioritizing problems specific to their needs and would thus also facilitate the cross-regional exchange of experience and knowledge on tools and data. The Commission noted that MILAC could be incorporated into the overall planning for an IOTWS. The Commission supported MILAC and requested the Management Committee to ensure appropriate input by the JCOMM Programme Areas during implementation.

WMO Natural Disaster Prevention and Mitigation Programme (DPM)

11.5.19 The Commission noted that WMO, through its 10 international scientific and technical programmes, a network of 40 Regional Specialized Meteorological Centres (RSMCs) and three World Meteorological Centres, had the global operational infrastructure for observing, detecting, mapping and providing early warning of weather-, water-, and climate-related hazards. The Commission acknowledged WMO's roles and capacity to make significant contributions towards the establishment of early warning systems within a multi-hazard global framework.

11.5.20 The Commission also acknowledged WMO's strong commitment to disaster risk reduction and noted that:

(*a*) Fourteenth Congress, through its Resolution 29, had established its DPM Programme;

(*b*) The fifty-sixth session of the Executive Council, through its Resolution 5, had established the Executive Council Advisory Group on Natural Disaster Prevention and Mitigation;

(*c*) The fifty-seventh session of the Executive Council, through its Resolution 9, had adopted the DPM Implementation Plan and had requested the Secretary-General to proceed with the activities outlined in the Plan as a matter of high priority.

The primary goal of the DPM Programme was to ensure, through organization-wide coordination and strong strategic partnerships, the optimal utilization of WMO's global infrastructure and integration of its core scientific capabilities and expertise, particularly relating to risk assessment and early warning systems for weather-, water-, and climate-related hazards, in all relevant phases of disaster risk management decision-making at the international, regional and national levels.

11.5.21 The Commission noted that within a "multi-hazard" framework, detailed regional and national surveys of capabilities (strengths and weaknesses) were being carried out as a high priority activity of the DPM Programme. Those included analyses of the gaps and needs in WMO's core areas of activities and related technical capabilities covering observing, monitoring, forecasting and warning; capacity-building and training; and NMHs' educational and public outreach programmes and linkages with risk management and emergency structure. Those efforts would be coordinated with WMO's activities related to least developed countries (LDCs) and Small Island Developing States (SIDS) to ensure that relevant projects were developed to address the specific needs of LDCs and SIDs. The process would identify a systematic phased approach according to the priorities established within each of WMO's Regions.

12. Relationship with other organizations and bodies (agenda item 12)

12.1 United Nations system agencies (including the follow-on to ACC/SOCA) (agenda item 12.1)

12.1.1 The Commission recalled that IOC had hosted the Secretariat of the Sub-committee on Oceans and Coastal Areas of the United Nations Administrative Committee on Coordination (ACC/SOCA) since its establishment in 1993 and had also chaired the Sub-Committee since 1999. In November 2001, the ACC had decided that all its subsidiary bodies should cease to exist by the end of 2001 and that future inter-agency support requirements would best be handled through ad hoc, time-bound, task-oriented arrangements using a lead agency approach. Subsequent consultations among the United Nations Programmes and Specialized Agencies participating in the coordination of ocean and coastal area activities indicated a strong interest in developing a new inter-agency coordinating mechanism consistent with the new arrangements being developed in the United Nations system.

12.1.2 The Commission noted that, in September 2003, the United Nations High-Level Committee on Programmes had approved the creation of an Oceans and Coastal Areas Network (subsequently named UN-Oceans) to build on ACC/SOCA, covering a wide range of issues and composed of the concerned bodies of the United Nations system. Following recommendations of the open-ended United Nations Informal Consultative Process on Oceans and the Law of the Sea (UNICPOLOS) and, taking into account the decisions adopted by the

World Summit on Sustainable Development (Johannesburg, South Africa, 26 August-4 September 2002) in that regard, the fifty-seventh session of the United Nations General Assembly (New York, 2002) had invited the Secretary-General to establish an effective, transparent and regular inter-agency coordination mechanism on oceans and coastal issues within the United Nations system.

12.1.3 The Commission noted further with interest that IOC had hosted the first meeting of UN-Oceans in Paris from 25 to 26 January 2005, where the partners had adopted their Rules of Procedure and Terms of Reference. The group had unanimously elected the IOC Executive Secretary as Coordinator of UN-Oceans and had called on the IOC Secretariat to serve as the implementing Secretariat for UN-Oceans. Four UN-Oceans Task Forces had been established for:

(*a*) Post-Tsunami Response;
(*b*) The Regular Process for Global Assessment of the Marine Environment;
(*c*) Biodiversity in Marine Areas beyond National Jurisdictions;
(*d*) The Second Intergovernmental Review of the Global Programme of Action for Protection of the Marine Environment from Land-based Activities.

12.1.4 The Commission agreed that those developments would be useful in coordinating ocean and coastal activities within the United Nations system. It expressed satisfaction that UN-Oceans had decided to operate as a flexible mechanism to review joint and overlapping activities and to support related deliberations of the UNICPOLOS, coordinating, as far as possible, its meetings with UNICPOLOS sessions.

12.1.5 The Commission recognized that the annual UNICPOLOS sessions, and the associated Annual Report of the Secretary-General on Oceans and the Law of the Sea presented to the sessions, represented a potentially valuable mechanism for exposing marine issues of concern to JCOMM to a wide and influential audience involved in ocean affairs. To date, however, issues such as sustained ocean monitoring, ocean prediction and ocean services had not been considered through that process. The Commission, therefore, requested the co-presidents to work with the Secretariat to develop an approach to the UNICPOLOS process in an endeavour to have such important ocean issues brought to its attention, and also, if possible, included in the annual reports of the Secretary-General.

12.2 GEO, WSSD follow-up, other Conventions (agenda item 12.2)

Group on Earth Observations (GEO) process and WSSD follow-up

12.2.1 The Commission recalled that the World Summit on Sustainable Development had adopted a Plan of Implementation and that subsequent meetings of the G8 ministers had called on countries to enhance current observational networks, including ocean observations from the high sea, the coastal zone and space. In that context, the Commission noted that since the ad hoc Group of Earth Observations (GEO) had been established by the first Earth Observation Summit (EOS I, Washington DC, United States, 31 July 2003), remarkable efforts had been made to develop a comprehensive, coordinated and sustained Global Earth Observation System of Systems (GEOSS).

12.2.2 The Commission was informed that a Declaration adopted at EOS I which had called for action in strengthening global cooperation on Earth observations, had charged the GEO with developing a 10-Year Implementation Plan to promote the development of GEOSS, based on existing observing systems, which would:

(*a*) Cover the full spectrum of in situ and remotely sensed observations;
(*b*) Provide an opportunity for all nations and international organizations to work together for a common cause, within a commonly agreed approach, framework, and methodology;
(*c*) Actively involve developing countries in making improved observations within their national territories, and accessing and using observations made by others;
(*d*) Provide a means to build on the efforts of those international efforts to assess user requirements, identify gaps in global observations, improve communication among nations and organizations with common interests in similar observation capabilities;
(*e*) Provide high-level (ministerial) recognition of the universal need for improved Earth observations;
(*f*) Promote consensus-building among participants about the highest priority observation needs, which were unmet or required a significant increase in resources to provide comprehensive solutions.

The implementation of the Plan should result in:

(*a*) Nations' commitment to make more complete long-term collections of high-priority Earth observations;
(*b*) The filling of the gaps in observing capabilities;
(*c*) Attention to capacity-building in both developing and developed countries;
(*d*) Greater interoperability and connectivity among individual component observing systems for improved exchange and appropriate sharing of data and information to commonly agreed standards.

12.2.3 The Commission was informed that the second Earth Observation Summit (EOS II, Tokyo, Japan, 25 April 2004) had approved a Framework Document consisting of a high-level synopsis of the GEO effort. It had identified the nine beneficiary areas for GEOSS development, responding to socio-economic needs, including:

(*a*) Disasters;
(*b*) Human health;
(*c*) Energy resources;
(*d*) Climate variability and change;
(*e*) Water-resources management;
(*f*) Weather;
(*g*) Ecosystems;

(*h*) Agriculture and combating desertification;
(*i*) Biodiversity.

12.2.4 The Commission noted that, following intensive efforts by GEO Member countries and participating organizations, the third Earth Observation Summit (EOS III, Brussels, Belgium, 16 February 2005) had endorsed the 10-Year Implementation Plan as the basis for its further development and for establishing a Global Earth Observation System of Systems (GEOSS). EOS III further established the intergovernmental Group on Earth Observations, to replace the ad hoc Group and to take the steps necessary to implement GEOSS in accordance with its Implementation Plan. EOS III also encouraged the national governments and governing bodies of the United Nations Specialized Agencies and Programmes to endorse the implementation of GEOSS and to encourage and assist GEO in its work.

12.2.5 The Commission noted with appreciation a Communiqué adopted by EOS III relating to support for tsunami and multi-hazard alert systems. The Commission was informed that the Summit had supported IOC coordination activities and other initiatives to achieve effective tsunami warning systems, as an integral part of a multi-hazard approach supported by GEOSS, and had also requested GEO to support the expansion of multi-hazard capabilities for disaster reduction at national, regional, and international levels.

12.2.6 The Commission noted that the sixth session of the GEO (GEO 6, Brussels,, Belgium, 14-15 February 2005) had agreed to locate the GEO Secretariat at the WMO Headquarters in Geneva, as offered by WMO and supported by the Government of Switzerland.

JCOMM role in GEOSS and its development

12.2.7 The Commission noted that WMO Resolution 9 (EC-LVI) on GEOSS had affirmed WMO's full support to the GEO process and the resulting GEOSS. WMO Members were urged to work closely with other Earth observation agencies at the national level to ensure the development of well-coordinated national plans for GEOSS implementation. The WMO Secretary-General was requested to keep GEO members fully informed of WMO long-term experience in operational observing and telecommunication systems and service provision, and of its capacity to provide effective leadership in the implementation and operation of several key components of GEOSS.

12.2.8 The Commission further noted IOC Resolution EC-XXXVII.2, which had endorsed the concept of GEOSS and had fully supported its implementation within the IOC mandate. The IOC Executive Council had stressed that GOOS should be recognized clearly in the GEOSS Implementation Plan as a key component of Earth Observation, and that existing implementation plans and the GEOSS 10-year Implementation Plan should be mutually consistent. It further urged Member States to:

(*a*) Become fully involved in the planning and implementation of GEOSS by becoming members of GEO;
(*b*) Ensure that their GEO national delegations were fully informed about existing and planned ocean observations;
(*c*) Promote the plans and goals of IOC in that context.

12.2.9 The Commission noted with appreciation the contributions made by IOC and WMO to the overall GEO process, especially the emphasis put on the value of existing observing systems such as GCOS, GOOS and the Global Terrestrial Observing System (GTOS), and, within the latter's mandates, on the need to further develop linkages with the new systems. Considering that the ocean component of GCOS-92 has been adopted by JCOMM as the design for its operational ocean observing system, the Commission welcomed the GEOSS 10-Year Implementation Plan which supported implementation of actions called for in GCOS-92 and the relevant Integrated Global Observing Strategy Partnership (IGOS-P) Theme Reports.

12.2.10 In view of the high visibility of the GEO process to the policy-makers, the Commission recognized that the GEO could be an effective tool in the future not only to get political support for Earth Observation activities but also to enhance communication among in situ and remote sensing communities. The Commission further emphasized that JCOMM, as an implementation mechanism for oceanographic and marine meteorological components of Earth Observation, providing global, intergovernmental coordination of implementation activities and regulatory/guidance material for operational oceanography and marine meteorology, should play a key role as the leading global implementation mechanism of marine observations and services within the GEOSS framework. In that regard, the Commission welcomed the information that the GEOSS work plan involved support to JCOMM in the implementation of its own work programme, and that the Secretariat and key JCOMM experts were already involved in addressing that work, and agreed that JCOMM should continue interacting with GEO in progressing the GEOSS Implementation Plan and its work plan.

12.2.11 Recognizing the important interaction already underway as noted above, the Commission agreed that continuous efforts should be made to maintain and enhance the communication between GEO and JCOMM, not only through WMO and IOC but also through the Members/Member States of both organizations, to ensure that the oceanographic and marine meteorology component was both comprehensive and global. It also encouraged Members/Member States to play an active part in the GEO process at the national level, so as to provide the appropriate information on JCOMM activities.

12.2.12 The Commission adopted Recommendation 13 (JCOMM-II).

WSSD follow-up and other Conventions

12.2.13 The Commission noted that there was a role for JCOMM in many of the actions specified in the WSSD Implementation Plan, which stated (paragraph 30 e.): "Promote integrated, multidisciplinary and multisectoral

coastal and ocean management at the national level, and encourage and assist coastal States in developing ocean policies and mechanisms on integrated coastal management", making it clear that JCOMM development would bring together oceanographers and meteorologists at the national level to develop coordinated actions, often for the first time in some countries. In the same spirit, the Commission recalled that the UNFCCC, and its associated COP, had already been considered in detail under agenda item 11.1 in the context of GCOS. At the same time, it recognized that other United Nations conventions, including the Convention on Biological Diversity, were likely to be of increasing importance to JCOMM in the future, in particular as the Commission's involvement in non-physical and coastal issues developed. It therefore requested the Management Committee and the Secretariat to continue to review progress and activities associated with those Conventions, with a view to proposing possible JCOMM interactions as appropriate.

12.3 THE INTEGRATED GLOBAL OBSERVING STRATEGY PARTNERSHIP (agenda item 12.3)

12.3.1 The Commission recalled that the Integrated Global Observing Strategy Partnership (IGOS-P), which was established in June 1998, had grouped the major global environmental observing systems, their sponsoring agencies, major international research programmes (WCRP, the International Geosphere-Biosphere Programme (IGBP) and environmental satellite operators (coordinated through CEOS into a partnership to develop and implement a fully integrated approach to earth environmental monitoring (http://www.igospartners/org). The IGOS was being developed through a number of specialized themes, the first of which was oceans. *An Ocean Theme for the IGOS-P* had been published in 2001, and was being reviewed by the IGOS-P, under what would become a regular rolling review process for all IGOS-P.

12.3.2 The Commission agreed that the Ocean Theme report was important guidance for ocean observations and should be fully consistent with the implementation strategy for GOOS, GCOS and GEOSS. The Commission also emphasized that JCOMM would certainly have an important role to play in the implementation of the in situ component. It therefore agreed that the Management Committee and Observation Coordination Group should be involved as appropriate in the IGOS Ocean Theme, in cooperation with the GOOS Scientific Steering Committee.

12.3.3 The Commission further noted that the IGOS Partners were awaiting the development of a coastal theme, which would be relevant to JCOMM users. In addition, IGOS Partners had recently formally approved an integrated global carbon theme that included designs for ocean carbon measurements that were beginning to be made from ships of opportunity, and that would most likely be integrated under SOT in due course. Those observations were essential for monitoring the behaviour of the climate system. A cryosphere theme that included sea-ice and floating ice (icebergs) was under preparation, and would be of interest to JCOMM. The Commission expressed its appreciation for developments taking place under IGOS-P, which were highly relevant to its own work programme.

12.4 NON-UNITED NATIONS SYSTEM ORGANIZATIONS AND PROGRAMMES (agenda item 12.4)

12.4.1 The Commission recognized that, in addition to the joint activities with other UN system agencies, both WMO and IOC had also collaborated extensively on marine issues with international organizations and programmes outside the system, both governmental and non-governmental, such as ICSU, the International Ocean Institute (IOI), IHO, ICES, the North Pacific Marine Science Organization (PICES), POGO, etc. The Commission agreed on the high value to WMO and IOC of that collaboration, and urged that it should be continued and further developed in the future.

12.4.2 In particular, the Commission agreed that strengthening cooperation between JCOMM and the IOI as well as with POGO would be instrumental in meeting the interests of wider user groups and communities, particularly in matters relating to education and training, capacity-building, ocean protection and coastal area management. The Commission highlighted that cooperation with IOI was already under way, through the work of the TTR (see agenda item 8), and that the OCG had agreed that continued close contact should be made between JCOMM and POGO, through the Management Committee and also the Observations, Data Management and Capacity-building Programme Areas. The Commission requested all concerned to pursue and strengthen, as necessary, such cooperation.

12.5 INDUSTRY AND COMMERCE (agenda item 12.5)

12.5.1 The Commission noted that both WMO and IOC had worked for many years with some organizations representing industrial and commercial marine-related activities and companies, including those involved with commercial shipping, the offshore oil and gas industry, equipment manufacturers and vendors, and providers of marine telecommunications systems. The Commission also noted that those organizations involved both major users of marine data and services and also potential sources of data and collaborators in marine monitoring and research.

12.5.2 The Commission noted, nevertheless, that there remained considerable potential for benefits to both sides through enhanced interaction between JCOMM and the private sector. It further noted that such involvement could take many forms, including the design, manufacture and sale of observing system equipment; the operation of observing systems and the supply of data; and the use of data and products, deriving from national agencies within the context of JCOMM programmes, to prepare improved or secondary products for sale to end-users. At the same time, the Commission recognized that it was likely that the private sector would wish to be actively involved in the planning,

governance, and implementation of the overall system. Through such means it was also likely that the private sector could become a powerful advocate for the full implementation of government funded, marine observing and data management systems.

12.5.3 The Commission agreed on the importance of actively seeking to enhance its involvement with the private sector, and recommended the establishment of an ad hoc cross-cutting panel to further explore and develop the public/private sector cooperation concept. It requested that the Management Committee address that recommendation as a priority topic for the coming intersessional period. In addition, the Management Committee should consider other appropriate actions to develop public/private involvement in JCOMM. Such actions should include the private sector as a key audience for the new JCOMM Communication Plan and might include industry-specific workshops as a way of identifying and prioritizing industry's requirements as users, developing private sector advocacy, and obtaining industries commitments.

13. JCOMM PLANNING AND BUDGET (agenda item 13)

13.1 WMO LONG-TERM PLAN (agenda item 13.1)

13.1.1 The Commission noted that the *Sixth WMO Long-term Plan 2004-2011* (WMO-No. 962) and *Horizon 2011: Sixth WMO Long-term Plan (2004-2011) Summary for decision makers* (WMO-No. 963) had been prepared and distributed. Those publications were also available electronically in CD-ROM format and on the WMO Web site. The implementation of the Marine Meteorology and Oceanography Programme (Programme 4.4. MMOP) would be coordinated through JCOMM. JCOMM would have the opportunity to contribute to the evolution of the implementation of the 6LTP, particularly the MMOP.

13.1.2 The Commission shared the view of Fourteenth Congress that JCOMM was now recognized as a primary implementation mechanism for GOOS, and for operational oceanography and marine meteorology. For that task, JCOMM would require the enhanced, active support of all maritime Members, especially collaboration between NMHSs and appropriate national oceanographic agencies/institutions at the national level.

13.1.3 The Commission noted with interest that JCOMM would be expected to contribute to the preparation of the 7LTP (2008-2015), to be prepared by the Executive Council Working Group on Long-term Planning, that would eventually be endorsed by the WMO Executive Council in 2006 and approved by WMO Congress in 2007. The Commission welcomed that information, as well as the opportunity for JCOMM to make an input, and requested the co-presidents, in consultation with the Management Committee, to develop that input based on the work plan and priorities as decided during the present session (see agenda item 13.3).

13.1.4 The Commission noted that in the preparation of the Programme and Budget proposal for the Fifteenth Financial Period (2008-2011) consideration was being given to the following programme priority areas:

(*a*) Contribution to the protection of life and property, especially natural disaster prevention and mitigation;
(*b*) Development of NMHSs and the provision of services for the socio-economic benefits of nations, in particular in the LDCs;
(*c*) Climate change and its impact;
(*d*) Hydrology and water resources; and
(*e*) The WMO Space Programme.

13.2 IOC/UNESCO MEDIUM-TERM PLAN (agenda item 13.2)

13.2.1 The Commission noted the adoption by the 31st session of UNESCO's General Conference in 2001 of its Medium-Term Strategy for 2002-2007 (Paris, 15 October-3 November 2001), as well as the companion IOC Medium-Term Strategy for 2004-2007. It further noted that, in the future, the IOC Medium-Term Strategy would fully correspond to that of UNESCO, and would focus on the modalities of action in order to achieve the IOC commitments under the UNESCO Medium-Term Strategy. That UNESCO session had stated that the IOC "will improve ocean services to Members States through the new JCOMM", and the IOC companion strategy had further noted that the "IOC is pioneering the development of operational oceanography, the continuous monitoring of ocean conditions to provide useful information to a wide range of public and private users. JCOMM, as a technical commission of IOC, subsidiary to the IOC Assembly, and as a constituent body of the WMO, subsidiary to its Congress, will serve as a conduit to seek the needed governance in [this current] phase of the implementation of GOOS".

13.2.2 The Commission noted with interest that JCOMM would be invited to provide input to the Medium-Term Strategy for 2008-2013, which would eventually be endorsed by the IOC Executive Council in 2006 and approved by the UNESCO General Conference in October 2007. The Commission welcomed that information, as well as the opportunity for JCOMM to provide input, and requested the co-presidents, in consultation with the Management Committee, to develop that input based on the work plan and priorities as decided during the present session (see agenda item 13.3).

13.3 JCOMM BUDGET (agenda item 13.3)

13.3.1 The Commission noted with appreciation the report of the sessional group on budget and resources given by the co-president, Ms S. Narayanan. The group was charged with:

(*a*) Assessing available Secretariat resources for implementation of JCOMM activities;
(*c*) Conducting a preliminary review of the priorities in each PA;
(*d*) Recommending a strategy to seek resources to meet those priorities.

13.3.2 The Commission affirmed that JCOMM was an implementation mechanism; that Secretariat resources would predominantly be used for coordination activities

to initiate and facilitate that implementation; and that extra-budgetary resources would be required for effective JCOMM implementation. It also agreed that JCOMM needed to prioritize its projects, and that those priorities should be aligned with the approved JCOMM Strategy.

13.3.3 In reviewing the WMO and IOC allocations to JCOMM for 2006 and 2007, the Commission noted that the Secretariat's resources for two years would meet only about 50 per cent or less of the funding requirements associated with the actions agreed and requested by the present session. In order to address the budgetary deficit, the Commission would seek additional extra-budgetary resources in a coordinated fashion, not only within the United Nations system but also from external sources.

13.3.4 In that regard, the Commission noted and agreed with the recommendations of the sessional group, as follows:

(*a*) Short-term implementation of JCOMM programmes:
  (i) The Management Committee needed to review and prioritize the actions requiring funds and seek appropriate sponsors. It was suggested that proponents of projects of interest to JCOMM should prepare a one-page summary outlining the objectives, deliverables, timelines and a realistic estimate of the budget requirement;
  (ii) JCOMM should put forward those proposals that required moderate funding within the United Nations system, to Member countries, and where appropriate to other groups such as POGO, GEO, and others;
  (iii) The TTR, reporting to the Management Committee, should promote those large projects that would need support from identified funding sources;

(*b*) Proactive fund-raising with WMO and IOC:
  (i) JCOMM should ensure integration with WMO's three cross-cutting initiatives: the Natural DPM Programme, the WMO Space Programme, and the Least Developed Countries Programme;
  (ii) JCOMM should be more involved in the planning of the budget of the two parent bodies;
  (iii) JCOMM should interact more closely with other programmes within WMO (e.g., WIS) and IOC (e.g., IODE) to achieve maximum synergies;
  (iv) JCOMM should formulate its projects in a form that could be effectively and easily integrated with the results-based budget approach of WMO and IOC;

(*c*) Promotion of JCOMM:
  (i) JCOMM should ensure its goals and objectives were widely recognized;
  (ii) JCOMM should ensure that its requirements were incorporated in other global initiatives;
  (iii) JCOMM should develop and implement a strong communications strategy.

13.3.5 The Commission emphasized, in particular, the importance of prioritizing intersessional activities, and requested that the Management Committee, with the assistance of the Secretariat, immediately carry out that task in accordance with the WMO Long-Term Plan and IOC Medium Term Strategy.

14. JCOMM DEVELOPMENT (agenda item 14)

14.1 SUBSIDIARY STRUCTURE AND ESTABLISHMENT OF GROUPS, TEAMS AND RAPPORTEURS (agenda item 14.1)

14.1.1 The Commission recalled that, at its first session, it had agreed that the primary guidance, coordination and management of the work of JCOMM would be provided by the co-presidents and a Management Committee. That work would, in turn, be structured into four broad PAs — Services, Observations, Data Management and Capacity-building. Within each PA, the work would be coordinated and integrated by a Coordination Group, the chairperson of which would also act as Programme Area Coordinator. More specific tasks within the different PAs would then be undertaken by relatively small expert teams, task teams and rapporteurs, as well as by the pre-existing bodies and panels.

14.1.2 The Commission noted with appreciation a report from the chairperson of the Sessional Working Group on Structure, Mr G. Holland (Canada). It noted that four structural issues had been raised in the working group:

(*a*) The adequacy of the present capacity-building structure to fulfil the needs of the Commission;
(*b*) A need for further integration and coordination of Programme Areas;
(*c*) The ability of the Commission to interact and coordinate its requirements for satellite platforms and sensors with the space-based community;
(*d*) The need to ensure that the structure of the Commission was aligned with and evolved in accordance with its stated objectives and strategy.

It also noted that the working group had identified a need to improve the Commission's "outreach" capability, and had recommended that the Management Committee undertake the preparation of a Communications Plan, including outreach, and address those actions needed for its implementation.

14.1.3 The Commission decided to adopt a new structure addressing the capacity-building needs of the Commission, with Capacity-building Rapporteurs appointed to each of the three PAs (Observations, Services, and Data Management), forming a cross-cutting integrative team. The Commission noted that one member of that cross-cutting team would represent the team to the Management Committee, and would coordinate with the GOOS Scientific Steering Committee (see also agenda item 8.1). The Commission also decided that the TTR would report directly to the Management Committee.

14.1.4 The Commission recognized the evolving importance of remote sensing, and, in particular, satellite space-based data in the realization of the goals and

work programme of the Commission. It decided to specify that each of the Programme Area Coordination Groups should have an appointed expert in satellite data, with two in the OPA, providing both a meteorological and a oceanographic perspective. Those four experts would form a cross-cutting and integrative team on Satellite Data Requirements. It noted that one of those experts would meet with the Management Committee and would be responsible for organizing satellite/remote sensing requirements within the Commission, by coordinating the work and inputs of the other experts, and by liaising with other external bodies.

14.1.5 The Commission decided to continue with the three other PAs. In so doing, the Commission decided not to take into account groups and/or teams that had been established for a relatively short period of time to deal with specific activities, and which would be the responsibility of the Management Committee. In addition, the Commission specifically entrusted the Management Committee, amongst its other duties, with keeping the JCOMM structure under permanent review and adapting it, as necessary, when the rationale and the need to implement any specific change(s) in the structure arose.

14.1.6 The Commission recognized the need to improve coordination amongst and integration of the different PAs in issues beyond capacity-building and satellite data requirements, and requested that that be a priority issue for the Management Committee during the coming intersessional period. It recommended that the Programme Area Coordination Groups explore better and more frequent mechanisms for communication and coordination within the PA. It also recommended that a specific responsibility for each PA be assigned to a member of the Management Committee, who would then be responsible for identifying and communicating relevant actions across PAs as well as to the Management Committee.

14.1.7 The Commission requested that the co-presidents approach the IOC and WMO with a request for an overall review of the Commission. It noted that such a review should take place in the intersessional period, in time to be presented and considered at the third session of the Commission (JCOMM-III).

14.1.8 The Commission expressed its appreciation to the Secretary-General of WMO and the Executive Secretary of IOC for having provided the draft structure proposal to Members/Member States well in advance of the present session, and for having requested the nomination of experts as potential officers and members of the various bodies identified within the proposal. However, the Commission decided that the process should be adjusted in the future in the following manner. Before the third session of the Commission, the Management Committee, in consultation with Programme Area Coordination Groups and the associated expert groups, would be asked to examine the membership of their respective groups and the associated requirements for continuity, specialized expertise, the need for renewal and, in particular, the adequacy of geographical representation. Those specific requirements would then form the basis for the call to Members/Member States for nominations. The nominations received would then be returned to the Management Committee and its subsidiary bodies in order to prepare recommendations to be presented to JCOMM-III. The Commission decided that it would retain responsibility for amending the recommendations and for appointing the chairperson of the respective groups.

14.1.9 The Commission recognized the fundamental importance to the future success of JCOMM and to the full development of operational oceanography of the work of the individual experts within the proposed structure. It therefore requested Members/Member States to ensure that, as far as possible, their appointed experts be allowed sufficient time within their normal national work programme to complete allocated tasks in support of the Commission.

14.1.10 The Commission adopted Resolutions 1 to 6 (JCOMM-II) to establish a Management Committee, three PAs and their appropriate component groups, expert teams, task teams and rapporteurs, as well as new teams for the cross-cutting integrative capacity-building and satellite data requirement activities of the Commission. Detailed terms of reference and membership were included as part of the respective resolutions. Because of the limited funds available to the Secretariats, it further requested Members/Member States to fund nationally, wherever possible, the participation of their selected experts in the work of the Commission.

14.2 **STRATEGY** (agenda item 14.2)

14.2.1 **COMMUNICATIONS AND OUTREACH** (agenda item 14.2.1)

14.2.1.1 The Commission recognized that having an effective communications and outreach programme was a fundamental requirement for JCOMM, both internally for the benefit of the Commission and its Members/Member States, and externally, for the full range of users and other stakeholders. It recalled that existing components of such a programme included the JCOMM booklet, the primary and associated JCOMM Web sites, and the various publication series. At the same time, it agreed that if communications and outreach were to be truly effective in conveying the right information and messages to the desired target audiences, they should be undertaken in the context of a proper communications strategy and plan. Such a plan should identify critical audiences, the goals of a communications effort, messages to be conveyed to key audiences, and needed communications. At the same time, any outreach activity needed continuous effort and an ongoing commitment to both financial and human resources.

14.2.1.2 In that context, the Commission noted with appreciation that the Management Committee had kept the issue of communications and outreach under constant review during the intersessional period, and at its fourth session (Paris, 9-12 February 2005) had proposed that the JCOMM Secretariat should proceed

with the preparation of a JCOMM Communications Plan, taking into account the existing wider communications plans of IOC and WMO, and working in coordination with the GOOS Project Office as much as possible. The Commission strongly supported that proposal. It recognized that the preparation of such a plan would best be undertaken by communications professionals, and that that would require external funding for implementation. The Commission, therefore, requested the co-presidents to work with the Secretariat to secure such external funding, engage the professional support and finalize the plan.

14.2.1.3 The Commission further agreed that, once the plan was completed, it would need to be implemented, and that, following the example of other similar organizations and bodies, such implementation should be funded through the regular JCOMM budget. It, therefore, also requested the co-presidents to work with the Secretariat to identify the required budgetary resources and implement the Communications Plan once it had been completed.

14.2.1.4 The Commission recognized that the full engagement of its Members/Member States required them to be up-to-date with activities and actions of JCOMM, especially in the PAs. It requested that the JCOMM Communications Plan should incorporate guidelines for internal communications with the goal of providing national focal points with regular and timely reports on all areas of activity, and that those reports should also incorporate succinct and direct executive summaries.

14.2.2 INTEGRATION (agenda item 14.2.2)

14.2.2.1 The Commission recalled that the JCOMM vision statement began: "The vision of JCOMM is that of an organization which coordinates, and develops and recommends standards and procedures for, at the global level, a fully integrated marine observing, data management and services system…" The process of integration was thus fundamental to the whole JCOMM concept. The Commission recognized that the formation of JCOMM had represented the first step, by providing a mechanism for integrating the work of marine meteorologists and oceanographers into operational data, information, products and services supplied to users. It also recalled that additional steps in the integration process had been taken during the past intersessional period, such as through the establishment of the SOT, the merger of JCOMM and GOOS capacity-building, and the increasingly close linkages between JCOMM and IODE in ocean data management. The Commission stressed the importance of concentrating on activities not undertaken by other organizations where JCOMM could best add value.

14.2.2.2 At the same time, the Commission agreed that the integration process needed to be carried significantly further during the coming intersessional period. Led by the Management Committee, all elements of the JCOMM structure should strive for better integration, both within and beyond JCOMM itself. This would require work on integration among JCOMM PAs, with GOOS and the GRAs, with IODE, with other WMO and IOC programmes (in particular, those dealing with natural disaster reduction), with the programmes of other United Nations agencies, and with the private sector. The Commission underlined that effective use of end-to-end data management for oceanographic and marine meteorological data was important for successful implementation across the PAs, and called for support for the development of such cross-cutting tools. Such enhanced integration was not just in the interests of a more efficient and effective working of the Commission, though this was of considerable importance, but also because users and other stakeholders would benefit from an integrated approach to the provision of the required data, information, products and services. The Commission, therefore, agreed that the furtherance of the JCOMM integration process should be one of the priority issues to be addressed by the Management Committee during the coming four years.

14.2.3 STRATEGY DOCUMENT (agenda item 14.2.3)

14.2.3.1 The Commission noted that, following the preparation and publication of the JCOMM booklet, as proposed by JCOMM-I, the Management Committee had recognized that that booklet represented a first step towards a JCOMM Strategy Document or Strategic Plan. Such a strategy document should, in general, provide overall guidelines for the work of the Commission in moving towards the achievement of its long-term objectives, deriving from its vision statement. The Management Committee had agreed that the strategy document would thus provide a road map for the Commission itself; serve to illustrate the value and role of JCOMM in relation to the parent organizations, Members/Member States and their national agencies as well as the overall user community; and assist in securing funding support by demonstrating a clear and structured approach to achieving JCOMM's objectives. In addition, the Management Committee had further agreed that the document should be based on an overall set of guiding principles, which would cover issues such as streamlining and integration, technological advances, user interactions, responsiveness to the parent organizations and other stakeholders, outreach, communications, etc.

14.2.3.2 The Commission strongly supported the requirement for a JCOMM Strategy Document, as well as the considerations of the Management Committee as outlined above. It noted with appreciation that a first draft of the Strategy Document had been prepared by the co-presidents, and subsequently reviewed and revised, through several iterations, by the Management Committee and a number of external experts. The Commission reviewed the final draft of the JCOMM Strategy Document, as presented to it by the Management Committee, and proposed a number of amendments. It approved the draft as amended, the Executive Summary of which is given in Annex II to the present report, and requested the Secretariat to publish the finalized Strategy Document as a JCOMM Technical

Report. The Commission thanked the co-presidents and the Management Committee for its work in preparing that Strategy Document, which it considered a very valuable contribution to the work and status of JCOMM. It requested that all JCOMM entities adhere to the principles of the Strategy Document. It requested the Management Committee to keep the document under review, with a view to proposing amendments and revisions to future JCOMM sessions, as the Commission and its work programme evolved. It also instructed the Management Committee to complement the Strategy Document with an integrated JCOMM Implementation Plan during the coming intersessional period. That plan should include a comprehensive set of specific objectives and deliverables, with associated timelines and performance indicators, across all PAs, and should adhere to the more general requirements and procedures of the parent organizations.

14.2.4 System performance and monitoring (agenda item 14.2.4)

14.2.4.1 The Commission recalled that, under agenda item 6.3, it had reviewed the important developments which had taken place during the past intersessional period in the implementation of a comprehensive performance monitoring programme for the integrated, operational, in situ ocean observing system. Such monitoring, in the form of easy to understand performance reports, allowed evaluation of the effectiveness of the observing system and should help convince governments to provide the funding needed to meet global implementation targets. In that regard, the OCG had been working to bring together elements of that work to develop summary reports illustrating how advances towards global coverage had improved the adequacy of the observational information that was essential for monitoring the state of the ocean and marine atmosphere.

14.2.4.2 The Commission recognized that work on monitoring the performance of the observing system represented an important first step in the development of a more comprehensive system performance monitoring programme for the whole of JCOMM. The JCOMM Implementation Plan would allow proper monitoring and assessment of the performance of the Commission to be undertaken, against the identified deliverables, with the following applications and advantages:

(*a*) Provide the required input to the broader IOC and WMO performance monitoring process;
(*b*) Allow the rapid identification of problems with programme implementation and facilitate remedial action;
(*c*) As with the observing system monitoring noted above, provide data and information to support efforts to convince governments to provide the funding needed to meet implementation targets;
(*d*) Provide data and information to users on the effectiveness and value of JCOMM, its programme and systems.

14.2.4.3 The Commission agreed that the development and implementation of system-wide performance monitoring within JCOMM was also a high priority issue for the coming intersessional period and requested the co-presidents, the Management Committee and the Secretariat to address it as a matter of urgency.

14.3 Resource requirements and commitments (agenda item 14.3)

14.3.1 The Commission recognized that there were two types of resources required for the implementation of the JCOMM Programme: resources for programme planning, coordination and management; and resources for system implementation and maintenance. The former were normally provided through the Secretariat's regular budget, augmented where possible by external contributions to the JCOMM Trust Fund for specific activities, and those had been addressed in detail under agenda item 13.3.

14.3.2 It was recognized that the resources required for system implementation and maintenance were entirely the responsibility of Members/Member States, and took many forms, including: maintenance of components of the observing system; data management facilities, including communications and the operation of data management and data archival centres, for both national and international purposes; the operation of data processing, product preparation and services facilities, again for both national and international purposes; system monitoring to support both national and international objectives; and the operation of specialized centres and/or facilities to support international requirements or obligations, such as Web sites, JCOMMOPS and possible future JCOMM Specialized Oceanographic Centres. The full implementation of the JCOMM programme would require that Members/Member States continue and expand their contributions to all those components, to support both national and international requirements.

14.3.3 The Commission fully recognized that its Members/Member States, the members of its expert teams and groups, and even participants in the present session, were generally not in a position to make commitments regarding the required resources. Nevertheless, they were often in a position to influence national decision makers regarding implementation issues, if provided with appropriate information and assistance through JCOMM. The Commission agreed that existing information of that type included, in particular, the observing system monitoring statistics discussed in detail under agenda item 6.3, which clearly demonstrated the fact that the operational in situ observing system was currently only some 50 per cent implemented, and that significant resources would be required to achieve full implementation, and not simply a reallocation of existing resources, as had occurred in the past. In addition, the Commission agreed that the more extensive JCOMM system performance monitoring, as discussed above under general summary paragraph 14.2.4, would provide further critical input to that process, as would work on a proper "business case" for operational oceanography, addressed under agenda

item 5.2. The Commission, therefore, urged once more that that work should be completed as soon as possible, and that JCOMM Members/Member States should then make maximum use of the information provided to persuade national decision makers to provide the additional funding required for the full implementation of the JCOMM programme.

15. INTERSESSIONAL WORK PROGRAMME (agenda item 15)

15.1 The Commission recognized it had adopted all the elements of its work programme for the next intersessional period when discussing the various agenda items above. It therefore requested the Secretariat to compile the work programme for the next intersessional period in an appropriately structured form and to attach it as annex III to the final report of the session.

16. REVIEW OF PREVIOUS RESOLUTIONS AND RECOMMENDATIONS OF JCOMM (INCLUDING CMM AND IGOSS) AND OF RELEVANT RESOLUTIONS OF THE GOVERNING BODIES OF WMO AND IOC (agenda item 16)

16.1 In accordance with WMO General Regulation 190, the Commission examined those resolutions and recommendations adopted by JCOMM (including CMM and IGOSS) prior to JCOMM-II which were still in force. It noted that action on many of the previous recommendations had already been taken and completed, or their substance incorporated into different WMO and IOC *Manuals* and *Guides*, as appropriate. Resolution 7 (JCOMM-II) was adopted.

16.2 The Commission also examined WMO and IOC Governing Body resolutions within the field of the activities of JCOMM. Recommendation 14 (JCOMM-II) was adopted.

17. ELECTION OF OFFICERS (agenda item 17)

17.1 The Commission elected Mr P. Dexter (Australia) as its co-president for meteorology, and Mr J.-L. Fellous (France) as its co-president for oceanography. The Commission agreed that, in order to avoid confusion regarding management responsibilities, Mr Dexter should assume primary authority for guiding the work of JCOMM during the first two years of the intersessional period, and Mr Fellous during the second two years. Notwithstanding that arrangement, the Commission recommended that the co-presidents should implement an arrangement whereby they shared, as far as possible, responsibilities for overseeing different components of the technical work of JCOMM.

17.2 Following the elections, the Commission took the opportunity to place on record its considerable and sincere appreciation to the retiring co-presidents, Mr J. Guddal (Norway) and Ms S. Narayanan (Canada), for their outstanding work in guiding the work of the Commission during its first and most crucial intersessional period.

18. DATE AND PLACE OF THE THIRD SESSION (agenda item 18)

18.1 The Commission was pleased to receive the tentative offer by Morocco to host its third session in 2009. It requested the co-presidents to consult with the Secretary-General of WMO, the Executive Secretary of IOC and the Government of Morocco, with a view to confirming the offer and determining the exact date and place, in accordance with WMO General Regulation 187.

19. CLOSURE OF THE SESSION (agenda item 19)

19.1 The second session of the Joint WMO/IOC Technical Commission for Oceanography and Marine Meteorology closed at 3.50 p.m. on 27 September 2005.

RESOLUTIONS ADOPTED BY THE SESSION

RESOLUTION 1 (JCOMM-II)

MANAGEMENT COMMITTEE OF THE JOINT WMO/IOC TECHNICAL COMMISSION FOR OCEANOGRAPHY AND MARINE METEOROLOGY

THE JOINT WMO/IOC TECHNICAL COMMISSION FOR OCEANOGRAPHY AND MARINE METEOROLOGY,

NOTING:

(1) Resolution 1 (JCOMM-I) – Management Committee of the Joint WMO/IOC Technical Commission for Oceanography and Marine Meteorology,

(2) Resolution 7 (EC-LIV) – Report of the first session of the Joint WMO/IOC Technical Commission for Oceanography and Marine Meteorology,

(3) Resolution EC-XXXV.4 – First session of the Joint WMO/IOC Technical Commission for Oceanography and Marine Meteorology,

(4) Resolution 16 (Cg-XIV) – Marine Meteorology and Oceanographic Activities Programme,

(5) The report of the co-presidents of the Commission to JCOMM-II,

CONSIDERING:

(1) The requirement of the Commission to promote, coordinate and integrate marine meteorological and operational oceanographic programmes and activities,

(2) The contributions of the Commission to the WWW, WCP, WCRP, GOOS, GCOS and other major programmes of WMO and IOC,

(3) The need to coordinate the work of the Commission with other appropriate international organizations and their subsidiary bodies,

(4) The need for continued overall coordination of the work programme of the Commission and for advice on matters referred to it by the Executive Councils of WMO and IOC, the WMO Congress and the IOC Assembly,

DECIDES:

(1) To re-establish a Management Committee with the following terms of reference:
   (*a*) Review the short and long-term planning of the work programme of JCOMM and advise on its implementation;
   (*b*) Assess the resources required for the implementation of the work programme, as well as approaches to identifying and mobilizing these resources;
   (*c*) Coordinate and integrate the work of JCOMM, as implemented through the various working groups, teams and rapporteurs;
   (*d*) Review the internal structure and working methods of the Commission, including its relationship to other bodies, both internal and external to WMO and IOC, and develop proposals for modifications as appropriate;
   (*e*) Assess the implementation of activities and projects referred to JCOMM for action by WWW, WCP, GOOS, GCOS and other programmes, including, in particular, the GCOS Implementation Plan;
   (*f*) Contribute as required to the planning processes of WMO and IOC;

(2) That the co-presidents shall have the responsibility to jointly undertake the duties required of presidents of technical commissions of WMO and technical committees of IOC as defined in their respective regulations. These would include or be extended to include the following:
   (*a*) In joint consultation, to guide and coordinate the activities of the Commission and its working groups intersessionally;
   (*b*) In joint consultation, and with the assistance of the Secretariats, to direct and approve intersessional actions including the creation and dissolution of ad hoc expert groups, task teams and rapporteurs, pending approval by the Commission in session;
   (*c*) To carry out specific duties as prescribed by decisions of Congress and the Executive Council of WMO and the Assembly and Executive Council of IOC, as well as by the regulations of each organization;
   (*d*) To report to the governing bodies of WMO and IOC at their regular sessions on the activities of the Commission, as necessary;
   (*e*) To ensure that the activities, recommendations and resolutions of the Commission are consistent with the provisions of the WMO Convention, the IOC Statutes, the decisions of WMO and IOC governing bodies, and the regulations of both organizations;

(3) That the Management Committee will be composed of:
   (*a*) The two co-presidents of the Commission;
   (*b*) The Programme Area Coordinators;
   (*c*) The representative of the Cross-cutting Team on Capacity-building;
   (*d*) The representative of the Cross-cutting Team on Satellite Data Requirements;

(*e*) The chairperson of the Task Team on Resources;
(*f*) The following experts:
Mr P. Dandin (France);
Ms R. Folorunsho (Nigeria);
Mr I. Frolov (Russian Federation);
Mr R. Nuñez (Chile);
Mr H. Wang (China)
(*g*) Senior Representatives of GOOS, GCOS and IODE; Representatives of CBS and other bodies may be invited, as appropriate;

(4) That additional experts may be invited by the co-presidents, in consultation with the Secretary-General of WMO and the Executive Secretary IOC, to participate in sessions of the committee, as appropriate.

RESOLUTION 2 (JCOMM-II)

SERVICES PROGRAMME AREA

THE JOINT WMO/IOC TECHNICAL COMMISSION FOR OCEANOGRAPHY AND MARINE METEOROLOGY,

NOTING:

(1) Resolution 2 (JCOMM-I) – Services Programme Area,
(2) The report of the co-presidents of the Commission to JCOMM-II,
(3) The report of the chairperson of the Services Programme Area to JCOMM-II,

CONSIDERING:

(1) The continuing and expanding requirements of marine users for marine meteorological and oceanographic services and information,
(2) The need to ensure that the services provided to users meet these requirements, including in terms of timeliness and quality,
(3) The need to keep under review and to respond to the requirements of Members/Member States for guidance in the implementation of their duties and obligations with regard to marine services, in particular those specified in the WMO *Manual on Marine Meteorological Services* (WMO-No. 558),
(4) The need to monitor closely the operations of the WMO marine broadcast system for the GMDSS, as well as MPERSS, to develop modifications to the systems as necessary and to provide assistance to Members/Member States as required,
(5) The need to develop the preparation and dissemination of ocean products and services,
(6) The need to coordinate closely with other programmes of WMO and IOC (WWW, WCP, GOOS, GCOS), as well as with other organizations such as IMO, IHO, IMSO and ICS in the provision of marine services and information,

DECIDES:

(1) To re-implement a JCOMM Services Programme Area with the following components:
(*a*) A Services Coordination Group;
(*b*) An Expert Team on Maritime Safety Services;
(*c*) An Expert Team on Wind Waves and Storm Surges;
(*d*) An Expert Team on Sea Ice;
(*e*) An Expert Team on Marine Accident Emergency Support;
(*f*) A Capacity-building Rapporteur, as a member of the Services Coordination Group and of the Cross-cutting Team on Capacity-building;
(*g*) A Satellite Expert, as a member of the Services Coordination Group and of the Cross-cutting Team on Satellite Data Requirements;

(2) That the terms of reference of the Services Coordination Group and the Expert Teams shall be as given in the annex to this resolution;
(3) That the general membership of the Services Coordination Group and the Expert Teams shall also be as given in the annex to this resolution;
(4) To select, in accordance with WMO General Regulation 32:
(*a*) Mr C. Donlon (United Kingdom) as chairperson of the Services Coordination Group and Services Programme Area Coordinator;
(*b*) Mr H. Savina (France) as chairperson of the Expert Team on Maritime Safety Services;
(*c*) Mr V. Swail (Canada) as chairperson of the Expert Team on Wind Waves and Storm Surges;
(*d*) Mr V. Smolyanitsky (Russian Federation) as chairperson of the Expert Team on Sea Ice;
(*e*) Mr P. Daniel (France) as chairperson of the Expert Team on Marine Accident Emergency Support;

(5) To select, in accordance with WMO General Regulation 32, as members of the Services Coordination Group:
Mr H. Guijun (China);
Mr P. Parker (Australia);

(6) To select, in accordance with WMO General Regulation 32, the following experts to serve as members of the Expert Team on Wind Waves and Storm Surges:
Mr M. Higaki (Japan);
Mr M. Holt (United Kingdom);
Mr I. Lavrenov (Russian Federation);
Mr J.-M. Lefèvre (France);
Mr J. Seo (Republic of Korea);

Mr H. Tolman (United States);
Mr H. de Vries (Netherlands);
Mr G. Warren (Australia);

(7) To select, in accordance with WMO General Regulation 32, the following experts to serve as members of the Expert Team on Sea Ice:
Mr H. Andersen (Denmark);
Mr S. Bai (China);
Mr H. Bjornsson (Iceland);
Mr J. Falkingham (Canada)
Mr T. Grafström (Sweden);
Mr K. Hamada (Japan);
Mr M. Picasso (Argentina);
Mr M. Porcires (Norway);
Mr A. Seina (Finland);
Mr P. Seymour (United States)
Mr J. Shanklin (United Kingdom);

REQUESTS the Secretary-General of WMO and the Executive Secretary IOC to invite IMO, IHO, ICS, IFSMA, IMSO, FAO and other relevant organizations and bodies to participate in the work within this Programme Area, as appropriate.

ANNEX TO RESOLUTION 2 (JCOMM-II)

TERMS OF REFERENCE AND GENERAL MEMBERSHIP OF THE COORDINATION GROUP AND EXPERT TEAMS OF THE SERVICES PROGRAMME AREA

1. Services Coordination Group

Terms of reference

The Services Coordination Group, in close collaboration with CBS, GOOS and GCOS subsidiary bodies and related experts, shall:

(*a*) Keep under review and advise on the effectiveness, coordination and operation of the Services work programme, including performance with respect to timeliness, standards, quality and relevance to established user requirements;
(*b*) Through the assembly of requirements identified by specialist service groups, and other Programme Areas of JCOMM, provide advice on JCOMM services that need to be changed, implemented or discontinued;
(*c*) Develop interfaces to representative user groups in order to monitor the strength and weaknesses of existing services;
(*d*) With the concurrence of the co-presidents of JCOMM, establish and create expert teams, task teams, pilot projects and appoint rapporteurs, as appropriate, to undertake the work of the Services Programme Area;
(*e*) Ensure effective coordination and cooperation with groups and bodies in the area of service provision, including other Programme Areas of the Commission;
(*f*) Liaise with external bodies, in particular those representing user communities;
(*g*) Identify capacity-building requirements related to the Programme Area;
(*h*) Identify satellite remote sensing requirements related to the Programme Area.

General membership

The membership is selected to ensure an appropriate range of expertise and to maintain an appropriate geographical representation, and includes:

Programme Area/Services Coordinator (chairperson);
Chairpersons of Expert Teams (four);
Capacity-building Rapporteur;
Satellite Expert;
Chairpersons of any task teams;
Three additional experts.

Representatives of JCOMM Programme Areas and of other expert bodies may be invited, as appropriate, with the concurrence of the co-presidents of the Commission, and in general with no resource implications to JCOMM.

2. Expert Team on Maritime Safety Services

Terms of reference

The Expert Team on Maritime Safety Services, in close collaboration with IMO, IHO, ICS, IMSO and other concerned organizations and bodies on maritime safety issues, including the GMDSS, shall:

(*a*) Monitor and review the operations of marine broadcast systems, including for the GMDSS and others for vessels not covered by the SOLAS Convention;
(*b*) Monitor and review technical and service quality standards for meteorological and oceanographic maritime safety information, particularly for the GMDSS, and provide assistance and support to Members as required;
(*c*) Ensure feedback from the user communities is obtained through appropriate and organized channels and applied to improve the relevance, effectiveness and quality of services;
(*d*) Ensure effective coordination and cooperation with concerned organizations, bodies and Members and Member States on maritime safety issues;
(*e*) Propose actions as appropriate to meet requirements for international coordination of meteorological and related communication services;

(*f*) Provide advice to the Services Coordination Group and other JCOMM groups, as required, on issues related to maritime safety services.

General membership
Chairperson, selected by the Commission.

Open membership, including representatives/nominations of the Issuing Services for the GMDSS, representatives of IMO, IHO, ICS, IMSO, and other user groups, as appropriate.

3. Expert Team on Wind Waves and Storm Surges

Terms of reference
The Expert Team on Wind Waves and Storm Surges shall:
(*a*) Review and advise on the implementation of wind wave and storm surge activities within JCOMM and propose amendments as required;
(*b*) Develop technical advice on wave and storm surge modelling, forecasting and service provision and provide assistance and support to Members/Member States as required;
(*c*) Interact closely with ETMSS on all aspects of sea state and surge forecasting relevant to the operation and improvement of maritime safety services;
(*d*) Monitor projects for verification of operational wind wave and storm surge model outputs and assist in their implementation as required;
(*e*) Ensure effective coordination and cooperation with other WMO and appropriate GOOS bodies, particularly on requirements for, and implementation of, wind wave and storm surge products and services;
(*f*) Provide advice to the Services Coordination Group and other JCOMM groups, as required, on issues related to wind waves and storm surges.

General membership
The membership is selected to ensure an appropriate range of expertise and to maintain an appropriate geographical representation.

Up to nine members, including the chairperson, and a further three to five (self-supporting) members, representative of the range of activities related to wind waves and storm surges within JCOMM. Additional experts may be invited as appropriate, with the concurrence of the co-presidents of the Commission and in general with no resource implications to JCOMM.

4. Expert Team on Sea Ice

Terms of reference
The Expert Team on Sea Ice shall:
(*a*) Review and catalogue the products and services required by user communities in sea-ice areas;
(*b*) Encourage and advise on the relevant numerical models and forecast techniques for products and services;
(*c*) Develop technical guidance material, software exchange, specialized training and other appropriate capacity-building support with regard to sea-ice observations and services and provide assistance and support to Members/Member States as required;
(*d*) Interact closely with the ETMSS and ETMAES on all aspects of the impacts of sea-ice relevant to maritime safety, marine pollution response and search and rescue services;
(*e*) Maintain linkages with relevant international organizations and programmes, in particular BSIM, CLIC, IICWG, ASPeCt, GCOS and IHO;
(*f*) Keep under review and provide guidance as appropriate on the operations of the Global Digital Sea Ice Data Bank, including appropriate quality control, error analysis and archiving mechanisms, and encourage and facilitate enhanced submissions of sea-ice data to the bank;
(*g*) Review and propose amendments to formats, nomenclatures and procedures for sea-ice data and information exchange as well as to relevant terminology, coding and mapping standards, including management of an ice objects register within ECDIS, and requirements for sea-ice information as an Essential Climate Variable (ECV) within GCOS;
(*h*) Provide advice to the Services Coordination Group and other JCOMM groups, as required, on issues related to sea-ice and the ice-covered regions;
(*i*) Play a key role in JCOMM involvement in major international polar projects such as IPY 2007-2008.

General membership
The membership is selected to ensure an appropriate range of expertise and to maintain an appropriate geographical representation.

Up to 12 members, including the chairperson, representatives of the range of activities related to sea-ice and the ice-covered regions within JCOMM. (It is expected that, in general, the ETSI will be self-funding.)

Representatives of regional and international sea-ice bodies in particular the Baltic Sea Ice Meeting and the International Ice Charting Working Group will also be invited to participate at their own expense.

5. Expert Team on Marine Accident Emergency Support

Terms of reference
The Expert Team on Marine Accident Emergency Support shall:

(*a*) In support of the Marine Pollution Emergency Response Support System (MPERSS):
  (i) Monitor implementation and operations of MPERSS; review and suggest, as necessary, improvements to the contents of the overall system plan;
  (ii) Facilitate coordination and cooperation amongst the Area Meteorological and Oceanographic Coordinators (AMOCs) of MPERSS, in particular, with a view to ensuring full and ongoing operations in all areas, as well as the exchange of relevant advice, information, data and products between AMOCs, as appropriate and required;

(*b*) In support of maritime search and rescue (SAR) operations, and in particular for the Global Maritime Distress and Safety System (GMDSS):
  (i) Monitor requirements for meteorological and oceanographic data, information, products and services to support SAR operations worldwide, and prepare draft amendments to the *Manual on Marine Meteorological Services* (WMO-No. 558) in this regard, as appropriate;
  (ii) As necessary, facilitate coordination and cooperation amongst relevant agencies in the provision of meteorological and oceanographic information and support to maritime SAR operations;

(*c*) Ensure effective and ongoing coordination and cooperation with relevant organizations and bodies, as well as with Members/Member States on any type of marine accident emergency support needs;

(*d*) Provide advice to the Services Coordination Group and other JCOMM groups, as required, on issues related to marine accident emergency support.

General membership

Chairperson, selected by the Commission.

Open membership, including representatives of the AMOCs for MPERSS and other national agencies, as appropriate.

Representatives of IMO, IHO and other concerned organizations and bodies, including representatives of specific user groups, as appropriate, should be invited to participate.

RESOLUTION 3 (JCOMM-II)

OBSERVATIONS PROGRAMME AREA

THE JOINT WMO/IOC TECHNICAL COMMISSION FOR OCEANOGRAPHY AND MARINE METEOROLOGY,

NOTING:

(1) Resolution 3 (JCOMM-I) – Observations Programme Area,
(2) WMO Resolution 4 (EC-LII) and IOC Resolution EC-XXXIII.8 – Data Buoy Cooperation Panel,
(3) IOC Resolution EC-XXXIII.9 – Global Sea Level Observing System,
(4) Paragraph 3.4.4.13 of the general summary of the *Abridged Final Report with Resolutions of the Fourteenth World Meteorological Congress* (WMO-No. 960),
(5) IOC Resolution XX-6 – The Argo Project,
(6) Global Ocean Observations for GOOS/GCOS: An Action Plan for Existing Bodies and Mechanisms (GOOS Report No. 66/GCOS Report No. 51, 1999),
(7) Conference Statement of the First International Conference on Ocean Observing Systems for Climate, St-Raphael, France, October 1999,
(8) The report of the chairperson of the Observations Coordination Group to the session,

CONSIDERING:

(1) The need to maintain, improve, coordinate and integrate a comprehensive in situ ocean observing system, in response to stated requirements for marine data to support the WWW, WCP, WCRP, GOOS, GCOS and marine services,
(2) The need to monitor new developments in marine observing technology and advise on their incorporation into operational observing networks, as appropriate,
(3) The need to coordinate the development and implementation of standardized, high quality marine observing practices and instrumentation,
(4) The need to review continuously and advise on, and assist in, the implementation of new marine telecommunications systems and procedures,
(5) The need to provide guidance to Members/Member States on technical aspects of marine observing systems,
(6) The need to identify and coordinate the provision of resources and logistic facilities for the deployment and servicing of marine observing platforms and instrumentation,
(7) The need to continuously monitor the performance and quality of marine observing systems and to assist in the implementation of remedial actions, as necessary,
(8) The need to coordinate with appropriate bodies of CBS, CIMO, GOOS and GCOS on marine instrumentation, observations networks and requirements for marine data,

DECIDES:

(1) To re-implement a JCOMM Observations Programme Area, with the following components:

(*a*) An Observations Coordination Group;
(*b*) A Data Buoy Observations Team, known as the Data Buoy Cooperation Panel;
(*c*) A Sea Level Observations Team, known as the GLOSS Group of Experts;
(*d*) A Ship Observations Team, aimed at continuing to develop coordination and synergies among the three existing ship-based panels, i.e. the SOOP Implementation Panel, the VOS Panel and the ASAP Panel;
(*e*) A Capacity-building Rapporteur, as a member of the Observations Coordination Group and of the Cross-cutting Team on Capacity-building;
(*f*) Two Satellite Experts (one ocean and one meteorology), as members of the Observations Coordination Group and of the Cross-cutting Team on Satellite Data Requirements;

(2) To maintain close liaison and coordination with the Argo Steering Team, the OceanSITES Project, and the International Ocean Carbon Coordination Project (IOCCP);

(3) That the terms of reference for the Observations Coordination Group and the Ship, Data Buoy and Sea Level Observations Teams shall be as given in the annex to this resolution,

(4) That the general membership of the Observations Coordination Group and Ship, Data Buoy and Sea Level Observations Teams shall also be as given in the annex to this resolution,

(5) To select, in accordance with WMO General Regulation 32:
(*a*) Mr M. Johnson (United States) as chairperson of the Observations Coordination Group and Observations Programme Area Coordinator;
(*b*) Mr G. Ball (Australia) as chairperson of the Ship Observations Team;

(6) To select, in accordance with WMO General Regulation 32:
(*a*) Mr S. Cook (United States) as chairperson of the SOOP Implementation Panel;
(*b*) Ms J. Fletcher (New Zealand) as chairperson of the VOS Panel;

Requests the Secretary-General of WMO and the Executive Secretary IOC to invite relevant organizations and bodies to participate in the work of this programme area, as appropriate.

ANNEX TO RESOLUTION 3 (JCOMM-II)

TERMS OF REFERENCE AND GENERAL MEMBERSHIP OF THE COORDINATION GROUP AND TEAMS OF THE OBSERVATIONS PROGRAMME AREA

1. Observations Coordination Group

Terms of reference

The Observations Coordination Group shall:

(*a*) Keep under review and advise on the effectiveness, coordination and operation of the Observations work programme, including performance measured against scientific requirements, delivery of raw data, measurement standards, logistics and resources;
(*b*) Provide advice to JCOMM and to Observations Teams on possible solutions for newly-identified requirements, consulting, as appropriate, with relevant scientific groups and CBS;
(*c*) Review in situ data requirements and recommend changes, as appropriate, taking into account the continuing development of satellite observations and their capabilities;
(*d*) Coordinate the development of standardized, high quality observing practices and instrumentation and prepare recommendations for JCOMM;
(*e*) With the concurrence of the co-presidents of JCOMM, establish and create expert teams, task teams, pilot projects and appoint rapporteurs, as appropriate, to undertake the work of the Observations Programme Area;
(*f*) Examine trade-offs and use of new and improved techniques/developments against requirements and available resources;
(*g*) Liaise with, and input to, CBS activities regarding the consolidated requirements database and operational satellites;
(*h*) Identify capacity-building requirements related to the Programme Area;
(*i*) Identify satellite remote sensing requirements in the meteorological and ocean domains related to the Programme Area.

General membership

The membership is selected to ensure an appropriate range of expertise and to maintain an appropriate geographical representation, and includes:

Programme Area/Observations Coordinator (chairperson);
Chairperson Ship Observations Team;

Chairperson DBCP;
Chairperson GLOSS Group of Experts;
Chairperson Argo Steering Team;
Representative of International Ocean Carbon Coordination Project;
Representative of OceanSITES;
Chairperson Tropical Moored Buoys Implementation Panel;
Data Assimilation/Modeling Expert;
Capacity-building Rapporteur;
Ocean Satellite Expert;
Meteorological Satellite Expert.

JCOMMOPS will participate in the work and the meetings of the Coordination Group.

2. Ship Observations Team

Terms of reference

The Ship Observations Team shall:

(*a*) Review and analyse requirements for ship-based observational data expressed by relevant existing international programmes and/or systems and in support of marine services, and coordinate actions to implement and maintain the networks to satisfy these requirements;
(*b*) Provide continuing assessment of the extent to which those requirements are being met;
(*c*) Develop methodology for constantly controlling and improving the quality of data;
(*d*) Review marine telecommunication facilities and procedures for observational data collection, as well as technology and techniques for data-processing and transmission, and propose actions as necessary for improvements and enhanced application;
(*e*) Coordinate PMO/ship greeting operations globally, propose actions to enhance PMO standards and operations and contribute, as required, to PMO and observer training;
(*f*) Review, maintain and update as necessary technical guidance material relating to ship observations and PMOs;
(*g*) Liaise and coordinate as necessary with other JCOMM Programme Areas and expert teams, as well as with other interested parties;
(*h*) Participate in planning activities of appropriate observing system experiments and major international research programmes as the specialist group on observations based onboard ships, including voluntary observing ships, ships-of-opportunity and research ships;
(*i*) Seek opportunities for deploying various kinds of measuring devices and widely publicize those opportunities;
(*j*) Develop, as necessary, new pilot projects and/or operational activities and establish new specialized panels as required;
(*k*) Carry out other activities as agreed by participating members to implement and operate the SOT Programme and to promote and expand it internationally.

Terms of reference of component panels

SOOP Implementation Panel

(*a*) Review, recommend and, as necessary, coordinate the implementation of specialized shipboard instrumentation and observing practices dedicated to temperature and salinity measurements;
(*b*) Coordinate the exchange of technical information on relevant oceanographic equipment and expendables, development, functionality, reliability and accuracy, and survey new developments in instrumentation technology and recommended practices;
(*c*) Ensure the distribution of available programme resources to ships to meet the agreed sampling strategy in the most efficient way;
(*d*) Ensure the transmission of data in real-time from participating ships; ensure that delayed mode data are checked and distributed in a timely manner to data processing centres;
(*e*) Maintain, through the SOOP Coordinator, appropriate inventories, monitoring reports and analyses, performance indicators and information exchange facilities;
(*f*) Provide guidance to the Coordinator in his support for the SOOP;
(*g*) Prepare annually a report on the status of SOOP operations, data availability and data quality.

Ad hoc ASAP Panel *(The following terms of reference may be assumed by one of the other panels during the intersession.)*

(*a*) Coordinate the overall implementation of the ASAP, including recommending routes and monitoring the overall performance of the programme, both operationally and in respect of the quality of the ASAP system data-processing;
(*b*) As may be required by some members, arrange for and use, funds and contributions in kind needed for the procurement, implementation and operation of ASAP systems and for the promotion and expansion of the programme;
(*c*) Coordinate the exchange of technical information on relevant meteorological equipment and expendables, development, functionality, reliability and accuracy, and survey new developments in instrumentation technology and recommended practices;
(*d*) Prepare annually a report on the status of ASAP operations, data availability and data quality.

VOS Panel

(*a*) Review, recommend and coordinate the implementation of new and improved specialized shipboard

meteorological instrumentation, sitting and observing practices, as well as of associated software;
(*b*) Support the development and maintenance of pilot projects such as the VOSClim Project;
(*c*) Develop and implement activities to enhance ship recruitment, including promotional brochures, training videos, etc.;
(*d*) Prepare annually a report on the status of VOS operations, data availability and data quality.

General membership
Chairperson, selected by the Commission.

Chairpersons of the SOOPIP, VOS and ASAP Panels.

Open membership, comprising operators of VOS, SOOP and ASAP, representatives of monitoring centres, data management centres and bodies, representatives of IMSO and other communications satellite systems, representatives of manufacturers, representatives of science advisory bodies and users, as appropriate.

JCOMMOPS will participate in the work and the meetings of the Ship Observations Team.

3. Data Buoy Observations Team

Terms of reference
Existing terms of reference for DBCP, TIP and action groups.

General membership
Open membership, comprising existing DBCP members, action groups and TIP.

JCOMMOPS will participate in the work and the meetings of the Team.

4. Sea Level Observations Team

GLOSS Group of Experts

Terms of reference
Existing terms of reference as determined by the IOC Executive Council.

Membership
Existing GLOSS Group of Experts and GLOSS Scientific Subgroup.

RESOLUTION 4 (JCOMM-II)

DATA MANAGEMENT PROGRAMME AREA

THE JOINT WMO/IOC TECHNICAL COMMISSION FOR OCEANOGRAPHY AND MARINE METEOROLOGY,

NOTING:
(1) Resolution 4 (JCOMM-I) – Data Management Programme Area,
(2) The WMO *Manual on Marine Meteorological Services* (WMO-No. 558),
(3) The report of the chairperson of the Data Management Programme Area to the session,
(4) The report of the eighteenth session of the IOC Committee on IODE,

CONSIDERING:
(1) The need to implement, maintain and make available to users a fully integrated ocean/atmosphere data stream,
(2) The requirement for the timely delivery of integrated data and associated metadata,
(3) The need to develop and maintain monitoring, evaluation and follow-up procedures,
(4) The need for generic practices including quality control, metadata, analysis, data flow and data exchange standards, formats and procedures,
(5) The need to identify and, as appropriate, rescue, digitize and archive historical data,
(6) The need to collaborate and coordinate closely with other programmes and bodies, both within and outside WMO and IOC, namely CBS, CCl and IODE,
(7) The capabilities and experience of existing data management centres, systems and programmes, both within and outside IOC and WMO,
(8) The need to develop and/or strengthen national data management capacity, especially in developing countries,

DECIDES:
(1) To re-implement a JCOMM Data Management Programme Area with the following components:
   (*a*) A Data Management Coordination Group;
   (*b*) An Expert Team on Data Management Practices, co-sponsored by the IOC Committee on IODE;
   (*c*) An Expert Team on Marine Climatology;
   (*d*) A Capacity-building Rapporteur, as a member of the Data Management Coordination Group and of the Cross-cutting Team on Capacity-building;
   (*e*) A Satellite Expert, as a member of the Data Management Coordination Group and of the Cross-cutting Team on Satellite Data Requirements;

(2) That the terms of reference of the Data Management Coordination Group and the Expert Teams shall be as given in the annex to this resolution;
(3) That the general membership of the Data Management Coordination Group and the Expert Teams shall also be as given in the annex to this resolution;
(4) To select, in accordance with WMO General Regulation 32:
  (*a*) Mr R. Keeley (Canada) as chairperson of the Data Management Coordination Group and Data Management Programme Area Coordinator;
  (*b*) After consultation with the chairperson of the IOC Committee on IODE, Mr N. Mikhailov (Russian Federation) as chairperson of the Expert Team on Data Management Practices;
  (*c*) Mr S. Woodruff (United States) as chairperson of the Expert Team on Marine Climatology;
(5) To select, in accordance with WMO General Regulation 32, the following experts to serve within the Data Management Coordination Group:
  (*a*) Mr X. Dengwen (China) as Expert on Data Exchange Codes and Formats;
  (*b*) Mr D. Thomas (Australia) as Expert on Communications Systems for Data Exchange;
  (*c*) Ms S. Pouliquen (France) as Expert on Data Flow Monitoring;
(6) Invites Members/Member States to nominate experts for the Expert Team on Data Management Practices, to facilitate a final selection by the co-presidents and the chairperson of the IOC Committee on IODE, to ensure equal balance between meteorological and oceanographic data management experts;
(7) To select, in accordance with WMO General Regulation 32, the following experts to serve as members of the Expert Team on Marine Climatology:
  Ms E. Gowland (United Kingdom);
  Ms E. Kent (United Kingdom);
  Mr F. Koek (Netherlands);
  Ms L. Ke Xiou (China);
  Mr M. Mietus (Poland);
  Mr M. Rutherford (Australia);
  Ms Y. Unal (Turkey);
  Mr A. Vorontsov (Russian Federation);
  Mr W. Wong (Hong Kong);
  Mr T. Yoshida (Japan);
  Mr R. Zollner (Germany);

Requests the Secretary-General of WMO and the Executive Secretary IOC to invite CBS, CCl, IODE, the directors of relevant WDC and other relevant organizations and bodies to participate in the work of this programme area, as appropriate.

ANNEX TO RESOLUTION 4 (JCOMM-II)

TERMS OF REFERENCE AND GENERAL MEMBERSHIP OF THE COORDINATION GROUP AND EXPERT TEAMS OF THE DATA MANAGEMENT PROGRAMME AREA

1. Data Management Coordination Group

Terms of reference

The Data Management Coordination Group, in close collaboration with IODE and CBS subsidiary bodies and related experts, shall:

(*a*) Develop the strategy, initiate and oversee the implementation of the Data Management Programme Area;
(*b*) Identify, review, assess and recommend priorities and actions for the Data Management Programme Area;
(*c*) In concurrence with the co-presidents of JCOMM, establish and create expert teams, task teams, pilot projects and appoint rapporteurs, as appropriate, to undertake the work of the Data Management Programme Area;
(*d*) Ensure collaboration, appropriate coordination and liaison with data management bodies and other bodies;
(*e*) Ensure full integration and effective cooperation of data management activities within the Commission;
(*f*) Keep under review, assess and coordinate the adoption of appropriate new information technology;
(*g*) Establish and maintain cooperation with science programmes and assist with their data management activities, as appropriate;
(*h*) Provide advice and feedback to users of the Data Management Programme Area functions, both through the appropriate JCOMM Programme Area and directly;
(*i*) Promote the adoption of good Data Management practices within the Commission and with external partners;
(*j*) Identify capacity-building requirements related to the Programme Area.
(*k*) Identify satellite remote sensing requirements related to the Programme Area.

General membership

The membership is selected to ensure an appropriate range of expertise and to maintain an appropriate geographical representation, and includes:

DMPA Coordinator (chairperson);
Chairpersons of Expert Teams (two);
Three members with specific expertise in respectively, data exchange codes and formats; communications systems for data exchange; and data flow monitoring;
Capacity-building Rapporteur;
A Satellite Expert;
Up to two additional experts;
A representative of IODE.

Additional experts may be invited as appropriate, with the concurrence of the co-presidents of the Commission and in general with no resources implications to JCOMM.

2. Expert Team on Data Management Practices

Terms of reference
The JCOMM/IODE Expert Team on Data Management Practices, in close collaboration with CBS subsidiary bodies and related experts, shall:
(*a*) Develop, recommend, and implement principles and practices for an end-to-end data management system for JCOMM;
(*b*) Review and assess the effectiveness of end-to-end data management practices, including integration and consideration of new techniques and approaches;
(*c*) Provide advice to the Data Management Coordination Group and other groups of JCOMM, as required, on end-to-end data management practices;
(*d*) Liaise and collaborate with other groups as needed, to ensure access to required expertise, appropriate coordination and to avoid duplication.

General membership
The membership is selected to ensure an appropriate range of expertise and to maintain an appropriate geographical representation, and includes:
(*a*) Up to nine experts, including the chairperson, selected from Members/Member States, representative of the range of responsibilities of the Expert Team.
(*b*) Representatives of JCOMM Programme Areas, and of other expert bodies may be invited, as appropriate, with the concurrence of the co-presidents of JCOMM and the chairperson of the IOC Committee on IODE, and with no resource implications to the Commission.

3. Expert Team on Marine Climatology

Terms of reference
The Expert Team on Marine Climatology, in close collaboration with IODE, GOOS, GCOS, CCl and CBS subsidiary bodies and related experts, shall:
(*a*) Determine procedures and principles for the development and management of global and regional oceanographic and marine meteorological climatological datasets;
(*b*) Review and assess the climatological elements of the Commission, including the operation of the MCSS and the GCCs, and the development of required oceanographic and marine meteorological products;
(*c*) Review the GOOS and GCOS requirements for climatological datasets, taking account of the need for quality and integration;
(*d*) Develop procedures and standards for data assembly and the creation of climatological datasets, including the establishment of dedicated facilities and centres;
(*e*) Collaborate and liaise with other groups as needed to ensure access to expertise and ensure appropriate coordination;
(*f*) Keep under review and update, as necessary, relevant technical publications in the area of oceanographic and marine meteorological climatologies.

General membership
The membership is selected to ensure an appropriate range of expertise and to maintain an appropriate geographical representation, and includes:
(*a*) Up to 12 experts, including the chairperson, selected from Members/Member States, representative of the range of responsibilities of the Expert Team;
(*b*) Additional representatives from the responsible members for the MCSS and GCC, from relevant projects and subsidiary bodies of IODE, as required, in consultation with the co-presidents;
(*c*) Representatives of JCOMM Programme Areas and of other expert bodies may be invited, as appropriate, with the concurrence of the co-presidents of JCOMM and with no resource implications to the Commission.

RESOLUTION 5 (JCOMM-II)

CAPACITY-BUILDING

THE JOINT WMO/IOC TECHNICAL COMMISSION FOR OCEANOGRAPHY AND MARINE METEOROLOGY,

NOTING:

(1) Resolution 5 (JCOMM-I) – Education, Training and capacity-building Programme Area,
(2) The IOC, JCOMM and GOOS Capacity-building Strategies,
(3) The report of the chairperson of the Capacity-building Coordination Group to the session,

CONSIDERING:

(1) The need to develop and provide oversight for the implementation of the JCOMM and GOOS Capacity-building Strategies,
(2) The need to review and update as necessary existing training and guidance material and generate new material where required,
(3) The value of coordinating support to Members/Member States in marine observing systems, data management and services on a regional or subregional basis,
(4) The need to coordinate closely with other JCOMM programme areas, other programmes and bodies of WMO and IOC and external programmes and bodies in the implementation of integrated specialized training and support activities,
(5) The need to identify and harness the resources necessary to support JCOMM and GOOS capacity-building,
(6) The need to foster capacity-building within Programme Areas

DECIDES:

(1) To appoint Capacity-building Rapporteurs within the Observations, Services and Data Management Programme Areas, forming a cross-cutting team;
(2) To establish a joint JCOMM-GOOS Task Team on Resources;
(3) That the terms of reference for the Capacity-building Rapporteurs and Task Team on Resources shall be as given in the annex to this resolution;
(4) To entrust the Management Committee, in consultation with the GOOS Scientific Steering Committee, with selecting, in accordance with WMO General Regulation 32 :
   (*a*) Three Capacity-building Rapporteurs to be members of the Observations, Services and Data Management Coordination Groups, respectively, and one of the three to be a member of the Management Committee;
   (*b*) A chairperson of the Task Team for Resources;

REQUESTS the Secretary-General of WMO and the Executive Secretary IOC to invite relevant external international and national donor agencies to nominate representatives to participate on the Task Team on Resources, as appropriate.

ANNEX TO RESOLUTION 5 (JCOMM-II)

TERMS OF REFERENCE OF THE JCOMM CAPACITY-BUILDING RAPPORTEURS AND TASK TEAM ON RESOURCES

1. Rapporteurs

Terms of reference

(*a*) The Capacity-building Rapporteur for each JCOMM Programme Area shall be responsible for the assembly of capacity-building requirements of that Programme Area as brought forward from groups, countries and regions through close liaison with the Coordinator, Coordination Group, and other teams and groups within that Programme Area;
(*b*) The Capacity-building Rapporteurs for the three Programme Areas will regularly liaise and integrate the capacity-building requirements of their respective Programme Areas;
(*c*) The Capacity-building Rapporteur assigned to the Management Committee shall transmit the integrated capacity-building requirements via the JCOMM co-presidents to WMO ET/TCO, IOC-TEMA, IODE, GCOS, IGOS, GEF, IMF or other relevant organizations and bodies involved in capacity-building;
(*d*) Develop mechanisms for measuring the impact and success of capacity-building activities, and a system for regular review and evaluation.

General membership

The membership is selected to ensure an appropriate range of expertise and to maintain an appropriate geographical representation.

2. Task Team on Resources

Terms of reference
The Task Team on Resources shall:
(a) Monitor the existence, fields of interest and procedures of international and national aid programmes, foundations and all other possible sources of funding and advise on proposal development; and
(b) Where possible, develop links and contacts to funding sources and assist potential capacity-building recipients in developing contacts with potential donors and in proposal development.

General membership
Chairperson of the Task Team on Resources.

Donor agency representatives.

RESOLUTION 6 (JCOMM-II)

SATELLITE DATA

THE JOINT WMO/IOC TECHNICAL COMMISSION FOR OCEANOGRAPHY AND MARINE METEOROLOGY,
NOTING the evolving importance of satellite space-based data in achieving the goals of JCOMM,
CONSIDERING:
(1) The need to identify the end-to-end requirements for satellite data within JCOMM,
(2) The need to foster and coordinate these requirements consistently across JCOMM Programme Areas, and
(3) The need to convey the JCOMM requirements for satellite data to relevant external bodies including WMO, IOC and the space agencies,
DECIDES:
(1) To appoint satellite experts within the observations (one meteorological and one oceanographical), services and data management programme areas, forming a cross-cutting team;
(2) To entrust the Management Committee in consultation with the GOOS Scientific Steering Committee, with selecting, in accordance with WMO General Regulation 32, four satellite experts to be members of the observations, services and data management coordination groups and to select one of these to be a member of the Management Committee;
(3) That the terms of reference of the Cross-cutting Team on Satellite Data Requirements shall be given in the annex to this resolution.
REQUESTS
(1) The Management Committee to ask the Secretary-General of WMO and the Executive Secretary IOC to invite Member States to nominate appropriate experts, and
(2) The Management Committee to make the appointments and inform JCOMM Members, as appropriate.

ANNEX TO RESOLUTION 6 (JCOMM-II)

TERMS OF REFERENCE AND GENERAL MEMBERSHIP OF THE CROSS-CUTTING TEAM ON SATELLITE DATA REQUIREMENTS

Terms of reference
The Cross-cutting Team on Satellite Data Requirements shall:
(*a*) Be responsible for collecting and integrating the space-based remote sensing requirements that are essential for JCOMM services and products;
(*b*) Advise the subsidiary bodies on satellite/remote sensing matters, within each Programme Area, such as on the utilization, distribution and dissemination of satellite data and relevant data products;
(*c*) Maintain JCOMM satellite remote sensing data requirements based on regular contact with CGMS, the WMOSP, the IOC Remote Sensing Plan, CEOS, the relevant IGOS Themes, the WMO high-level policy meetings, the OOPC and other appropriate groups, and;
(*d*) Advise the Management Committee through the appointed satellite representative.

RESOLUTION 7 (JCOMM-II)

REVIEW OF PREVIOUS RESOLUTIONS AND RECOMMENDATIONS OF JCOMM (INCLUDING CMM AND IGOSS) AND OF RELEVANT RESOLUTIONS OF THE GOVERNING BODIES OF WMO AND IOC

THE JOINT WMO/IOC TECHNICAL COMMISSION FOR OCEANOGRAPHY AND MARINE METEOROLOGY,

CONSIDERING that all resolutions adopted prior to JCOMM-II are now obsolete,

CONSIDERING further that all recommendations adopted prior to the first session of JCOMM and still in force have been reconsidered,

NOTING the action taken on the recommendations adopted prior to JCOMM-II,

DECIDES:

(1) Not to keep in force Resolutions 1 to 6 (JCOMM-I);
(2) Not to keep in force Recommendations 6, 7, 8, 9, 10, 11 and 13 (JCOMM-I);
(3) To keep in force Recommendations 1, 2, 3, 4, 5 and 12 (JCOMM-I);
(4) Not to keep in force Recommendations 13 (CMM-X), 2, 5, 8 and 10 (CMM-XI), and 11 (CMM-XII);
(5) To keep in force Recommendations 1, 12 (CMM-XI), and 4 and 6 (CMM XII);
(6) Not to keep in force Recommendations 1 (JWC-IGOSS-IV) and 1 (JWC-IGOSS-V);
(7) To keep in force Recommendation 2 (JWC-IGOSS-V);
(8) To publish in the final report of JCOMM-II the texts of the recommendations that are kept in force.

ANNEX TO RESOLUTION 7 (JCOMM-II)

RECOMMENDATIONS OF THE WMO/IOC TECHNICAL COMMISSION FOR OCEANOGRAPHY AND MARINE METEOROLOGY ADOPTED PRIOR TO ITS SECOND SESSION AND MAINTAINED IN FORCE

Recommendation 1 (JCOMM-I) – Ocean Data Acquisition System (ODAS) Metadata Format

THE JOINT WMO/IOC TECHNICAL COMMISSION FOR OCEANOGRAPHY AND MARINE METEOROLOGY,

NOTING:

(1) The *Abridged Final Report with Resolutions and Recommendations of the Twelfth Session of the Commission for Marine Meteorology* (WMO-No. 860), general summary paragraph 7.3.9,
(2) The final report of the JCOMM Subgroup on Marine Climatology, eighth session (Asheville, April 2000), paragraphs 6.1.1–6.1.3 and annex VIII,
(3) The summary report of the DBCP-XVI (Victoria, October 2000), paragraphs 95–99,

CONSIDERING:

(1) That a comprehensive ODAS metadatabase would allow a full and accurate interpretation of the observational data from ODAS which are available in climatological archives,
(2) That observational data and associated metadata from ODAS are of importance to global climate studies as well as for a range of marine climate applications,

RECOMMENDS that the format given in the annex to this recommendation be used as the global format for the assembly, exchange and archival of metadata from all types of ODAS, including, in particular, drifting and moored buoys and fixed platforms;

INVITES:

(1) One or more Members/Member States to agree to host an ODAS metadatabase;
(2) Members/Member States operating ODAS to arrange for the assembly of the metadata from these platforms in the agreed format and for their eventual submission to the ODAS metadata archival centre(s);

REQUESTS the Secretary-General of WMO and the Executive Secretary IOC, with the assistance of the co-presidents of JCOMM and the chairperson of the DBCP, to consult with Members/Member States, with a view to establishing the metadata archival centre(s), and to otherwise assist Members/Member States, as necessary, in the submission of metadata to these centre(s).

Annex to Recommendation 1 (JCOMM-I)

OCEAN DATA ACQUISITION SYSTEM (ODAS) INGEST FORMAT

The two basic metadata record types (header and data) are listed. Within the data record type, there are different subsidiary record types defined for the different sensor types that are presently defined (the data record list could be expanded in the future). The descriptions of the fields that make up each record type are listed in the table.

1. **Header record** (HR is the identifier for the metadata header record)
   HR; ts; WMOn; stn; Ain; ind; oed; cnty; ragy; Idum; DA; Lat; Lon; WC; lngth; brth; diam; hult; huln; mtyp; cmsy; Stt; foo; dfmt; wdpth; plt; DI; WebA; footnote # 1; footnote # 2; footnote # 3; footnote # 4; footnote # 5
2. **Data records** (DR is the identifier for the sensor information record, thus designated data record) the first six elements will link the data record to the header record. A data record will only exist when there is an actual sensor on the platform and it can be repeated for every sensor of a given type.
   "Sno" in the eighth element represents the sequence number of sensors located on the platform, e.g. if two anemometer sensors were on the platform there would be two data records for anemometers indicated in elements 7 and 8 as AN 1 and AN 2.
   The "ind" field is a critical part in linking records in the case where a platform was moved or totally re-equipped or redesigned. This will allow the correct data records to be linked to the proper header record especially in cases where the same identifier was reissued at a later date.
   AN metadata record: **Anemometer** sensor (AN in 7th element).
   DR; ts; WMOn; stn; AIn; ind; AN; Sno; anmI; aMS; anmL; anDB; anDC; hwl; ouAN; sfWD; sfWS; apWD; apWS; amWS; cmpT; apWG; amWG; amScd; amID; amSD; footnote # 1
   AT metadata record: **Air temperature** sensor (AT in 7th element).
   DR; ts; WMOn; stn; AIn; ind; AT; Sno; ats; atsMS; atsL; atsDB; atsC; atswl; ouAT; sfAT; apAT; atScd; atID; atSD; footnote # 1; footnote # 2
   WT metadata record: **Water temperature** sensor (WT in 7th element).
   DR; ts; WMOn; stn; AIn; ind; WT; Sno; wts; wtsMS; wtsL; wtsDB; wtsC; dws; ouWT; sfWT; apWT; wtScd; wtID; wtSD; footnote # 1
   SA metadata record: **Salinity** sensor (SA in 7th element).
   DR; ts; WMOn; stn; AIn; ind; SA; Sno; Sstp, Ssm; SsL; SsDB; SsC; dss; ouSs; sfSs; apSs; mSs; SsScd; SsID; SsSD; footnote # 1
   BP metadata record: **Barometric pressure** (BP in 7th element).
   DR; ts; WMOn; stn; AIn; ind; BP; Sno; bps; bpsMS; bpsL; bpsDB; bpsC; bpswl; ouBP; sfBP; apBP; bpScd; bpsID; bpsSD
   RH metadata record: **Relative humidity** (wet bulb/dew point) sensor (RH in 7th element).
   DR; ts; WMOn; stn; AIn; ind; RH; Sno; hs; hsMS; hsL; hsDB; hsC; hswl; ouHS; sfHS; apHS; hsScd; hsID; hsSD
   PG metadata record: **Precipitation gauge** (PG in 7th element).
   DR; ts; WMOn; stn; AIn; ind; PG; Sno; pg; pgMS; pgL; pgDB; pgC; pgwl; pupg; sfPG; apPG; pgScd; pgID; pgSD
   RD metadata record: **Radiation** sensor (RD in 7th element).
   DR; ts; WMOn; stn; AIn; ind; RD; Sno; srs; rMS; rsL; rsDB; rsC; srwl; ours; sfSR; apSR; srScd; rsID; rsSD
   CR metadata record: **Ocean current** sensor (CR in 7th element).
   DR; ts; WMOn; stn; AIn; ind; CR; Sno; OC; Tsmoc; dmOC; ouOC; sfOC; apOC; ocScd; ocID; ocSD
   WS metadata record: **Wave spectra** (WS in 7th element).
   DR; ts; WMOn; stn; AIn; ind; WS; Sno; wasp; Digf; Nblks; Npts; spAT; sfWAS, apWAS
   HV metadata record: **Horizontal visibility** (HV in 7th element).
   DR; ts; WMOn; stn; AIn; ind; HV; Sno; hvm; hvit; hvl; hvDB; hvC; hvwl; hvou; hvsf; hvap; hvScd; hvID; hvSD

Table
ODAS metadatabase contents

Record type and sequence number		*Field abbreviation*	*Input codes*	*Description of fields*
HEADER RECORD (HR)				
HR	1	ts	MB DB ID FP IS AL CM PF OT	Type of station Moored buoy Drifting buoy Ice drifter Fixed platform (oil rig, etc.) Island station Automatic light station Coastal marine automated station Profiling floats (e.g. ARGO — a global array of profiling floats) Other (specify in footnote # 1 Header record)
	2	WMOn		WMO number — 5-digit identifier
	3	stn		Unique call sign if available; otherwise, station name (C-MAN, platforms, etc.)
	4	AIn		Additional identifier number; define in footnote # 2 (e.g. ARGOS = up to 7 digits, GOES no., others)
	5	ind		Period of validity/beginning of historical record (initiation date — year, month, day e.g. 19950321) date of mooring, launching, or platform instrumentation (date the platform began collecting weather observations under its current ID and location). If the platform is moved or assigned a new ID then a new period of validity should be initiated
	6	oed		Operational end date of platform operations (year, month, day e.g. 20000127). This item is associated with the entry above which shows the beginning date and this item the ending date when a platform closed operations. If for example a moored buoy was placed in the Great Lakes each spring and withdrawn each winter the beginning date would not change unless the identifier, ownership, or location changed at some point. When one of these change, a new beginning date should be entered "ind" above and an operational end date entered in this field
	7	cnty	see list	Country of ownership — International Organization for Standardization (ISO) country code (Alpha-2; two character alpha code)
	8	ragy		Responsible agency/organization within a country responsible for the platform's operations, launch, and metadata [e.g. in the United States it could be the National Ocean Service (NOS) NOAA, National Data Buoy Center (NDBC) NOAA, Woods Hole Institute, etc.] List the full name of the organization or agency responsible. There should be a link between the responsible agency/organization and Web address listed in item 114
	9	ldmu		Last date metadata updated (year, month, day e.g. 20000527 representing 27 May 2000)
	10	DA	 1 2 3 4 5	Degree of automation Fully automated Always supplemented with manual input Occasionally supplemented with manual input Fully manual (no automation) Unknown
	11	Lat		Latitude — degrees, up to three decimal places if available (e.g. 50. 985 N/S)
	12	Lon		Longitude — degrees, up to three decimal places if available (e.g. 124.976 E/W)
	13	WC		Watch circle — nearest whole metre (e.g. 346.5 = 347 m). The maximum distance a moored buoy can be located from its central position related to the length and type of mooring. Outside the watch circle and the moored buoy is likely adrift

Record type and sequence number		*Field abbreviation*	*Input codes*	*Description of fields*
HEADER RECORD (HR) (*continued*)				
HR	14	Lngth		Length — the length of the platform (if rectangular or boat shape hull). See code "diam" below if the platform is a discus. Metres to tenths (e.g. 26.9 m)
	15	Brth		Breadth — the breadth (width) of the platform (if rectangular or boat shaped hull). Metres to tenths (e.g. 12.6 m)
	16	Diam		Diameter — platform dimension for discus type hulls. Diameter in metres to tenths (e.g. 6.0 m)
	17	Hult		Hull type
			DS	Discus (cylinders)
			BS	Boat shaped hull
			RS	Rectangular shape
			SP	Spars
			OD	ODAS 30 series
			NM	NOMAD
			TR	Torus
			CN	Conic
			OR	Omnidirectional wave-rider
			DR	Directional wave-rider
			OT	Other (specify in footnote # 3 Header record)
	18	Huln		Hull or platform number — enter as assigned (a combination of numeric and alpha characters if required)
	19	Mtyp		Mooring type — mooring type if a moored buoy or drouge type if drifting buoy
			AC	All chain (shallow depths generally up to 90 m)
			ST	Semitaut (intermediated depths generally 60 to 600 m — generally nylon cable)
			FC	Float inverse catenary (deep ocean generally 600 to 6 000 m — generally nylon with glass floats)
			PC	Poly-nylon inverse catenary (deep ocean generally 1 200 to 6 000 m)
				Drouge type
			HS	Holey sock drogue
			TS	Tristar
			WS	Window shade
			PA	Parachute
			NL	Non-Lagrangian sea anchor
				Use for either mooring or drouge as needed
			OT	Other (specify in footnote # 4 Header record)
	20	Cmsy		Satellite data-collection system — system used to transmit the observations
			GO	GOES DCP
			AR	ARGOS PTT
			GA	GOES primary ARGOS backup
			RF	RF
			OT	Other (specify in footnote # 5 Header record)
	21	Stt		Satellite transmission time — time slot assigned for observation transmission. Hours and minutes UTC (e.g. 1230) or for example, on the hour, on the half-hour, two orbits per day, etc.
	22	Foo		Frequency of observations — hours and minutes (e.g. every hour = 1.0, every 6 hours = 6.0, or every half hour 0.5, etc., I = irregular)
	23	dfmt		Data format — data format (*Manual on Codes* (WMO-No. 306) the observations was transmitted or digitized (i.e. observational form)
				BUOY — FM 18-X SHIP — FM 13-X TESAC — FM 64-IX WAVEOB — FM 65-IX BUFR — FM 94-XI Other WMO codes added as needed
				NOTE: Use actual WMO code designator as the abbreviation (e.g. FM 18-X)

Record type and sequence number		*Field abbreviation*	*Input codes*	*Description of fields*
HEADER RECORD (HR) (*continued*)				
	24	wdpth		Water depth (nearest whole metre)
	25	plt		Payload type (e.g. DACT, VEEP, GSBP, ZENO, ODAS33, etc.) Details should be provided regarding each type of payload (payload description)
	26	DI		Digital image — a photograph or schematic of the platform and equipment
			AV	Available in digital file
			NA	Not available
	27	WebA		Web address (URL) where additional information can be obtained
ANEMOMETER (AN)				
DR	1	anmI		Anemometer instrument type
			P	Propeller/vane
			TC	Three cup
			FC	Four cup
			S	Sonic
			WT	WOTAN (wind observation through ambient noise)
			OT	Other (define in footnote)
	2	aMS		Anemometer — model (manufacturer/series no.)
	3	anmL		Anemometer — location
			FM	Foremast
			AM	Aftmast
			CM	Centremast (mainmast)
			RY	Right yardarm
			LY	Left yardarm
			OT	Other (define in footnote)
	4	anDB		Anemometer — distance from the bow or front of platform (metres to tenths)
	5	anDC		Anemometer — distance from centre line or from centre of discus (metres to tenths)
	6	hwl		Anemometer — height above water line (metres to tenths). Value can be negative for WOTAN
	7	ouAN		Anemometer — operational range and units of measurement (e.g. 0 to 60 m s^{-1}; 000 to 360 degrees)
	8	sfWD		Sampling frequency (Hz) — wind direction (e.g. 1.28 Hz)
	9	sfWS		Sampling frequency (Hz) — wind speed (e.g. 1.28 Hz)
	10	apWD		Averaging period (minutes to tenths) — wind direction (e.g. 8.0 minutes)
	11	apWS		Averaging period (minutes to tenths) — wind speed (e.g. 8.0 minutes)
	12	amWS		Averaging method — wind speed
			S	Scalar
			V	Vector
	13	cmpT		Compass type/model no. — anemometer
	14	apWG		Averaging period (seconds) — wind gust (e.g. 5 seconds)
	15	amWG		Averaging method — wind gust
			S	Scalar
			V	Vector
	16	amScd		Calibration date — anemometer sensor no. Date sensor was last calibrated (year, month, day, e.g. 20000723)

Record type and sequence number		*Field abbreviation*	*Input codes*	*Description of fields*
ANEMOMETER (AN) (continued)				
	17	amID		Anemometer sensor installation date (year, month, day, e.g. 19950228). If the direction sensor and speed sensor are separate instruments then use footnote #1 in the anemometer data record to enter the dates for speed sensor and this position for direction sensor
	18	amSD		Anemometer out of service dates (beginning and ending dates; year, month, day, e.g. 19960123–19960212). If known these dates should be entered anytime either the direction, speed, or both is unavailable due to equipment outage (non-reporting or invalid reports)
AIR TEMPERATURE (AT)				
DR	1	ats		Air temperature sensor — instrument type
			ER	Electrical resistance thermometer
			M	Mercury-in-glass thermometer
			MS	Screen shelter — mercury thermometer
			A	Alcohol-in-glass thermometer
			AS	Screen shelter — alcohol thermometer
			OT	Other (specify in footnote # 1 in the air temperature data record)
	2	atsMS		Air temperature sensor — model (manufacturer/series no.)
	3	atsL		Air temperature sensor — location
			FM	Foremast
			AM	Aftmast
			CM	Centremast (mainmast)
			RY	Right yardarm
			LY	Left yardarm
			OT	Other (specify in footnote # 2 in the air temperature data record)
	4	atsDB		Air temperature sensor — distance (metres to tenths) from bow or front of platform NOTE: Leave this field blank if platform is a discus
	5	atsC		Air temperature sensor — distance (metres to tenths) from centre line or centre of discus
	6	atswl		Air temperature sensor — height (metres to tenths) above water line
	7	ouAT		Air temperature sensor — operational range and units of measurement (e.g. - 40°C to + 50°C)
	8	sfAT		Sampling frequency (Hz) — air temperature sensor (e.g. 1.28 Hz)
	9	apAT		Averaging period (minutes to tenths) — air temperature sensor (e.g. 8.0 minutes)
	10	atScd		Calibration date — air temperature sensor no. Date sensor was last calibrated (year, month, day, e.g. 20000723)
	11	atID		Air temperature sensor installation date (year, month, day, e.g. 19950228)
	12	atSD		Air temperature sensor out of service dates (beginning and ending dates; year, month, day, e.g. 19960123–19960212). If known these dates should be entered anytime the air temperature is unavailable due to equipment outage (non-reporting or invalid reports)

Record type and sequence number		*Field abbreviation*	*Input codes*	*Description of fields*
WATER TEMPERATURE (WT)				
DR	1	wts		Water temperature sensor — instrument type
			HC	Hull contact sensor
			HT	"Through hull" sensor
			RT	Radiation thermometer
			ER	Electrical resistance thermometer
			TT	Trailing thermistor
			BU	Bucket thermometer
			CTD	CTD (conductivity-temperature-depth)
			STD	STD (salinity-temperature-depth)
			RM	Refractometer
			XC	XCTD (expendable CTD probe)
			NS	Nansen cast
			AL	ALACE (autonomus Lagrangian circulation explorer)
			XBT	Expendable bathythermograph
			OT	Other (specify in footnote # 1 in the water temperature data record)
	2	wtsMS		Water (sea) temperature sensor — model (manufacturer/series no.)
	3	wtsL		Water temperature sensor — location (e.g. port bow, bottom of discus, etc.)
	4	wtsDB		Water temperature sensor — distance (metres to tenths) from the bow or front of platform NOTE: Left blank for discus hulls and subsurface temperatures
	5	wtsC		Water temperature sensor — distance (metres to tenths) from centre line or centre of discus
	6	dws		Depth of water temperature sensor; tenths of metres (e.g. 10.3 m) below the water line
	7	ouWT		Operational range and units of measurement — water temperature sensor (e.g. range - 4°C to + 40°C)
	8	sfWT		Sample frequency (Hz) — water temperature sensor (e.g. 1.28 Hz)
	9	apWT		Averaging period (minutes to tenths) — water temperature sensor (e.g. 8.0 minutes)
	10	wtScd		Calibration date — water temperature sensor no. Date sensor was last calibrated (year, month, day, e.g. 20000723)
	11	wtID		Water temperature sensor installation date (year, month, day, e.g. 19950228)
	12	wtSD		Water temperature sensor out of service dates (beginning and ending dates; year, month, day, e.g. 19960123–19960212). If known these dates should be entered anytime the water temperature is unavailable due to equipment outage (non-reporting or invalid reports)
SALINITY (SA)				
DR	1	Sstp		Salinity — sensor type
			CTD	CTD (conductivity-temperature-depth)
			STD	STD (salinity-temperature-depth)
			RM	Refractometer
			XC	XCTD (expendable CTD probe)
			NS	Nansen cast
			AL	ALACE (autonomous Lagrangian circulation explorer)
			OT	Other (specify in footnote # 1 in the salinity data record)
	2	Ssm		Salinity sensor (model/manufacturer/series no.)

Record type and sequence number		*Field abbreviation*	*Input codes*	*Description of fields*
SALINITY (SA) (continued)				
	3	SsL		Salinity sensor no. — location NOTE: To be used only for those sensors attached to a platform
	4	SsDB		Salinity sensor no. — distance from bow or front of platform NOTE: To be used only when sensor is attached to a platform (same as location above)
	5	SsC		Salinity sensor no. — distance from centre line or centre of discus
	6	dss		Depth of salinity sensor no. — metres to tenths (e.g. 10.7 m) of salinity sensor below the water line (surface of the water)
	7	ouSs		Salinity sensor — operational range and units of measurement (e.g. 25 to 45 parts per thousand. Salinity is calculated based on the measurement of chlorinity)
	8	sfSs		Sample frequency — available only for automated digital sensors
	9	apSs		Averaging period — available only for automated digital sensors
	10	mSs		Method used to compute the salinity (e.g. chlorinity, electrical conductivity, refractive index, etc.)
	11	SsScd		Calibration date — salinity sensor no. Date the sensor was last calibrated (year, month, day, e.g. 20000207)
	12	SsID		Salinity sensor installation date (year, month, day, e.g. 19950228)
	13	SsSD		Salinity sensor out of service dates (beginning and ending dates; year, month, day, e.g. 19960123–19960212). If known these dates should be entered anytime the salinity is unavailable due to equipment outage (non-reporting or invalid reports)
BAROMETRIC PRESSURE (BP)				
DR	1	bps		Barometric pressure sensor — instrument type
	2	bpsMS		Barometric pressure sensor — model (manufacturer/series no.)
	3	bpsL		Barometric pressure sensor — location (e.g. centremast)
	4	bpsDB		Barometric pressure sensor — distance (metres to tenths) from the bow or front of platform NOTE: Leave this field blank if platform is a discus
	5	bpsC		Barometric pressure sensor — distance (metres to tenths) from centre line or centre of discus
	6	bpswl		Barometric pressure sensor — height (metres to tenths) above water line
	7	ouBP		Barometric pressure sensor — operational range and units of measurement (e.g. 900–1 100 hPa)
	8	sfBP		Sampling frequency (Hz) — barometric pressure sensor (e.g. 1.28 Hz)
	9	apBP		Averaging period (minutes to tenths) — barometric pressure sensor (e.g. 8.0 minutes)
	10	bpScd		Calibration date — barometric pressure sensor no. Latest date of calibration (year, month, day, e.g. 20000207)
	11	bpsID		Barometric pressure sensor installation date (year, month, day, e.g. 19950228)
	12	bpsSD		Barometric pressure sensor out of service dates (beginning and ending dates; year, month, day, e.g. 19960123–19960212). If known these dates should be entered anytime the barometric pressure is unavailable due to equipment outage

Record type and sequence number		*Field abbreviation*	*Input codes*	*Description of fields*
RELATIVE HUMIDITY (RH)				
DR	1	hs		Relative humidity (wet bulb/dew point) sensor — instrument type
	2	hsMS		Relative humidity (wet bulb/dew point) sensor — model (manufacturer/series no.)
	3	hsL		Relative humidity (wet bulb/dew point) sensor — location (left yardarm mast)
	4	hsDB		Relative humidity sensor — distance (metres to tenths) from the bow or front of platform NOTE: Leave this field blank if platform is a discus
	5	hsC		Relative humidity sensor — distance (metres to tenths) from centre line or centre of discus
	6	hswl		Relative humidity sensor — height (metres to tenths) above water line
	7	ouhs		Relative humidity (wet bulb/dew point) sensor — operational range and units of measurement (e.g. range 0–100 per cent)
	8	sfhs		Sampling frequency (Hz) — relative humidity (wet bulb/dew point) sensor (e.g. 1 Hz)
	9	aphs		Averaging period (minutes) — relative humidity (wet bulb/dew point) sensor (e.g.1 min.)
	10	hsScd		Calibration date — relative humidity (wet bulb/dew point) sensor no. Latest date the sensor was calibrated (year, month, day, e.g. 20000207)
	11	hsID		Relative humidity (wet bulb/dew point) sensor installation date (year, month, day, e.g. 19950228)
	12	hsSD		Relative humidity (wet bulb/dew point) sensor out of service dates (beginning and ending dates; year, month, day, e.g. 19960123–19960212). If known, these dates should be entered anytime the relative humidity (wet bulb/dew point) is unavailable due to equipment outage (non-reporting or invalid reports)
PRECIPITATION (PG)				
DR	1	pg		Precipitation gauge — instrument type (e. g. weighing bucket, tipping bucket, etc.)
	2	pgMS		Precipitation gauge — model (manufacturer/series no.)
	3	pgL		Precipitation gauge — location
	4	pgDB		Precipitation gauge — distance (metres to tenths) from the bow or front of platform
	5	pgC		Precipitation gauge — distance (metres to tenths) from centre line or off centre of a discus
	6	pgwl		Precipitation gauge — height (metres to tenths) above water line
	7	oupg		Precipitation gauge — operational range and units of measurement (e.g. 0 to 25 cm per hour)
	8	sfPG		Sampling frequency — precipitation gauge (e.g. continuous)
	9	apPG		Averaging period — precipitation gauge (e.g. 6 hours; then reset)
	10	pgScd		Calibration date — precipitation gauge no. Latest date sensor/gauge was calibrated (year, month, day, e.g. 20000207)
	11	pgID		Precipitation gauge installation date (year, month, day, e.g. 19950228)
	12	pgSD		Precipitation gauge out of service dates (beginning and ending dates; year, month, day, e.g. 19960123–19960212). If known, these dates should be entered anytime the precipitation measurement is unavailable due to equipment outage (non-reporting or invalid reports)

Record type and sequence number		*Field abbreviation*	*Input codes*	*Description of fields*
RADIATION (RD)				
DR	1	srs		Solar radiation sensor — instrument type
	2	rMS		Radiation sensor — model (manufacturer/series no.)
	3	rsL		Radiation sensor — location (e.g. foremast)
	4	rsDB		Radiation sensor — distance (metres to tenths) from the bow or front of platform NOTE: Leave this field blank if platform is a discus
	5	rsC		Radiation sensor — distance (metres to tenths) from centre line or centre of discus
	6	srwl		Solar radiation sensor — height (metres to tenths) above water line
	7	ours		Radiation sensor — operational range and units of measurement (e.g. 0.07 – 1.65 cal cm^{-2} min^{-1})
	8	sfSR		Sampling frequency (Hz) — solar radiation sensor (e.g. 1 Hz)
	9	apSR		Averaging period (minutes to tenths) — solar radiation sensor (e.g. 8.0 minutes)
	10	srScd		Calibration date — solar radiation sensor no. Latest date the sensor was calibrated (year, month, day, e.g. 20000207)
	11	rsID		Radiation sensor installation date (year, month, day, e.g. 19950228)
	12	rsSD		Radiation sensor out of service dates (beginning and ending dates: year, month, day, e.g. 19960123–19960212). If known, these dates should be entered anytime the radiation measurement is unavailable due to equipment outage (non-reporting or invalid reports)
OCEAN CURRENTS (CR)				
DR	1	OC	 C M E	Ocean current speed reported Calculated Measured Estimated
	2	TSmoc		Type sensor measuring ocean currents (type/model/manufacturer)
	3	dmOC		Depth of measurement (in metres, e.g. 10 m) of the ocean current
	4	ouOC		Ocean currents — operational range and units of measurement (range e.g. —10 m s^{-1} to +10m s^{-1})
	5	sfOC		Sampling frequency (Hz) — ocean currents (e.g.0.667 Hz)
	6	apOC		Averaging period (minutes to tenths) — ocean currents (e.g. 20.0 minutes)
	7	ocScd		Calibration date — ocean current sensor (year, month, day, e.g. 20000208)
	8	ocID		Ocean current sensor installation date (year, month, day, e.g. 19950228)
	9	ocSD		Ocean current sensor out of service dates (beginning and ending dates; year, month, day, e.g. 19960123–19960212). If known, these dates should be entered anytime the ocean current measurement is unavailable due to equipment outage (non-reporting or invalid reports)

Record type and sequence number		*Field abbreviation*	*Input codes*	*Description of fields*
WAVE SPECTRA (WS)				
DR	1	wasp		Wave spectra — type of surface elevation sensor (from which wave spectra is derived)
	2	Digf		Digital filter used — wave spectra
	3	Nblks		Number of blocks used for averaging — wave spectra
	4	Npts		Number of points in each block — wave spectra
	5	spAT		Spectral analysis technique (e.g. FFT, MEM, etc.)
	6	sfWAS		Sampling frequency — wave spectra (e.g. 2.56 Hz)
	7	apWAS		Averaging period — length of record for averaging period — wave spectra (e.g. 20 minutes)
HORIZONTAL VISIBILITY (HV)				
DR	1	hvm	MAN ATM	Horizontal visibility Manual Automated
	2	hvit		Instrument type (automated sensor) — model/manufacturer/series no.
	3	hvl		Location — horizontal visibility sensor no.
	4	hvDB		Horizontal visibility sensor — distance (metres to tenths) from the bow or front of platform NOTE: Leave this field blank if platform is a discus
	5	hvC		Horizontal visibility sensor — distance (metres to tenths) from centre line or centre of discus
	6	hvwl		Horizontal visibility sensor — height (metres to tenths) above water line
	7	hvou		Horizontal visibility sensor — operational range and units of measurement (e.g. 0000 to 9 999 metres or < 0.1 km – 10 km)
	8	hvsf		Sampling frequency — horizontal visibility sensor no.
	9	hvap		Averaging period — horizontal visibility sensor no.
	10	hvScd		Calibration date — horizontal visibility sensor no. Latest date sensor was calibrated (year, month, day, e.g. 20000208)
	11	hvID		Horizontal visibility sensor installation date (year, month, day, e.g. 19950228)
	12	hvSD		Horizontal visibility sensor out of service dates (beginning and ending dates; year, month, day, e.g. 19960123–19960212). If known, these dates should be entered anytime the visibility measurement is unavailable due to equipment outage (non-reporting or invalid reports)

Recommendation 2 (JCOMM-I) — Resources for Ship-based Observations

THE JOINT WMO/IOC TECHNICAL COMMISSION FOR OCEANOGRAPHY ON MARINE METEOROLOGY,

NOTING:

(1) The SOOPIP chairperson's report to JCOMM and final report of SOOPIP-III (La Jolla, March 2000),
(2) The ASAP Panel chairperson's report to JCOMM and final report of ASAP Panel-XII (Reading, September 2000),
(3) Final report of the Subgroup on the VOS, first session (Athens, March 1998),
(4) Expressed WWW, GOOS/GCOS and CLIVAR requirements for upper ocean thermal data and the conclusions from the Global Upper Ocean Thermal Review,

CONSIDERING:

(1) That ship-based observation programmes have been faced with decreased resources, coupled with increases in the costs of instruments and expendables (e.g. XBTs and radiosondes),
(2) That this situation could potentially adversely affect the data, products and services provided through JCOMM, GOOS and CLIVAR, in support of operational meteorology and oceanography, marine scientific research and global climate studies,
(3) That in situ ocean observing systems are complementary to space-based systems and supply the ground truth data on which the space-based systems depend,
(4) That there are many data-sparse ocean areas where ship-based observing systems can offer a unique contribution,
(5) That the PMO network provides the essential link to ship management and crew for the operations of the VOS, SOOP and ASAP and is critical to the maintenance of the quantity and quality of the observations,
(6) The importance attached to integrated, high-quality data streams from ship observations,
(7) That the SOOP Coordinator's position is essential for the implementation and operation of the SOOP programme,
(8) That the VOS scheme and ASAP would also greatly benefit from similar international coordination support,

RECOMMENDS strongly that Members/Member States recognize the continued importance of long-term commitment to ship-based observational programmes and, in particular:

(1) Emphasize a ship observations network that recognizes the benefits of a unified approach for meteorological, oceanographic and climate applications, and the heightened importance attached to integration of the former separate networks and higher quality and more timely data streams;
(2) Address the increasing need for ship deployment of autonomous observational platforms and expendables, and automated shipboard meteorological observation and data transmission systems;
(3) Increase the resources committed to supplying expendables for ship observations in support of international implementation plans;
(4) Make concerted efforts to maintain the level of recruitment of ships to the ship observations programme at the present level or above;
(5) Ensure maintenance and expansion of the PMO network;
(6) Increase the resources committed to support the activities of JCOMMOPS;

REQUESTS the Secretary General of WMO and the Executive Secretary IOC, with the assistance of the co-presidents of JCOMM and the chairpersons of the VOS, ASAP and SOOP Panels, to consult with Members/Member States, with a view to increasing the resources committed to ship-based observation programmes.

Recommendation 3 (JCOMM-I) — International Seakeepers Society

THE JOINT WMO/IOC TECHNICAL COMMISSION FOR OCEANOGRAPHY AND MARINE METEOROLOGY,

NOTING:

(1) The reports of the chairpersons of the Working Group on Marine Observing Systems and the SOOP Implementation Panel to JCOMM-I,
(2) The presentation to JCOMM-I on the work of the International SeaKeepers Society,
(3) The report of the first JCOMM Transition Planning Meeting (St Petersburg, July 1999), JCOMM Meeting Report No. 1,

RECOGNIZING:

(1) That extensive scientific evaluation and quality assessment of the SeaKeepers module had taken place over a number of years,
(2) That observational data from the SeaKeepers module installed on a number of vessels were already being distributed in real time on the GTS,

CONSIDERING:

(1) That SeaKeepers vessels were distributed worldwide and often sailed in data-sparse ocean areas away from commercial shipping lanes,
(2) That meteorological and oceanographic observations from SeaKeepers vessels, if made freely and openly available to users in both real time and delayed mode, through the GTS and other communication channels, would be of substantial value to the WWW, GOOS, GCOS and other major programmes of WMO and IOC,

RECOMMENDS:

(1) That vessels equipped with the SeaKeepers module (members of the International Seakeepers Society) whose meteorological and physical oceanographic data are made freely available to all users, in both real time and delayed mode, in support of the major programmes of WMO and IOC, should be formally recognized as a component of the integrated ship observations programme;
(2) That the International SeaKeepers Society should participate actively in the work of the Ship Observations Team;
(3) That the Ship Observations Team includes observational data from SeaKeepers vessels in its overall

monitoring and evaluation of the quality, integrity, timeliness and value of meteorological and oceanographic observations from ship-based platforms, to ensure that SeaKeepers data conform with the requirements of JCOMM programmes;

REQUESTS:

(1) GOOS, through its Coastal Ocean Observations Panel, to review and assess the quality and value of non-physical oceanographic data collected through the SeaKeepers module and, as appropriate, recommend on their inclusion as part of an integrated operational ocean monitoring system;

(2) The Secretary-General of WMO and the Executive Secretary IOC to bring the work of the International SeaKeepers Society to the attention of Members/Member States, and otherwise to assist in the implementation of this recommendation.

Recommendation 4 (JCOMM-I) —Vandalism of Ocean Data Buoys

THE JOINT WMO/IOC TECHNICAL COMMISSION FOR OCEANOGRAPHY AND MARINE METEOROLOGY,

NOTING:

(1) The final report of DBCP-XVI (Victoria, October 2000), paragraph 9.2.4,

(2) The "hydrogram"* dated 5 August 2000 and issued by the International hydrographic Organization to bring the problem of vandalism of buoys, both deliberate or inadvertent, to the attention of the maritime community,

(3) The text of the hydrogram, available via the DBCP Web site at http://dbcp.nos.noaa.gov/dbcp/vandalism.html.

CONSIDERING:

(1) That the acts of vandalism that seriously damaged buoys were very detrimental to the ocean observing networks of which these buoys were an important part,

(2) That the collection or inadvertent damage to buoys by fishing vessels or mariners was similarly a substantial problem in some areas,

(3) The need to alert mariners and fishermen to the importance of data buoy programmes to maritime safety, maritime operations, climate research and prediction and other marine applications,

RECOMMENDS to Members/Member States:

(1) To contact their respective Hydrographic Services to reinforce the message in the hydrogram and to ensure that it is reissued as often as possible;

(2) To develop, if possible, tamper-proof designs for buoy systems;

(3) To design a warning system in the event that any data buoys were intentionally damaged;

(4) To take legal steps nationally to limit acts of vandalism within their territorial seas and Exclusive Economic Zones;

REQUESTS the Secretary-General of WMO and the Executive Secretary IOC to provide assistance, as required, to Members/Member States in the implementation of this recommendation.

Recommendation 5 (JCOMM-I) — The Global Sea-level Observing System (GLOSS)

THE JOINT WMO/IOC TECHNICAL COMMISSION FOR OCEANOGRAPHY AND MARINE METEOROLOGY,

NOTING:

(1) The considerable achievements of GLOSS in establishing a global system to monitor sea-level variability and changes,

(2) That over two thirds of the GLOSS Core Network stations, as defined in accordance with the 1997 Implementation Plan for GLOSS, are operational and that this number has remained essentially unchanged over the past few years,

CONSIDERING:

(1) The importance of long-term sea-level measurements to many WMO Programmes concerned with climate change, hydrology, storm surges and tropical cyclones,

(2) The importance of sea-level measurements for operational oceanography, marine meteorology coastal engineering and defence applications and in the wider implementation of GOOS,

(3) The potential for station sharing and use of tide gauge data transmission platforms for delivery of other data types,

RECOMMENDS to Members/Member States and national agencies to:

(1) Continue and strengthen the support for GLOSS: (*a*) at the national level through maintenance of GLOSS-designated tide gauges; and (*b*) at the international level through support to the IOC Trust Fund or through bilateral and/or multilateral assistance for GLOSS activities by, for example, collaborative support for maintaining/upgrading GLOSS gauges in accordance with the GLOSS Implementation Plan;

(2) Provide in situ sea-level data from GLOSS stations to the international data centres without delay in accordance with the provisions of the Implementation Plan;

(3) Consider local and regional observation platform sharing for data acquisition of other important parameters at GLOSS sites, especially by providing the necessary upgrades for real-time data acquisition;

RECOMMENDS further that the products of GLOSS-related Sea-level Centres (such as the Permanent Service for Mean Sea Level in the United Kingdom and the Hawaii Sea-level Center in the United States) should be made more widely known to the WMO/IOC communities through existing WMO information services, in order to promote enhanced knowledge and understanding in this important field;

REQUESTS the Secretary-General of WMO and the Executive Secretary IOC to provide assistance to

* Hydrogram: A message to bring to the attention of the mariner important and significant maritime safety information not normally contained in the weekly Notice to mariners.

Members/Member States, as appropriate, and within the available budgetary resources, in the implementation of this recommendation.

Recommendation 12 (JCOMM-I) — Working Arrangements between WMO and the International Mobile Satellite Organization (IMSO)

THE JOINT WMO/IOC TECHNICAL COMMISSION FOR OCEANOGRAPHY AND MARINE METEOROLOGY,

NOTING:

(1) Resolution 19 (Cg-XI) — The collection and dissemination of marine meteorological and oceanographic information using INMARSAT,
(2) Recommendation 8 (CMM-XI) — The collection of meteorological and oceanographic information using INMARSAT,
(3) The Convention of the International Mobile Satellite Organization, as amended,

CONSIDERING:

(1) That the INMARSAT system is now the primary mechanism for the collection of meteorological and oceanographic reports from ships at sea, as well as for providing a major facility for the dissemination of meteorological and oceanographic information to maritime users under the GMDSS,
(2) That IMSO is the intergovernmental organization charged with providing the necessary oversight for the provision of satellite services for the GMDSS,

RECOGNIZING that WMO will need to continue to interact closely in the future with IMSO on many issues relating to the use of the INMARSAT system for the dissemination of meteorological and oceanographic information essential to the safety of life and property at sea,

RECOMMENDS that WMO establish formal working arrangements with IMSO to facilitate this interaction;

REQUESTS the Secretary-General of WMO, in consultation with the Secretary-General of IMSO, to prepare appropriate draft working arrangements, for the consideration of the WMO Executive Council and the IMSO Assembly.

Recommendation 1 (CMM-XI) — Marine meteorological services monitoring programme

THE COMMISSION FOR MARINE METEOROLOGY,

NOTING:

(1) Recommendation 1 (CMM-VIII) — Marine meteorological services monitoring programme,
(2) Abridged final report, CMM-IX, general summary, paragraph 5.7 and Annex II,
(3) Report and recommendations to CMM-XI by the Sub-group of Experts on Warning and Forecast Preparation on Marine Meteorological Services Monitoring,

CONSIDERING:

(1) The continuing importance to mariners of the provision of high quality, timely marine meteorological services,
(2) The need for routine and continuous monitoring of marine meteorological services to maintain the highest possible standards,
(3) The importance of keeping up-to-date information on the requirements of marine users for meteorological and oceanographic information and services,

RECOGNIZING the activities for the monitoring of marine meteorological services already effected by many Members,

RECOMMENDS:

(1) That a systematic, long-term marine meteorological services monitoring programme be implemented;
(2) That the programme be based on the questionnaire and response summary format given in the annex to this recommendation;
(3) That the monitoring should be undertaken by Members and coordinated by the WMO Secretariat and should take place on a routine basis every four years;
(4) That a comprehensive analysis of the results of the monitoring should be prepared by the WMO Secretariat following each four-yearly monitoring, and transmitted immediately to Members for follow-up action, as appropriate;
(5) That a brief summary of the results of this monitoring should be prepared for each session of CMM, as well as for sessions of the Advisory Working Group and the Working Group on Marine Meteorological Services;

INVITES Members to carefully review the results of this monitoring, including detailed criticisms and suggestions provided by users, and to take appropriate measures to correct identified deficiencies in marine meteorological services within their respective areas of concern, including through the distribution of results to marine forecasters and PMOs;

REQUESTS:

(1) The Advisory Working Group and the Working Group on Marine Meteorological Services to closely follow the implementation and results of this monitoring programme and to propose modifications, as appropriate;
(2) The Secretary-General to arrange for Secretariat support for the monitoring programme as detailed under **RECOMMENDS** above.

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NOTE: This recommendation replaces Recommendation 1 (CMM-VIII) which is no longer in force.

Annex to Recommendation 1 (CMM-XI)

Marine meteorological services monitoring programme questionnaire

A. **To masters, deck and radio officers of VOS**

In order to monitor the effectiveness of the weather and sea bulletins produced and transmitted by Meteorological Services, the World Meteorological Organization would appreciate your cooperation in completing the following questionnaire. The objective of this programme is the improvement of meteorological support to shipping.

Ship's name (call sign) .....
Country of registry .....
Name of master .....
Operational area(s) .....
Voyage from .....to .....
Position of ship when questionnaire completed .....
Date and time .....

Please complete the following questionnaire by ticking the appropriate heading and inserting comments, as appropriate.

	Good	Fair	Poor	Met. service issued by	CRS
1. Storm and gale warnings					
(*a*) Clarity of information	_____	_____	_____	_____	_____
(*b*) Accuracy of information	_____	_____	_____		
(*c*) Timeliness	_____	_____	_____		
2. Weather bulletins					
(*a*) Clarity of information	_____	_____	_____	_____	_____
(*b*) Accuracy of information	_____	_____	_____		
(*c*) Timeliness	_____	_____	_____		
(*d*) Terminology used	_____	_____	_____		
3. Radiofacsimile broadcasts					
(*a*) Maintaining schedules	_____	_____	_____	_____	_____
(*b*) Accuracy of information	_____	_____	_____		
(*c*) Readability	_____	_____	_____		
(*d*) Symbology	_____	_____	_____		
(*e*) Quality of reception	_____	_____	_____		

4. Coastal Radio Stations (CRS)/Coast Earth Stations (CES)

(*a*) Establishing contact with receiving station (CRS/CES)	_____	_____	_____	_____
(*b*) Delays with OBS messages	_____ Yes		(Time.....)	_____ No
(*c*) Refusal of CRS/CES to accept OBS messages	_____ Yes	(CRS/CES.....)	_____ Yes	
(*d*) Use of five or ten-figure groups	_____ 5	_____ 10		

5. Other related problems (if any)
Date and time .....
Position of the ship .....
Radio frequency and station call sign .....

6. Suggested improvements .....

Use additional sheets if necessary
For each case complete one questionnaire
After completion, please return to Meteorological Service at the following address: .....

Master's signature

B. **A summary of the replies to the questionnaire addressed to Voluntary Observing Ships (VOS) received by (Meteorological Service)**

	Number of ships which replied			Percentage of total replies		
	Good	Fair	Poor	Good	Fair	Poor
1. Storm and gale warnings						
(*a*) Clarity of information	_____	_____	_____	_____	_____	_____
(*b*) Accuracy of information	_____	_____	_____	_____	_____	_____
(*c*) Timeliness	_____	_____	_____	_____	_____	_____

2. Weather bulletins
(*a*) Clarity of information _____ _____ _____ _____ _____ _____
(*b*) Accuracy of information _____ _____ _____ _____ _____ _____
(*c*) Timeliness _____ _____ _____ _____ _____ _____
(*d*) Terminology used _____ _____ _____ _____ _____ _____

3. Radio-facsimile broadcasts
(*a*) Maintaining schedules _____ _____ _____ _____ _____ _____
(*b*) Accuracy of information _____ _____ _____ _____ _____ _____
(*c*) Readability _____ _____ _____ _____ _____ _____
(*d*) Symbology _____ _____ _____ _____ _____ _____

4. Coastal Radio Stations (CRS) / Coast Earth Stations (CES)
(*a*) Establishing contact with receiving station _____ _____ _____ _____ _____ _____
(*b*) Delays with OBS message _____ _____ _____ _____ _____ _____
(*c*) Refusal of CRS/CES to accept OBS _____ _____ _____ _____ _____ _____
(*d*) Use of five or ten-figure groups _____ _____ _____ _____ _____ _____

5. Other related problems

. . . . . .
. . . . . .
. . . . . .
. . . . . .

6. Suggested improvements

Recommendation 12 (CMM-XI) — Use of Beaufort equivalent scale of wind force

THE COMMISSION FOR MARINE METEOROLOGY,

NOTING:

(1) The *Manual on Marine Meteorological Services* (WMO-No.558), Volume I, Part I, Appendix I.3 — Beaufort scale of wind force,

(2) The final report of the sixth session of the CMM Sub-group on Marine Climatology,

NOTING FURTHER various papers published in the scientific literature in recent years which analyse the consequences of the use of various Beaufort equivalent scales for determining sea surface wind speeds for scientific studies of marine climate and climate change,

RECALLING the extensive discussions on this subject which had taken place at previous sessions of the Commission,

BEARING IN MIND the likely difficulties for global climate studies resulting from variations in observing practices for surface wind speeds from ships as well as from the use of different Beaufort equivalent scales for deriving such wind speeds,

CONSIDERING, however,

(1) The need to maintain continuity and consistency in data archives of marine surface winds and to avoid complications for marine observers,

(2) That the existing Beaufort equivalent scale is sufficiently accurate for operational observation purposes,

(3) That no international agreement yet exists on an appropriate Beaufort equivalent scale for scientific study applications,

AGREES that the existing Beaufort equivalent scale, as given in the *Manual on Marine Meteorological Services*, should be retained for operational observation and data archival purposes;

RECOMMENDS:

(1) To Members to standardize shipboard observing practices for marine surface winds, according to guidelines given in the *Manual on Marine Meteorological Services* and the *Guide to Marine Meteorological Services*;

(2) To those involved in climate research to take into account the difficulties and differences noted with the official WMO Beaufort equivalent scale and also with other "scientific Beaufort equivalent scales", as well as various environmental ship factors, when using archived ship wind data in studies of marine climate and climate change;

REQUESTS:

(1) The Secretary-General to bring this recommendation to the attention of all concerned;

(2) The Sub-group on Marine Climatology to continue to review the development and application of Beaufort equivalent scales for climate study purposes, to report any significant developments to the Commission and to Members, as appropriate, and also to examine the possibility of developing an extended Beaufort equivalent scale for marine forecast presentation purposes.

Recommendation 4 (CMM-XII) — Wave forecast verification scheme

THE COMMISSION FOR MARINE METEOROLOGY,

NOTING:

(1) Recommendation 4 (CMM-XI) — WMO wave programme 1993–1997,

(2) The report to CMM-XII by the chairperson of the Subgroup on Wave Modelling and Forecasting,

RECOGNIZING that formal verification systems for operational numerical weather prediction models have led directly to general and specific improvements in these models,

NOTING with interest the informal wind wave forecast verification scheme already adopted by a number of

centres operating operational global or basin-scale models,

CONSIDERING:

(1) The potential improvements which might be expected in operational wind wave models through a more generalized and formal approach to wave model forecast verification,

(2) That for a verification scheme to be most effective, all National Meteorological Services operating global or basin-scale models should, if possible, participate,

RECOMMENDS:

(1) That the wind wave model forecast verification scheme outlined in the annex to this recommendation should be further developed and formally implemented;

(2) That all Members operating global or basin-scale wave forecast models should be urged to participate;

REQUESTS the Subgroup on Wave Modelling and Forecasting:

(1) To develop further details of the scheme, for eventual consideration and adoption, on a trial basis, by interested Members;

(2) To review the implementation and operation of the trial scheme and to report on progress to CMM-XIII;

REQUESTS the Secretary-General to provide assistance to Members in the implementation of the scheme, as appropriate, and within the available budgetary resources.

Annex to Recommendation 4 (CMM-XII)

Wind wave forecast verification scheme

1. A scheme for exchanging verification statistics for operational wave models

Reliable wave observations are available only from around 40 to 50 moored buoys, and there are only a few parameters for which observations are available. A subset of the available moored buoys has been used, choosing those buoys in deep water, away from coasts, and ensuring that all possible regions are adequately represented.

Model values are extracted at six-hourly intervals both at t+00 (analysis) and for forecast periods of t+24, 48, 72, 96 and 120 hours (if available). Each month the data files are transmitted to the anonymous ftp server at the UKMO, where a file is produced containing the observations and model values from all centres. These files are placed on the UKMO anonymous ftp server for retrieval by participants.

Tables of statistics based on this data are calculated at ECMWF, and the summary files are transmitted to the UKMO ftp server for retrieval by participants. Thus, the workload involved in running the exchange is shared. All the files of data, statistics and any postscript files for the current month are freely available via anonymous ftp from the UKMO server.

The exchange has grown to now compare data from five participating centres, at 36 moored buoys, and for six separate forecast periods. Early results showed the impact at t+00 of assimilating ERS-1 altimeter data: those models that assimilated ERS-1 data had a wave height bias of some –0.2 m, and showed a rapid increase in model wave height during the first 24 hours of the forecast, compared to those centres not assimilating. Further, the immediate benefit of the switch early in 1996 to using ERS-2 data was readily seen. The t+00 bias of –0.2 m was removed, and the spin up of wave height was reduced.

The data exchange, by comparing both instantaneous observations and six-hourly averaged observations, revealed some ongoing problems with wave reports from the UKMO buoys west of Ireland. This was communicated to those responsible for maintaining the instruments, and a program to replace the communication units, already in hand, was seen to cure the problems.

Examination of time-series of model and observed wave heights, particularly in November 1995, showed a systematic failure of the WAM model at ECMWF to reach the highest wave heights observed during extreme storms in the west Atlantic. The WAM model run at FNMOC was closer to the observations. This illustrates that WAM model results may depend on details of the implementation (model grid and spectral resolution), and the wind data used.

2. Wider benefits from adopting an international verification of wave models

Many National Meteorological Services engaged in wave forecasting may benefit from this activity, in the same way in which many countries benefit from the exchange of internationally-accepted weather forecast verification scores. Until now, model validation has been carried out with special case studies, rather than using routinely available forecast model results.

Widespread access to information on wave model performance may also stimulate those Meteorological or Hydrographic centres that at present do not place their buoy observations on the GTS to consider doing so, and so allow a verification of wave models in the areas of local interest to these centres.

Several centres already make use of the third generation WAM model, and the UKMO is planning to implement a version of WAM in the near future. Yet already the exchange has revealed differences between different operational implementations of WAM — using winds from different models, with differing grid and spectral resolutions, assimilating altimeter data, or not. Even with most operational wave models based on WAM, a formally-adopted verification exchange will lead to improvements in wave model forecast systems.

A better understanding of the quality of surface winds from NWP models may lead to improvements in the modelling of the marine boundary layer. This may, through improved modelling of surface fluxes of heat, moisture and momentum, lead to improved NWP forecasts of surface winds.

Improvements in global wave modelling will also lead to improvements in regional wave modelling, through a better specification of boundary forcing and incoming swell, and improvements in model

formulation. Many smaller, regional Meteorological Centres, although not running a global wave model, may still wish to run a regional wave model to provide local forecasts of sea state. Making available information on global wave model verification will assist with this.

Recommendation 6 (CMM-XII) — Data buoys in support of meteorological and oceanographic operations and research

THE COMMISSION FOR MARINE METEOROLOGY,

NOTING:

(1) Resolution 9 (EC-XLV) — Data Buoy Cooperation Panel,
(2) Recommendation 6 (CMM-XI) — Drifting buoys in support of meteorological and oceanographic operations and research,
(3) The *Fourth WMO Long-term Plan*, Part II, Volume 1 (WMO/TD-No. 700) — The WWW Programme — and Volume 4 (WMO/TD-No. 703) — The Applications of Meteorology Programme,
(4) The final report of the Ocean Observing System Development Panel — *An Ocean Observing System for Climate*,
(5) Annual reports of the DBCP for 1995 and 1996,
(6) DBCP Technical Document No. 4 (1995) — *WOCE Surface Velocity Programme Barometer Drifter Construction Manual*,

NOTING with appreciation the efforts of the DBCP, in conjunction with GCOS and global research programmes, to expand cooperative buoy deployments worldwide through the creation of new regional action groups such as those in the South Atlantic and Indian Oceans,

RECOGNIZING nevertheless:

(1) That not all drifting buoys carry sensors for atmospheric pressure and/or sea-surface temperature,
(2) That a large number of drifting buoy deployments now taking place or planned over the next few years are funded through research programmes and that these deployments may cease with the termination of the specific research programmes,

CONSIDERING:

(1) That drifting buoys represent a very cost-effective means for acquiring surface meteorological and oceanographic data from remote ocean areas,
(2) The stated requirements for operational buoy data in support of the WWW, marine meteorological services and global climate studies,

CONSIDERING further that the success of the DBCP was critically dependent on the activities of, and the coordination provided by, its technical coordinator, and that increasing difficulties for Members in maintaining voluntary financial contributions were threatening the continuance of the position,

RECOMMENDS:

(1) That agencies, institutions, and organizations involved in the acquisition and deployment of drifting buoys be urged to equip these buoys with at least atmospheric pressure, SST and, if possible, air temperature sensors so as to enhance their potential value to a wide variety of WMO programmes, in particular making use of the low-cost SVP-B drifter whenever practicable;
(2) That the international research community also be urged to continue to make the data from their drifting buoys available for real-time distribution over the GTS and for later permanent archival;
(3) That Members and the Data Buoy Cooperation Panel continue their efforts to ensure funding of drifting buoy deployments on a long-term, operational basis following the termination of the specific research programmes;
(4) That as many additional Members as possible contribute to the DBCP Trust Fund, to reduce the burden on existing contributors and ensure the maintenance of the essential technical coordinator position, which benefitted all Members of WMO;
(5) That the DBCP and the Executive Council consider the possibilities for new and innovative ways of funding and maintaining the technical coordinator position;

REQUESTS the Secretary-General and the Data Buoy Cooperation Panel to bring this recommendation to the attention of Members and others concerned and to assist whenever possible in the implementation of the recommendation.

Recommendation 2 (JWC-IGOSS-V) — Real-time distribution and archiving of oceanographic data

THE JOINT IOC/WMO WORKING COMMITTEE FOR IGOSS,

NOTING: (i) the requirements of IGOSS for real-time oceanographic data in support of both operational and research users, (ii) the value of long-term series of oceanograhic data for climatological studies, (iii) Recommendation 2 (DBCP-III) — Real-time Distribution and Archiving of Oceanographic Data from Drifting Buoys,

CONSIDERING: (i) that many oceanographers make both surface and sub-surface measurements of oceanographic variables of great potential value to IGOSS, (ii) that many of these measurements are not presently being made available in real-time over the GTS,

RECOMMENDS: (i) that oceanographers and others involved in the collection of both surface and sub-surface oceanographic data make every effort to ensure the distribution of these data in real time over the GTS, (ii) that oceanographic data be also made available to the RNODCs for permanent global archival,

REQUESTS the Secretariats, the IGOSS Operational Coordinator, the Chairperson of the Joint Working Committee and Member States, in liaison with the Drifting Buoy Cooperation Panel, to bring this recommendation to the attention of those concerned.

RECOMMENDATIONS ADOPTED BY THE SESSION

RECOMMENDATION 1 (JCOMM-II)

GUIDE TO STORM SURGE FORECASTING

THE JOINT WMO/IOC TECHNICAL COMMISSION FOR OCEANOGRAPHY AND MARINE METEOROLOGY,

NOTING:

(1) Paragraphs 6.2.6 and 6.2.15 of the general summary of the *Abridged Final Report with Resolutions and Recommendations of the First Session of the Joint WMO/IOC Technical Commission for Oceanography and Marine Meteorology* (WMO-No. 931),

(2) The final report of the first session of the Expert Team on Wind Waves and Storm Surges, JCOMM Meeting Report No. 22,

CONSIDERING:

(1) That storm surges, both tropical and extra-tropical, represent a major marine hazard, and result in the loss of life and property in many parts of the world on a regular basis,

(2) That accurate and timely forecasts and warnings would contribute substantially to mitigating the threat to life and property from storm surges,

(3) That the preparation and issuing of such forecasts and warnings is the responsibility of National Meteorological Services and/or oceanographic agencies in many countries,

(4) That many such services and agencies would benefit substantially from enhanced technical guidance and support in the preparation of forecasts and warnings of storm surges,

RECOMMENDS:

(1) That a Guide to Storm Surge Forecasting be prepared;

(2) That the contents of this Guide should be as given in the annex to this recommendation;

REQUESTS the Expert Team on Wind Waves and Storm Surges to provide technical advice and guidance in the preparation of the guide;

REQUESTS the Secretary-General of WMO and Executive Secretary IOC:

(1) To arrange for the preparation of the Guide, in consultation with the co-presidents of JCOMM, the president of CBS and other bodies and organizations, as appropriate;

(2) To publish the Guide in the WMO *Manuals* and *Guides* series.

ANNEX TO RECOMMENDATION 1 (JCOMM-II)

DRAFT TABLE OF CONTENTS
GUIDE TO STORM SURGE FORECASTING

RECOMMENDATION 2 (JCOMM-II)

THE DEVELOPMENT OF OPERATIONAL OCEANOGRAPHIC PRODUCTS AND SERVICES UNDER JCOMM

THE JOINT WMO/IOC TECHNICAL COMMISSION FOR OCEANOGRAPHY AND MARINE METEOROLOGY,

NOTING:

(1) Paragraphs 6.2.17, 6.5.3 and 6.6.9 of the general summary of the *Abridged Final Report with Resolutions and Recommendations of the First Session of the Joint WMO/IOC Technical Commission for Oceanography and Marine Meteorology* (WMO-No. 931),

(2) The final report of the second session of the Services Coordination Group, JCOMM Meeting Report No. 30,

(3) The final report of the fourth session of the JCOMM Management Committee, JCOMM Meeting Report No. 34,

RECOGNIZING that the Global Ocean Data Assimilation Experiment (GODAE) is due to finish in 2008, and that there is a need to ensure, where possible and appropriate, the long-term maintenance of many of the structures, procedures and centres established under GODAE,

CONSIDERING:

(1) The large number of operational or quasi-operational oceanographic products becoming available, as demonstrated by OceanOps 04 and the GODAE Symposium, and the requirement to properly document such products,

(2) That many of these products are developed and maintained through public-funded mechanisms, and may generally be classified as primary products, being made available to intermediate users, not end users, except in the clear cases of products for the public good, such as those for maritime safety services,

(3) The need to carefully document and classify user requirements for operational oceanographic products,

(4) The need to address a number of technical issues relating to future operational oceanographic products under JCOMM, including presentation and delivery formats, symbology and nomenclature, data and metadata formats, new technological developments in data and product management, and a business case for operational oceanography,

(5) The potential future value of Specialized Oceanographic Centres in support of developing countries,

(6) The potential value also of a redeveloped JCOMM Electronic Products Bulletin, as a user-friendly Web portal to JCOMM products and services, and the need to coordinate this redevelopment closely with GOOS and its own Products and Services Bulletin,

RECOMMENDS:

(1) That work be undertaken to further the development of operational oceanographic products under JCOMM, as detailed in the actions specified in the annex to this recommendation;

(2) That work also be undertaken, through the Services Programme Area, to redevelop the JCOMM Electronic Products Bulletin as a Web portal to JCOMM products and services;

REQUESTS:

(1) The Services Coordination Group and the Management Committee to provide oversight as well as technical advice and guidance in the implementation of this recommendation, in coordination with GOOS;

(2) The Secretary-General of WMO and Executive Secretary IOC to provide support, as necessary, for the implementation of the recommendation, within available resources.

ANNEX TO RECOMMENDATION 2 (JCOMM-II)

ACTIONS FOR THE FURTHER DEVELOPMENT OF OPERATIONAL OCEANOGRAPHIC PRODUCTS AND SERVICES UNDER JCOMM

1. **Recommendation**: A comprehensive User Requirement Document (URD) that detailed the needs, applications and scenarios for operational ocean and relevant marine meteorological products should be established as the basis for the development of future products and services. The URD should be developed as a rolling open document that is regularly updated with current state-of-the-art applications. The Management Committee proposed that a consultant or seconded expert should be engaged by the Secretariat, to prepare, as a first step, a comprehensive compilation of existing information, based in particular on the results of OceanOps 04, the GODAE Symposium, GCOS 92, etc., for review and follow-up action by the GOOS Steering Committee and the JCOMM Management Committee.
2. **Recommendation**: A comprehensive catalogue of existing operational or quasi-operational ocean products was essential. Steps to achieve this should include:
   (*a*) A small group of experts (subset of or defined by the SCG) to prepare specifications for the catalogue, including product classes, parameters and access details required;
   (*b*) A formal agreement to be established by the JCOMM Secretariat with MEDIAS-France for the design of the catalogue and maintenance of the database;
   (*c*) Initial information for the catalogue to be developed through a Secretariat survey;
   (*d*) Procedures for updating the catalogue to be defined by the expert group as part of the specifications for the catalogue, for implemention by the Secretariat.

The Management Committee had endorsed the recommendation and had requested the Secretariat and SCG to take appropriate action.

3. **Recommendation**: The GODAE Symposium had agreed that guidelines for operational ocean product presentation, symbology and nomenclature were important for users. However, it had also agreed that this was a task for an international body (JCOMM) rather than GODAE. Development of such guidelines, and their formal adoption by JCOMM, was not a trivial task, and should therefore be undertaken during the next JCOMM intersessional period, through the establishment (under SCG) of a small ad hoc Task Team, comprising representatives of major existing ocean product centres, including as a minimum the GODAE product centres, to work by e-mail to develop a draft of the guidelines, for review through a wider JCOMM process (SCG, the Management Committee and JCOMM members), for final presentation to the co-presidents and the Management Committee, by 2007. The URD described above should be used as a reference for capability requirements. The Management Committee had endorsed this recommendation.
4. **Recommendation**: It was proposed that, with the approval of the fourth session of the Management Committee and IODE, an ad hoc Task Team should be established, under DMCG and IODE, and comprising representatives of JCOMM DM, IODE and GODAE, to develop a detailed proposal for the required standardized data and metadata formats. These would then be reviewed by the wider GODAE community as well as the JCOMM and IODE process, before presentation for adoption by the Management Committee and a future IODE session in 2007. Due attention should be paid to internationally agreed metadata standards (e.g., ISO 19115 Geospatial data – Metadata). Interoperability was a key issue and user requirements/consultations should be used as the basis for data format decisions. The Management Committee requested the Data Management Programme Area Coordinator, in cooperation with the chairperson of IODE, to arrange for the preparation, as a first step, of a comprehensive review of existing activities and work on this topic, to be reported to the fifth session of the Management Committee. Further action, if required, could then be addressed.
5. **Recommendation**: JCOMM, with initial collaboration from GODAE, needed to develop a rolling implementation plan, with the wider community, for the integration of new technological developments in data and product management. This issue should be included in the future work plan for the DMPA. The Management Committee had endorsed this recommendation, to be implemented by 2007.
6. **Recommendation:** An interaction mechanism between GODAE/JCOMM and the coastal modelling community was required, to develop a possible Coastal Ocean Data Assimilation Experiment (CODAE). The Management Committee had suggested that this should be

reviewed as part of the response to COOP in the next intersessional period (see also discussions under agenda item 4.3).

7. **Recommendation:** Beyond this, JCOMM must continue the dialogue with the GOOS Scientific Steering Committee to further define requirements for modelling and product support for non-physical variables and processes, including ecosystem modelling. Action on this recommendation was taken under agenda item 4.3.
8. **Recommendation**: The newly merged JCOMM/GOOS CB Panel should examine requirements and develop specific proposals regarding possible pilot projects and designated ocean product centres to support developing countries. The Management Committee had endorsed this recommendation.
9. **Recommendation**: The Management Committee should formally and rapidly address the question of the business case for operational oceanography. The Management Committee had noted that a related study on this issue was currently being undertaken under the sponsorship of IOC. It therefore proposed that the results of this study, when available, should first be reviewed by JCOMM (Management Committee and SCG), before any decision was taken on what additional actions were required under JCOMM.

RECOMMENDATION 3 (JCOMM-II)

CONSUMABLES FOR SHIP-BASED OBSERVATIONS

THE JOINT WMO/IOC TECHNICAL COMMISSION FOR OCEANOGRAPHY AND MARINE METEOROLOGY,

NOTING:

(1) Recommendation 2 (JCOMM-I) – Resources for Ship-Based Observations,
(2) The final report of the third session of the Ship Observations Team, JCOMM Meeting Report No. 35,
(3) The report of the Observations Programme Area Coordinator to JCOMM-II,

RECOGNIZING:

(1) That many components of the operational, in situ ocean observing system coordinated by JCOMM are currently well short of requirements, including in particular the XBT network coordinated by the Ship Observations Team,
(2) That currently only a small number of Members/Member States contribute to the maintenance of the observing system,
(3) That the cost of the purchase and supply of consumables (such as XBTs) represents a major obstacle to the enhanced involvement of maritime countries in the system,

CONSIDERING:

(1) That the implementation of the observing system could be enhanced through the establishment of a simple mechanism to encourage more countries to contribute to the system and complete the global XBT and other networks,
(2) That considerable cost savings could be achieved through the bulk purchase and supply of consumables for ship-based observations, including in particular XBTs,
(3) That the provision of consumables from a common pool would greatly assist maritime countries wishing to contribute to the implementation and maintenance of the observing system, in support of national, regional and global interests and programmes,

RECOMMENDS:

(1) That a scheme for the bulk purchase and supply of consumables for ship-based observations be developed, and a special Trust Fund be established for that purpose;
(2) That Members/Member States which are in a position to do so, contribute to this Trust Fund, in support of the full implementation and maintenance of the ocean observing system coordinated by JCOMM, and the enhanced involvement of maritime countries in this work;
(3) That, at the same time, Members/Member States continue to procure and supply consumables for ship-based observations through their existing national procedures;

REQUESTS:

(1) The Observations Programme Area Coordinator, in consultation with the chairperson of the Ship Observations Team, the co-presidents of JCOMM, the JCOMM Secretariat and relevant Members/Member States, to develop a plan for the bulk purchase and supply of consumables for ship-based observations, for consideration and approval by the Management Committee;
(2) The Secretary-General of WMO and the Executive Secretary IOC to support the implementation of this plan through the establishment of a special Trust Fund for this purpose.

RECOMMENDATION 4 (JCOMM-II)

NEW TERMS OF REFERENCE FOR JCOMMOPS

THE JOINT WMO/IOC TECHNICAL COMMISSION FOR OCEANOGRAPHY AND MARINE METEOROLOGY,

NOTING:

(1) The JCOMM Terms of Reference and especially those related to the development of observing networks,
(2) Recommendation 6 (JCOMM-I) – Establishment of a JCOMM in situ Observing Platform Support Centre (JCOMMOPS),
(3) The final report of the first session of the Ship Observations Team, JCOMM Meeting Report No. 11,
(4) The final report of the first session of the Observations Coordination Group, JCOMM Meeting Report No. 13,
(5) The final report of the second session of the Ship Observations Team, JCOMM Meeting Report No. 24,
(6) The final report of the twentieth session of the Data Buoy Cooperation Panel, JCOMM Meeting Report No. 33,
(7) The final report of the fourth session of the JCOMM Management Committee, JCOMM Meeting Report No. 34,
(8) The final report of the third session of the Ship Observations Team, JCOMM Meeting Report No. 35,

CONSIDERING:

(1) The requirement for JCOMM to be active in a process in which oceanographic and marine meteorological observing system elements make the transition to a fully integrated system,
(2) The need to integrate at the international level a number of activities regarding operation and implementation of in situ marine observing systems,
(3) The success of JCOMMOPS development and work, based on DBCP, SOOP and Argo technical coordination facilities, thanks to resources provided by Members/Member States through the DBCP, SOOPIP and Argo,
(4) The potential value of extending JCOMMOPS activities to include some services to support SOT Coordination, as proposed by the second session of the Ship Observations Team,
(5) The need to make satellite information available, and, in particular, results from the work of the Cross-cutting Team on Satellite Data Requirements,

RECOMMENDS:

(1) That the JCOMMOPS Terms of Reference should be modified to enable the provision of extended support to SOT Coordination and the dissemination on the Web site of information provided by the Cross-cutting Team on Satellite Data Requirements;
(2) That the new JCOMMOPS Terms of Reference should be as given in the annex to this recommendation;
(3) That JCOMMOPS should continue to be based in Toulouse, under the day-to-day supervision of the WMO and IOC Secretariats;

REQUESTS Members/Member States, where possible, to commit the resources required to support JCOMMOPS.

NOTE: This recommendation replaces Recommendation 6 (JCOMM-I), which is no longer in force.

ANNEX TO RECOMMENDATION 4 (JCOMM-II)

TERMS OF REFERENCE FOR THE JCOMM IN SITU OBSERVING PLATFORM SUPPORT CENTRE (JCOMMOPS)

Under the overall guidance of the JCOMM Observations Coordination Group and following the direction of the Data Buoy Cooperation Panel, the Ship Observations Team, the Argo Steering Team, and the Cross-cutting Team on Satellite Data Requirements, the JCOMMOPS shall:

(i) Act as a focal point for implementation and coordination of observing platforms monitored by the above programmes and provide assistance to platform operators for free and unrestricted exchange of data by, inter alia, providing information on telecommunications systems, clarifying and resolving issues between platform operators and telecommunications system operators, and encouraging the implementation of standard formats;
(ii) Maintain information on relevant data requirements for observations in support of GOOS, GCOS, and the WWW as provided by the appropriate international scientific panels and JCOMM Expert Teams and Groups, and routinely provide information on the functional status of the observing systems;
(iii) Provide a gateway for information on instrumentation deployment and servicing opportunities, and on operator contact information; and
(iv) Provide information on the observational programme, including on instrumentation, on instrument evaluation, and on data quality.

RECOMMENDATION 5 (JCOMM-II)

IOC PROJECT OFFICE FOR IODE

THE JOINT WMO/IOC TECHNICAL COMMISSION FOR OCEANOGRAPHY AND MARINE METEOROLOGY,

NOTING:

(1) Paragraphs 4.3.6 and 4.4.4 of the final report of the fourth session of the Management Committee, JCOMM Meeting Report No. 34,
(2) Paragraphs 3.2 and 4.1 of the final report of the eighteenth session of the IOC Committee for IODE,
(3) The official inauguration of the IOC Project Office for IODE that took place on 25 April 2005 in Ostend, Belgium,
(4) The successful organization of a first joint JCOMM/IODE/GOOS training event held at the Project Office in September 2005 (Digital Modelling Training Course 2005),

CONSIDERING the excellent facilities provided by the IOC Project Office for IODE to potentially support a range of data management-related activities of IOC, WMO and other organizations as appropriate,

RECOMMENDS:

(1) That the IOC Project Office for IODE should be used for joint data management-related activities of IOC/IODE, JCOMM, WMO, and other relevant organizations, on projects of mutual interest;
(2) The further organization of joint JCOMM/IODE/GOOS training events through the Project Office;

REQUESTS Members/Member States to promote the Project Office and to second relevant experts on a short- or long-term basis to support its activities.

RECOMMENDATION 6 (JCOMM-II)

JCOMM DATA MANAGEMENT STRATEGY

THE JOINT WMO/IOC TECHNICAL COMMISSION FOR OCEANOGRAPHY AND MARINE METEOROLOGY,

NOTING:

(1) Paragraphs 4.3.8 and 4.3.9 of the final report of the fourth session of the Management Committee, JCOMM Meeting Report No. 34,
(2) Paragraph 5.4 of the final report of the eighteenth session of the IOC Committee for IODE,

CONSIDERING:

(1) The urgent need for the development of a JCOMM Data Management Strategy,
(2) The need for this Data Management Strategy to be closely coordinated with those of IODE and the WMO Information System (WIS),

RECOMMENDS that the JCOMM Data Management Strategy be prepared jointly with IOC/IODE and WIS;

REQUESTS the Secretary-General of WMO and the Executive Secretary IOC to facilitate the preparation of the strategy, in consultation with the co-presidents of JCOMM, the IODE chairperson, the ICG-WIS chairperson and other bodies and organizations as appropriate.

RECOMMENDATION 7 (JCOMM-II)

COMPLEMENTARY GUIDELINES FOR NAVTEX BROADCASTS

THE JOINT WMO/IOC TECHNICAL COMMISSION FOR OCEANOGRAPHY AND MARINE METEOROLOGY,

NOTING:

(1) The International Convention for the Safety of Life at Sea (SOLAS), 1974, in particular Chapter V (Safety of Navigation), Regulation 5 (Meteorological services and warnings) of the 2001 amendments,
(2) The 1988 amendments to SOLAS for the Global Maritime Distress and Safety System,
(3) Recommendation 3 (CMM-XII) – Services for coastal areas using the international NAVTEX service,
(4) The *Abridged Final Report with Resolutions and Recommendations of the First Session of the Joint WMO/IOC Technical Commission for Oceanography and Marine Meteorology* (WMO-No. 931),
(5) The final report of the first session of the Expert Team on Maritime Safety Services, JCOMM Meeting Report No. 15,
(6) Annex VI to the WMO Technical Regulations (*Manual on Marine Meteorological Services* (WMO-No. 558)),

RECOGNIZING:

(1) The obligations of countries which are signatories to SOLAS to provide meteorological services for shipping as specified in the Convention, including its 1988 amendments, in particular through the International NAVTEX Service,

(2) That the International NAVTEX Service is not well adapted to the broadcast of relatively long meteorological forecasts and warnings,

(3) That the use of the International NAVTEX Service for the broadcast of meteorological forecasts and warnings needs to be fully in harmony with navigational warning services coordinated by IHO, and to be responsive to requirements for maritime safety services expressed by IMO,

RECOMMENDS:

(1) That the amended and complementary guidelines for the provision of meteorological forecast and warning broadcasts through the International NAVTEX Service as detailed in annex 1 to this resolution be adopted;

(2) That the list of common abbreviations for use with the International NAVTEX Service as detailed in annex 2 also be adopted;

(3) That the *Manual on Marine Meteorological Services* (WMO-No. 558), Volume I, Part I be amended accordingly;

URGES Members/Member States with forecast and warning preparation and broadcast responsibilities through the International NAVTEX Service:

(1) To continue to implement their responsibilities in full, in accordance with the guidelines in the *Manual*;

(2) To keep the JCOMM Secretariat closely informed of developments and problems in the operation of the system;

(3) To liaise closely with users regarding their requirements for, and response, to meteorological forecast and warning broadcasts through the International NAVTEX Service;

REQUESTS the Expert Team on Maritime Safety Services to keep the implementation of, and user response to, the guidelines and common abbreviations for meteorological forecast and warning broadcasts through the International NAVTEX Service under review, and to develop proposals for amendments as necessary;

REQUESTS the Secretary-General of WMO:

(1) To provide appropriate technical advisory assistance to Members/Member States concerned in the implementation of the guidelines and abbreviations;

(2) To bring this recommendation to the attention of IMO and IHO and other organizations and bodies concerned, and to continue to liaise closely with them in the operation of the guidelines.

ANNEX 1 TO RECOMMENDATION 7 (JCOMM-II)

AMENDED AND COMPLEMENTARY GUIDELINES FOR METEOROLOGICAL FORECAST AND WARNING BROADCASTS THROUGH THE NAVTEX SERVICE

4. SPECIFIC GUIDELINES FOR NAVTEX SERVICES

4.1 General

4.1.1 NAVTEX is a narrow-band, direct-printing telegraphy service for the promulgation of Maritime Safety Information (MSI) known as **coastal warnings** (navigational and meteorological warnings, meteorological forecasts and other urgent information to ships). The transmission coverage/service area for **coastal warnings**, defined in SOLAS, extends from the Fairway Buoy/Pilot Station to 250 nautical miles from the transmitter, or to the range declared by an Administration in the IMO GMDSS Master Plan. In particular, NAVTEX cannot be considered as a reliable system to receive meteorological information in port: other systems should be made available for end-users to get meteorological information in harbour.

4.1.2 According to WMO vocabulary, NAVTEX broadcasts shall include weather information for **offshore** and **coastal waters**.

4.1.3 The International NAVTEX Service is the coordinated broadcast and automatic reception on the frequency 518 kHz of MSI using the English language. It forms part of the Global Maritime Distress and Safety System (GMDSS) developed by the International Maritime Organization (IMO) and, since 1 August 1993, a NAVTEX receiving capability has become part of the mandatory equipment which is required to be carried in certain vessels under the provisions of the International Convention for the Safety of Life at Sea (SOLAS), 1974, as amended in 1988.

4.1.4 The frequencies 490 and 4 209.5 kHz are available to administrations for National NAVTEX broadcasts using their national language or English.

4.1.5 As NAVTEX is a single frequency system, each NAVTEX station and content provider must take measures to prevent mutual interference with other stations. To avoid such mutual interference, each NAVTEX station is assigned specific time slots, which are 10 minutes in length every 4 hours. Stations which share common time slots are arranged to be geographically distant. When a NAVTEX broadcast may exceed the assigned broadcast period, or broadcast a warning at an unscheduled time, the NAVTEX station must make scheduling arrangements with nearby stations to prevent potential mutual interference. Such rescheduling of broadcasts may result in an undesirable

cascade effect, inhibiting the fundamental purpose of the NAVTEX system. Therefore, unscheduled broadcasts, and excessive MSI which may exceed scheduled time slots, should be avoided.

4.1.6 Responsibility for coordinating the establishment of the global NAVTEX service has been vested by IMO in its Coordinating Panel on NAVTEX (See note).

4.1.7 The operational and technical characteristics of the NAVTEX system are contained in Recommendation ITU-R M.540-2 and in the NAVTEX Manual published by the International Maritime Organization (IMO Publication Sales Number IMO-951E).

4.1.8 The user at sea may experience reception problems caused by a variety of factors, such as:

(*a*) **Excessive transmitter power output**
The optimum power output for a NAVTEX transmitter by day is 1Kw. This should achieve a maximum range of approximately 400 nms, with guaranteed reception out to 250 nms. More than 1Kw may cause the transmission to follow the curvature of the earth to a significantly greater distance. In addition, such power may also create a sky wave which could well be received in excess of 1 000 nms from the transmitter;

(*b*) **Overrunning timeslots**
After the time allotted to each NAVTEX transmission, the next transmitter will commence its transmission. If the first transmitter continues beyond its allocated transmission period, its ongoing transmission will mask the phasing signal from the second transmitter if it is in range of the first one. It is this phasing signal that enables the receiver to lock onto the correct transmitter. If the first transmitter has continued beyond its time limit, the receiver will not be able to lock onto the next station which will seem to the user as if the second station is off the air and the receiving vessel could miss vital safety information, i.e. a storm warning;

(*c*) **"Night Effect"**
This is the name given to the fact that for a given power output the range of a Medium Frequency transmission is significantly increased at night. For example, where 1KW will give a range of approximately 400 nms by day, that same signal at night could achieve a range of as much as 1 000 miles. Accordingly it is imperative that NAVTEX transmitters reduce power at night, in the case of NAVTEX to 300 watts or such power as is required to achieve the optimum range of 250 nms.

4.1.9 Criteria for the GMDSS receivers have been defined to ensure that corrupted messages are not recorded. These criteria are:

(*a*) "Only message identifications which have been satisfactorily received should be stored. A message is satisfactorily received if the character error rate is below 4 per cent";

(*b*) "When the error rate is more than 33 per cent during a period longer than 5 seconds, the printing of the message shall be forbidden because of bad reception, and the identification of the message shall not be memorized."

4.2 Procedures

4.2.1 The time-shared nature of NAVTEX imposes the need for strict discipline in controlling the information flow of the broadcast. Into the ten minutes time slots must be fitted navigational warnings, meteorological warnings, weather forecasts, SAR Initial Distress Alerts, Pilot information and Radio Navigational Aids information such as GPS errors. It is important that forecasts are dedicated only to the specific area covered by the NAVTEX transmitter, and other measures are to be taken, to ensure that messages are no longer in length than necessary. In particular, short concise formats, which have been agreed universally, should be used.

4.2.1.1 Gale, storm, hurricane and warnings of other severe meteorological phenomena should be broadcast under B2 character **B** (Meteorological Warning), once upon receipt and then at the next scheduled broadcast times only.

4.2.1.2 Routine forecasts should be broadcast at scheduled broadcast times under B2 character **E** (Meteorological Forecast) at least twice daily.

4.3 Specific guidelines for the provision of meteorological information

4.3.1 It is essential for meteorological messages to be as short as possible, whilst still transferring the necessary information to the mariners at sea. Only the responsible NMS shall prepare such messages. Manual modifications by NAVTEX Coordinators shall be kept to a minimum, and shall only be made if approved by the appropriate NMS according to precise procedures and criteria.

4.3.2 For this reason, additional requirements and guidelines to Volume I, Part II, for Meteorological messages prepared for NAVTEX Service, are needed. The main specific ways for NMS to shorten NAVTEX messages, if needed, are:

(*a*) **Use of abbreviations**: this is the most effective and efficient method to shorten meteorological messages, but using only strictly selected and approved abbreviations. The abbreviations list for GMDSS MSI (to be used for International NAVTEX Service), in accordance with the multilingual list of terms used in weather and sea bulletins, is included in Appendix 1.2 of the *Manual on Marine Meteorological Services* (WMO-No. 558). For national NAVTEX Service, administrations should also define an abbreviation list for their native language. When neighbouring countries use the same native language, a common list should be considered, at least on a regional basis (and then included in Volume II of the *Manual*).

Abbreviations should be used, as appropriate (in some situations or for some events, forecasters may prefer to use plain language), in most parts of meteorological messages, except for **warnings (included or not in scheduled bulletins), that shall remain in plain language**. The International NAVTEX service is in English but care should be taken to use the recommended abbreviations, otherwise confusion may arise to users whose native language is not English. Where additional abbreviations better meet local or regional needs, these may be used as required;

(*b*) **Split bulletins**: All warnings, subject to higher priority, should always be issued as separate messages under B2 character **B** for NAVTEX. In scheduled bulletins, Part I should then be very short, referring either to a list of sub-areas or to a numbering system. This method generates a reduction in the size of single messages (i.e. lower risk of rejection). The slight increase of the global volume of information transmitted (because of the redundancy needed for single messages to be self-supporting) can be considered as insignificant;

(*c*) **Mandatory information only**: The provision of non-mandatory information (such as analyses or prognoses in code form, selections of reports from sea or land stations - described as Parts IV, V, VI in the *Manual on Marine Meteorological Services* - medium-range forecasts, etc.), shall not be broadcast over the International NAVTEX system. These should be issued as separate messages, with lower priority if needed, using a national system, to reduce risks for messages that include mandatory Parts II and III (Synopsis and Forecasts) to be rejected;

(*d*) **Consolidate information**: As the final message is available in written form onboard, one single sentence (like "squalls in all areas" for example), included either in the **Synopsis (Part II)** or in the **Forecasts (Part III)**, could favourably replace words (like "squalls") repeated for each sub-area, if the expected conditions are homogeneous on the whole domain or a large part of it. This could be particularly useful when expected wind and sea-state conditions are severe;

(*e*) **Remove verbiage**: NAVTEX is a text system and should not be in flowing prose (messages are printed). Superfluous words should be omitted;

(*f*) **Consistency between bulletins and transmitter coverage**: NMS should ensure that the information broadcast is pertinent only to the transmitter coverage/service area.

4.4 General principles for coordination

4.4.1 Where there is a requirement for coordination of meteorological information via NAVTEX, the following principles should be adopted:

(*a*) It is assumed that there is an existing exchange using the GTS of weather warnings and some weather forecasts (once or twice daily) for mariners between all National Meteorological Services working in the area;

(*b*) There should be one National Meteorological Service working as meteorological coordination centre responsible for the provision of weather bulletins for mariners via the NAVTEX system in the area concerned. The selection of the NMS as meteorological coordination centre may be governed by its proximity to the majority of forecasting areas in the region and existing involvement in the provision of NAVTEX services;

(*c*) The meteorological coordination centre should submit its forecasts and warnings to the NAVTEX station operators for dissemination on a 24-hour daily operational basis. If necessary, the provision of weather bulletins from other countries could be included for waters not already covered by the coordination centre;

(*d*) Every National Meteorological Service serving the area concerned should have access to the meteorological coordination centre to deliver by GTS its warnings and forecasts for the areas for which it intends to have responsibility;

(*e*) The meteorological coordination centre should decide which warning is sent to the NAVTEX operator for dissemination by the system. The criteria for such decisions are based on warnings with the highest wind speed. In cases of significant difference and serious doubts in warnings, the centre should ask the service which prepared the message in question for additional confirmation (e.g. via the GTS link);

(*f*) The meteorological bulletins and additional warnings which have been sent to the NAVTEX station operators for dissemination should be copied, by the meteorological coordination centre via the GTS, to all National Meteorological Services serving the area.

4.5 Coordination arrangements

4.5.1 Specific international coordination arrangements for NAVTEX broadcasts of meteorological information, whenever established, are detailed in the relevant section of Volume II of this *Manual*.

NOTE: The NAVTEX Coordinating Panel can be contacted at the following address:
The Chairman
Coordinating Panel on NAVTEX
International Maritime Organization
4 Albert Embankment
LONDON SE1 7SR

ANNEX 2 TO RECOMMENDATION 7 (JCOMM-II)

COMMON ABBREVIATIONS FOR INTERNATIONAL NAVTEX SERVICE

All wind directions to be abbreviated as indicated below.

Terminology in full	NAVTEX Abbreviations
North or Northerly	N
Northeast or Northeasterly	NE
East or Easterly	E
Southeast or Southeasterly	SE
South or Southerly	S
Southwest or Southwesterly	SW
West or Westerly	W
Northwest or Northwesterly	NW

NOTE: The use of the above abbreviations for wind direction could generate savings of the order of 6-8% in the length of bulletins drafted for the International NAVTEX Service.

Terminology in full	NAVTEX Abbreviations
Decreasing	DECR
Increasing	INCR
Variable	VRB
Becoming	BECMG
Locally	LOC
Moderate	MOD
Occasionally	OCNL
Scattered	SCT
Temporarily/Temporary	TEMPO
Isolated	ISOL
Frequent/Frequency	FRQ
Showers	SHWRS or SH
Cold Front	C-FRONT or CFNT
Warm Front	W-FRONT or WFNT
Occlusion Front	O-FRONT or OFNT
Weakening	WKN
Building	BLDN
Filling	FLN
Deepening	DPN
Intensifying/Intensify	INTSF
Improving/Improve	IMPR
Stationary	STNR
Quasi-Stationary	QSTNR
Moving/Move	MOV or MVG
Veering	VEER
Backing	BACK
Slowly	SLWY
Quickly	QCKY
Rapidly	RPDY
Knots	KT
Km/h	KMH
Nautical miles	NM
Metres	M
HectoPascal	HPA
Meteo…	MET
Forecast	FCST
Further outlooks	TEND
Visibility	VIS
Slight	SLGT or SLT
Quadrant	QUAD
Possible	POSS
Probability/Probable	PROB
Significant	SIG
No change	NC
No significant change	NOSIG
Following	FLW
Next	NXT
Heavy	HVY
Severe	SEV or SVR
Strong	STRG
From	FM
Expected	EXP
Latitude/Longitude	LAT/LONG

Remarks:

The overall savings by the use of the abbreviations in the above lists in the meteorological content of the International NAVTEX Service broadcasts could, it is estimated, generate savings more than 20% in transmission time.

"Expected" and "Latitude/Longitude" should, when possible, be omitted in the messages.

RECOMMENDATION 8 (JCOMM-II)

GUIDELINES FOR SEA-ICE CHARTS

THE JOINT WMO/IOC TECHNICAL COMMISSION FOR OCEANOGRAPHY AND MARINE METEOROLOGY,

NOTING:

(1) Recommendation 11 (CMM-X) – Format for the archival and exchange of sea-ice data in digital form (SIGRID),

(2) JCOMM Technical Report Series *Ice Chart Colour Code Standard* (WMO/TD-No. 1215) and *SIGRID-3: A Vector Archive Format for Sea Ice Charts* (WMO/TD-No. 1214),

(3) The final report of the second session of the JCOMM Expert Team on Sea Ice (ETSI) - tenth session of Steering Group for the Global Digital Sea Ice Data Bank (GDSIDB), JCOMM Meeting Report No. 28,

(4) The *Manual on Marine Meteorological Services* (WMO-No. 558), Volume 1, Part I,

CONSIDERING that the *Manual on Marine Meteorological Services* does not currently provide guidelines for a recommended scheme for sea-ice charts,

RECOGNIZING:

(1) That the new technical documents for sea-ice charts facilitate utilization of operational sea-ice products as well as coding procedures for climatological information,

(2) That the Colour Standard and SIGRID formats are now extensively used by most national sea-ice services in their operational and archival practices,

RECOMMENDS that the *Manual on Marine Meteorological Services* (WMO-No. 558), Volume I, Part I, item 4.2.9 be amended accordingly:

4.2.9 Model SI – sea-ice information -– charts

The "*International System of Sea-Ice Symbols* (WMO-No. 259, Volume III) and the "*Ice chart colour code standard*" (WMO/TD-No. 1215) should be used. Sea-ice climatological information should be provided using SIGRID gridded and vector archive formats for sea-ice charts (WMO-No. 716, WMO-No. 792, WMO/TD-No. 1214)".

URGES Members/Member States with sea-ice information issuing and relay responsibilities:

(1) To continue to implement their responsibilities in full, in accordance with the guidelines in the *Manual*;

(2) To keep the JCOMM Secretariat closely informed of developments and problems in the operation of the system;

(3) To liaise closely with users regarding their requirements for, and response to, operational and climatological sea-ice charts;

REQUESTS the Expert Team on Sea Ice, in close cooperation with the Expert Team on Maritime Safety Services, to keep the implementation of, and user response to, the guidelines for sea-ice information products under review, and to develop proposals for amendments as necessary;

REQUESTS the Secretary-General of WMO:

(1) To provide appropriate technical advisory assistance to Members/Member States concerned in the implementation of the recommendation;

(2) To bring this recommendation to the attention of IMO and IHO and other organizations and bodies concerned, and to continue to liaise closely with them in the operation of the guidelines.

RECOMMENDATION 9 (JCOMM-II)

MODIFICATIONS TO THE INTERNATIONAL MARITIME METEOROLOGICAL TAPE (IMMT) FORMAT AND MINIMUM QUALITY CONTROL STANDARDS (MQCS)

THE JOINT WMO/IOC TECHNICAL COMMISSION FOR OCEANOGRAPHY AND MARINE METEOROLOGY,

NOTING:

(1) The *Manual on Marine Meteorological Service* (WMO-No. 558) Volume 1, Appendices 1.13 and 1.15,

(2) The final report of the first session of the JCOMM Expert Team on Marine Climatology, JCOMM Meeting Report No. 32,

RECOGNIZING that the current Minimum Quality Control Standards (MQCS-IV) do not extend to the additional elements introduced for the VOSClim Project at JCOMM-I,

CONSIDERING:

(1) That the IMMT format remains the primary format for the exchange of marine climatological data, for both the MCSS and the VOSClim Project,

(2) The importance of the MQCS to the quality of the data contained in the MCSS data archives,

(3) The importance to the Global Collecting Centres of maintaining both the IMMT and the MQCS up-to-date,

RECOMMENDS:

(1) That the amendments to the *Manual on Marine Meteorological Services* and the *Guide to Marine*

Meteorological Services (WMO-No. 471) as detailed in annexes 1 and 2 to this recommendation be approved, and included in the appropriate appendices in the *Manual* and *Guide*;

(2) That the new version of the IMMT format (IMMT-3) be implemented generally for all data collected as from 1 January 2007;

(3) That the new version of the Minimum Quality Control Standards (MQCS-V) also be implemented generally for all data collected from 1 January 2007;

REQUESTS the Expert Team on Marine Climatology to continue to review the implementation and value of the revised format and quality control standards, to provide technical assistance to the Members/Member States concerned as required and to propose further amendments to the format and standards as necessary;

REQUESTS the Secretary-General of WMO to provide appropriate technical advisory assistance to Members/Member States concerned, as required, in the implementation of the revised format and standards.

ANNEX 1 TO RECOMMENDATION 9 (JCOMM-II)

AMENDMENTS TO THE MANUAL ON MARINE METEOROLOGICAL SERVICES AND GUIDE TO MARINE METEOROLOGICAL SERVICES

LAYOUT FOR THE INTERNATIONAL MARITIME METEOROLOGICAL TAPE (IMMT) [VERSION IMMT-3]

Element Number	*Character Number*	*Code*	*Element*	*Coding procedure*
1	1	i_T	Format/temperature indicator	3=IMMT format with temperatures in tenths of °C 4=IMMT format with temperatures in halves of °C 5=IMMT format with temperatures in whole °C
2	2-5	AAAA	Year UTC	Four digits
3	6-7	MM	Month UTC	01 - 12 January to December
4	8-9	YY	Day UTC	01 - 31
5	10-11	GG	Time of observation	Nearest whole hour UTC, WMO specifications
6	12	Q_c	Quadrant of the globe	WMO code table 3333
7	13-15	$L_aL_aL_a$	Latitude	Tenths of degrees, WMO specifications
8	16-19	$L_oL_oL_oL_o$	Longitude	Tenths of degrees
9	20		Cloud height (h) and visibility (VV) measuring indicator	0 - h and VV estimated 1 - h measured, VV estimated 2 - h and VV measured 3 - h estimated, VV measured
10	21	h	Height of clouds	WMO code table 1600
11	22-23	VV	Visibility	WMO code table 4377
12	24	N	Cloud amount	Oktas, WMO code table 2700; show 9 where applicable
13	25-26	DD	True wind direction	Tens of degrees, WMO code table 0877; show 00 or 99 where applicable
14	27	i_w	Indicator for wind speed	WMO code table 1855

Element Number	*Character Number*	*Code*	*Element*	*Coding procedure*
15	28-29	ff	Wind speed	Tens and units of knots or meters per second, hundreds omitted; values in excess of 99 knots are to be indicated in units of meters per second and i_w encoded accordingly; the method of estimation or measurement and the units used (knots or meters per second) are indicated in element 14
16	30	s_n	Sign of temperature	WMO code table 3845
17	31-33	TTT	Air temperature	Tenths of degrees Celsius
18	34	s_t	Sign of dew-point temperature	0 - positive or zero measured dew-point temperature 1 - negative measured dew-point temperature 2 - iced measured dew-point temperature 5 - positive or zero computed dew-point temperature 6 - negative computed dew-point temperature 7 - iced computed dew-point temperature
19	35-37	$T_dT_dT_d$	Dew-point temperature	Tenths of degrees Celsius
20	38-41	PPPP	Air pressure	Tenths of hectopascals
21	42-43	ww	Present weather	WMO code table 4677 or 4680
22	44	W_1	Past weather	WMO code table 4561 or 4531
23	45	W_2	Past weather	WMO code table 4561 or 4531
24	46	N_h	Amount of lowest clouds	As reported for CL or, if no CL cloud is present, for CM, in oktas; WMO code table 2700
25	47	C_L	Genus of CL clouds	WMO code table 0513
26	48	C_M	Genus of CM clouds	WMO code table 0515
27	49	C_H	Genus of CH clouds	WMO code table 0509
28	50	s_n	Sign of sea-surface temperature	WMO code table 3845
29	51-53	$T_wT_wT_w$	Sea surface temperature	Tenth of degrees Celsius
30	54		Indicator for sea-surface temperature measurement	0 - Bucket thermometer 1 - Condenser inlet 2 - Trailing thermistor 3 - Hull contact sensor 4 - "Through hull" sensor 5 - Radiation thermometer 6 - Bait tanks thermometer 7 - Others

Element Number	*Character Number*	*Code*	*Element*	*Coding procedure*	
31	55		Indicator for wave measurement		0 - Wind sea and swell estimated
				Shipborne wave recorder	1 - Wind sea and swell measured
					2 - Mixed wave measured, swell estimated
					3 - Other combinations measured and estimated
				Buoy	4 - Wind sea and swell measured
					5 - Mixed wave measured, swell estimated
					6 - Other combinations measured and estimated
					7 - Wind sea and swell measured
				Other measurement system	8 - Mixed wave measured, swell estimated
					9 - Other combinations measured and estimated
32	56-57	P_wP_w	Period of wind waves or of measured waves	Whole seconds; show 99 where applicable in accordance with Note (3) under specification of P_wP_w in the *Manual on Codes*	
33	58-59	H_wH_w	Height of wind waves or of measured waves	Half-meter values. Examples: Calm or less than $^1/_4$m to be encoded 00; $3^1/_2$m to be encoded 07; 7m to be encoded 14; $11^1/_2$m to be encoded 23	
34	60-61	$d_{w1}d_{w1}$	Direction of predominant swell waves	Tens of degrees, WMO code table 0877; encoded 00 or 99 where applicable. Blanks = No observation of waves attempted	
35	62-63	$P_{w1}P_{w1}$	Period of predominant swell waves	Whole seconds; encoded 99 where applicable (see under element 32)	
36	64-65	$H_{w1}H_{w1}$	Height of predominant swell waves	Half-meter values (see under element 33)	
37	66	I_s	Ice accretion on ships	WMO code table 1751	
38	67-68	E_sE_s	Thickness of ice accretion	In centimetres	
39	69	R_s	Rate of ice accretion	WMO code table 3551	
40	70		Source of observation	0 - Unknown	
				1 - Logbook	National
				2 - Telecommunication channels	
				3 - Publications	
				4 - Logbook	International
				5 - Telecommunication channels	data exchange
				6 - Publications	
41	71		Observation platform	0 - unknown	
				1 - Selected ship	
				2 - Supplementary ship	
				3 - Auxiliary ship	
				4 - Automated station/data buoy	
				5 - Fixed sea station	
				6 - Coastal station	
				7 - Aircraft	
				8 - Satellite	
				9 - Others	

Element Number	*Character Number*	*Code*	*Element*	*Coding procedure*
42	72-78		Ship identifier	Ship's call sign or other identifier encoded as follows: 7 characters call sign Columns 72-78 6 characters call sign Columns 72-77 5 characters call sign Columns 72-76 4 characters call sign Columns 72-75 3 characters call sign Columns 72-74
43	79-80		Country which has recruited the ship	According to the two-character alphabetical codes assigned by the International Organization for Standardization (ISO)
44	81		National use	
45	82		Quality control indicator	0 - No quality control (QC) 1 - Manual QC only 2 - Automated QC only /MQC (no time-sequence checks) 3 - Automated QC only (inc. time sequence checks) 4 - Manual and automated QC (superficial; no automated time-sequence checks) 5 - Manual and automated QC (superficial; including time-sequence checks) 6 - Manual and automated QC (intensive, including automated time-sequence checks) 7 & 8 - Not used 9 - National system of QC (information to be furnished to WMO)
46	83	i_x	Weather data indicator	1 - Manual 4 - Automatic If present and past weather data included Code tables 4677 and 4561 used 7 - Automatic If present and past weather data included Code tables 4680 and 4531 used
47	84	i_R	Indicator for inclusion or omission of precipitation data	WMO code table 1819
48	85-87	RRR	Amount of precipitation which has fallen during the period preceding the time of observation, as indicated by tR	WMO code table 3590
49	88	t_R	Duration of period of reference for amount of precipitation, ending at the time of the report	WMO code table 4019
50	89	s_w	Sign of wet-bulb temperature	0 - positive or zero measured wet-bulb temperature 1 - negative measured wet-bulb temperature 2 - iced measured wet-bulb temperature 5 - positive or zero computed wet-bulb temperature 6 - negative computed wet-bulb temperature 7 - iced computed wet-bulb temperature
51	90-92	$T_bT_bT_b$	Wet-bulb temperature	In tenths of degree Celsius, sign given by element 50
52	93	a	Characteristic of pressure tendency	WMO code table 0200

Element Number	*Character Number*	*Code*	*Element*	*Coding procedure*
			during the three hours preceding the time of observation	
53	94-96	ppp	Amount of pressure tendency at station level during the three hours preceding the time of observation	In tenths of hectopascal
54	97	D_s	True direction of resultant displacement of the ship during the three hours preceding the time of observation	WMO code table 0700
55	98	v_s	Ship's average speed made good during the three hours preceding the time of observation	WMO code table 4451
56	99-100	$d_{w2}d_{w2}$	Direction of secondary swell waves	Tens of degrees, WMO code table 0877; encoded 00 or 99 where applicable. Blanks = No observation of waves attempted
57	101-102	$P_{w2}P_{w2}$	Period of secondary swell waves	Whole seconds; encoded 99 where applicable (see under element 32)
58	103-104	$H_{w2}H_{w2}$	Height of secondary swell waves	Half-meter values (see under element 33)
59	105	c_i	Concentration or arrangement of sea ice	WMO code table 0639
60	106	S_i	Stage of development	WMO code table 3739
61	107	b_i	Ice of land origin	WMO code table 0439
62	108	D_i	True bearing of principal ice edge	WMO code table 0739
63	109	z_i	Present ice situation and trend of conditions over the preceding three hours	WMO code table 5239
64	110		FM 13 code version	0 = previous to FM 24-V 1 = FM 24-V 2 = FM 24-VI Ext. 3 = FM 13-VII 4 = FM 13-VIII 5 = FM 13-VIII Ext. 6 = FM 13-IX 7 = FM 13-IX Ext. 8 = FM 13-X, etc.
65	111		IMMT version	0 = IMMT version just prior to version number being included 1 = IMMT-1 (in effect from Nov. 1994) 2 = IMMT-2 (in effect from Jan. 2003) 3 = IMMT-3 (in effect from Jan. 2006) 4 = IMMT-4 (next version)

Element Number	*Character Number*	*Code*	*Element*	*Coding procedure*
				etc.
66	112	Q_1	Quality control indicator for (h)	0 - no quality control (QC) has been performed in this element 1 - QC has been performed; element appears to be correct 2 - QC has been performed; element appears to be inconsistent with other elements 3 - QC has been performed; element appears to be doubtful 4 - QC has been performed; element appears to be erroneous 5 - The value has been changed as a result of QC 6 - 8 Reserve 9 - The value of the element missing
67	113	Q_2	QC indicator for (VV)	- idem -
68	114	Q_3	QC indicator for (clouds: elements 12, 24-27)	- idem -
69	115	Q_4	QC indicator for (dd)	- idem -
70	116	Q_5	QC indicator for (ff)	- idem -
71	117	Q_6	QC indicator for (TTT)	- idem -
72	118	Q_7	QC indicator for ($T_dT_dT_d$)	- idem -
73	119	Q_8	QC indicator for (PPPP)	- idem -
74	120	Q_9	QC indicator for (weather: elements 21-23)	- idem -
75	121	Q_{10}	QC indicator for ($T_wT_wT_w$)	- idem -
76	122	Q_{11}	QC indicator for (P_wP_w)	- idem -
77	123	Q_{12}	QC indicator for (H_wH_w)	- idem -
78	124	Q_{13}	QC indicator for (swell: elements 34-36, 56-58)	- idem -
79	125	Q_{14}	QC indicator for (i_RRRRt_R)	- idem -
80	126	Q_{15}	QC indicator for (a)	- idem -
81	127	Q_{16}	QC indicator for (ppp)	- idem -
82	128	Q_{17}	QC indicator for (D_s)	- idem -
83	129	Q_{18}	QC indicator for (v_s)	- idem -
84	130	Q_{19}	QC indicator for ($t_bt_bt_b$)	- idem -

Element Number	*Character Number*	*Code*	*Element*	*Coding procedure*
85	131	Q_{20}	QC indicator for ships' position	- idem -
86	132	Q_{21}	Minimum quality control standards (MQCS) version identification	1 = MQCS- I (Original version, Feb. 1989) CMM-X 2 = MQCS-II (Version 2, March 1997) CMM-X11 3 = MQCS-III (Version 3, April 2000) SGMC-VIII 4 = MQCS-IV (Version 4, June 2001) JCOMM-I 5 = MQCS-V (Version 5, July 2004) ETMC-I
	etc.			
			Additional Requirements for the VOSClim Project	
87	133-135	HDG	Ship's heading; the direction to which the bow is pointing, referenced to true North.	(000-360); e.g. 360 = North 000 = No Movement 090 = East
88	136-138	COG	Ship's ground course; the direction the vessel actually moves over the fixed earth and referenced to True North	(000-360); e.g. 360 = North 000 = No Movement 090 = East
89	139-140	SOG	Ship's ground speed; the speed the vessel actually moves over the fixed earth.	(00-99); Round to nearest whole knot
90	141-142	SLL	Maximum height in meters of deck cargo above Summer maximum load line.	(00-99); report to nearest whole meter
91	143-145	$s_L$hh	Departure of reference level (Summermaximum load line) from actual sealevel. Consider the difference positive when the Summer maximum load line is above the level of the sea and negative if below the water line.	Position 143 (sL) sign position;, 0 = positive or zero, 1 = negative Positions 144-145 (hh); (00-99) is the difference to the nearest whole meter between the Summer maximum load line and the sea level.
92	146-148	RWD	Relative wind direction in degrees off the bow	Relative wind direction; e.g. 000 = no apparent relative wind speed (calm conditions on deck). Reported direction for relative wind = 001-360 degrees in a clockwise direction off the bow of the ship. When directly on the bow, RWD = 360.
93	149-151	RWS	Relative wind speed reported in units indicated by i_W (knots or m/s)	Reported in either whole knots or whole meters per second (e.g. 010 knots or 005 m/s). Units established by iW as indicated in Character Number 27.

Note: Since the relative wind speed can be greater than the true wind speed e.g., iW indicates knots and ff = 98, the relative wind speed may be 101 knots; therefore, three positions must be allocated since iW cannot be adjusted and the relative wind speed converted to meters per second as is done in element 15.

94	152	Q22	Quality control indicator for (HDG)	0 - no quality control (QC) has been performed in this element 1 - QC has been performed; element appears to be correct 2 - QC has been performed; element appears to be inconsistent with other elements 3 - QC has been performed; element appears to be doubtful 4 - QC has been performed; element appears to be erroneous 5 - The value has been changed as a result of QC 6 - 8 Reserve

Element Number	*Character Number*	*Code*	*Element*	*Coding procedure*
				9 - The value of the element missing
95	153	Q_{23}	QC indicator for (COG)	- idem -
96	154	Q_{24}	QC indicator for (SOG)	- idem -
97	155	Q_{25}	QC indicator for (SLL)	- idem -
98	156	Q_{26}	QC indicator for (SL)	- idem -
99	157	Q_{27}	QC indicator for (hh)	- idem -
100	158	Q_{28}	QC indicator for (RWD)	- idem -
101	159	Q_{29}	QC indicator for (RWS)	- idem -

NOTE: Most of the codes (groups of letters) in the IMMT format with the exception of those added for the VOSCLIM Project are defined in the *Manual on Codes* (WMO–No. 306) as they basically mirror the code groups used in FM 13-X SHIP code. Because CBS was not persuaded to expand the FM 13-X SHIP code for the VOSCLIM Project, the additional observed elements (selected codes) will not appear in the WMO *Manual on Codes*. Therefore an effort was made to select unique codes (groups of letters) not defined in the WMO *Manual on Codes* for the elements added to the IMMT-2 format version modified for the VOSCLIM Project. This was deliberately done to try and prevent a difference in meaning for a given code group (identical symbolic letters) in the *Manual* versus that in IMMT. Presumably none of the Character Code formats will be altered in the future by CBS.

ANNEX 2 TO RECOMMENDATION 9 (JCOMM-II)

AMENDMENTS TO THE *MANUAL ON MARINE METEOROLOGICAL SERVICES* (WMO-No. 588) AND *GUIDE TO MARINE METEOROLOGICAL SERVICES* (WMO-No. 471)

MINIMUM QUALITY CONTROL STANDARDS MQCS-V (VERSION 5, JUNE 2004)

Δ = space (ASCII 32)

Element	*Error*	*Action*
1	$i_T \neq 3–5, \Delta$	Correct manually otherwise = Δ
2	AAAA ≠ valid year	Correct manually otherwise reject
3	MM ≠ 01–12	Correct manually otherwise reject
4	YY ≠ valid day of month	Correct manually otherwise reject
5	GG ≠ 00–23	Correct manually otherwise reject
6	Q ≠ 1, 3, 5, 7	Correct manually and $Q_{20} = 5$, otherwise $Q_{20} = 4$
	Q = Δ	$Q_{20} = 2$
7	$L_aL_aL_a \neq 000–900$	Correct manually and $Q_{20} = 5$, otherwise $Q_{20} = 4$
	$L_aL_aL_a = \Delta\,\Delta\,\Delta$	$Q_{20} = 2$
8	$L_oL_oL_oL_o \neq 0000–1800$	Correct manually and $Q_{20} = 5$, otherwise $Q_{20} = 4$
	$L_oL_oL_oL_o = \Delta\,\Delta\,\Delta\,\Delta$	$Q_{20} = 2$
	$L_aL_aL_a = L_oL_oL_oL_o = \Delta\,\Delta\,\Delta\,(\Delta)$	Correct manually otherwise reject

Time sequence checks		
	Change in latitude > 0.7°/hr	Correct manually otherwise Q_{20} = 3
	Change in longitude > 0.7°/hr when latitude 00–39.9	Correct manually otherwise Q_{20} = 3
	Change in longitude > 1.0°/hr when latitude 40–49.9	Correct manually otherwise Q_{20} = 3
	Change in longitude > 1.4°/hr when latitude 50–59.9	Correct manually otherwise Q_{20} = 3
	Change in longitude > 2.0°/hr when latitude 60–69.9	Correct manually otherwise Q_{20} = 3
	Change in longitude > 2.7°/hr when latitude 70–79.9	Correct manually otherwise Q_{20} = 3
9		No checking
10	h ≠ 0–9	Correct manually and Q_1 = 5, otherwise Q1 = 4
	h = Δ	Q_1 = 9
11	VV ≠ 90–99	Correct manually and Q_2 = 5, otherwise Q_2 = 4
	VV = Δ Δ	Q_2 = 9
12	N ≠ 0–9, Δ	Correct manually and Q_3 = 5, otherwise Q_3 = 4
	N < Nh	Correct manually and Q_3 = 5, otherwise Q_3 = 2
13	dd ≠ 00–36, 99	Correct manually and Q_4 = 5, otherwise Q_4 = 4
	dd = ΔΔ	Q_4 = 9
	dd versus ff	
	dd = 00, ff ≠ 00	Correct manually and Q_4 or Q_5 = 5 otherwise $Q_4 = Q_5 = 2$
	dd ≠ 00, ff = 00	Correct manually and Q_4 or Q_5 = 5 otherwise $Q_4 = Q_5 = 2$
14	i_w ≠ 0, 1, 3, 4	Correct manually, otherwise $Q_5 = Q_{29} = 4$
15	ff > 80 knots	Correct manually and Q_5 = 5, otherwise Q_5 = 3
	ff = Δ Δ	Q_5 = 9
16	s_n ≠ 0, 1	Correct manually, otherwise Q_6 = 4
17	TTT = Δ Δ Δ	Q_6 = 9
	If –25 > TTT >40 then when latitude < 45.0	
	TTT < –25	Q_6 = 4
	TTT > 40	Q_6 = 3
	when latitude ≥ 45.0	
	TTT < –25	Q_6 = 3
	TTT > 40	Q_6 = 4
TTT versus humidity parameters		
	TTT < WB (wet bulb)	Correct manually and Q_6 = 5, otherwise $Q_6 = Q_{19} = 2$
	TTT < DP (dew point)	Correct manually and $Q_6 = Q_7 = 5$, otherwise $Q_6 = Q_7 = 2$
18	s_t ≠ 0, 1, 2, 5, 6, 7, 9	Correct manually, otherwise Q_7 =4
19	DP > WB	Correct manually and Q_7 = 5, otherwise $Q_7 = Q_{19} = 2$
	DP > TTT	Correct manually and Q_7 = 5, otherwise $Q_7 = Q_6 = 2$
	WB = DP = Δ Δ Δ	Q_7 = 9
20	930 > PPPP > 1050 hPa	Correct manually and Q_8 = 5, otherwise Q_8 = 3
	870 > PPPP > 1070 hPa	Correct manually and Q_8 = 5, otherwise Q_8 = 4
	PPPP = Δ Δ Δ Δ	Q_8 = 9
21	ww = 22–24, 26, 36–39, 48, 49, 56, 57, 66–79, 83–88, 93–94 and latitude <20°	Correct manually and Q_9 = 5, otherwise Q_9= 4
	if i_x = 7:	
	$w_a w_a$ = 24 - 25, 35, 47 - 48, 54-56, 64-68, 70-78, 85-87 and latitude <20°	Correct manually and Q9 = 5, otherwise Q9= 4
22, 23	W_1 or W_2 = 7 and latitude <20°	Correct manually and Q_9 = 5, otherwise Q_9 = 4
	$W_1 < W_2$	Correct manually and Q_9 = 5, otherwise Q_9 = 2
	$W_1 = W_2$ = ΔΔΔΔ	Q_9 = 9

24–27	N = 0 and $N_hC_LC_MC_H \neq 0000$	Correct manually and $Q_3 = 5$, otherwise $Q_3 = 2$
	N = Δ and $N_hC_LC_MC_H \neq \Delta\Delta\Delta\Delta$	Correct manually and $Q_3 = 5$, otherwise $Q_3 = 2$
	N = 9 and not (N_h = 9 and $C_LC_MC_H = \Delta\Delta\Delta$)	Correct manually and $Q_3 = 5$, otherwise $Q_3 = 2$
	N=Δ and $N_hC_LC_MC_H = \Delta\Delta\Delta\Delta$	$Q_3 = 9$
28	$s_n \neq 0, 1$	Correct manually otherwise $Q_{10} = 4$
29	$T_wT_wT_w = \Delta\Delta\Delta$	$Q_{10} = 9$
	if $-2.0 > T_wT_wT_w > 37.0$ then when latitude < 45.0	
	$T_wT_wT_w < -2.0$	Control manually and $Q_{10} = 5$, otherwise $Q_{10} = 4$
	$T_wT_wT_w > 37.0$	Control manually and $Q_{10} = 5$, otherwise $Q_{10} = 3$
	when latitude ≥ 45.0	
	$T_wT_wT_w < -2.0$	Control manually and $Q_{10} = 5$, otherwise $Q_{10} = 3$
	$T_wT_wT_w > 37.0$	Control manually and $Q_{10} = 5$, otherwise $Q_{10} = 4$
30	Indicator ≠ 0–7, Δ	Correct manually, otherwise Δ
31	Indicator ≠ 0–9, Δ	Correct manually, otherwise Δ
32	$20 < P_wP_w < 30$	$Q_{11} = 3$
	$P_wP_w \geq 30$ and ≠ 99	$Q_{11} = 4$
	$P_wP_w = \Delta\,\Delta$	$Q_{11} = 9$
33	$35 < H_wH_w < 50$	$Q_{12} = 3$
	$H_wH_w \geq 50$	$Q_{12} = 4$
	$H_wH_w = \Delta\,\Delta$	$Q_{12} = 9$
34	$d_{w1}\,d_{w1} \neq$ 00–36, 99	Correct manually and $Q_{13} = 5$, otherwise $Q_{13} = 4$
	$swell_1 = swell_2 = \Delta$	$Q_{13} = 9$
35	$25 < P_{w1}P_{w1} < 30$	$Q_{13} = 3$
	$P_{w1}P_{w1} \geq 30$ and ≠ 99	$Q_{13} = 4$
36	$35 < H_{w1}H_{w1} < 50$	$Q_{13} = 3$
	$H_{w1}H_{w1} \geq 50$	$Q_{13} = 4$
37	$I_s \neq 1–5, \Delta$	Correct manually, otherwise Δ
38	$E_sE_s \neq$ 00–99, ΔΔ	Correct manually, otherwise ΔΔ
39	$R_s \neq 0–4, \Delta$	Correct manually, otherwise Δ
40	Source ≠ 0–6	Correct manually, otherwise Δ
41	Platform ≠ 0–9	Correct manually, otherwise Δ
42	No call sign	Insert manually, mandatory entry
43	No country code	Insert manually
44		No quality control
45	Q ≠ 0–6, 9	Correct manually, otherwise Δ
46	$i_x \neq 1–7$	Correct manually, otherwise Δ
47	i_R = 0–2 and RRR = 000, ΔΔΔ	Correct manually, otherwise $Q_{14} = 4$
	i_R = 3 and RRR ≠ 000, ΔΔΔ	Correct manually, otherwise $Q_{14} = 2$
	i_R = 4 and RRR ≠ ΔΔΔ	Correct manually, otherwise $Q_{14} = 2$
	$i_R \neq 0–4$	Correct manually, otherwise $Q_{14} = 4$
48	RRR ≠ 001–999 and i_R = 1, 2	Correct manually and $Q_{14} = 5$, otherwise $Q_{14} = 2$
49	$t_R \neq 0–9, \Delta$	Correct manually and $Q_{14} = 5$, otherwise $Q_{14} = 4$
50	$s_W \neq 0, 1, 2, 5, 6, 7, 9$	Correct manually, otherwise $Q_{19} = 4$
51	WB < DP	Correct manually and $Q_{19} = 5$, otherwise $Q_{19} = Q_7 = 2$
	WB = ΔΔΔ	$Q_{19} = 9$
	WB > TTT	Correct manually and $Q_{19} = 5$, otherwise $Q_{19} = Q_6 = 2$
52	a ≠ 0–8	Correct manually and $Q_{15} = 5$, otherwise $Q_{15} = 4$
	a = 4 and ppp ≠ 000	Correct manually and Q_{15} or $Q_{16} = 5$, otherwise $Q_{15} = Q_{16} = 2$
	a = 1, 2, 3, 6, 7, 8 and ppp = 000	Correct manually and Q_{15} or $Q_{16} = 5$, otherwise $Q_{15} = Q_{16} = 2$
	a = Δ	$Q_{15} = 9$
53	250 ≥ ppp > 150	Correct manually and $Q_{16} = 5$, otherwise $Q_{16} = 3$
	ppp > 250	Correct manually and $Q_{16} = 5$ otherwise $Q_{16} = 4$
	ppp = ΔΔΔ	$Q_{16} = 9$

54	$D_s \neq$ 0–9, Δ	Correct manually and $Q_{17} = 5$, otherwise $Q_{17} = 4$	
	$D_s =$ Δ	$Q_{17} = 9$	
55	$V_s \neq$ 0–9, Δ	Correct manually and $Q_{18} = 5$, otherwise $Q_{18} = 4$	
	$V_s =$ Δ	$Q_{18} = 9$	
56	$d_{w2}d_{w2} \neq$ 00–36, 99, ΔΔ	Correct manually and $Q_{13} = 5$, otherwise $Q_{13} = 4$	
57	$25 < P_{w2}P_{w2} < 30$	$Q_{13} = 3$	
	$P_{w2}P_{w2} \geq 30$ and $\neq 99$	$Q_{13} = 4$	
58	$35 < H_{w2}H_{w2} < 50$	$Q_{13} = 3$	
	$H_{w2}H_{w2} \geq 50$	$Q_{13} = 4$	
59	$c_i \neq$ 0–9, Δ	Correct manually, otherwise Δ	
60	$S_i \neq$ 0–9, Δ	Correct manually, otherwise Δ	
61	$b_i \neq$ 0–9, Δ	Correct manually, otherwise Δ	
62	$D_i \neq$ 0–9, Δ	Correct manually, otherwise Δ	
63	$z_i \neq$ 0–9, Δ	Correct manually, otherwise Δ	
86	Minimum quality control (MQC) standards version identification	1 = MQC-I (Original version, Feb. 1989)	CMM-X
		2 = MQC-II (Version 2, March 1997)	CMM-XII
		3 = MQC-III (Version 3, April 2000)	SGMC-VIII
		4 = MQC-IV (Version 4, June 2001)	JCOMM-I
		5 = MQC-V (Version 5, July 2001)	ETMC-I
87	HDG ≠ 000-360	correct manually and Q22 = 5, otherwise Q22 = 4	
	HDG = ΔΔΔ	Q22 = 9	
88	COG ≠ 000-360	correct manually and Q23 = 5, otherwise Q23 = 4	
	COG = ΔΔΔ	Q23 = 9	
89	SOG ≠ 00 - 99	correct manually and Q24 = 5, otherwise Q24 = 4	
	SOG = ΔΔ	Q24 = 9	
	SOG > 33	correct manually and Q24 = 5, otherwise Q24 = 3	
90	SLL ≠ 00-99	correct manually and Q25 = 5, otherwise Q25 = 4	
	SLL = ΔΔ	Q25 = 9	
	SLL > 32	correct manually and Q25 = 5, otherwise Q25 = 3	
91	sL ≠ 0,1	correct manually and Q26 = 5, otherwise Q26 = 4	
	sL = Δ	Q26 = 9	
	hh ≠ 00 - 99	correct manually and Q27 = 5, otherwise Q27 = 4	
	hh = ΔΔ	Q27 = 9	
	hh >= 13	correct manually and Q27 = 5, otherwise Q27 = 3	
	hh < -01	correct manually and Q27 = 5, otherwise Q27 = 4	
92	RWD ≠ 000 - 360, 999	correct manually and Q28 = 5, otherwise Q28 = 4	
	RWD = ΔΔΔ	Q28 = 9	
93	RWS ≠ 000 - 999	correct manually and Q29 = 5, otherwise Q29 = 4	
	RWS = ΔΔΔ	Q29 = 9	
	RWS > 110 kts	correct manually and Q29 = 5, otherwise Q29 = 3	
	RWD versus RWS		
	RWD = 000, RWS ≠ 000	correct manually and Q28 or Q29 = 5, otherwise Q28 = Q29 = 2	
	RWD ≠ 000, RWS = 000	correct manually and Q28 or Q29 = 5, otherwise Q28 = Q29 = 2	

Specifications for quality control indicators Q_1 to Q_{29}

0	No quality control (QC) has been performed on this element
1	QC has been performed; element appears to be correct
2	QC has been performed; element appears to be inconsistent with other elements
3	QC has been performed; element appears to be doubtful
4	QC has been performed; element appears to be erroneous
5	The value has been changed as a result of QC
6	Reserved for GCC
7	Reserved for GCC
8	Reserve
9	The value of the element is missing

RECOMMENDATION 10 (JCOMM-II)

MARINE POLLUTION EMERGENCY RESPONSE SUPPORT SYSTEM (MPERSS)

THE JOINT WMO/IOC TECHNICAL COMMISSION FOR OCEANOGRAPHY AND MARINE METEOROLOGY,

NOTING:

(1) Recommendation 2 (CMM-XI) – Marine Pollution Emergency Response Support System (MPERSS) for the high seas,

(2) The *Abridged Final Report with Resolutions and Recommendations of the First Session of the Joint Technical Commission for Oceanography and marine Meteorology* (WMO-No. 931), section 6.4 – Marine pollution related services,

(3) The final report of the ad hoc Task Team on the Marine Pollution Emergency Response Support System, JCOMM Meeting Report No. 29,

(4) The final report of the second session of the Services Coordination Group, JCOMM Meeting Report No. 30,

RECOGNIZING the success of the trials of the Marine Pollution Emergency Response Support System adopted by the eleventh session of the Commission for the Marine Meteorology, both in demonstrating the value of the trial system and also in developing it to operational status,

CONSIDERING:

(1) That operations at sea in response to marine pollution emergencies are fundamentally dependent on the support of meteorological and/or oceanographic data, information and services,

(2) That marine pollution events outside waters under national jurisdiction are essentially international in character,

(3) That no coordinated system exists for the provision of meteorological and oceanographic support for operations in response to such events,

(4) That considerable benefits will accrue to coastal states through the operation of such a coordinated system for meteorological and oceanographic support,

(5) That benefits will also accrue through the transfer of experience, technology and capacity from centres already providing meteorological and oceanographic support to marine pollution emergency response operations, to centres in other coastal states wishing to provide such support for emergencies in waters under national jurisdiction,

AGREES that the Marine Pollution Emergency Response Support System can now be considered operational;

RECOMMENDS that the details of the Marine Pollution Emergency Response Support System, as amended by the Services Coordination Group and given in the annex to this recommendation, should be adopted and included in the *Guide to Marine Meteorological Services* (WMO-No. 471);

EXPRESSES ITS APPRECIATION:

(1) To those Members/Member States which have accepted responsibilities under the system;

(2) In particular to *Météo-France* for establishing and maintaining the MPERSS Web site;

CONSIDERING further that, following ongoing development and operational experience, and possible additional modifications to the system, it might be considered for inclusion in appropriate regulatory material of WMO and IOC, such as the M*anual on Marine Meteorological Services* (WMO-No. 558);

REQUESTS:

(1) The Expert Team on Accident Emergency Support (ETMAES) to:

(*a*) Keep the implementation of and user response to the MPERSS under review, and to develop proposals for amendments, as necessary;

(*b*) Provide technical support to Members in the implementation and operation of the MPERSS;

(2) The Secretary-General of WMO to bring this recommendation to the attention of UNEP, IMO and other organizations and bodies concerned, and to invite them to collaborate with JCOMM in the further development and operation of the system;

INVITES the International Maritime Organization:

(1) To continue to provide the JCOMM Secretariat with updated information on national and regional marine pollution combating centres and contact points;

(2) To continue to provide national and regional marine pollution combating authorities and contact points with details of the structure and operations of the MPERSS.

ANNEX TO RECOMMENDATION 10 (JCOMM-II)

AMENDMENTS TO THE *GUIDE TO METEOROLOGICAL SERVICES*

METEOROLOGICAL AND OCEANOGRAPHIC SUPPORT FOR MARINE POLLUTION EMERGENCY RESPONSE OPERATIONS

1. PRINCIPLES The principles for marine meteorological and oceanographic support for marine pollution emergency response operations are as follows:	*Principle 1* For the purpose of the efficient and effective provision of meteorological and oceanographic information for marine pollution emergency response operations on

the high seas and in view of the international character of these operations, there is a requirement to provide an internationally coordinated system of meteorological and oceanographic support for such operations. For this purpose the oceans and seas are divided into areas for which National Meteorological and Oceanographic Services have accepted responsibility. These areas, termed Marine Pollution Incident (MPI) areas, are the same areas as the METAREAs of the Global Maritime Distress and Safety System (GMDSS) but exclude waters under national jurisdiction.

Principle 2

The areas of responsibility together provide complete coverage of oceans and seas by meteorological and oceanographic information contained in the products prepared and issued by the participating National Meteorological and Oceanographic Services.

Principle 3

The preparation and issue of meteorological and oceanographic information for areas of responsibility is coordinated in accordance with the procedures mentioned in section 2.

Principle 4

The efficiency and effectiveness of the provision of meteorological and oceanographic information in support of marine pollution emergency response operations is monitored by obtaining opinions and reports from the users.

2. PROCEDURES

2.1 Definitions

2.1.1 An Area Meteorological and Oceanographic Coordinator (AMOC) is a national service which may be a:

(*a*) National Meteorological Service, or

(*b*) National Meteorological Service, which also operates oceanographic services, or

(*c*) National Meteorological Service liaising with Oceanographic Service(s) where these are in operation,

which has accepted responsibility for coordinating the provision of regional meteorological information and oceanographic information as appropriate, which is issued to support marine pollution emergency response operations in the designated area for which the Service (or Services) has accepted responsibility. The AMOC is also available to provide relevant support and advice for waters under national jurisdiction within its area if so requested by the countries concerned. [These national Services may eventually become designated Regional Specialized Centres for Marine Pollution Emergency Support.] The support supplied by an AMOC (or a Supporting Service) shall include:

(*a*) Basic meteorological forecasts and warnings tailored for the area(s) concerned;

The support supplied by an AMOC (or a Supporting Service) may also include;

(*a*) Basic oceanographic forecasts for the area(s) concerned;

(*b*) The observation, analysis and forecasting of the values of specific meteorological and oceanographic variables required as input to models describing the movement, dispersion, dissipation and dissolution of marine pollution;

(*c*) In some cases, the operation of these models;

(*d*) In some cases, access to national and international telecommunications facilities;

(*e*) Other operational support.

The issued information may have been prepared solely by the AMOC, or by another Supporting Service(s), or a combination of both, on the basis of an agreement between the Services concerned. The location and contact (telephone, e-mail, telex, telefax, etc.) details of any marine pollution emergency response operations authority (or authorities) responsible within the designated Marine Pollution Incident (MPI) area should be maintained on the MPERSS Web site. National information for this site should be maintained by AMOCs or Supporting Services.

2.1.2 A Supporting Service is a National Meteorological or Oceanographic Service which has accepted responsibility to provide on request, either directly or to the AMOC, meteorological (basic or enhanced) support for parts of, or an entire, designated MPI area. Depending on the location of the incident, Supporting Services may be requested by the emergency authority to provide the meteorological and/or oceanographic support directly to that authority. In such cases, the AMOC should be so advised by the Supporting Service. A Supporting Service should advise the AMOC of the facilities it has available to fulfil its role.

2.2 Areas of responsibility

2.2.1 Areas of responsibility (Marine Pollution Incident (MPI) areas) and the responsible Services for AMOCs and Supporting Service(s) shall be as given in Appendix I.

NOTES: (1) The areas of responsibility given in Appendix I are reviewed by JCOMM to ensure complete area coverage and adequacy of services.

(2) An MPI area has, in some cases, been subdivided to meet the requirements of National Meteorological or Oceanographic Services.

(3) The areas of responsibility defined in Appendix I represent a minimum requirement for AMOC and Supporting Services. Both AMOCs and Supporting Services may extend the area of coverage for the issue of meteorological and oceanographic support information beyond these areas of responsibility, if they so wish, to meet national requirements. In this case, the area of coverage should be specified in the text of each communication to the marine pollution emergency response operations authority.

2.2.2 Any amendments to the area of responsibility or proposal for the introduction of a change in participating national Services' responsibilities for an area, shall have the approval of the Executive Council based on a recommendation by JCOMM.

2.2.2.1 Before drawing up any recommendation on the proposed amendment for submission to the Executive Council, JCOMM shall receive the comments of the national Services directly concerned with the proposed amendment as well as the comments of the president(s) of the regional association(s) concerned.

NOTE: All correspondence relating to the areas of responsibility is addressed to the Secretary-General.

2.2.3 Whenever an AMOC is no longer able to provide this service it should inform the Secretary-General of WMO at least six months in advance of the intended termination date. Whenever a Supporting Service is no longer available to provide this service, it should inform the relevant AMOC at least six months in advance of the intended termination date.

2.3 Meteorological support to marine pollution emergency response operations on the high seas

2.3.1 Support to these emergency operations may, as stated in paragraph 2.1.1, include a variety of elements, such as:

(*a*) Basic meteorological forecasts and warnings tailored for the area(s) concerned. Special attention should be given to the early provision of actual and forecast surface conditions in the area of the pollution incident. This may be the initial requirement following a pollution incident;

(*b*) Basic oceanographic forecasts for the area(s) concerned. Special attention should be given to the early provision of actual and forecast oceanographic conditions, both surface and subsurface, in and downstream of the area of the pollution incident. This may be the initial requirement following a pollution incident;

(*c*) The observation, analysis and forecasting of the values of specific meteorological and/or oceanographic variables required as input to models describing the movement, dispersion, dissipation and dissolution of marine pollution. AMOC and Supporting Service should, if possible, ascertain from the relevant marine pollution emergency response operations authority the specific meteorological and oceanographic variables required for a particular model, also the location of the model operator and access details. General guidelines for the type of data which will be required are given in Appendix II, if information regarding specific required variables for a model is not available;

(*d*) The operation of the models by the national Meteorological or Oceanographic Service. If an AMOC or Supporting Service has this facility and it can be used in the MPI area, the existence of this facility should be made known to the relevant marine pollution emergency response operations authority at an early stage, and ideally prior to an actual pollution incident in the MPI area. [AMOCs should give consideration to conducting periodic trials of their pollution models and cooperating with the pollution emergency authorities in their MPI area to assess the efficiency and effectiveness of the output data from their models.]

(*e*) Access to national and international telecommunications facilities. Effective and efficient communications is an essential element in an emergency situation and AMOCs and Supporting Services must ensure that they have access to reliable communication links between all parties involved in a marine pollution incident within their MPI area. The AMOC should ascertain from the marine pollution emergency response operations authority the method by which the transfer of the required meteorological support shall be effected. This information shall be relayed to the Supporting Service(s) for the MPI area concerned. The use of the most appropriate communications methods should be considered to ensure the meteorological and oceanographic support is delivered to the location of the pollution incident as required, e.g. by the on-scene dispersal craft. Similarly, use of the Global Telecommunication System (GTS) by a marine pollution emergency response operations authority via a regional telecommunication hub (RTH) of the Global Telecommunication System (GTS) may also be a consideration in cases of a major pollution incident;

(*f*) Other operational support. AMOCs shall, at an early stage of a marine pollution incident affecting their area of responsibility, ascertain from the relevant marine pollution emergency response operations authority details

of the incident and the nature of the support required. It shall be the responsibility of the AMOC to advise the marine pollution emergency response operations authority of the support facilities which the AMOC and/or the Supporting Service(s) can provide. [This shall be undertaken whether or not a pollution incident occurs in an MPI area, and this information shall be updated to the marine pollution emergency response operations authorities at regular intervals, and immediately should there be a change in the support facilities available from the AMOC or Supporting Service. It is the responsibility of the Supporting Service(s) to advise the AMOC of any change to its support facilities.] It should be noted that operations at sea in response to marine pollution emergencies are fundamentally dependent on the support of Meteorological and Oceanographic Services. It is thus essential that AMOCs and Supporting Services offer as full a range of operational support as possible and practicable to marine pollution emergency response operations.

2.3.2 A record of all communications should be maintained, showing the times of origin, transmission and reception of the information provided.

2.4 IMO regional marine pollution combatting centres. Marine pollution research and monitoring programmes of IOC/UNEP

2.4.1 IMO and UNEP have established regional marine pollution combatting centres in a few locations throughout the world. These centres have been incorporated in the coordinated meteorological support plan in Appendix I. Full details of these centres are given in Appendix III. The majority of these centres are non-operational and have an advisory capacity only. The nature of the centre, whether advisory or operational, is indicated in Appendix III. It should be noted that it is the responsibility of the participating National Meteorological and/or Oceanographic Service(s) to ascertain the location of any marine pollution emergency response operations authority relevant to the MPI area and/or to each marine pollution incident.

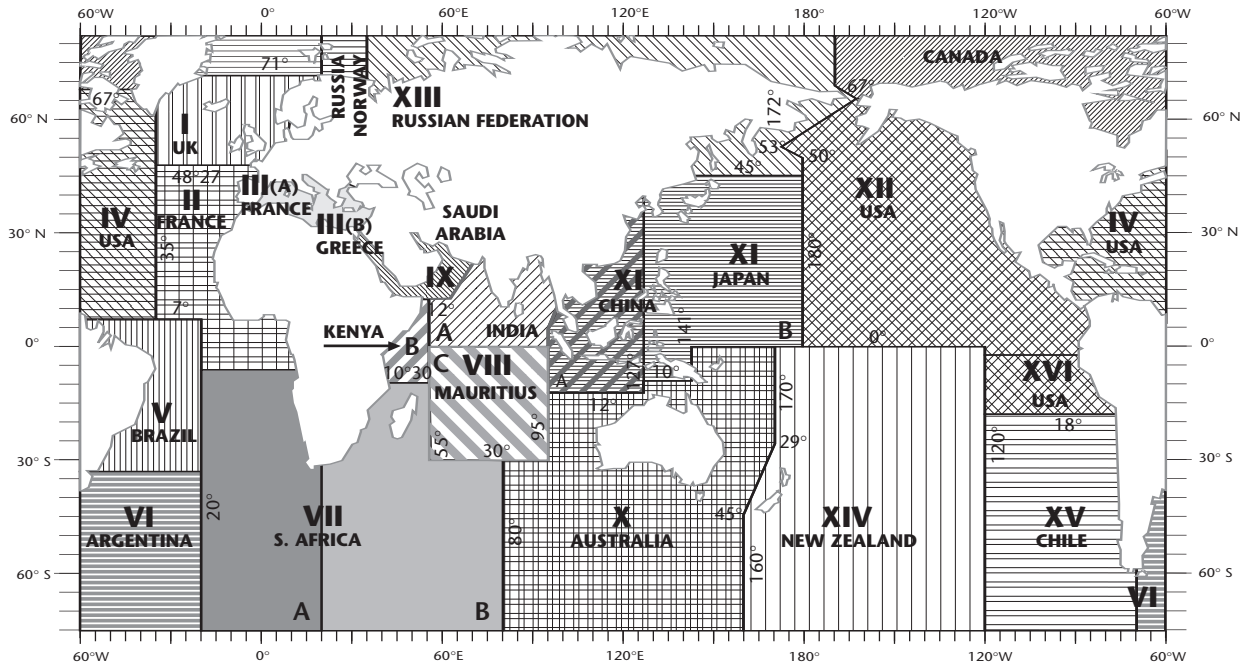
2.4.2 The objectives and activities of the Regional Marine Pollution Emergency Response Centre for the Mediterranean Sea and its role in the case of emergency are given in Appendix IV.

2.4.3 The International Convention on Oil Pollution Preparedness, Response and Cooperation, 1990 (OPRC Convention), Article 12 - Institutional Arrangements, identified the International Maritime Organization Secretariat as having specific responsibilities with regard to the provision of information and technical services under the Convention. Contact information for the IMO Secretariat is also given in Appendix III and information on activities in Appendix V. It is the responsibility of the WMO Secretariat to keep the IMO Secretariat informed of all international dispositions and arrangements made under the WMO meteorological and oceanographic support system. At the same time, AMOCs may wish to contact the IMO Secretariat directly to obtain information on specific arrangements which may exist for combatting oil and other pollution incidents in their MPI area(s) of responsibility.

2.4.4 IOC and UNEP co-sponsor the programme on Global Investigation of Pollution in the Marine Environment (GIPME).

APPENDIX I

MARINE POLLUTION INCIDENT (MPI) AREAS SHOWING RESPONSIBLE NATIONAL AGENCIES



COORDINATED METOCEAN SUPPORT TO MARINE POLLUTION INCIDENT (MPI) AREA RECIPIENT OF METOCEAN DATA

MPI Area	*Area Meteorological Co-ordinator*	*Supporting Service*	*Remarks*
I	United Kingdom	Norway Iceland Ireland France	Norway responsible for Arctic waters north of 71°N
II	France	Portugal Spain	
III(A)	France		
III (B)	Greece	Malta France	
IV	United States	Canada	Canada responsible for Arctic waters north of 67°N
V	Brazil		
VI	Argentina		
VII	South Africa	La Réunion	
VIII(A)	India		Indian Ocean north of the equator, west of 95°E, east of 55°E, excluding Area IX
VIII(B)	Kenya	United Republic of Tanzania	12°N-10°30'S 55°E to East African coast
VIII(C)	Mauritius	La Reunión	0° - 30°S 55°E - 95°E
IX	Saudi Arabia	Bahrain	
X	Australia		
XI(A)	China	Hong Kong Malaysia Indonesia Singapore	125°E - Mainland China to west boundary of Area IX (95°E) (excluding Philippine waters
XI(B)	Japan	Philippines Indonesia Guam (United States)	
XII & XVI	United States	Canada	Canada responsible for Arctic waters north of 67°N
XIII	Russian Federation		
XIV	New Zealand		
XV	Chile		

APPENDIX II

METOCEAN INPUT DATA REQUIREMENTS

FOR MARINE POLLUTION MONITORING AND RESPONSE

For maritime vessel incidents and pollution events it is important to ensure that actual and forecast (short- and medium-term) weather and oceanographic information is available for the incident site.

Regional models should be developed or sourced to ensure coverage of the MPERSS area of responsibility.

The main functions and requirements of marine pollution emergency response operation authorities (MPEROAs) include:

A. Vessel safety and support
To ensure safety of life and reduce the potential of further pollution, metocean information will be required for are:

. crew safety and evacuation
. drifting of the casualty
. salvage considerations
. cargo removal and lightering.

B. Pollution at sea (oil, chemicals and cargo containers)
This can be achieved by spill and drift trajectory modelling using fixed or dynamic metocean models. These trajectory models vary in complexity, cost of development and the geographic area of need, e.g. open sea (primarily influenced by ocean currents and winds) or near shore (influence of tidal conditions and winds). The primary function is to determine:

. movement direction and speed
. spreading of the pollutant.

For most coastal and continental shelf incidents high accuracy digital bathymetric data sets will also be required for most trajectory models as well as the determination of dominant tidal constants for the location.

The ground truthing of spill models are important to ensure the accuracy and performance and assists in the refinement of algorithms. This can be achieved through the deployment of drifter buoys, use of HF ocean surface radar, satellite sensors, etc.

C. Weathering and fate of oil at sea
The extent of weathering of oil at sea affects the choice of response procedures to be used to combat the spilt oil. To determine "weathering" characteristics of the oil, present models require inputs for:

. sea surface wind speed (present and predicted)
. wave height (present and predicted)
. water temperature and salinity (present and predicted)
surface current and at depth in the mixed layer (present and predicted)
ice properties.

D. Response operations of MPEROAs
MPEROAs will require metocean information to support the planning and carrying out of field operations, these include:

. planning (scenario development)
. operations (at sea/on shore)
. logistics/equipment (limitations of use under certain sea states)
. recording of response actions and decision support information for cost recovery.

Metocean parameters likely to be required for the individual MPERSS regions include:

. sea surface winds – velocity/direction/directional variations/gust factors
. wave/swell – height/period/direction
. tidal – height/timing for incident location
. air temperature
. instability and severe weather events – storms, cyclones, wind squalls, etc.
. visibility
. fog
. sunshine hours
. rain, hail
. lightning strikes.
. tidal-height/timing for incident location
. ocean current and eddies
. water properties – temperature/salinity
. ice properties (concentration, thickness, drift stage of melting, etc.).

Sources of metocean data
The collection of metocean data is achieved through many sources and mechanisms including:

. satellite (orbiting/geostationary) providing sea surface temperatures, scatterometer winds, sea wave height, etc.
. coastal HF radar
. automatic coastal/land stations
. drifting buoys
. moored buoys
. Argo floats
. vessel reports/observations and automatic stations
. subsurface temperature probes

- current profilers
- oil platforms
- aircraft
- weather radar
- weather balloons.

Priorities for metocean collection and modelling
The priorities for metocean data input should initially focus on the high risk areas of coastline, shipping routes, ports, navigation hazards or regions that are known as major problem areas for shipping or oil production/exploration platforms. Special attention should be given to the modelling of ice cover pollution.

Form of metocean data
The fast communication of metocean data and numerical model outputs is essential for MPEROAs across the MPERSS region. Effective electronic data communications should be established for MPEROAs, also the data must be in a form that meets user requirements in quality, accuracy and presentation needs.

RECOMMENDATION 11 (JCOMM-II)

MODIFICATIONS TO THE *INTERNATIONAL LIST OF SELECTED, SUPPLEMENTARY AND AUXILIARY SHIPS* (WMO-NO. 47)

THE JOINT WMO/IOC TECHNICAL COMMISSION FOR OCEANOGRAPHY AND MARINE METEOROLOGY,

NOTING:

(1) Recommendation 9 (CMM-XII) – Modifications to the *International List of Selected, Supplementary and Auxiliary Ships* (WMO-No. 47),

(2) The final reports of the second and third sessions of the Ship Observations Team, JCOMM Meeting Report Nos. 24 and 35, respectively,

(3) The final report of the first session of the Expert Team on Marine Climatology, JCOMM Meeting Report No. 32,

RECOGNIZING with appreciation that the modifications proposed at the twelfth session of the Commission for Marine Meteorology to the *International List of Selected Supplementary and Auxiliary Ships* had been implemented,

CONSIDERING:

(1) That the *List* is an important tool for VOS operators in managing the scheme in an effective and efficient manner, in support of a number of WMO and IOC programmes,

(2) That accurate details about the method of observation and instrument type, instrument exposure, instrument calibration dates and ship layout, are vital if the objectives and desired accuracies of the VOS Climate Project (VOSClim) are to be achieved,

RECOMMENDS:

(1) That existing field definitions in the *List* be modified as indicated in annex 1 to this recommendation,

(2) That one field be deleted and new fields be included in the *List*, as given in annex 2 to this recommendation;

(3) That a version of the Extensible Markup Language (XML) should be developed and implemented for the future exchange of the metadata included in the *List*;

REQUESTS the Ship Observations Team, in consultation as necessary with the Expert Team on Marine Climatology and other interested bodies and user groups, to:

(1) Keep the structure, contents and status of the *List* under review, and propose modifications as required,

(2) Develop XML for the future exchange of the metadata for the *List*, for consideration and adoption by the co-presidents on behalf of the Commission.

ANNEX 1 TO RECOMMENDATION 11 (JCOMM-II)

FIELDS RECOMMENDED FOR REDEFINITION

prSt	Teleprinter and satellite. This field has no useful current meaning and should be redefined as the "**Satellite system for transmitting observations**".
chtvsslD	Average cargo height (an element of vsslD). This dimension can vary widely from voyage to voyage, and from route to route. To record one average value is misleading and meaningless. Vessels participating in VOSClim record the maximum cargo height in IMMT-2 format at each observation, which is considered to be more useful for modelling purposes. This field should be redefined to the "**Maximum cargo height**", which is described as the maximum height of the deck cargo above the maximum summer load line.

ANNEX 2 TO RECOMMENDATION 11 (JCOMM-II)

FORMATTING CHANGES

New fields with their associated code tables

(1) anmT - Type of anemometer

AN	Anemograph.
CCV	Cup anemometer and wind vane (combined unit).
SCV	Cup anemometer and wind vane (separate instruments).
HA	Handheld anemometer.
PV	Propeller vane.
SON	Sonic anemometer.
OT	Other (specify in footnote).

Notes for Table 'anmT

NOTE: This table and the proposed field anmM (Make and model of anemometer) will replace the current dual-purpose field 'anmI - Anemometer Instrument Type'. These changes will enable anemometer metadata to be reported in a similar manner to other instrument types, e.g. barometer and thermometer.

(2) freq - Routine observing frequency

OPD	One observation per day (24 hour intervals)
TPD	Two observations per day (12 hour intervals)
FPD	Four observations per day (6 hour intervals)
EPD	Eight observations per day (3 hour intervals)
HLY	Hourly observations
IRR	Irregular observations

(3) anSC - Side indicator of the fixed anemometer from the centre line, if appropriate.

P	Port
S	Starboard

Field recommended for deletion

phGr	Communication codes are out-dated and no longer considered useful.

New fields

ver	Version of the WMO-No. 47 format (This version defined as 03).
anmM	Make and model of the anemometer.
awsM	Make and model of the Automatic Weather Station.
awsP	Name and version of the Automatic Weather Station processing software.
awsC	Name and version of the Automatic Weather Station data entry/display software.
logE	Name and version of the electronic logbook software.
vosR	Recruitment date of the current VOS participation.
vosD	De-recruitment date of the last VOS participation (applicable only if the vessel has been re-recruited).
vclmR	Last VOSClim recruitment date within the current period of VOS participation.
vclmD	Last VOSClim de-recruitment date within the current period of VOS participation.
reg	Country of Registration.

RECOMMENDATION 12 (JCOMM-II)

JCOMM SUPPORT FOR MARINE MULTI-HAZARD WARNING SYSTEMS, INCLUDING TSUNAMIS

THE JOINT WMO/IOC TECHNICAL COMMISSION FOR OCEANOGRAPHY ON MARINE METEOROLOGY,

EXPRESSING its deepest sympathies to the people affected by the tsunami that hit Indian Ocean coastal countries on 26 December 2004, as well as by various other natural disasters during the intersessional period,

NOTING with appreciation the actions taken by IOC and WMO and Members/Member States in response to the tsunami, including, in particular, the establishment of an Intergovernmental Coordination Group for the Indian Ocean Tsunami Warning and Mitigation System (ICG/IOTWS), and the WMO's actions to upgrade its GTS, where necessary, to facilitate the timely and reliable exchange of tsunami-related information and warnings as a critical contribution to not only the Indian Ocean Tsunami Warning and Mitigation System, but also for other regions at risk,

RECOGNIZING that:

(1) The rapid implementation of reliable and comprehensive tsunami preparedness, warning and mitigation systems for all ocean basins vulnerable to such events is an immediate and urgent priority,

(2) Other marine hazards, including storm surges and extreme waves, specifically associated with tropical cyclones are significant and frequently occurring threats, with the potential to cause major damage and loss of life,

(3) To be sustainable and effective in the long-term, tsunami warning systems should be developed and

operated within the context of a broader marine multi-hazard early warning strategy,

(4) Several warning systems have been developed and operated under the umbrella of WMO (e.g. tropical cyclones) and IOC (ITSU),

CONSIDERING:

(1) The expertise, facilities and infrastructure already existing within or coordinated by the different JCOMM Programme Areas, including in particular Services and Observations,

(2) The potential for these JCOMM resources to be further developed and enhanced to support the implementation and long-term maintenance of marine multi-hazard warning systems, including for tsunamis,

REQUESTS the JCOMM co-presidents, in consultation with the Programme Area Coordinators, with relevant WMO technical commissions and subsidiary bodies of IOC, GOOS regional alliances and associations and IODE regional networks, as appropriate, to develop and implement a plan of action to contribute to the implementation and maintenance of marine multi-hazard warning systems for all ocean basins, including in particular the actions specified in paragraph 11.5.17 of the general summary of this report;

RECOMMENDS:

(1) That Members/Member States, the Secretary-General of WMO and the Executive Secretary IOC be urged to provide the necessary support to JCOMM, in terms of facilities, funding and expertise, to enable the implementation of its plan of action for contributing to marine multi-hazard warning systems;

(2) That the work being undertaken by JCOMM towards marine multi-hazard warning systems be incorporated into broader programmes of action being implemented by IOC and WMO;

(3) That early warning systems for ocean-related hazards be incorporated within a multi-hazard approach using collaborative inter-commission and inter-agency mechanisms;

(4) That the WMO Global Telecommunication System (GTS) be recognized as the backbone global telecommunication mechanism for the exchange of multi-hazard, observations, information and warnings, including tsunami warnings and alert information;

(5) That the Commission should contribute, as a first priority, to the development of the global tsunami warning system within a multi-hazard framework in collaboration with all stakeholders including the relevant WMO Technical Commissions and programmes, IOC subsidiary bodies, other United Nations agencies and other intergovernmental organizations.

RECOMMENDATION 13 (JCOMM-II)

THE GLOBAL EARTH OBSERVATION SYSTEM OF SYSTEMS

THE JOINT WMO/IOC TECHNICAL COMMISSION FOR OCEANOGRAPHY AND MARINE METEOROLOGY,

RECALLING the WSSD Plan of Implementation, particularly paragraph 132,

NOTING:

(1) Resolution 9 (EC-LVI) – Global Earth Observation System of Systems,

(2) Resolution IOC EC-XXXVII.2 – The Earth Observation Summit,

(3) The Declaration from the First Earth Observation Summit,

(4) The Communiqué from the Second Earth Observation Summit,

(5) The Resolution of the Third Earth Observation Summit,

(6) The Global Earth Observation System of Systems (GEOSS) 10-Year Implementation Plan endorsed by the Third Earth Observation Summit,

(7) The Implementation Plan for the Global Observing System for Climate in Support of the UNFCCC (GCOS No. 92),

CONSIDERING:

(1) The relevance to GEOSS of WMO and IOC programmes, experience and expertise, and the roles and responsibilities of other intergovernmental organizations,

(2) The exceptional opportunity provided by the development of the GEOSS 10-year Implementation Plan to define and secure, at a high political level, firm resources for sustained operational observation of the Earth, and at the national and international levels for the observing systems for oceans, coastal areas, and natural and human-induced hazards,

(3) The significant contributions made by IOC and WMO to the overall process for GEOSS establishment and for developing its 10-year Implementation Plan,

(4) That JCOMM is recognized in the GEOSS 10-Year Implementation Plan and its Work Plan as a mechanism to implement an in situ ocean observing system, in relation to the support for implementation of actions called for in GCOS Implementation Plan,

(5) That the GCOS-92 identified JCOMM as the implementing agent, or a contributing implementing agent for actions relating to ocean observations,

RECOMMENDS that:

(1) Members/Member States be urged to endorse the objectives of GEOSS, to become members of GEO,

and to support its 10-year Implementation Plan to the maximum extent possible;

(2) Members/Member States become involved in the planning and implementation of GEOSS at the national and international levels;

(3) Members/Member States ensure that each national coordination mechanism for GEO/GEOSS is fully informed of, and consistent with, existing and planned activities of JCOMM;

INVITES the Group on Earth Observations (GEO) to:

(1) Recognize JCOMM as a key implementation mechanism for oceanographic and marine meteorological components of Earth Observation, providing global, intergovernmental coordination of implementation activities and regulatory and guidance material for operational oceanography and marine meteorology;

(2) Ensure that the implementation of GEOSS will be based on full and open exchange of observational data with minimum delay and cost, and will be in accordance with relevant international instruments, national policies and legislation, in particular, the WMO and IOC Data Exchange Policies;

(3) Ensure GEOSS comprises a rational balance of in-situ measurements, surface-based and satellite (oceans and atmosphere) remote sensing measurements of the Earth;

(4) Pursue the evolution of common data protocols and exchange standards, based on best practices, in order to maximize the ease of information exchange;

(5) Pursue the synergy with existing and planned international and national observing systems, in particular those under the leadership of the WMO and IOC, which include JCOMM;

REQUESTS the Secretary-General of WMO and the Executive Secretary IOC:

(1) With the assistance of the co-presidents of JCOMM, to keep GEO fully informed of JCOMM activities in operational oceanography and marine meteorology, and of its capacity to provide effective leadership in the coordination of the global ocean observation network;

(2) To ensure GEO fully utilizes the potential contribution from JCOMM to deliver the GEOSS 10-Year Implementation Plan.

RECOMMENDATION 14 (JCOMM-II)

REVISION OF RESOLUTIONS OF THE WMO AND IOC GOVERNING BODIES BASED ON PREVIOUS RECOMMENDATIONS OF THE JOINT WMO/IOC TECHNICAL COMMISSION FOR OCEANOGRAPHY AND MARINE METEOROLOGY (INCLUDING THE WMO COMMISSION FOR MARINE METEOROLOGY AND THE JOINT IOC/WMO COMMITTEE FOR THE INTEGRATED GLOBAL OCEAN SERVICES SYSTEM)

THE JOINT WMO/IOC TECHNICAL COMMISSION FOR OCEANOGRAPHY AND MARINE METEOROLOGY,

NOTING with satisfaction the action taken by the WMO and IOC governing bodies on the previous recommendations of the Joint WMO/IOC Technical Commission for Oceanography and Marine Meteorology (including the WMO Commission for Marine Meteorology and the Joint IOC/WMO Committee for IGOSS), as well as on other matters related to the work of that body,

CONSIDERING that many of these recommendations have become redundant in the meantime,

RECOMMENDS:

(1) That WMO Resolution 7 (EC-LIV) and IOC Resolution EC-XXXV.4 be no longer considered necessary;

(2) That WMO Resolutions 15 (EC-XXI), 12 (EC-XXV) and 3 (EC-XLVIII) be kept in force.

ANNEXES

ANNEX I
Annex to paragraph 10.14 of the general summary

LIST OF WEB SITE ADDRESSES

The First International Conference on Ocean Observations for Climate
http://www.bom.gov.au/OceanObs99/Papers/Statement.pdf

The Strategic Plan for the Global Ocean Data Assimilation Experiment (GODAE)
http://www.bom.gov.au/bmrc/mrlr/nrs/oopc/godae/strategic_plan.pdf

The Global Digital Sea Ice Data Bank (GDSIDB)
http://www.aari.nw.ru/gdsidb/gdsidb_2.html (AARI, St.Petersburg, Russian Federation)
http://www.dmi.dk/pub/gdsidb_mirror/content.html (mirror of AARI site at DMI)
http://www-nsidc.colorado.edu/NOAA/index.html (NSIDC, Boulder, Colorado, United States)

JCOMM in situ Observing Platform Support Centre (JCOMMOPS)
http://www.jcommops.org/

The Data Buoy Cooperation Panel (DBCP)
http://www.dbcp.noaa.gov/dbcp/

DBCP vandalism
http://dbcp.nos.noaa.gov/dbcp/vandalism.html

DBCP Internet mailing lists
http://www.jcommops.org/mailing_lists.html#DBCP

DBCP an electronic forum
http://www-dbcp.cls.fr/

Argo Science Team (AST)
http://www.argo.ucsd.edu

Argo Information Centre (AIC)
http://argo.jcommops.org/

Global Sea Level Observing System (GLOSS)
http://www.pol.ac.uk/psmsl/programmes/gloss.info.html

Global Ocean Observing System (GOOS)
http://ioc.unesco.org/goos/.

International Oceanographic Data and Information exchange (IODE)
http://ioc3.unesco.org/iode/

Marine Environmental Data Information Referral Catalogue (MEDI)
http://www.aodc.gov.au/iode/medi.

JCOMM Electronic Products Bulletin (J-EPB)
http://iri.ldeo.columbia.edu/climate/monitoring/ipb/

Ship Observations Team (SOT)
http://www.jcommops.org/sot/

Voluntary Observing Ships (VOS)
http://www.bom.gov.au/jcomm/vos/

Voluntary Observing Ships (VOS) Climate Subset Project (VOSCLIM)
http://www.ncdc.noaa.gov/VOSClim.html/

Ship-of-Opportunity Programme
http://www.brest.ird.fr/soopip

WMO home page
http://www.wmo.ch

WMO Marine Programme
http://www.wmo.ch/web/aom/marprog/

WMO ftp server
ftp://www.wmo.ch/documents/lpc

Data flow monitoring reports
http://www.meds-sdmm.dfo-mpo.gc.ca/meds/Prog_Int/GTSPP/GTSPP_e.htm
http://www.nodc.noaa.gov/GTSPP/gtspp-home.html

Marine climate data
http://www.dwd.de/research/gcc/gcc.html
http://www.ncdc.noaa.gov/

Global Maritime Distress and Safety System (GMDSS)
http://weather.gmdss.org/gmdss.html

Marine Pollution Emergency Response Support System (MPERSS)
http://www.maes-mperss.org/

Global Temperature-Salinity Profile Programme (GTSPP)
http://www.nodc.noaa.gov/GTSPP/gtspp-home.html

ANNEX II

Annex to paragraph 14.2.3.2 of the general summary

EXECUTIVE SUMMARY FOR THE JCOMM STRATEGY DOCUMENT

The WMO/IOC Joint Technical Commission for Oceanography and Marine Meteorology (JCOMM) was established in 1999 to coordinate worldwide marine meteorological and oceanographic services and their supporting observational, data management and capacity building programmes.

JCOMM's vision to benefit the global community is long-term, far-reaching and innovative. JCOMM coordinates, develops and recommends standards and procedures for a fully-integrated marine observing, data management and services system that uses state-of-the-art technologies and capabilities; is responsive to the evolving needs of all users of marine data and products; and includes an outreach programme to enhance the national capacity of all maritime countries. The strategy for making this vision a reality will be through creative synergies amongst governments, the international community, donors and the private sector, and increased national support in terms of experts, in-kind resources and funding.

JCOMM's work is accomplished through a Management Committee and three Programme Areas (Observations, Data Management, Services and Capacity-building), and their subsidiary expert and task teams, and two cross-cutting activities for capacity-building and satellite data requirements. The Management Committee and the Programme Area Coordination Groups function at a strategic level while, at the same time, ensuring the implementation of the work plan through the subsidiary expert teams, pilot projects, and collaboration with other programmes. JCOMM's strategy also calls for regular review of its programmes and performance and adjustment of its work plan to reflect changes in its requirements, emphasis, priorities and resources.

JCOMM's strategy includes an increased emphasis on communications, both internally within JCOMM and externally with clients, partners and stakeholders. JCOMM will devote continuing efforts to the dissemination of information on its various programmes, activities and initiatives to the broader client community around the world.

Receiving feedback from potential clients is fundamental to the success of JCOMM and its Members/ Member States. Whilst some mechanisms to evaluate programme performance and satisfaction of stakeholders already exist (e.g., marine meteorological services user surveys and observing system performance metrics), strengthened mechanisms will be essential to help provide regular feedback and guide the evolution of JCOMM.

JCOMM is an ambitious and complex endeavour. It holds the prospect of considerable potential benefits to all countries in the long-term operation of a coordinated, integrated, global oceanographic and marine meteorological observing, data management and services system. The implementation of the Commission's programme will be a long-term, complex process, necessitating a phased, iterative and cost-effective approach over the decades to come.

ANNEX III

Annex to paragraph 15.1 of the general summary

WORK PLAN FOR JCOMM FOR THE PERIOD 2006–2010

Reference	*Task*	*By whom*	*Target*
Organizational			
Paragraph 5.2.8	Re-establish the Task Team on the JEB and review the Terms of Reference and the resource requirements to redevelop it.	Management Committee	ASAP
Paragraph 8.1.15	Establish and ensure coordination of capacity-building with Programme Areas Observations, Data Management, and Services.	Programme Areas	ASAP
Paragraph 8.1.16	Appoint a Rapporteur on Capacity-building in each of the three Programme Areas.	Management Committee and GOOS Scientific Steering Committee	ASAP
Paragraph 8.1.16	Assist groups, countries, and regions in identifying potential donors and developing capacity building proposals.	Task Team on Resources	ASAP
Paragraph 12.5.3	Establish ad hoc cross-cutting panel to advise on developing relations with the private sector.	Management Committee	ASAP
Paragraph 13.1.3	Develop JCOMM input to 7LTP.	JCOMM co-presidents in consultation with the Management Committee	ASAP
Paragraph 13.2.2	Develop JCOMM input to the IOC/UNESCO Medium-Term Strategy.	JCOMM co-presidents in consultation with the Management Committee	ASAP
Paragraph 2.2.2	Review and apply to JCOMM accepted WMO and IOC documentation practices.	Management Committee	Intersessional
Paragraph 4.1.5	Coordinate among the appropriate programme areas the implementation of significant issues arising from the work of the OOPC and other actions referred to JCOMM by the OOPC.	Management Committee	Intersessional

Reference	*Task*	*By whom*	*Target*
Recommendation 2 (JCOMM-II) and Annex	Examine requirements and develop specific proposals regarding possible pilot projects and designated ocean product centres to support developing countries.	JCOMM/GOOS CB Panel	Intersessional
Recommendation 2 (JCOMM-II) and Annex	Review the results of the study related to the question of the business case for operational oceanography that was undertaken under the sponsorship of IOC.	Management Committee and Services Coordination Group	Intersessional
Paragraph 6.1.28	Continue to keep the IOC and WMO governing bodies informed of the high importance of the PMO network so they can convey this message to Members at an appropriate level.	JCOMM co-presidents	Intersessional
Paragraphs 7.2.3 and 7.2.5, and Recommendation 5 (JCOMM-II)	Organize training workshops through the IOC Project Office for IODE.	Cross-cutting Team on Capacity-building, IODE and GOOS	Intersessional
Paragraph 7.2.6	Consider supporting financially the activities of GE-BICH Pilot Projects.	Management Committee	Intersessional
Paragraph 8.1.7	Evaluate all specific JCOMM training events, based on the questionnaires developed, and involve the donors, the recipients and the executing agencies.	Management Committee and Cross-cutting Team on Capacity-building	Intersessional
Paragraph 8.1.14	Implement capacity-building activities on a regional basis and in close collaboration with the GOOS Regional Alliances.	Management Committee and GOOS Steering Committee	Intersessional
Paragraph 8.3.1	Develop a project on an early warning system to mitigate flooding and earthquake effects on the African coast.	Cross-cutting Team on Capacity-building, GOOS and IODE	Intersessional
Paragraph 8.4.2	Investigate new sources for funding JCOMM training activities and develop a list and analysis of funding agencies to support JCOMM capacity-building projects.	Task Team on Resources	Intersessional
Paragraph 11.1.5	Incorporate the appropriate actions within the Plans prepared by GCOS and by the GEO into the activities of the relevant JCOMM coordination groups.	Management Committee and Programme Areas	Intersessional

Reference	*Task*	*By whom*	*Target*
Paragraph 11.1.11	Develop a business case for operational oceanography to enhance GOOS implementation, coordinated under JCOMM and effected through national agencies.	Management Committee, JCOMM co-presidents and I-GOOS Board	Intersessional
Paragraph 11.5.16	Contribute to the establishment and/or maintenance of the IOTWS and ITSU and other future regionally-based coordination groups for tsunami warning and mitigation.	JCOMM co-presidents and Observations and Services Programme Areas	Intersessional
Paragraph 11.5.17 and Recommendation 12 (JCOMM-II)	Develop an action plan for JCOMM contributions to multi-hazard warning systems.	JCOMM co-presidents, PA Coordinators, Management Committee, with other WMO and IOC subsidiary bodies, GRAs and IODE	Intersessional
Paragraph 11.5.18	Ensure JCOMM input to MILAC.	Management Committee	Intersessional
Paragraph 12.1.5	Develop an approach to coordinate JCOMM input to the UNICPOLOS process.	Management Committee	Intersessional
Recommendation 13 (JCOMM-II)	Keep GEO informed of JCOMM activities and ensure utilization of the contributions from JCOMM in the GEOSS 10-Year implementation Plan.	JCOMM co-presidents	Intersessional
Paragraphs 13.3.2, 13.3.4 and 13.3.5	Prioritize JCOMM activities and implement recommendations of the sessional budget group as given in paragraphs 13.3.4.	Management Committee	Intersessional
Paragraph 14.1.7	Approach the IOC and WMO with a request for an overall review of the Commission.	JCOMM co-presidents	Intersessional
Paragraphs 14.2.1.2 and 14.2.1.3	Prepare a JCOMM Communications Plan and try to provide external funding for its implementation through the regular JCOMM budget.	JCOMM co-presidents, in coordination with GOOS Project Office	Intersessional
Paragraph 14.2.3.2	Complement the JCOMM Strategy Document with an integrated JCOMM Implementation Plan.	Management Committee	Intersessional
Paragraph 14.2.4.3	Develop and implement system-wide performance monitoring in JCOMM.	Management Committee	Intersessional
Paragraph 14.1.8	Develop specific requirements regarding future structure and membership of JCOMM subsidiary bodies, as input to the call for nominations prior to JCOMM-III.	Management Committee	Before JCOMM-III

Reference	*Task*	*By whom*	*Target*
Paragraph 14.2.3.2	Keep the JCOMM Strategy Document under review and propose amendments and revisions to JCOMM sessions.	Management Committee	JCOMM-III
Paragraph 4.4.1	Keep general ocean data requirements under constant review.	Management Committee	Continuing
Recommendation 2 (JCOMM-II) and Annex	Continue the dialogue with the GOOS Scientific Steering Committee to further define requirements for modelling and product support for non-physical variables and processes, including ecosystem modelling.	Management Committee	
Paragraph 8.1.2	Continue, expand and formalize regional requirements surveys.	CB rapporteurs	Continuing
Paragraph 8.1.3	Continue regional development projects within the broader context of the global programme for natural disaster mitigation.	CB rapporteurs	Continuing
Paragraph 11.2.4	Work with OOPC to ensure ongoing two-way interaction with WCRP.	JCOMM co-presidents and OOPC	Continuing
Paragraph 12.2.13	Review activities associated with United Nations Conventions such as UNFCCC and the Convention on Biological Diversity, and develop JCOMM input as required.	Management Committee	Continuing
Paragraph 14.1.6	Assign specific responsibilities for PAs to members of the Management Committee, and generally enhance coordination and integration across PAs.	JCOMM co-presidents	Continuing
Paragraph 14.2.2.2	Enhance JCOMM integration.	Management Committee	Continuing
Services			
Paragraph 5.1.6	Liaise with IHO and IMO to coordinate the use of the common URL: http://weather.gmdss.org, for the provision of both meteorological and navigational warning information in real-time via the Web site.	ET on MSS	ASAP
Paragraph 5.1.7	Continue the work for the designation of Kenya to be an operational GMDSS Preparation Service for Metarea VIII (S).	ET on MSS	ASAP

Reference	*Task*	*By whom*	*Target*
Paragraph 5.1.27 and Recommendation 10 (JCOMM-II)	Include the revised MPERSS system plan in the *Guide to Marine Meteorological Services* (WMO-No. 471).	ET on MAES	ASAP
Recommendation 2 (JCOMM-II) and Annex	Establish (under SCG) a small ad hoc Task Team, comprising representatives of major existing ocean product centres, including, as a minimum, the GODAE product centres.	Services Coordination Group, JCOMM co-presidents and Management Committee	ASAP
Paragraph 5.3.6	Investigate the feasibility of expanding the MMS monitoring survey to non-GMDSS users.	ET on MSS	ASAP
Paragraph 5.1.31	Thoroughly review the content and structure of the WMO publication *Weather Reporting* (WMO-No. 9) – Volume D – Information for shipping, in the light of the expected target audience, the relevance of the information provided, and capabilities for regular updating.	Services Coordination Group	ASAP and Continuing
Paragraph 5.1.20	Finalize WMO Sea Ice Nomenclature including an Illustrated Glossary of Sea Ice Terms.	ET on SI	Before IPY 2007-2008
Paragraph 5.1.24	Cooperate closely with the major international sea-ice programmes and projects, in particular BSIM and IICWG, advise on integrated sea-ice products and coupled sea-ice – ocean – atmosphere numeric models, and on new initiatives for the provision of tailored support for the IPY, including ice climate normals and data archival.	ET on SI with cooperation of BSIM and IICWG	IPY 2007-2008
Recommendation 2 (JCOMM-II) and Annex	Development of a draft of the guidelines, for review through a wider JCOMM process (SCG, MAN, JCOMM Members/Member States), by the established small ad hoc Task Team (working by e-mail).	Services Coordination Group, JCOMM co-presidents and Management Committee	End 2007
Paragraph 11.2.13	Provide tailored services and information support to the IPY and cooperate with DBCP, IABP and IPAB in their implementation during the IPY.	ET on SI	2007-2008
Paragraph 4.2.2	Ensure that a clear set of observational data requirements to support marine meteorological and operational oceanographic products and services is finalized and included in the CEOS/WMO database.	Services Coordination Group	Intersessional
Paragraph 5.1.9	Develop appropriate amendments to the *Manual on Marine Meteorological Services* (WMO-No. 558) related to requirements for non-GMDSS marine broadcast services, in particular for coastal zones.	ET on MSS	Intersessional

Reference	*Task*	*By whom*	*Target*
Paragraphs 5.1.15 and 10.3, and Recommendation 1 (JCOMM-II)	Complete preparation of the Guide to Storm Surge Forecasting and publish it in the WMO Manuals and Guides series	ET on WS in consultation with JCOMM co-presidents and CBS presidents	Intersessional
Paragraph 5.1.34	Liaise with the existing tsunami warning and mitigation support activities of both IOC and WMO to determine the appropriate approach to this contribution.	Services Coordination Group	Intersessional
Recommendation 2 (JCOMM-II) and Annex	Prepare comprehensive catalogue of existing operational or quasi-operational ocean products.	Services Coordination Group	Intersessional
Recommendation 7 (JCOMM-II) and Annex	Keep the implementation of, and user response to, the guidelines and common abbreviations for meteorological forecast and warning broadcasts through the International NAVTEX Service under review.	ET on MSS with IMO and IHO	Intersessional
Recommendation 8 (JCOMM-II)	Review the guidelines for sea-ice information products and develop appropriate amendments for the *Manual on Marine Meteorological Services* (WMO-No. 558).	ET on SI and ET on MSS	Intersessional
Recommendation 10 (JCOMM-II) and Annex	Keep the implementation of, and user response to, the MPERSS under review.	ET on MAES	Intersessional
Paragraphs 5.2.8 and 5.2.7	Develop operational oceanographic products and services under JCOMM.	Services Coordination Group and Management Committee	Before JCOMM-III
Paragraph 5.3.4	Distribute among NMS and mariners the results of the MMS monitoring survey in 2004-2005 and publish it on JCOMM, JCOMMOPS and GMDSS Web sites.	ET on MSS	Before JCOMM-III
Paragraph 5.1.21	Revise the publication *Sea Ice Information Services in the World* (WMO-No. 574) and include it in the *Manual on Marine Meteorological Services* (WMO-No. 558).	ET on SI	JCOMM-III
Paragraph 5.2.5 and Recommendation 2 (JCOMM-II)	Re-develop the JCOMM Electronic Products Bulletin as a Web portal to JCOMM products and services.	Services Coordination Group and Management Committee	JCOMM-III

Reference	*Task*	*By whom*	*Target*
Paragraph 9.2	Keep under review the preparation of a set of regulations and guidance material, relating to the preparation and provision of oceanographic products and services for adoption by WMO and IOC.	Services Programme Area Coordinator and Management Committee	JCOMM-III
Paragraphs 5.1.5 and 5.3.7	Continue and finalize the project for graphic information dissemination as part of the GMDSS.	ET on MSS	Continuing
Paragraph 5.1.24	Continue to work as the international body responsible for ice information standards, in particular for the Ice Objects register in ECDIS in cooperation with the IHO and for information and assessment of sea-ice as an Essential Climate Variable (ECV) under GCOS.	ET on SI with cooperation of IHO	Continuing
Paragraph 5.1.34	Continue to work with IMO, IHO and IOC on the use of the GMDSS for the dissemination of tsunami warnings, as appropriate.	ETMSS in liaison with IMO and IHO	Continuing
Paragraphs 11.2.11 and 11.2.13	Improve observational systems and services in the Arctic and Antarctic.	Observations and Services Programme Areas	Continuing
Observations			
Paragraph 6.1.29	Develop a plan of action to stop leakages of real-time ship positions, while at the same time maintaining the flow of critical meteorological and oceanographic information to users and to monitor the effectiveness of these actions.	Ship Observations Team	ASAP
Paragraph 6.1.22	Organize a scientific review of the requirements for VOSClim and VOS data to be used in numerical weather prediction and in climate studies.	Management Committee and Ship Observations Team	ASAP
Paragraph 7.5.3	Initiate actions for the BUFR encoding for the GTS exchange of oceanographic data, as appropriate, including in particular profiling float data.	Observations and Data Management Coordination Groups and Argo	ASAP
Paragraph 6.1.9	Organize a workshop to establish a pilot project for SST metadata collection and real-time distribution.	DBCP Technical Coordinator and Observations Coordination Group	2006
Paragraph 11.2.10	Establish contact with the Project Steering Committees set up within the projects, and assist in the promotion of the IPY projects.	Observations Programme Area Coordinator	IPY 2007-2008

Reference	*Task*	*By whom*	*Target*
Paragraph 4.2.1	Continue to address the requirements of operational users for both in situ and satellite-derived observational marine meteorological and oceanographic data as a part of the ongoing work programme, in coordination with CBS, as appropriate.	Observations Coordination Group	Intersessional
Paragraph 6.1.24	Monitor the possibilities for re-establishment of WRAP, with enhanced support from a number of Members/Member States.	Ship Observations Team	Intersessional
Paragraph 6.1.31	Develop pilot projects for the design and evaluation of new observation programmes, such as the IOCCP for pCO2 and GOSUD for sea surface salinity monitoring programmes.	Ship Observations Team	Intersessional
Paragraph 6.1.37	Coordinate installation and upgrading of tide gauges in the Indian Ocean as a part of the Indian Ocean Tsunami Warning System.	GLOSS Group of Experts with Finland and ISDR	Intersessional
Paragraph 6.1.37	Coordinate the development of the sea level aspects for the ODINAFRICA III project.	GLOSS Group of Experts, Members	Intersessional
Paragraph 6.1.37	Upgrade, under the IPY, the Arctic and Antarctic tide gauge networks to be installed to contribute to GOOS and GCOS.	GLOSS Group of Experts, Members	Intersessional
Paragraph 6.1.44	Assist in transforming the Argo programme from a pilot project to a sustained part of the ocean observing system.	Observations Coordination Group and Argos Steering	Intersessional
Paragraph 6.1.44	Work with Members for the continued long-term sustained funding of Argo float deployments.	Observations Coordination Group and Argos Steering Team	Intersessional
Paragraph 6.3.2	Implement the ocean and relevant atmospheric actions within GCOS-92.	Observations Coordination Group	Intersessional
Paragraphs 6.3.3 and 6.3.4	Implement observational components in support of the international comprehensive marine hazard warning system.	Observations Coordination Group	Intersessional

Reference	*Task*	*By whom*	*Target*
Paragraphs 6.3.12, 6.3.14, 6.4.5 and 6.4.6, and Recommendation 4 (JCOMM-II)	Investigate the feasibility of funding JCOMMOPS development and operations through a dedicated JCOMM Trust Fund instead of through the DBCP, SOOP and Argo.	Observations Coordination Group	Intersessional
Paragraphs 6.5.3 and 6.5.4	Complete the study of procedures for evaluating and accrediting instrumentation; develop a mechanism to ensure that data collected by observing system operators conform to agreed basic standards, formats and levels of data quality; coordinate JCOMM input to the wider IOC study on instrument standards.	Ship Observations Team, Observations Coordination Group and Management Committee	Intersessional
Recommendation 11 (JCOMM-II)	Keep the structure, contents and status of the *International List of Selected, Supplementary and Auxiliary Ships* (WMO-No. 47) under review.	Ship Observations Team in consultation with ET on MC	Intersessional
Recommendation 11 (JCOMM-II)	Develop XML for the future exchange of the metadata for WMO-No. 47 and JCOMM co-presidents.	Ship Observations Team in consultation with ET on MC,	Intersessional
Paragraphs 6.1.17, 6.3.13 and 6.3.14 and Recommendation 3 (JCOMM-II)	Develop a plan for the bulk purchase and supply of consumables for ship-based observations.	Observations Programme Area Coordinator, Ships Observations Team Chairperson, JCOMM Co-presidents and Members/ Member States	Before JCOMM-III
Paragraph 6.4.5	Review JCOMMOPS activities and submit a report at JCOMM-III.	Observations Coordination Group	Continuing
Paragraph 6.1.10	Continue to address the vandalism problem.	DBCP in consultation with IMO, FAO, IHO, ITC	Continuing
Paragraph 7.5.15	Make widely available within JCOMM the results of the DBCP annual review of new communications systems, such as Iridium for the collection of data from automated marine platforms.	DBCP	Continuing
Paragraphs 11.2.11 and 11.2.13	Improve observational systems and services in the Arctic and Antarctic.	Observations and Services Programme Areas	Continuing

Reference	*Task*	*By whom*	*Target*
Paragraph 12.3.2	Cooperate with the IGOS Ocean Theme to implement its in situ component.	Management Committee and Observation Coordination Group	Continuing
Data Management			
Recommendation 2 (JCOMM-II) and Annex	Establish (under DMCG and IODE) an ad hoc Task Team, comprising representatives of JCOMM DM, IODE and GODAE.	Data Management Coordination Group, JCOMM co-presidents and Management Committee	ASAP
Paragraph 7.5.3	Initiate actions for the BUFR encoding for the GTS exchange of oceanographic data, as appropriate, including, in particular, profiling float data.	Observations and Data Management Coordination Groups and Argo	ASAP
Paragraph 7.6.3	Prepare a revised Expert Team Data Management Practices work plan for implementation of the OIT project.	ET on DMP and IODE	Before MAN-V
Recommendation 2 (JCOMM-II) and Annex	Prepare a comprehensive review of existing activities and work on the required standardized data and metadata formats.	Data Management Programme Area Coordinator in cooperation with the chairperson of IODE	MAN-V
Recommendation 9 (JCOMM-II)	Implement the new version of the international maritime meteorological tape format for all data collected as from 1 January 2007.	Members/Member States and ET on MC	01 January 2007
Recommendation 9 (JCOMM-II)	Implement the new version of the minimum quality control standards for all data collected from 1 January 2007	Members/Member States and ET on MC	01 January 2007
Recommendation 2 (JCOMM-II) and Annex	Develop a rolling implementation plan, with the wider community, for the integration of new technological developments in data and product management.	Data Management Coordination Group with initial collaboration from GODAE	2007
Paragraph 7.1.17	Organize a Third JCOMM Workshop on Advances in Marine Climatology to be held in 2007.	Management Programme Area Coordinator	2007

Reference	*Task*	*By whom*	*Target*
Paragraph 7.2.6	Arrange for ongoing JCOMM representation on ICG/WIS.	Management Programme Area Coordinator and IODE	2007
Paragraph 7.6.2	Convene a joint JCOMM/IODE/GODAE Workshop on quality control and data assembly.	Data Management Coordination Group, IODE and GODAE	2007
Recommendation 2 (JCOMM-II) and Annex	Develop a detailed proposal for the required standardized data and metadata formats to be prepared by the ad hoc Task Team.	Data Management Coordination Group, JCOMM co-presidents and Management Committee	End 2007
Paragraph 4.2.1	Continue to address the requirements of operational users for both in situ and satellite derived observational marine meteorological and oceanographic data as a part of the ongoing work programme, in coordination with CBS, as appropriate.	Data Management Coordination Group	Intersessional
Recommendation 2 (JCOMM-II) and Annex	Develop a possible Coastal Ocean Data Assimilation Experiment (CODAE) by reviewing this as part of the response to COOP.	Data Management Coordination Group with collaboration from GODAE	Intersessional
Paragraph 7.1.12	Work to integrate all JCOMM E2E Data Management activities.	Data Management Programme Area and Management Committee	Intersessional
Paragraph 7.1.14	Undertake development of DM standards in close collaboration with Argo, DBCP and the SPA.	Expert Team on Data Management Practices, Argo, DBCP, SPA	Intersessional
Paragraph 7.1.18	Examine how both oceanographic and ice climatologies could be coordinated so as to be seen as an integrated product.	ET on MC	Intersessional
Paragraph 7.5.16	Provide appropriate JCOMM participation in the CBS activities related to data exchange.	Management Committee and Data Management Coordination Group	Intersessional

Reference	*Task*	*By whom*	*Target*
Paragraph 7.7.1 and Recommendation 6 (JCOMM-II)	Develop a JCOMM data management strategy to be closely coordinated with those of IODE and the WMO Information system.	Data Management Coordination Group, JCOMM co-presidents, IODE chairperson, ICG-WIS chairperson	Intersessional
Paragraph 7.2.2	Work with IODE and IOC to develop a data management strategy document as a guide for complementary progress between relevant WMO and IOC programmes.	Data Management Programme Area	Before JCOMM-III
Paragraph 7.1.4	Maintain a permanent list of oceanography and marine meteorology data management initiatives to promote complementarity and synergy.	Data Management Programme Area Coordinator and IODE	Continuing
Paragraph 7.1.6	Encourage synergies between ETMC and ETDMP.	Data Management Programme Area Coordinator and Management Committee	Continuing
Paragraph 7.1.8	Intensify collaboration of the IODE NODCs with WMO NMHSs at the national level on JCOMM data management activities.	Data Management Programme Area and IODE	Continuing
Paragraphs 7.6.7 and 7.6.10	Ensure wider participation of GTSPP and GOSUD in Expert Team Data Management Practices pilot projects, carrying out the functions of GTSPP and GOSUD data sources under the E2EDM system prototype.	ET on DMP, IODE, GTSPP and GOSUD	Continuing
Recommendation 9 (JCOMM-II)	Review the implementation and value of the revised format and quality control standards.	ET on MC	Continuing

APPENDIX A

LIST OF PERSONS ATTENDING THE SESSION

A. Officers of the session

J. Guddal
S. Narayanan (Ms) Co-presidents

B. Representatives of WMO Members and IOC Member States

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APPENDIX B

LIST OF ABBREVIATIONS

AIC	Argo Information Centre
AMOC	Area Meteorological and Oceanographic Coordinator
AREP	Atmospheric Research and Environment Programme
ARGO	Array for Real-time Geostrophic Oceanography
ASAP	Automated Shipboard Aerological Programme
ASEAN	Association of South-East Asian Nations
ASPECT	Antarctic Sea-ice Processes, Ecosystems and Climate
AWS	Automatic Weather Station
BIPM	International Bureau of Weights and Measures
BODC	British Oceanographic Data Centre
BSIM	Baltic Sea Ice Meeting
CAgM	Commission for Agricultural Meteorology
CBCG	Capacity-building Coordination Group
CBPA	Capacity-building Programme Area
CBS	Commission for Basic Systems
CCI	Commission for Climatology
CEDRE	Centre of Documentation, Research and Experimentation on Accidental Water Pollution
CEOS	Committee on Earth Observation Satellites
CGMS	Coordination Group for Meteorological Satellites
CIMO	Commission for Instruments and Methods of Observation
CLIC	Climate and Cryosphere Programme
CLIMAR	Workshop on Advances in Marine Climatology
CLIVAR	Climate Variability and Predictability
CLS	Collect-Localization-Satellites
CMM	Commission for Marine Meteorology
CMOS	Canadian Meteorological and Oceanographic Society
CNES	National Centre for Space Studies
CNRS	National Scientific Research Center
COOP	Coastal Ocean Observations Panel
COP	Conference of the Parties
COST	European Cooperation in the Field of Scientific and Technical Research
CSD	United Nations Commission on Sustainable Development
DBCP	Data Buoy Cooperation Panel
DMACS	Data Management and Communications Subsystem
DMCG	Data Management Coordination Group
DMPA	Data Management Programme Area
DPM	Natural Disaster Prevention and Mitigation Programme
E2EDM	End-to-End Data Management Project
E-ASAP	EUMETNET ASAP Programme
ECDIS	Electronic Chart Display and Information System
ECMWF	European Centre for Medium-Range Weather Forecasts
ECV	Essential Climate Variable
EOS	Earth Observation Summit
ESA	European Space Agency
E-SURFMAR	EUCOS Surface Marine Programme
ETDMP	Expert Team on Data Management Practices
ETMAES	Expert Team on Marine Accident Emergency Support
ETMC	Expert Team on Marine Climatology
ETMSS	Expert Team on Maritime Safety Services
ETSI	Expert Team on Sea Ice

ETWS	Expert Team on Wind Waves and Storm Surges
EUCOS	EUMETNET Composite Observing System
EUMETNET	European Meteorological Services Network
EUMETSAT	European Organization for the Exploitation of Meteorological Satellites
FAO	Food and Agriculture Organization of the United Nations
FTP	File Transfer Protocol
GAW	Global Atmosphere Watch
GCN	GLOSS Core Network
GCOS	Global Climate Observing System
GCS	Global Collecting Centre
GDAC	Global Data Assembly Centre
GDSIDB	Global Digital Sea Ice Data Bank
GE-BICH	IODE Group of Experts (GE) on Biological and Chemical Data Management and Exchange Practices (BICH)
GEF	Global Environment Facility
GE-GLOSS	IOC Group of Experts on the Global Sea-level Observing System
GEO	Group on Earth Observations
GEOSS	Global Earth Observation System of Systems
GETADE	IODE Group of Experts on Technical Aspects of Data Exchange
GLOSS	Global Sea-level Observing System
GMDSS	Global Maritime Distress and Safety System
GODAE	Global Ocean Data Assimilation Experiment
GODAR	Global Ocean Data Archaeology and Rescue
GOOS	Global Ocean Observing System
GOS	Global Observing System
GOSUD	Global Ocean Surface Underway Data Project
GRA	GOOS Regional Alliance
GSOP	CLIVAR Global Synthesis and Observation Panel
GSSC	GOOS Scientific Steering Committee
GTOS	Global Terrestrial Observing System
GTS	Global Telecommunication System
GTSPP	Global Temperature Salinity Profile Programme
HWR	Hydrology and Water Resources Programme
ICES	International Council for the Exploration of the Sea
ICG/IOTWS	Intergovernmental Coordination Group for the Indian Ocean Tsunami Warning and Mitigation System
ICS	International Chamber of Shipping
ICSU	International Council for Science
IDCS	International Data Collection System
IFREMER	French Research Institute for Exploitation of the Sea
IFSMA	International Federation of Shipmasters' Associations
IGOS	Integrated Global Observing Strategy
IGOS-P	Integrated Global Observing Strategy Partnership
IGOSS	Integrated Global Ocean Services System
IHO	International Hydrographic Organization
IICWG	International Ice Charting Working Group
IMMT	International Maritime Meteorological Tape
IMO	International Maritime Organization
IMSO	International Mobile Satellite Organization
IOC	Intergovernmental Oceanographic Commission
IOCCP	International Ocean Carbon Pilot Project
IODE	International Oceanographic Data and Information Exchange
IOTWS	Indian Ocean Tsunami Warning and Mitigation System
IPY	International Polar Year
IRD	French Institute of Research for Development
ISDR	International Strategy for Disaster Reduction

ISO	International Organization for Standardization
ITSU	International Tsunami Warning System in the Pacific
JCOMM	Joint WMO/IOC Technical Commission for Oceanography and Marine Meteorology
JCOMMOPS	JCOMM In Situ Observing Platform Support Centre
JEB	JCOMM Electronic Products Bulletin
JMA	Japan Meteorological Agency
LDC	Least Developed Country
LES	Land Earth Station
MARPOLSER	International Seminar/Workshop on the Marine Pollution Emergency Response Support System
MCSS	Marine Climatological Summaries Scheme
MEPC	Marine Environment Protection Committee
METOP	Meteorological Operational Satellite
MILAC	Marine Impacts on Lowland Agricultural and Coastal Resources
MMOP	Marine Meteorology and Oceanography Programme
MPERSS	Marine Pollution Emergency Response Support System
MQCS	Minimum quality control standards
NMDIS	National Marine Data and Information Service
NMHS	National Meteorological and Hydrological Service
NMS	National Meteorological or Hydrometeorological Service
NOAA	US National Oceanic and Atmospheric Administration
NODC	National Oceanographic Data Centre
OceanOps	Operational Metocean Products and Services in Support of Maritime Safety and Environmental Management
OCG	Observations Coordination Group
ODIN	Ocean Data and Information Network
ODINAFRICA	Ocean Data and Information Network for Africa
OIT	Ocean Information Technology
OOPC	Ocean Observations Panel for Climate
OPA	Observations Programme Area
PA	Programme Area
PIRATA	Pilot Research moored Array in the Tropical Atlantic
PMO	Port Meteorological Officer
POGO	Partnership for Observations of the Global Oceans
PSMSL	Permanent Service for Mean Sea Level
PWSP	Public Weather Services Programme
R&D	Research and Development
RA	Regional Association
RCOOS	Regional Coastal Ocean Observing System
RSMC	Regional Specialized Meteorological Centre
6LTP	Sixth WMO Long-term Plan
7LTP	Seventh WMO Long-term Plan
SAR	Maritime search and rescue
SBSTA	Subsidiary Body for Scientific and Technological Advice
SCG	Services Coordination Group
SEACAMP	South East Asian Centre for Atmospheric and Marine Prediction
SIDS	Small Island Developing States
SOLAS	International Convention for the Safety of Life at Sea
SOOP	Ship-of-Opportunity Programme
SOT	Ship Observations Team
SPA	Services Programme Area

TCP	Tropical Cyclone Programme
THORPEX	Observing System Research and Predictability Experiment
TIP	Tropical Moored Buoy Implementation Panel
TRITON	Triangle Trans-ocean Buoy Network
TTR	Task Team on Resources
UN-Oceans	United Nations Oceans and Coastal Areas Network
UNEP	United Nations Environment Programme
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNFCCC	United Nations Framework Convention on Climate Change
UNICPOLOS	United Nations Informal Consultative Process on Oceans and the Law of the Sea
VOS	Voluntary Observing Ship
VOSClim	Voluntary Observing Ships Climate Project
WCP	World Climate Programme
WCRP	World Climate Research Programme
WDC	World Data Centre
WHYCOS	World Hydrological Cycle Observing System
WIOMAP	Western Indian Ocean Marine Applications Project
WIS	WMO Information System
WMO	World Meteorological Organization
WMOSP	WMO Space Programme
WOCE	World Ocean Circulation Experiment
WSSD	World Summit on Sustainable Development
WWW	World Weather Watch
XBT	Expendable bathythermograph
XML	eXtensible Mark-up Language

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