WORLD METEOROLOGICAL ORGANIZATION

INTERGOVERNMENTAL OCEANOGRAPHIC COMMISSION (OF UNESCO)

JOINT WMO/IOC TECHNICAL COMMISSON FOR OCEANOGRAPHY AND MARINE METEOROLOGY

FIRST TRANSITION PLANNING MEETING

ST PETERSBURG, RUSSIAN FEDERATION, 19-23 JULY 1999

FINAL REPORT

JCOMM Meeting Report No. 1

GENERAL SUMMARY OF THE WORK OF THE SESSION

1. OPENING OF THE MEETING

1.1. Opening

1.1.1 The first transition planning meeting for the Joint WMO/IOC Technical Commission for Oceanography and Marine Meteorology (JCOMM) opened at 0930 hours on Monday 19 July 1999 in the conference room of the Arctic and Antarctic Research Institute (AARI), St Petersburg, Russian Federation. On behalf of the Secretary-General of WMO, Professor G.O.P. Obasi, and the Executive Secretary IOC, Dr P. Bernal, the WMO Secretariat representative welcomed participants to the meeting and to the start of the new era which JCOMM represented, in both oceanography and in cooperation between WMO and IOC. In doing so, he first expressed his very sincere and heartfelt thanks, on behalf of both the JCOMM parent Organizations, to the AARI and its Director, Dr Ivan Frolov, for hosting the meeting and for providing such excellent facilities, hospitality and support. He noted that it was particularly fitting that this first meeting to take place in the context of JCOMM should do so at AARI in Russia, in view of the leading role taken for many years by both Russia and the AARI in oceanography and polar science and services, and also because of the long-standing efforts of Dr Frolov himself in support of the former CMM.

1.1.2 The WMO representative recalled that JCOMM was formally established by merging the existing WMO Commission for Marine Meteorology and the Joint IOC/WMO Committee for the Integrated Global Ocean Services System. The present meeting was therefore expected to combine the functions of reviewing and revising the work programmes of CMM and IGOSS with planning the transformation of these bodies and their substructures into JCOMM. It was also expected to develop a procedure for the integration of other existing ocean observing system implementation mechanisms into an overall coordinated structure, as well as begin to address the urgent implementation requirements of GOOS/GCOS. The WMO representative concluded by wishing all participants a very successful meeting and beginning to JCOMM, as well as an enjoyable stay in St Petersburg. He then invited Dr Frolov to address the meeting.

1.1.3 On behalf of the AARI, Dr Frolov also welcomed participants to Russia, to St Petersburg and to the Institute. He expressed his pleasure that such an important and historic meeting was taking place in AARI, noting that the institute had been involved in polar research for more than 80 years. It was now a large institute, which organized all Russian Antarctic research, as well as most of that for the Arctic. This research covered oceanography, meteorology and sea ice studies, as well as many other aspects of polar science. Dr Frolov concluded by wishing all participants a very fruitful meeting and an enjoyable stay in St Petersburg.

1.1.4 The list of participants in the meeting is given in Annex I.

1.2. Election of the chairman

1.2.1 Participants agreed that the existing president of CMM, Mr Johannes Guddal, and chairman of IGOSS, Prof. D. Kohnke, should share the task of chairing the present meeting, with a decision on the interim co-presidency of JCOMM to be made later under agenda item 5.

1.3. Adoption of the agenda

1.3.1 The meeting adopted its agenda on the basis of the provisional agenda prepared by the Secretariats. This agenda is given in Annex II.

1.4. Working arrangements

1.4.1 The meeting agreed its hours of work and other practical session arrangements. The session documentation was introduced by the Secretariats.

2. JCOMM STATUS REVIEW

2.1 The meeting recalled that JCOMM was formally established through resolutions of the thirteenth WMO Congress (May 1999) and the twentieth IOC Assembly (June/July 1999). The meeting firstly reviewed details of these decisions, including the JCOMM terms of reference and other specific aspects of the joint technical commission agreed by the governing bodies. The JCOMM terms of reference are given in Annex III. The meeting agreed that one of the issues for the present meeting would be to find an effective way to fit together in a coherent structure all the important existing pieces of CMM and IGOSS, as well as other components of existing ocean observing systems. In doing so, it would be necessary eventually to indicate how existing and expected future resources and mechanisms would map onto stated requirements, and to develop procedures for addressing standards and regulatory matters. The meeting further agreed that JCOMM should begin by addressing only the requirements for physical and closely related chemical ocean data, with the implementation requirements of other parts of GOOS to be considered later, either through JCOMM or elsewhere.

2.2 The meeting recognized that the fundamental objective of JCOMM was to provide a fully integrated and coordinated mechanism for the global management of an operational ocean observing and data management system to provide the full range of marine meteorological and oceanographic variables needed to meet the requirements for such data of marine service providers and users, global climate studies and other major programmes of WMO and IOC. Complementary to this objective was a requirement to ensure that all Members/Member States of the two Organizations could both contribute to and benefit from the work of JCOMM. In the context of these objectives, the meeting agreed that one of the primary initial tasks of JCOMM would be to coordinate the implementation of the common GOOS/GCOS ocean climate module. It therefore also reviewed under this agenda item the requirements for and status of GOOS/GCOS implementation. This review included in particular the results of recent sessions of the GOOS and GCOS Steering Committees, as well as of I-GOOS. In doing so, the meeting considered the respective roles of JCOMM and I-GOOS, and agreed that they were different and complementary - JCOMM was a technical implementation body, while I-GOOS reviewed and recommended on requirements and resources for such implementation.

3. REPORTS ON EXISTING ACTIVITIES

3.1 Participants in the meeting included representatives of all the CMM and IGOSS subsidiary bodies, of all other bodies and mechanisms to be coordinated under or associated with JCOMM, as well as of GOOS and GCOS. Based on reports from these representatives, the meeting reviewed the status of all existing activities relevant to JCOMM. Such reports covered: the main CMM working groups and activities; IGOSS and SOOPIP; DBCP and TIP; GLOSS; IODE and GTSPP; ASAP. This review also included the work underway in WMO to analyse, on an ongoing basis, requirements for all types of meteorological, hydrological and oceanographic data, and of the capabilities of satellites and other types of observing systems to meet these.

3.2 The information presented under this agenda item was taken into account in particular when determining the future structure and work programme for JCOMM, considered under subsequent agenda items. Significant points raised during the discussion of the various reports included:

(i) The importance to the work of JCOMM of obtaining commitments at the national level in terms of both expertise and time from individuals, building on existing commitments to CMM and IGOSS, and in this context the need to convince national agencies of the value to them of contributing to JCOMM;

(ii) The need to foster and assist national coordination among different agencies in support of JCOMM; a related national problem involved entraining oceanographers in operational activities;
(iii) The need to include storm surge related activities within JCOMM, in association with wind waves and the WMO Wave Programme; the need to develop wave climatologies, both data and model based, which was a task for the marine climatology group; the need to develop closer cooperation in wave activities between JCOMM and GOOS, in particular coastal GOOS; the possible requirement for a science steering group for waves, perhaps established under SCOR;
(iv) In a general sense, the role of JCOMM in the development of climatologies and in climatological data management, including interactions with IODE and CCl;
(v) The possible merger of existing groups dealing with observations from VOS;
(vi) The important role to be played by JCOMM in national capacity building, including focussed specialized training, multi-component coastal area workshops, and regional cooperative projects;
(vii) Instrument testing and intercalibration, and the role of **ad hoc** task teams set up within operational groups for this purpose; also incorporation of new technologies;
(viii) The importance of carrying forward meteorological and oceanographic data simultaneously in data management streams within JCOMM, and in conjunction with IODE;
(ix) The importance of the data collection, exchange and processing infrastructure established under IGOSS for both GOOS and JCOMM, and the future role of both the IGOSS SOCs and the RNODCs for IGOSS of IODE;
(x) The possible incorporation of coastal moored buoy networks within a global ocean observing system;
(xi) Support for a GLOSS scientific sub-group for climate, but not for a coastal sub-group;
(xii) The use of the GTSPP as both an important data management mechanism for JCOMM, and also as a model for end-to-end data management in general; and in this context the transformation of the GTSPP Steering Group into a joint JCOMM/IODE Steering Group for End-to-end Data Management;
(xiii) Support for GTSPP to expand its functions to cover other data types and/or data sources;
(xiv) Data directory services for JCOMM including the potential use of MEDI and WMO directories;
(xv) JCOMM-related data centres and data base management procedures.

3.3 The meeting requested the Secretariats to compile all these status reports into a single document, to be printed separately from the meeting report and distributed to newly-nominated members of JCOMM.

4. REVIEW OF REQUIREMENTS

4.1 The meeting recalled that, as specified in its terms of reference, JCOMM must address requirements for marine meteorological and oceanographic data and products in support of the full range of services for marine users, as well as of the WWW and other major programmes of WMO and IOC. In addition, JCOMM was expected to be the primary mechanism for coordinating and regulating the implementation and maintenance of (at least initially) global physical ocean observations for GOOS and GCOS.

4.2 In this context, the meeting noted that, following a proposal from CMM-XII, a document entitled *Global Ocean Observations for GOOS/GCOS – an Action Plan for Existing Bodies and Mechanisms* had been prepared, and recently published as a formal planning document for both GOOS and GCOS. This document reviewed in detail existing implementation mechanisms and presents specific actions required of these mechanisms to support GOOS/GCOS implementation. As such, the document represented a blueprint for the initial support to be provided by JCOMM for the implementation of GOOS and GCOS. The meeting therefore carefully reviewed this document, including in particular the detailed requirements for ocean data developed by the Ocean

Observations Panel for Climate (OOPC) and specified therein, with a view to addressing the implementation actions in the JCOMM work plan. The work of the OOPC is summarized in Annex IV. The meeting expressed its appreciation for the development of the A*ction Plan*, and noted its importance, not just for JCOMM as a whole, but also at the national level. It therefore requested the Secretariats to arrange, if at all possible, for its translation and publication in at least the four major working languages of WMO and IOC.

4.3 The meeting recognized that JCOMM would also continue to be responsible for the provision of marine services and of operational marine data in support of the WWW and other WMO and IOC programmes. The meeting therefore also undertook a review of requirements for these applications, so that they could be fully reflected in the work plan. These requirements are partially specified in the *Action Plan.* The meeting agreed that, in general, JCOMM had a function to act as a review mechanism for ocean data requirements for user-oriented products and services. A mechanism was therefore needed for this, as well as to address priorities in the implementation of other requirements developed elsewhere.

4.4 It was agreed that JCOMM was also expected to provide support, within its operational mandate, to relevant research programmes. A review of these programmes and their requirements was therefore presented, including in particular the CLIVAR and the Global Ocean Data Assimilation Experiment (GODAE), with its associated Argo project. This review is summarized in Annex V.

4.5 With regard specifically to Argo, the meeting was informed of Resolution XX-6 of the recent 20th IOC Assembly which, inter alia, concluded that ---*concerned coastal states must be informed in advance, through appropriate channels, of all deployments of profiling floats which might drift into waters under their jurisdiction, indicating the exact location of such deployments*. In this context, the meeting was informed of the intention of the Argo Science Team to develop a comprehensive data and information management system, which would include *audit trails* for the processing of float data from the point of collection. This data system would be open, and include the full history of each float. The meeting noted that this process would provide a mechanism that could be used to satisfy the concerns expressed in the IOC resolution as stated above. **The meeting therefore recommended** that the Argo Science Team take note of this IOC resolution and in particular the need to inform coastal states of floats that are likely to enter their waters, as well as the deployment history of any such floats. Further, in the development of the data and information management strategy, a capacity to view the complete audit of Argo floats should be made available, together with methods for access to data. The meeting, however, did not consider that, at the present time, there was any obligation on Argo to take specific actions relating to floats entering EEZs.

4.6 Further on the subject of Argo, the meeting recognized that it remained, for the present, essentially a pilot project of the OOPC and hence of GOOS/GCOS, and as such outside the area of direct responsibility of JCOMM. In this context, any interaction between JCOMM and the Argo Science Team should, for the moment, be undertaken through the OOPC as the primary JCOMM science advisory body for climate issues. Nevertheless, it was agreed that Argo had enormous potential and was likely to lead eventually to an operational network of profiling floats which would, at that time, become naturally incorporated into the operational networks coordinated by JCOMM. Finally, the meeting recognized that Argo would shortly have an implementation panel, which would facilitate future interactions.

5. TRANSITION TO JCOMM

5.1 The meeting firstly noted that, in line with its status as a technical commission of WMO, JCOMM was an intergovernmental body of technical experts in the field of oceanography and marine meteorology, with a mandate to prepare both regulatory (what Member States **shall** do) and guidance (what Member States **should** do) material relating to marine observing systems and services. The role of the full commission in session was essentially to act as a final review body for activities, proposals and recommendations prepared for it by its sub-structure of working groups and rapporteurs. Based on these, it would then prepare recommendations for actions by Member States, for consideration and adoption by the respective governing bodies of WMO and IOC.

5.2 The meeting agreed that the transition from the existing CMM/IGOSS structure, plus reporting and coordination arrangements for the other ocean observing bodies, to the new JCOMM, required careful design and management. The new structure had to ensure that existing mechanisms which were working and productive were retained, while at the same time providing a structure which was cost-effective and appropriate to addressing user needs. Specifically, the following issues were addressed, with a view to preparing concrete proposals for consideration by the first session of JCOMM:

(i) interim and future presidency of the joint technical commission, membership, and coordination at the national level between meteorological and oceanographic communities, to provide the right level and mix of expertise;
(ii) very importantly, the commission sub-structure of working groups, sub-groups and rapporteurs, to eventually provide a fully integrated approach to fully addressing priority issues, while at the same time retaining the expertise and enthusiasm inherent in existing successful groups;
(iii) relationship to other programmes and bodies of WMO and IOC, including GOOS, GCOS, CBS, CCl and IODE;
(iv) training and capacity building within the context of JCOMM and operational oceanography;
(v) reporting mechanisms and oversight, both internal to JCOMM and also for the commission itself; e.g. to the Executive Councils, and also GOOS/GCOS and elsewhere;
(vi) coordinated Secretariat support for JCOMM.

The following paragraphs contain the results of the discussions on these subjects.

5.3 The meeting noted the decision of Congress and the Assembly regarding the co-presidency of JCOMM. It recognized that JCOMM-I would undertake the first formal election for these co-presidents, and that it would be for this commission session to ensure that the wishes of the governing bodies concerning the sharing of responsibilities between the meteorological and oceanographic disciplines were fulfilled to the extent possible. As an interim measure until JCOMM-I, and bearing in mind that CMM and IGOSS no longer formally existed, the meeting agreed that the former president of CMM, Johannes Guddal, and the former chairman of IGOSS, Dieter Kohnke, should be the interim co-presidents. It further agreed that the former vice-president of CMM, Sachooda Ragoonaden, and vice-chairman of IGOSS, Hans Dahlin, should continue to be fully involved in the transition process.

5.4 With regard to membership of JCOMM, the meeting requested the Secretariats to act as quickly as possible in requesting Members/Member States to nominate members, in order to entrain national agencies and institutions, as well as individuals, in the JCOMM process. This action should comprise, in the first instance, a joint WMO/IOC circular letter to Members/Member States, directed to the primary contact points for both Organizations, requesting nominations of experts from both communities to the joint commission, according to established procedures for such letters. The meeting strongly encouraged better coordination at the national level between atmospheric and oceanographic communities, in order to help further the coordinated

implementation of meteorological and oceanographic services and monitoring, and also provide effective input to and support for JCOMM. In this context, it recommended to the Secretariats that the proposed joint circular letter should also encourage such coordination, and specifically contain quotations of the relevant parts of the WMO/IOC resolution which established JCOMM.

5.5 The meeting noted that the formal reporting mechanism for JCOMM would be to the governing bodies (Executive Councils, Congress and the Assembly) of WMO and IOC, which would have to approve recommendations of JCOMM which involved expenditure and/or actions on the part of either of the Organizations as a whole, or of individual Member States. In addition, the meeting recognized the importance of close liaison with GOOS and GCOS in particular. In this context, it recommended that either or both of the co-presidents should become **ex officio** members of both the GOOS and GCOS Steering Committees, and that I-GOOS should invite the co-presidents to provide regular status reports from JCOMM to I-GOOS sessions. The meeting further agreed on the importance of close interactions with other technical bodies of WMO and IOC, in particular CBS and IODE. It considered that such interaction could best be effected, at least initially, through joint working groups or other bodies, or through reciprocal membership on working groups. In this context, it specifically agreed to the establishment of the Joint IODE/JCOMM Steering Group on End-to-end Data Management (see paragraph 3.3(xii) above); to the nomination by JCOMM of experts to the CBS Rolling Requirements Review process and to GOSSP; and to the reciprocal membership of JCOMM and IODE officers on their respective management groups. It requested the interim co-presidents and the Secretariats to arrange for appropriate participation in these activities, pending formal approval of this action by JCOMM-I.

5.6 The meeting noted the information provided by the Secretariats with regard to future joint Secretariat support to the work of JCOMM, as well as the necessity to resolve a number of small but important regulatory and constitutional differences between the cosponsoring Organizations. It urged the Secretariats to ensure that these issues were resolved as soon as possible, and in as transparent a way as possible, to ensure that they provided no future impediment to the implementation and operation of JCOMM.

5.7 With regard to the future structure of JCOMM, and in the context of the overall JCOMM objectives and terms of reference, the meeting agreed that it needed to begin a process in which oceanography and marine meteorology would transition from the existing largely unconnected set of monitoring, data management and service activities to a fully coordinated and integrated system. This transition process, however, must be incremental and evolutionary, not revolutionary, and must ensure the preservation of existing essential activities of CMM and IGOSS, particularly in the marine services area. The transition process should selectively broaden and modify the tasks of existing mechanisms towards an agreed new structure, with priority being given in the JCOMM work plan to activities which would lead to consolidation and integration.

5.8 In this context, the meeting agreed that a schematic of the future system to be managed by JCOMM might be as given in Annex VI, in which a coordinated set of data providers would feed into an integrated data management system of overlapping real time and non-real time components. This system would, in turn, deliver data and products to a comprehensive range of user interests, either directly or through intermediate service providers. The system would need to be backed by a comprehensive and effective capacity building and support process. As a first step towards this ideal, the meeting further agreed that the basic JCOMM structure should be as shown in Annex VII, in which the co-presidents would be advised and assisted by a Management Committee in the overall guidance and management of the work of JCOMM. This work would, in turn, be categorized and structured (in accordance with the JCOMM Terms of Reference) in four broad Programme Areas (PA) – Products and Services, Observations, Data Management and Education, Training and Implementation Support. Each Programme Area might be placed under the overall responsibility of a Coordinator, assisted as necessary by a small team of experts.

5.9 The meeting recognized that all the existing bodies which now formed part of JCOMM (both

internal and external to CMM and IGOSS) contained elements which contributed to some or all of these Programme Areas, as illustrated in the tabulation in Annex VIII. While this was logical and even desirable in many ways, it also complicated the transition process, including the preparation of recommendations regarding an initial substructure for JCOMM which would retain these bodies to the extent possible, while at the same time supporting the programme structure in Annex VII and facilitating the longer term transition to the idealised system in Annex VI. To begin this process, the meeting agreed to establish an **ad hoc** group, which was tasked with preparing a first draft sub-structure for JCOMM, based on the considerations in paragraphs 5.7 to 5.9 and on the schematics in Annexes VI to VIII. The group should also take into account decisions made on the interim work programme as recorded under agenda item 7, as well as the liaison proposals noted in paragraph 5.5 above. The **ad hoc** group would be chaired by the interim co-presidents, and would also include W. Appleby, F. Gerard, S. Khodkin, P. Parker, T. Pierce, V. Ryabinin and R. Wilson. The group would work primarily by correspondence, except when **ad hoc** meetings of two or more members could be inexpensively arranged, and should have an agreed draft structure available for consideration by all the members of the present transition planning meeting by March 2000.

5.10 The meeting further agreed that, as an integral part of its work, the **ad hoc** group on structure should develop an overall strategy statement relating to the transition from the existing structure to that illustrated in Annex VI.

6. JCOMM-I

6.1 Thirteenth WMO Congress authorised and provided funds for a full session of JCOMM to take place in the biennium 2000-2001. The meeting therefore agreed that WMO should take the lead responsibility for the preparation, conduct and follow-up to JCOMM-I, on the understanding that IOC would, in principle, become the lead agency for JCOMM-II, approximately four years later. In this case, this first session would also take place in full accordance with WMO rules and procedures, as had been the practice previously for IGOSS.

6.2 The meeting noted with interest and appreciation that Iceland had already offered formally to host this first session in June 2001. In view of the complexity of the transition process as already discussed under agenda item 5; of the long lead time required for the thorough preparation of such a session required by WMO; of the need for having clear and realistic proposals ready for consideration by the commission in session regarding initial structures, work programme and the ongoing transition process; and of the important ongoing and uncompleted work programme of CMM and IGOSS, the meeting considered that two years was probably realistic as a lead-up period for the session. At the same time, it recognized the importance for Member States of having this first session as soon as possible, as well as of presenting decisions and recommendations of the new commission to the respective governing bodies at the earliest opportunity. It therefore requested the WMO Secretariat, in consultation with the host country, to investigate the possibilities for holding the session earlier than the proposed date of June 2001, at the very least in April 2001 to allow consideration of decisions by the governing bodies in May and June 2001 respectively.

6.3 The meeting then reviewed and agreed a draft agenda and format for the session, within the context of WMO rules on such matters and on the basis of proposals from the Secretariats. A basic draft agenda is given in Annex IX. The meeting recognized that details of agenda sub-items, as well as a documentation plan for the session, could only be prepared after the **ad hoc** group on structure had completed its work. It therefore requested the Secretariats to undertake the preparation of this additional detail at an appropriate time, for further consideration and agreement by meeting participants. The meeting also agreed on the desirability of having a number of scientific lectures, to be given as part of the session. At the same time, it recognized the importance, to both Member States and the Secretariats, of keeping session time and costs to a minimum. It therefore agreed that the number of such lectures should be restricted to a maximum

of three, covering three of the following general themes:

(i) Operational oceanography, including models and applications;
(ii) New technologies for operational oceanography;
(iii) Oceans and climate;
(iv) Capacity building requirements for operational oceanography.

Neville Smith agreed to provide the Secretariats with the list of keynote speakers for the Oceanobs99 Conference, as a source of potential lecturers covering all proposed topics.

7. WORK PROGRAMME UNTIL JCOMM-I

7.1 The meeting agreed that this was one of the most important items on the agenda. CMM, IGOSS and the other bodies to report to JCOMM all had comprehensive, ongoing work programmes. These needed to be incorporated into a programme of work for the new technical commission for the time remaining until JCOMM-I, to ensure that key action items were completed, and that actions were also taken to address new issues, particularly relating to GOOS/GCOS implementation as specified in the action plan. At the same time, the integrated work plan should reflect the proposed Programme Area structure as agreed under agenda item 5, and give priority to those actions which enhanced the integration and consolidation process. In the wide-ranging discussions on this topic, the following issues were noted in particular:

(i) Incorporation of procedures and capabilities for evaluating system performance and cost-effectiveness, as well as intercalibrating and testing existing and new technologies;
(ii) Requirements and procedures for the preparation of regulatory and guidance material;
(iii) Coordinating and optimising existing observing networks, and generally enhancing the quantity and quality of available ocean data in support of diverse user requirements;
(iv) Use of international conventions (e.g. FCCC, OPRC, UNCLOS, SOLAS, regional conventions such as HELCOM) to support JCOMM work and facilitate regulation;
(v) Data exchange procedures and formats, including enhanced and standardized use of internet technology and facilities;
(vi) Development of a capacity building strategy;
(vii) Preserving current work and priorities relating to operational marine forecasting and services, while at the same time addressing urgent requirements for ocean data for climate;
(viii) The likely publication of a coastal GOOS implementation design prior to JCOMM-I.

7.2 The meeting recognized that all these considerations could not, and probably should not, be implemented immediately within an integrated work plan. At the same time, it was essential to begin the process. In this context, the meeting agreed an outline approach to an integrated work plan, based almost entirely on ongoing activities but structured into programme areas. This is given in Annex X. The meeting recognized that this outline plan provided an essential input to the work of the **ad hoc** group on JCOMM structure. It further stressed the importance of quantifying JCOMM objectives and linkages; of expanding the concept of lead groups on specific issues to encompass other expertise; and of recognizing the wide spectrum of JCOMM work, encompassing time scales from real-time to long time delay, and from raw observation to primary user (more often modelling and forecast centres than end users).

7.3 The meeting agreed that substantial further work was required to fully develop this outline plan, including the incorporation of the activities of bodies other than CMM and IGOSS, as well as actions specified in the Action Plan. It requested the **ad hoc** group on structure to undertake this work, in view of the closely interlinked nature of the two issues. Once this group had reached agreement on both a proposed structure and work plan, this should be reviewed and agreed first by the full interim Management Committee (see paragraph 8.1 below), and then circulated to the newly nominated members of the commission for information and to ensure that they are fully included in the planning process for JCOMM as soon as possible. At the same time, both the

proposed structure and work plan should also be circulated to chairs and members of existing bodies, to seek their views and input and to keep them fully involved in the implementation process. In this context, the meeting requested the Secretariats to ensure that the letter inviting nominations of members of JCOMM should also indicate that all the present activities of existing groups should and must continue until JCOMM-I, with the proviso that steps should be taken towards a graduated integration and consolidation wherever feasible. At the same time, the report of the present meeting should be distributed to all these existing groups, for information and to ensure their ongoing involvement in JCOMM.

7.4 The meeting agreed that JCOMM would need to interact closely on many issues with existing regional bodies and activities within both WMO and IOC, including GOOS regional projects, both to ensure that regional needs were being met, and also to obtain regional input and support for JCOMM implementation work. In this regard, it noted in particular:

(i) that the relation of JCOMM to regional GOOS would need to be clarified over the next two years, though in some cases it was clear already that regional GOOS activities were of significance to the JCOMM programme;
(ii) that eventually the GSC may request JCOMM to give advice on technical aspects of the work of regional GOOS bodies;
(iii) that the WMO regional marine rapporteurs were potentially a valuable resource for JCOMM, in providing direct contact with regional bodies and concerns and also as a means for raising awareness of JCOMM objectives and activities at the regional level.

7.5 The meeting reiterated that capacity building, in all its manifestations, was critical to the success of JCOMM as an entity, to achieving its objectives and implementing its programme, and particularly to ensuring that all countries could participate in and benefit from its work. In this context, the meeting agreed that JCOMM required a more structured approach to capacity building than had previously been the case for CMM and IGOSS. At the same time, the JCOMM capacity building programme should be compatible with the developing GOOS capacity building strategy. The meeting therefore decided to establish an **ad hoc** Task team on JCOMM Capacity Building. The team would comprise W. Appleby (chairman), M. Andrioli and S. Ragoonaden, with support and input from the Secretariats (C. Summerhayes and P. Dexter), and would have the following terms of reference:

(i) Evaluate, to the extent possible, the requirements of Member States for capacity building support in the context of JCOMM;
(ii) Develop a set of priorities for JCOMM capacity building, encompassing education, training and implementation support;
(iii) Interact with and contribute to the development of the GOOS capacity building strategy.

The task team should take the list of capacity building activities given in Annex X as a starting point in developing priorities, and should if possible complete its work by mid-2000.

7.6 The meeting noted with appreciation the existence and value of the IGOSS Electronic Products Bulletin (EPB), which would now become the JCOMM EPB. The meeting recalled the proposed development of a GOOS Products and Services Bulletin, which would serve a different purpose in providing examples of typical GOOS products, including some drawn from the JCOMM (formerly IGOSS) EPB. An advisory board for the bulletin had already been established, chaired by Johannes Guddal. The meeting agreed that this bulletin would provide a very important window and tool for JCOMM as well as GOOS, and should be sufficiently robust to withstand changes in personnel and availability of different products. In view of its potential value, and of the involvement already of many people involved in JCOMM, the meeting agreed that the bulletin should be cosponsored by JCOMM, and encouraged the board to work quickly towards its implementation.

7.7 The meeting noted with interest the proposal from the International SeaKeepers Society for

its yachts, equipped with appropriate observing and communications facilities, to become formally part of the global VOS programme and be recognized as contributing to global GOOS. It was informed that the society was already discussing with NOAA/USA on issues relating to instrumentation, quality control, calibration and communications. The meeting considered that these yachts were indeed of some potential value to an integrated global ocean observing system, for both meteorological and oceanographic variables. At the same time, the members of the International SeaKeepers Society could become valuable partners in the work to develop and expand the observing system to support many applications. It therefore agreed that, subject to an evaluation of the viability of the proposal from the point of view of both scientific and technical integrity in the international context, the proposal should be accepted, with the SeaKeepers yachts becoming a type of Yacht-of-Opportunity Programme within the wider SOOP/VOS. The meeting requested the Secretariats to pass details of the proposal to the Coastal GOOS Panel (C-GOOS) for scientific evaluation, and to the combined VOS group for technical evaluation. These evaluations should, if possible, be undertaken within six months, and in the meantime the Secretariats should inform the president of the society of the views and actions of JCOMM on the subject.

7.8 The meeting further noted with interest the plan by a number of major oceanographic institutions worldwide to establish a Partnership for Observation of the Global Ocean (POGO), which had as a primary aim to enhance cooperation and coordination among these institutions in support of long-term, sustained ocean monitoring. The meeting clearly recognized the potential importance and value of POGO to the future work of JCOMM, and stressed the need to develop a strategy for close cooperation between JCOMM and POGO in the context of operational ocean monitoring. It requested the interim co-presidents and the Secretariats to maintain close contact with POGO officials, with a view to preparing such a strategy.

8. CLOSURE

8.1 Based on the results of discussions under preceding agenda items, and in particular on the remaining unfinished tasks relating to structure, work programme and capacity building, the meeting agreed on the need to establish an interim JCOMM Management Committee, to finalize these tasks and generally to oversee and manage the work of the Commission in the years leading up to JCOMM-I. It agreed that participants in the present meeting should constitute the membership of this committee, and that its terms of reference were:

(i) finalize preparations for JCOMM-I, in particular relating to a draft structure, work plan (including initial integration steps), capacity building strategy, agenda for the session and related matters;
(ii) provide oversight for the overall ongoing work programme of the commission, interact with existing implementation bodies, and propose and assist in steps to further integration of bodies and activities to the extent possible.

It was further agreed that it would be desirable for this group to meet at least once during this period, and requested the co-presidents and the Secretariats to plan and implement such a meeting, preferably no later than May 2000.

8.2 Participants then reviewed and approved the final report of the meeting.

8.3 In closing the meeting the interim co-president, Dieter Kohnke, offered his sincere thanks once again, on behalf of all participants, to the AARI, to Dr Ivan Frolov its Director, to Dr Sergey Priamikov and to all their co-workers, for the excellent facilities, support and hospitality which they had provided for the meeting, which had contributed substantially to its success. He also thanked all participants and the Secretariats for their contributions to what had been a significant and substantial step in the development of operational oceanography.

8.4 Speaking on behalf of all participants, Dr Vladimir Ryabinin thanked both the co-presidents

for their very able conduct of the meeting, and wished them success during the remainder of their mandate.

8.5 The first Transition Planning Meeting for JCOMM closed at 1200 hours on Friday 23 July 1999.

oOo

Annex I

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Annex II

AGENDA

1. OPENING OF THE MEETING

1.1 Opening
1.2 Election of the chairman
1.3 Adoption of the agenda
1.4 Working arrangements

2. JCOMM STATUS REVIEW

3. REPORTS ON EXISTING ACTIVITIES

4. REVIEW OF REQUIREMENTS

5. TRANSITION TO JCOMM

6. JCOMM-I

7. WORK PROGRAMME UNTIL JCOMM-I

8. CLOSURE

Annex III

Joint WMO/IOC Technical Commission for Oceanography and Marine Meteorology (JCOMM)

The Technical Commission shall be responsible for matters relating to:

Further development of the observing networks

Under the guidance of the relevant scientific and operational programmes of IOC and WMO, development, maintenance, coordination and guidance of the operation of the global marine meteorological and oceanographic observing systems and supporting communications facilities of these organizations to meet the needs of the IOC and WMO Programmes and in particular of the Global Ocean Observing System (GOOS), the Global Climate Observing System (GCOS) and the World Weather Watch (WWW). Evaluation on a continuing basis of the efficiency of the overall observing system and suggesting and coordinating changes designed to improve it.

Implementation of data management systems

Development and implementation, in cooperation with the Commission for Basic Systems (CBS), the Committee for International Data and Information Exchange (IODE), the International Council of Scientific Unions (ICSU), and other appropriate data management bodies, end to end data management systems to meet the real-time operational needs of the present operational systems and the global observing systems; cooperation with these bodies in seeking commitments for operation of the necessary national compilation, quality control, and analysis centres to implement data flows necessary for users at time scales appropriate to their needs.

Delivery of products and services

Provision of guidance, assistance and encouragement for the national and international analysis centres, in cooperation with other appropriate bodies, to prepare and deliver the data products and services needed by the international science and operational programmes, Members of WMO, and Member states of IOC. Monitoring of the use of observations and derived products and suggesting changes to improve their quality. Coordination of the safety-related marine meteorological and associated oceanographic services as an integral part of the Global Maritime Distress and Safety System of the International Convention for the Safety of Life at Sea (SOLAS).

Provision of capacity building to Member States

Review and analysis of the needs of Member States of IOC and Members of WMO for education and training, and for technology transfer and implementation support in the areas of responsibility of the technical commission. Provision of the necessary technical publications, guidance material, and expert lecturers/trainers and operation of workshops as required to meet the needs. Development of projects to enhance Member States capacity to participate in and benefit from marine meteorological and oceanographic programmes of WMO and IOC.

Assistance in the documentation and management of the data in international systems

Development of cooperative arrangements with the data management bodies of IOC, ICSU, and WMO, such as IODE, the Commission for Climatology (CCl), and the ICSU World Data Centres to provide for comprehensive data sets (comprising both real-time and delayed mode data) with a high level of quality control, long term documentation and archival of the data, as required to meet the needs of secondary users of the data for future long term studies.

These responsibilities exclude those aspects specifically handled by other WMO constituent bodies or equivalent bodies of IOC.

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OOPC, Ocean Data Requirements and JCOMM

1. INTRODUCTION

Purpose of this document

This document is concerned with ocean data requirements and networks for climate and the role foreseen for JCOMM from the perspective of the GCOS/GOOS/WCRP Ocean Observations Panel for Climate (OOPC). The Action Plan (Document 12) represents the detail of these considerations, as we understand them now. The present document will discuss some of the background and recent developments and suggest how implementation may be carried out through a JCOMM.

The mission of the OOPC

From a phenomenological point of view, the OOPC was established with three principal interests: Seasonal-to-interannual prediction (ENSO), climate change and what we might term "climatologies".

The 1997/98 ENSO received unprecedented attention and provided wonderful opportunities to establish long-term support for the ENSO observing system. Through initiatives of the US (the Tropical Atmosphere-Ocean array, various ship-of-opportunity lines, surface drifters, etc.), Japan (TRITON, JMA XBT lines, etc.), Australia (operational ship-of-opportunity lines in the Indian Ocean and western Pacific) and others, we now have long-term commitment to this system, one of the initial goals of GCOS/GOOS.

The 4th meeting of the Conference of the Parties to the UN Framework Convention on Climate Change (COP IV) provided similar attention and opportunity for climate change. The carbon inventory was one aspect of this interest. If this attention can be turned into commitment, particular with respect to filling global gaps, we will have come a long way toward the observing system recommended by Ocean Observing System development Panel (OOSDP) in 1994.

The Panel is also concerned with the establishment of data sets adequate for determining the mean and annual cycle of the ocean, a fundamental requirement.

Since in part all of the above requirement cooperation and collaboration with the atmospheric community, the OOSDP goals included the determination of fields for and provision of data to the numerical weather prediction community.

Since the OOPC was established in 1995, its remit has broadened to include ocean assimilation and forecasting in general (e.g., the Global Ocean Data Assimilation Experiment, GODAE) and the ice-covered ocean. The former introduces a fourth dimension to OOPC's principal interests, namely short-range ocean prediction and the provision of boundary conditions to other fields in oceanography (e.g., coastal prediction).

The strategy

In terms of strategy, the OOPC has pursued several avenues.

(i) *Formal and Informal Implementation Mechanisms.* The establishment of a body whose dominant mission was implementation of ocean observations for climate was suggested by OOSDP, and pursued by OOPC. Through the energies of IOC/GOOS and the Ocean Affairs Division of WWW/WMO, we now have that body in the form of JCOMM. The JCOMM will herald in a new era in operational ocean observing.

Some elements are not well suited to this mode. For the time being at least, they probably require research facilities and close cooperation with the research community. A partnership of ocean institutions with such capability is emerging (the Partnership for Observations of the Global Ocean, *POGO*) and it is hoped that this partnership may work with JCOMM in areas where conventional mechanisms are not well suited.

(ii) *Demonstrations/Pilot Projects.* Remote sensing was always going to be a critical element of the ocean observing system for climate. But to take advantage of the possibilities, we needed a more integrated approach; vastly improved cooperation and integration of remote and direct data streams; and ocean models and data assimilation to exploit this information. The Global Ocean Data Assimilation Experiment was conceived as a necessary step towards achieving those aims. GODAE has attracted support from many agencies and has enjoyed encouragement and endorsement from all related intergovernmental bodies. Excellent progress has been made with respect to remote sensing, thanks in part to the Committee on Earth Observation Satellites (CEOS), and with the *Argo* initiative, we are about to see a small revolution in direct observation of the ocean.

Such projects are formally referred to as Pilot Projects in the parlance of GOOS and GCOS. Pilot Projects ***must*** have goals and outcomes that conform to GOOS (OOPC) objectives and integrally lead to a non-trivial contribution to the system. Their plans would include

- A set of objectives/goals
- A strategy
- An implementation plan
- A schedule
- Defined outcomes

Successful pilot projects would enable a certain improved/enhanced capacity, in this case for the JCOMM, and one would expect an orderly transition into the operational framework.

(iii) *Work and Renovation.* Specific, focussed projects have always been seen as an important mechanism for advancing implementation. In many cases it is simply a problem of getting the right individuals entrained into an aspect of the observing system, either to make it work as it should or to tune an existing system to work better. The OOPC/CLIVAR Sea Level Workshop provided valuable support to GLOSS in its efforts to implement and maintain the sea level network. The recent SST workshop was envisaged as a way of providing similar focus on problems related to the gathering, analysis and interpretation of SST data. The Time Series Workshop was perhaps less successful but the theme has now been taken up through a proposal for surface reference sites (with the Working Group on Numerical Experimentation) and a revised time-series/ocean observatories effort.

In the era of a JCOMM, this work and renovation should be regarded as actions on behalf of and for the objectives of JCOMM. The SST is a good example since it directly addressed issues identified in the (Interim) Action Plan. The study of the upper ocean thermal (and salinity) network similarly addresses a key aspect of the Action Plan.

2. OOPC AND THE JCOMM

The Action Plan (refer to Document 12) was recently revised to accommodate changes recommended by the OOPC and its companion Panels within GOOS and GCOS. The are are several substantial actions that are underway at present and these will be discussed in later sections. Here we will discuss matters arising related to the “System Analysis” of the Action Plan.

Scientific Oversight

The OOPC remains the prime body for providing scientific oversight to the JCOMM. The GCOS/WCRP Atmospheric Observations Panel for Climate and the GOOS Coastal Panel will also from time to time provide advice directly to the JCOMM. The Action Plan suggests there should be Working Groups aligned with the 3 streams of the system (sea level, surface fields and fluxes, and subsurface measurements). At this time only the Sea Level WG is close to being in place. A WG has been established for SST jointly with the AOPC, and the International GODAE Steering Team and Argo Science Team are in place for the pilot projects GODAE and Argo respectively. The final report of the SCOR/WCRP Air-Sea Flux Working Group is due this year and its immediate future remains uncertain. The TAO Implementation Panel continues to act as a body of scientific advice on matters related to TAO.

The GOOS Steering Committee did discuss the situation and has resolved to clarify the structural arrangements. In principle, each of these sub-groups should report through the OOPC if they are concerned with operational elements and the JCOMM.

Observing Network

Significant effort is being devoted to this area. The 1st International Conference on Ocean Observing Systems for Climate is intended, in part, to draw the different parts together into a system. It will join remote sensing and direct (*in situ*) observationalists together; it will build community consensus and support for the observing system. Its remit has been broadened beyond climate to specifically entrain all the interests of JCOMM, such as surface waves. It is developing a new paradigm for oceanography, with JCOMM as a central element. It is introducing a new era of cooperation between the operational community and research.

The SST Workshop and Working group, the upper ocean study, etc. are all tackling issues identified in the action plan. Some further detail is included in the sections below.

Data and information

Data and information management issues remain a primary concern. There has been some good news with a US initiative to build an ocean data server for GODAE at FNMOC and the SST and thermal studies are constructing more robust frameworks. A more general framework for GOOS remains elusive. JCOMM needs to consider very carefully what role it should play, particularly in the presence of CLIVAR.

Archives and standards

No real progress has been made in this area, at least from the perspective of OOPC.

Quality assurance

The projects/studies being initiated by OOPC and others seem the most effective route to progress in this area. The SST Workshop identified significant problems in this area in relation to products. The upper ocean thermal study is currently addressing this issue for the real-time and climate temperature data streams.

It is essential to build robust working relationships with the scientific community since it is this interaction which best assures climate quality of the highest standard. However these procedures can be costly and we need to better understand what level of quality assurance is appropriate for the rapid-delivery data stream. Satellite data pose particular problems in this regard.

There is also the issue of maintaining standards (calibration) among instruments, a problem that has been extremely painful for meteorology and the radiosonde network. We need to carefully consider the best way to “control” this potential problem. Diversity of manufacturers is generally good for cost but can be potentially damaging for climate.

Resources

The resource side is generally brighter now than it was 5 years ago. We have strong potential support for projects like Argo and we have key parts such as the ENSO observing system with sustained support. We have good prospects in terms of sustained support for key remote sensing instruments.

The COP IV outcome also opens up the prospect of more secure resources for climate observations. Many of the elements that appear in the Action Plan also appear in the Report on the Adequacy of Global Observing Systems that was prepared for COP IV. GCOS is taking the lead in preparations for COP V and beyond, including consideration of national reporting guidelines, intergovernmental mechanisms and funding. This may release new resources, particularly for developing countries.

The Conference will also be a key element in our drive to secure sustained support. It will address the issue of new resource management structures. *POGO* also offers a new opportunity to bring support to the observing system

Regulatory

This is an issue more for JCOMM and GOOS than OOPC. Good scientific oversight, however, is one element of the process required to sustain high quality data streams and products.

Technical support

This is mostly an issue for JCOMM consideration.

Administration

The GOOS Steering Committee did consider the existing arrangements and concluded that a more transparent and responsive structure was needed. There were many groups and regional entities working for, or in association with GOOS, and lines of responsibility and responsiveness were blurred. The creation of the JCOMM would greatly help administration on the implementation side since it would quite clearly define roles and responsibilities, but several anomalies remained and these would need to be examined. The administration of the ocean observing system (scientifically, technically, and in terms of resources and governance) must be efficient and effective and now was an excellent time to ensure that would be so.

GODAE and the OOPC also made specific suggestions with respect to pilot projects (see 1.3iii above). For profilers, for example, the implication is that the project should exercise its own discipline as standards and methods were developed with a view toward transitioning these to GOOS/GCOS (and JCOMM) oversight as the techniques became mature.

Capacity building

The OOPC itself is not directly involved in capacity building activities (a member of the OOPC will work with the GOOS Panel). Through programs such as GODAE and *Argo*, however, a great deal has been done to engage the capable nations in the name of GOOS. Both GODAE and the GOOS SC are considering mechanisms whereby developing nations can more actively participate.

The creation of the IOC Office in Perth has also provided further opportunities. The Report to COP IV identified both the Indian Ocean and the Southern Oceans as weaknesses in the observing system. Negotiations are already underway to engage this Office in the development of an enhanced observing capability for the Indian Ocean.

Affiliates

As outlined in Section 1, the UNFCCC and its Conference of the Parties, now represents are significant factor in the way the observing system is being developed. Operational oceanography is now also a more significant driver than before; the investment by the US Office of Naval Research in the GODAE data server is an excellent example of this maturing partnership. Several operational agencies, including the UKMO, JMA and BoM are now quite prominent.

The maturing partnership with CLIVAR is also quite significant. The Conference will, if things go according to plan, cement a new working relationship and herald in a new era with science as a significant user and, most importantly, a valued partner in the ever-continuing quest to improve and enhance the observing system. Document 13 explores this relationship on more detail.

The affiliation with space agencies through CEOS and its Integrated Global Observing Strategy is also now maturer. The oceans have been adopted as one of the key themes and work is underway to better define and prioritize the remote sensing requirements (see below).

Products

The SST Workshop revealed that one of the key products of the climate observing system, SST analyses, did not meet the high standards we desired. We should not be surprised if, as our user community matures and becomes more demanding, further shortcomings are revealed in our key products. The WG on Air-Sea Fluxes is due to report on surface flux products shortly.

The advent of GODAE and the more active participation of operational agencies is bound to increase the range of products generated under the banner of GOOS. One of the responsibilities that OOPC and JCOMM must share is that of guardian of quality and scientific credibility of products. The SST example cited above, and the work of sea level scientists in better refining changes, are two examples of proper care and diligence being displayed. Similar discipline should be displayed throughout the product range of GOOS, be it a product generated for ENSO prediction, short-range marine and ocean conditions, for commercial users, or for climate change assessments.

GODAE and the GOOS SC are also actively examining the delivery mechanism for products, especially to linked communities (e.g., coastal), and the metrics that need to be in place to evaluate the performance of the system.

Issues

The range of issues has not reduced. As solutions are being sought and implemented for some issues, new issues are arising because of the expanded interest and expanded user exploitation. The studies mentioned above and, in some case detailed below, are targeting some of the high priority scientific and technical issues. The sampling issues for surface variables have, if anything, become more acute as projects like GODAE and the coastal module of GOOS drive demand for high-resolution products.

The Conference is also being used as a way to resolve some issues. The acoustic tomography community, for example, are being invited, and challenged, to provide a persuasive case for it being included within the observing system. Initial indications are that they may well succeed, at least for regional deployments.

3. CURRENT STUDIES AND INITIATIVES

Upper ocean thermal study

The Sydney Implementation Workshop and its Action Plan identified several areas where

further work was needed. One of these concerned the ocean thermal observing networks and the practices used to assemble and process data. TOGA and WOCE were instrumental in implementing a ship-of-opportunity network based on the XBT and in developing (with IGOSS and IODE) complex data exchange and evaluation procedures. OOPC, in collaboration with the CLIVAR Upper Ocean Panel and the SOOP IP, and supported by the US NOAA Office of Global Programs and the Joint (CMR/BMRC) Australian Facility for Ocean Observing Systems (JAFOOS), are conducting a review of the network design (mainly the Ship-of-Opportunity network) and data and information management practices. Following the pattern of the Sea Level Workshop, a consultancy is being used to compile essential background information under the guidance of a scientific advisory committee.

The aims of this study are:

1) To compile a consolidated account of the existing upper ocean thermal database, using WOCE, Levitus and whatever other data bases that are available.
2) Produce consolidated "maps" of information level/content based on the dominant scales of climate signals.
3) Document the existing practices for assembling, quality control and distribution of upper ocean data, working from existing material of GTSPP, WOCE UOT/DPC and IGOSS SOOP.
4) Document to the extent possible the "value adding" of thermal data process chains, be they automated assimilation, quick-look/semi-automated quality control or higher-level scientific quality control and assembly.
5) Provide quantitative assessment of SOOP lines. This should include an assessment of relevance/impact against scientific objectives including seasonal-to-interannual prediction, environmental/ocean prediction, improved climatologies and climate change monitoring, scores against key attributes (continuity, quality, etc.), notes on extenuating circumstances, and the existence of proxies in the event of gaps/discontinuities in the lines. The broad-scale sampling should also be assessed as a precursor to *Argo* with a view to maintaining the temporal and spatial integrity of resolved signals such as the global ENSO wave, the Antarctic Circumpolar Wave, decadal variability, etc.
6) On the basis of 5, provide a renovated SOOP plan including broadcast and high-density strategies.
7) Produce a Report based on the above which will form the background for a Workshop to be convened in the 3rd quarter of 1999.

OOPC/AOPC Workshop on Global Sea Surface Temperature Data Sets

The seeds for this workshop (November 98) came from OOPC III and the 2nd meeting of the AOPC. OOPC was informed that systematic biases appeared near ice-covered regions in some analyses. The goal of the Workshop was to assess global and near-global sea surface temperature (SST) data sets and to recommend to the Panels criteria to be satisfied by SST analyses. To achieve this objective, the Workshop was asked to:

1) Summarize the characteristics of the observations used to produce analyses (gridded fields) of SST.
2) Assess differences among, and strengths and weaknesses of, the various SST analysis products extant.
3) Include both historical time series and current near-real-time analyses.
4) Establish specific criteria to be satisfied by SST analyses that can be certified as adequate for GCOS.

A draft report from that Workshop has been prepared. The conclusions included:

- Climate change is most stringent in terms of precision and accuracy (0.1°C);
- Differences in “global” SST can appear because of:
  - uncorrected satellite biases,
  - use of sea-ice “data”,

- data assembly;
- Still hampered by data gaps;
- Issues related to skin temperature; and
- Demand for high resolution (in space, time) is growing.

As a follow-up to this Workshop a group under the Chairmanship of R. Reynolds (NCEP, USA) is to be formed with the following (draft) terms-of-reference:

1) To record and evaluate the differences among historical and near-real-time analyses SST and SST/SI analyses
   a. Identify a standard data set for the intercomparisons of different products, e.g., COADS;
   b. Select several standard difference products as a minimum set (i.e., define regions and time periods; compute biases, standard deviations, and rms differences, etc.);
2) To identify the sources of difference in the analyses;
3) On the basis of comparison of those differences with the expected climate signals in the SST patterns, to recommend actions needed to ensure the quality and consistency of SST and SST/SI analyses;
4) To establish criteria to be satisfied by SST and SST/SI analyses to ensure the quality and consistency required by GCOS; and
5) To report annually to AOPC and OOPC on progress and recommendations.

Ocean Time-Series Stations/Observatories

The rationale for developing long-term TS stations and/or observatories has been discussed several times and was explored at the recent *POGO* meeting. The reasons include:

a) Surface reference sites for flux validation;
b) Subsurface / Upper ocean data for model development;
c) Deep ocean data for climate change; and
d) Other
   - Coastal
   - Biological
   - Deep Earth Observatories

Several approaches are being explored for implementation:

i) Surface reference sites
   - Build on existing (TAO, Met buoys, coastal buoys, etc.)
   - *Develop a project in cooperation with the CAS/WCRP WG on Numerical Experimentation.* The Working Group on Numerical Experimentation has agreed to collaborate on a project that would see several surface flux reference sites established and used routinely (and continuously) for the validation and development of numerical weather prediction models.

ii) Upper ocean
   - ENSO observing system
   - CLIVAR research
   - develop regional capacity
     - Brazil and PIRATA
     - Another mechanism for Japan, India, Oz, Indonesia, ... for Indian Ocean?

iii) *An OOPC (and CLIVAR UOP) working group*
   POGO devoted considerable time to exploring the possibility of supporting implementation of time-series stations/observatories. They requested OOPC to draft a plan for consideration at the 1st formal meeting of POGO (Dec 1-3 1999) to include:

- The N. Atlantic as an initial demonstration;
- A pilot project for GOOS (OOPC) consideration;
- A contribution to the sustained OS;
- Plan should consider rationale for global and/or selected sites, e.g. KERFIX, ...
- Need for other complementary components;
- Readiness of technology; cost;
- Standards, protocols and communications.

Remote Sensing

The OOPC works with the Global Observing Systems Space Panel (GOSSP) to define remote sensing requirements. The statement of user requirements is an important part of the interface to CEOS, relied upon by the agencies to define what is expected of them. It is thus very important that these statements be clear, accurate, and up to date. The OOPC has reviewed its requirements, in consultation with GODAE and GOSSP, and provided recommendations through the GOOS SC (see attached Table). The GOOS SC II endorsed the requirements as given and requested the keepers of the database to make changes to reflect this decision. All entries in the database should be attributable (sourced back) to GOOS and its Scientific Committee. It is the responsibility of the Panels and Projects to ensure that entries for particular applications are current and accurate.

GOSSP and the OOPC also asked the GOOS SC to support, as an initial draft, a set of priority measurements for GOOS and ocean climate:

(i) Surface topography/altimetry
- T/P-Jason-like precision altimetry
- High-resolution altimeter (e.g., ENVISAT)
- 3rd altimeter desirable

(ii) Sea surface irradiance (SST)
- Need improved methods for assembly, validation
- Trend toward higher resolution products (GODAE) and use of multiple platforms, including geostationary and microwave data

(iii) Surface wind vectors
- at least one scatterometer (or an equivalent) is essential
- Strong multi-application case emerging for a 2nd

(iv) Ocean colour
- Consensus that ocean colour is a priority measurement.

The OOPC has endorsed the suggested priorities but noted that the Conference would provide a more appropriate forum for endorsement. The OOPC has also noted the need for surface short-wave radiation products. An outline for a possible project had been discussed but, as yet, no decision had been made on a project.

4. OTHER IMPORTANT RELATIONSHIPS

The Report on the Adequacy of Global Observing Systems

Through 1998 a report was prepared by GCOS on the adequacy of global observing systems (for climate and climate change). This report was requested as a result of the WCRP Conference and Kyoto with a view to reporting to the 4th meeting of the Conference of the Parties to the UN FCCC in Beunos Aries. The OOPC, working partly from the basis provided by the (then draft) Action Plan, provided significant input to that Report, highlighting among other things the significant gaps in the global ocean observing network and the new opportunities provided for by the possible formation of a JCOMM.

For climate change, the challenge has been to obtain the attention and respect of those bodies

with key roles, such as the Intergovernmental Panel on Climate Change and the Conference of the Parties to the FCCC. The GCOS-led Report on the Adequacy of the Global Observing Systems was regarded by OOPC as a critical step in gaining this respect and the generally positive reaction to that report is we believe an important milestone. The OOPC is committed to doing whatever it can to provide substantial recommendations and input to the continuation of this process.

Under the leadership of GCOS, substantial progress has already been made in response to the recommendations of COP IV. A draft "National Reporting Guidelines" has been prepared to guide nations in the provision of information that would be used to assess the state of the global observing system. For JCOMM, it is important to note that key aspects of the observing system under its remit would be encompassed by such reports. As noted earlier, work is also underway to define possible intergovernmental mechanisms to support implementation of a climate observing system (again, the existence of a JCOMM is an important factor) and to see how funding mechanisms may be exercised in support of the global observing system.

The Partnership for Observations of the Global Ocean

Three of the major oceanographic institutions, Woods Hole Oceanographic Institution, Scripps Institution of Oceanography, and the Southampton Oceanographic Centre convened an exploratory meeting at IOC to examine the options for a more formal, long-term partnership. One of the main motivations was to provide a coherent input to the emerging requirements for sustained, global ocean observations from GOOS and CLIVAR. They were joined by JAMSTEC (Japan), CSIRO Marine Research and IFREMER (France) at this meeting. In all cases, the organisations were represented at the level of Director.

The participants expressed a strong interest in the plans of OOPC (GOOS/GCOS) and GODAE and a desire to assist in the implementation of these plans, if needed. POGO noted the emergence of a strong, focussed intergovernmental mechanism in the form of JCOMM. The meeting agreed there were several areas where a partnership of oceanographic institutions could be effective, working with JCOMM, including surface reference sites, oceanographic observatories (time-series moorings) and hydrographic and trans-ocean sections.

Consensus emerged very quickly at the meeting on the desirability of forming a partnership. It seems likely the partnership will initially focus on institutions with deep-sea going capabilities. This is perhaps too restrictive for the long-term, particularly if they wish to take system integration and modelling seriously, but perhaps it is appropriate for now. The participants gave GODAE and *Argo* high priority.

The participants requested OOPC to draft a Plan for ocean observatories/time-series stations, with the initial focus on the North Atlantic (see 3.3). There was also an excellent discussion on outreach and capacity building, another possible area for collaboration with JCOMM.

The first formal meeting of PGO is scheduled for Scripps, 1-3 December 1999. A Mission statement and Charter have been prepared.

The 1st International Conference on Ocean Observing System for Climate

As a community, we are enjoying respect and support at an unprecedented level after over a decade of working with the ocean observing system for climate. Yet for all the progress that has been made, it is difficult to state with conviction the preferred blend of observations needed for the observing system. The success of *Argo* as a proposal has in fact raised considerable concern within the ocean climate community because there seemed to be a real possibility that this success would be at the expense of other elements. It also highlighted the fact that, despite the best efforts of the OOSDP and OOPC, there still was not an agreed, detailed implementation plan setting out the preferred mix of methods and platforms. The research program CLIVAR faced a similar dilemma [it is worth noting that the CLIVAR Implementation Plan relies to a very large extent on the plans of GCOS/GOOS and the

JCOMM Action Plan].

For these reasons it was decided that a meeting of all the interested parties (scientists, technicians, etc.) was now vital. The 1st International Conference for Ocean Observing System for Climate (Saint Raphael, 18-22 October) is being convened under the joint auspices of the OOPC and CLIVAR's Upper Ocean Panel. The objectives of the Conference are quite bold. A series of papers are being solicited to document different aspects of the observing system (note that the remit has been broadened to include all physical measurements of the ocean). This approach is not unlike that developed by the IPCC for its Assessment Reports. The challenge that will be given to the Convening Authors is to provide a convincing case for their particular view/approach, complete with consideration of needed investment. All papers will be reviewed widely prior to the Conference, by both advocates (to ensure accurate scientific and technical detail) and non-advocates (to ensure a balanced perspective). With this process we hope to draw consensus on the value of the approach, its role within the ocean observing system for climate, and identify key issues that need further debate and/or work.

"Consensus drawing" is the dominant theme of the Conference. It is the hope of the joint convenors that this Conference will agree on the exact blend of methods/techniques that are needed for the (operational) observing system of GOOS/GCOS and the sustained observing system of CLIVAR. The conference organizers also will seek endorsement of a new paradigm for ocean data distribution whereby ALL data are made available without delay or intervention, and that all data are widely available for use. A Conference statement will be produced detailing those aspects for which agreement was reached and detailing those issues for which further study/planning was required.

The aims of the Conference are, not unexpectedly, closely aligned with the needs of JCOMM. Many of the issues raised in the Action Plan are to be addressed in the Conference papers. As a result, JCOMM will have a much clearer picture of what is supported as an initial observing system and of those enhancements that are given initial priority. The Conference will cement linkages for JCOMM into research and, in turn, showcase long-term dependencies from science on the JCOMM.

Research Programmes and GODAE

Introduction

1. The Joint Technical Commission for Oceanography and Marine Meteorology (JCOMM) was proposed as a mechanism for implementing and maintaining observing system elements relevant to the climate module of GOOS (and ocean component of GCOS) and the marine meteorology program of WMO. Most physical oceanographic measurements have been included using the argument that all such measurements are relevant to climate. In practice, no firm outer bound has been placed on JCOMM in order to allow some flexibility for the Commission.There are also several research programs and pilot projects that will contribute to, and benefit from, the JCOMM. This document provides a brief overview of those connections and their relevance.

The WCRP research program CLIVAR

2. The Climate Variability and Predictability Programme of the WCRP is the research counterpart of the physical aspects of GCOS ocean and atmosphere. It encompasses intraseasonal (e.g., monsoon), seasonal-to-interannual and decadal-to-centennial climate variations and climate change. The Tropical Oceans-Global Atmosphere experiment (TOGA) and World Ocean Circulation Experiment (WOCE) provide much of the scientific foundation for CLIVAR, just as they do for the design of the ocean climate observing system of GCOS/GOOS.

3. Figure 1 shows schematically the relationship between the “operational” components of the observing system of interest to JCOMM and the sustained and process study measurements of CLIVAR. The research observations are implemented in the presence of a basic/operational network. The over-riding imperative for CLIVAR is the quest for understanding and knowledge of the climate system, as described by the CLIVAR science plan. The observations of GCOS/GOOS are also undertaken scientifically and according to best practice but they exist for long-term applications, not just science. It can be expected that some elements needed by CLIVAR will be managed and implemented within the framework of JCOMM. Yet other elements will need expert, research facility capabilities. Some parts of the sustained observing system for CLIVAR may progress to operational support over time.

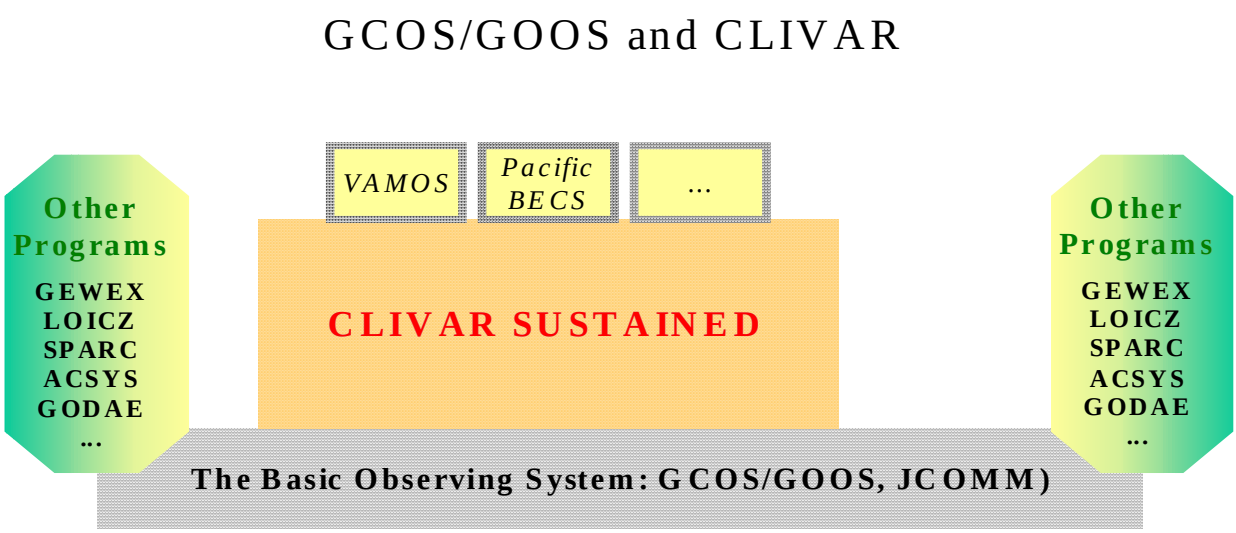

Figure 1. Schematic of the relationship between the (operational) ocean observing system for climate of GCOS/GOOS and the research program CLIVAR and other research programs and pilot projects. The CLIVAR sustained observing in turn provides a foundation for short life-time process studies, for example, within the Variability of the American Monsoon System (VAMOS) experiment.

Joint Projects

4. Over the last several years, the OOPC has worked hard with CLIVAR and its Upper Ocean Panel in order to establish an observing system that would jointly satisfy both research and operational needs (see Figure 2). This collaboration is vital for GCOS/GOOS since it provides access to scientific guidance and advice as the observing system develops and evolves.

5. The International Sea Level Workshop (GOOS Publication No. 55) was the first example of such cooperation. Both groups believed it was an effective strategy. Argo, the global array of profiling floats, was also developed as a joint pilot project. The first International Conference on Ocean Observing Systems for Climate (OCEANOBS99) was conceived to draw the oceanographic community into this new way of working.

6. The Upper Ocean Thermal Review and Workshop will be the next instance of collaboration, with the OOPC and SOOP IP providing the lead. For the time-series stations, where POGO might be needed for implementation, the lead will probably start with CLIVAR since it is mainly research imperatives and objectives that are setting the agenda.

The overall structure

7. Figure 3 is adapted from the structural diagram for JCOMM. CLIVAR is a Programme of the World Climate Research Programme that is in turn one of the sponsors of OOPC. GODAE and Argo are two pilot projects that are seen to be directly working toward the development of an operational ocean observing system for oceanography and climate.

8. The OOPC must take the lead role for scientific advice to JCOMM, but it also has a responsibility to ensure that scientific and technical advance in CLIVAR is used to improve the systems of JCOMM. The capacity-building projects like GODAE and Argo are an alternative way of enhancing the capabilities of JCOMM in collaboration with research.

Additional research requirements

9. The development of the CLIVAR Implementation Plan followed the development of the requirements for the Action Plan (for JCOMM) by the OOPC. These requirements were initially drafted for the Sydney Workshop based on the OOSDP Report (1995) and subsequent developments by OOPC. The Upper Ocean Panel of CLIVAR which, at that time, was mainly focussed on ENSO issues and the ENSO observing system, also made an early decision to use the OOSDP report as the basis for development of its plan.

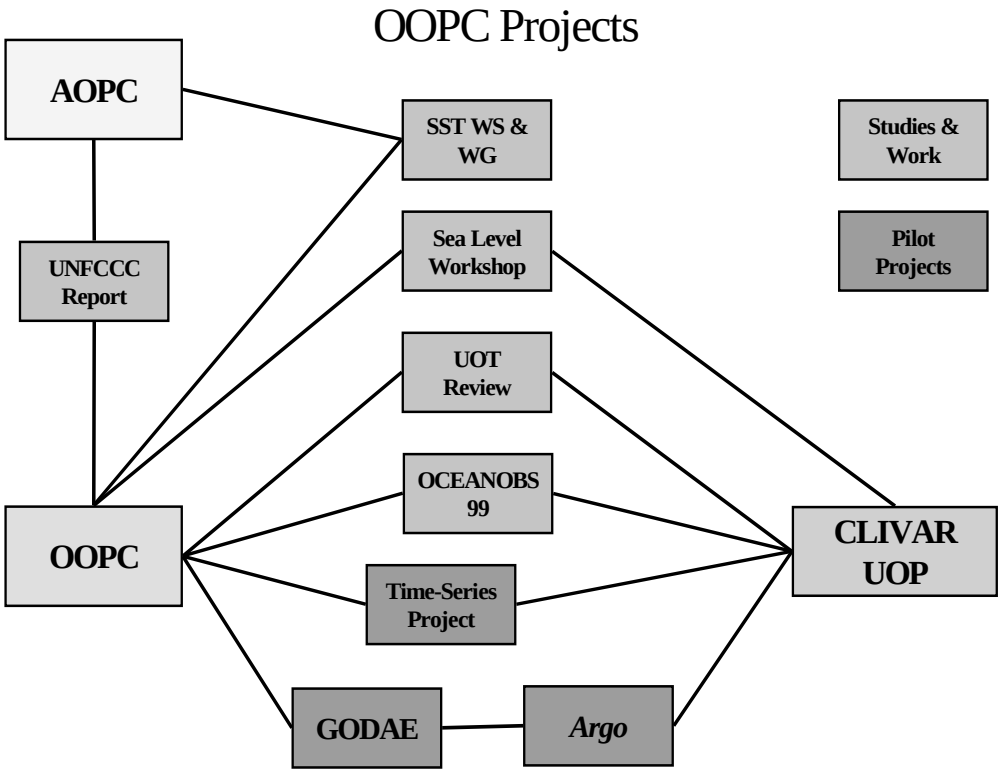

Figure 2. **Schematic showing projects of the OOPC and their relationship to CLIVAR and its Upper Ocean Panel**

10. It made sense then to use the Action Plan, with enhancements as appropriate to the research objectives of CLIVAR, as the basis for the CLIVAR Implementation Plan. This process was aided by the fact that much of the work writing the CLIVAR Plan was done by people familiar with the JCOMM process. At this same time the plans for Argo were emerging from GODAE and the CLIVAR UOP.

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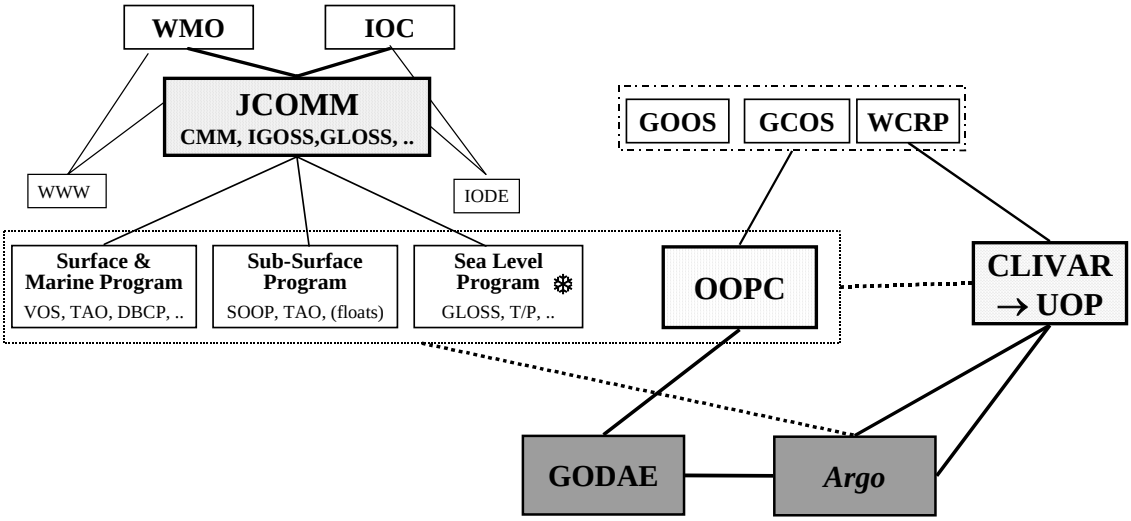


Figure3. Structural diagram showing the functional relationship between JCOMM and its Programs, the OOPC and its parent groups, GCOS, GOOS and WCRP, and the research program CLIVAR. Argo is an example of a shared pilot project.

11. The CLIVAR IP goes beyond the Action Plan in several areas. First, the emergence of Argo provided a means to sample subsurface salinity, a key variable for longer period climate studies and other research within CLIVAR. The Action Plan noted the possibility of using profiling floats but properly treated it as a pilot project rather than as an existing capability. The CLIVAR IP also discusses the need for hydrographic data in more detail (inventories and transport) and the role of time-series stations. One might expect that aspects of each of these sustained programs/projects would in time transition to some sort of operational footing. The case for operational support of some of the high-density XBT lines is also strengthening though, in this case, the above-mentioned study on the upper ocean thermal network may directly recommend support within GCOS/GOOS.

12. There are several differences between the scientific remit of OOPC and its research counterpart, the CLIVAR Upper Ocean Panel (note that CLIVAR has informally agreed that the latter panel should consider all observations relevant to the global sustained ocean observing system). First, the OOPC, like its predecessor the OOSDP, has a charge to consider biogeochemical observations and, in particular, strategies for monitoring the oceanic carbon budget. It is likely such measurements will become more common on platforms within the remit of the JCOMM. The Joint Global Ocean Flux Study (JGOFS) and the SCOR/IOC Panel for CO_2 are the groups most relevant in terms of scientific research. Second, OOPC has been asked to consider the ice-covered ocean that, within WCRP, is the interest of the Arctic Climate System Study (ACSYS). OOPC has opened up a dialogue with ACSYS with a view to strengthening this aspect. Finally, through GODAE and decisions of the GOOS

13. Scientific Committee (in its former guise as J-GOOS), OOPC has been taking a more active interest in ocean estimation (independent of its relevance to climate) and, in particular, ocean forecasts. WOCE is the relevant scientific group for ocean estimation though its interests are limited. For other aspects, there is no research program counterpart, which raises difficulties for both the OOPC and GODAE.

14. We are entering a new era for management of resources for sustained ocean observations, both in the in situ domain and for remote sensing. JCOMM will need to adapt to and learn to benefit from this new mode of business. Pilot projects are one way to engineer an orderly transition from research to operational, long-term (sustained) support. But this will not be the only mode and JCOMM will have to exercise both discipline and vision in dealing with a research community whose attention is more often on the exciting, leading edge and less often on the proven, robust long-term elements.

The Global Ocean Data Assimilation Experiment

15. Remote sensing was always going to be a critical element of the ocean observing system for climate. But to take advantage of the possibilities, we needed a more integrated approach with respect to remote sensing; vastly improved cooperation and integration of remote and direct data streams; and ocean models and data assimilation to exploit this information. The Global Ocean Data Assimilation Experiment (GODAE) was conceived as a necessary step towards achieving those aims. Excellent progress has been made with respect to defining remote sensing requirements, thanks in part to CEOS and GOSSP (see Document 10), and with the Argo initiative, we are about to see a small revolution in direct observation of the ocean (Section 5). The schedule for GODAE is however quite daunting and it faces major challenges to attract the intellectual involvement and modelling/data assimilation expertise and investment that will be necessary to make it work.

16. GODAE has devoted considerable time to the definition and goals of GODAE. The experience of the Global Atmospheric Research Programme and its FGGE were used extensively for this discussion. The revised are:

(i) The application of state-of-the art ocean models and assimilation methods for short-range open-ocean forecasts, for boundary conditions to extend predictability of coastal and regional subsystems, and for initial conditions of climate forecast models.

(ii) To provide global ocean analyses and re-analyses for developing improved understanding of the oceans, improved assessments of the predictability of ocean systems, and as a basis for improving the design and effectiveness of the global ocean observing system.

17. Existing SST products are limited for the purposes of GODAE. Present products are generally of modest resolution (typically greater than 100 km for global products) and do not capture higher-frequency details. GODAE resolved to develop a specific project related to high-resolution SST products. It was assumed that the AOPC/OOPC SST WG would be brought into existence to focus on climate aspects and that, as far as is practical, any global high-resolution product would reduce to the "best" global climate product when averaged over the appropriate space and time scales. The GODAE project will push as far in temporal and spatial resolution as is deemed practical. We want it to be useful for coastal and regional/mesoscale applications but it may not be practical to push down to the km scale globally. High resolution will probably mean at least 10 km and at least daily (not just produced daily), and perhaps some attempt to resolve the diurnal cycle. This product will be made available as a first guess for very-high resolution (~ 1 km coastal products).

18. There was also considerable debate at the most recent GODAE meeting concerning Pilot Projects. To realize the goals and ambitions of GODAE, Pilot Projects must have goals and outcomes that conform with GODAE objectives and integrally lead to the better conduct and/or execution of the primary global experiment. A Project will normally have

- A set of objectives/goals
- A strategy
- An implementation plan

- A schedule
- Defined outcomes

19. A GODAE Pilot Project develops capacity by engaging a section of the community in an activity that contributes in a non-trivial way to GODAE. It swells and enriches the GODAE Common. Argo is an example of a GODAE Pilot Project. The Pilots will normally embrace a particular sector of GODAE, be that the development of a specific observational capability or regional prototype of GODAE itself.

20. An alternative, and complementary approach, is to set in motion actions (tasks, work) that focus on the commonalities across dispersed activities. These might be called cross-cutting initiatives and are usually undertaken through working groups.
Three areas were identified as high-priority in terms of developing infrastructure.

- Data and information management/flow practices
- Linkages into the community beyond GODAE
- Developing metrics for assessing progress

21. A boost for the first of these activities has been provided by the announcement of support for a GODAE data server at the Fleet Numerical Meteorological and Oceanographic Center. This server will provide international access to most of the critical data sets and products and boundary conditions needed for operational oceanography. For the regional activities, GODAE concluded it was best to form a Working Group that would examine the generic issues, with an initial focus on the North Atlantic. The initial work program would focus on intercomparison exercises for models and data assimilation. The WG would look at skill evaluation, develop GODAE-generic impact studies and look at activities that linked with the non-GODAE community.

22. An initial draft of the GODAE Strategic Plan has been prepared. Like many other activities in 1999, the OCEANOBS99 Conference is seen as the most appropriate target for this Plan.

Argo, global the array of profiling floats

23. In the first half of 1998 both GODAE and CLIVAR passed resolutions supporting the idea of a global array of profiling floats, about 2-3000 in all, measuring T and S to 2000 m every 10 days. This initiative is now known as Argo. A Workshop was convened to examine the feasibility of this idea (in conjunction with the 2nd meeting of the International GODAE Steering Team). The Workshop concluded that Argo was most definitely worth doing and feasible. Initial estimates suggested the per-profile cost (of T and S to 2000m) could be as low as US$100. Certain technical challenges were identified but none of these were deemed insurmountable.

24. An Argo Science Team was formed with a target date of October 1 for the first draft of an implementation plan drawing on the Prospectus and the initial proposals. This draft was circulated for non-advocate review in October and drew around 30 responses. None questioned the need for Argo or the technical feasibility. The majority of the comments targeted the scientific and operational rationale, deployment, sampling strategies, and the need for integration within the global observing system. The GODAE Office published the Initial Plan in early November 1998 and distributed it to delegates at the CLIVAR Conference in the 1st week of December.

25. In parallel with the scientific development, a major campaign was initiated to encourage international participation, led by NOAA. This has clearly been very successful and GODAE (and GOOS and JCOMM) should be extremely grateful for the energy that has been expended by this group on our behalf.

26. The 1st meeting of the Argo Science Team was held in Easton prior to the third meeting of GODAE. Estimated national contributions are [1:]

Australia	30-50 floats per year
Canada	35
EU	50
France	50
Germany	?
Japan	
- design study	70
- frontiers, etc	?
UK	50
US	300

27. Conclusion: it is realistic to expect 600 deployments per year by around 2001. The main obstacle to global distribution is the Southern Ocean. The basin-by-basin requirements are (in units of total operating floats)

Indian	440
Pacific	1303
Atlantic	629
Southern Ocean	970

28. Achieving global distribution remains a top priority for Argo. There had been significant discussion on technical issues:

Salinity	Presently have demonstrated capability of around 2 years. New CTD sensors are being developed which promise more accuracy, better quality and greater lifetimes. Seeking a demonstration of 4 year lifetimes (due 2003!)
Communications	Argos, Orbcomm and Iridium are the leading candidates. Argo needs increased bandwidth cf the present and 2-way communications to minimise surface time (alleviating energy drain and fouling)
Power	General good news. Improved power efficiency should enable > 200 cycles and permit deep profiles without impacting longevity
Deployment	VOS and air are the leading candidates. The ability of VOS to achieve even global coverage is its main limitation. Air deployment is potentially cost-effective. Access to hours on a suitable aircraft is the key element for air deployment; there is no reason to suspect at the moment that air deployment will more troublesome (in terms of instrument damage and failure) than VOS.
Parking depth	Remains unresolved with arguments for both thermocline and deep.
Profile depth	Deep 2000m preferred (and doable independent of parking depth).
Cycle time	Around 10 days

There was also significant discussion also data flow issues (Figure 4).

29. There is unanimous agreement that ALL data will be distributed in real-time. The data

1 These are not national 'commitments' and should not be interpreted as final target numbers. They are seen as what is practical in the next few years.

acquisition/assembly centres are likely to be modelled on the WOCE Upper Ocean Thermal Data Assembly Centres. The Argo ST noted that retaining the interest and enthusiasm of the present float community may depend on attention to the openness of the total data and information system (e.g., the GODAE Common). While in principle this is so (e.g. models, products should be as freely exchanged as data), in practice it may need some explicit demonstrations that this will be the case. The data originators, assemblers, processors (modellers, assimilators) and service originators should all be equal in terms of identity with GODAE output. There must be explicit feedback and interactions amongst this constituency. This might also be a consideration for GOOS.

30. The Argo ST is now concentrating on the development of an implementation plan. OCEANOBS99 is as a key target in this process. Various initiatives are being taken to address the globalization issue. The issue of floats entering EEZ's and the potential for violation of Ocean Dumping Conventions are significant concerns.

31. In summary, Argo is at or ahead of the schedule that was established 12 months ago. Indeed, the international interest, derived from interests ranging from climate change to operational ocean forecasting, is impressively strong and suggests that we can confidently plan toward the initial targets. The climate change applications perhaps need to be exploited (explained) somewhat better than perhaps we are at present.

32. For JCOMM, it is important to remember that Argo remains a Pilot Project; it has many issues that must be resolved before we can claim it is a stable, robust method worthy of long-term support. Insofar as the OOPC is concerned, questions remain about the "optimum" sampling and the ability of Argo to cover the global ocean. Nevertheless, Argo data will be available in real-time and will impact on other elements of JCOMM in a non-trivial way. The OOPC/CLIVAR/SOOP thermal network study is a first attempt to assay what that impact might be. Argo also has many things in common with the early days of TAO; it is critically dependent on improved communications and it is delivering a data stream that is for most intents and purposes novel. We have little experience in dealing with such detailed, deep randomly distributed temperature data, and for salinity there are many outstanding technical and scientific issues. The decision to exchange all data in real-time is a bold initiative to entrain a larger community in the study of the data and development of Argo. JCOMM would be wise to consider and plan for the impact of Argo. However it would also be wise to let Argo develop and mature at its own pace and avoid unnecessary interventions and interference, no matter how well intentioned they might. Let Argo come to JCOMM, do not try and "capture" it.

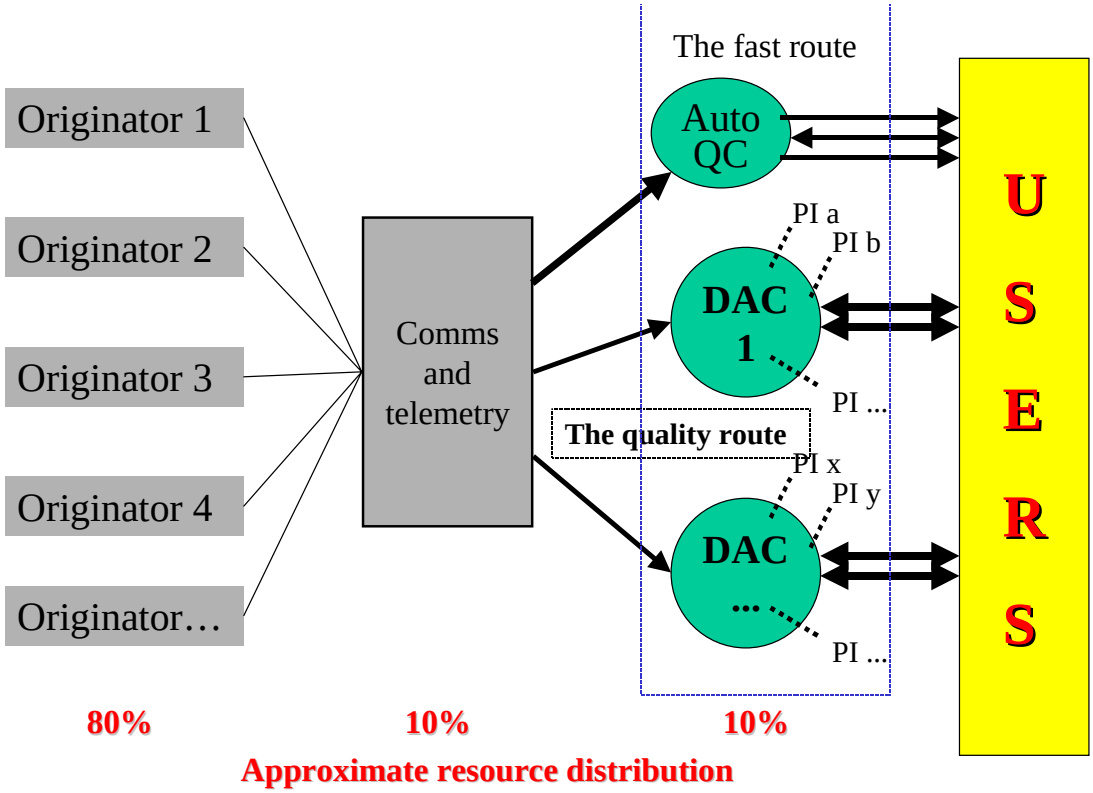
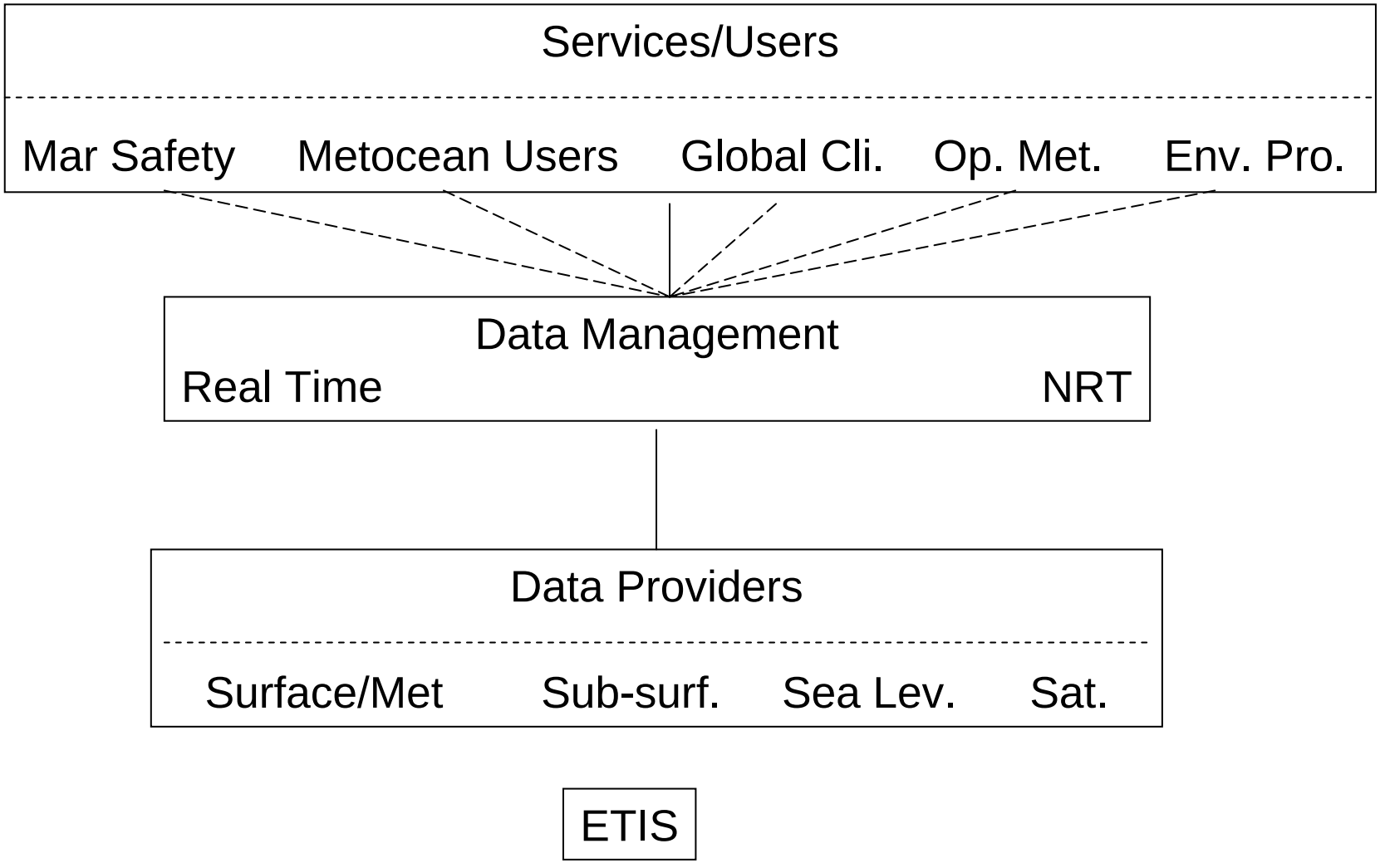


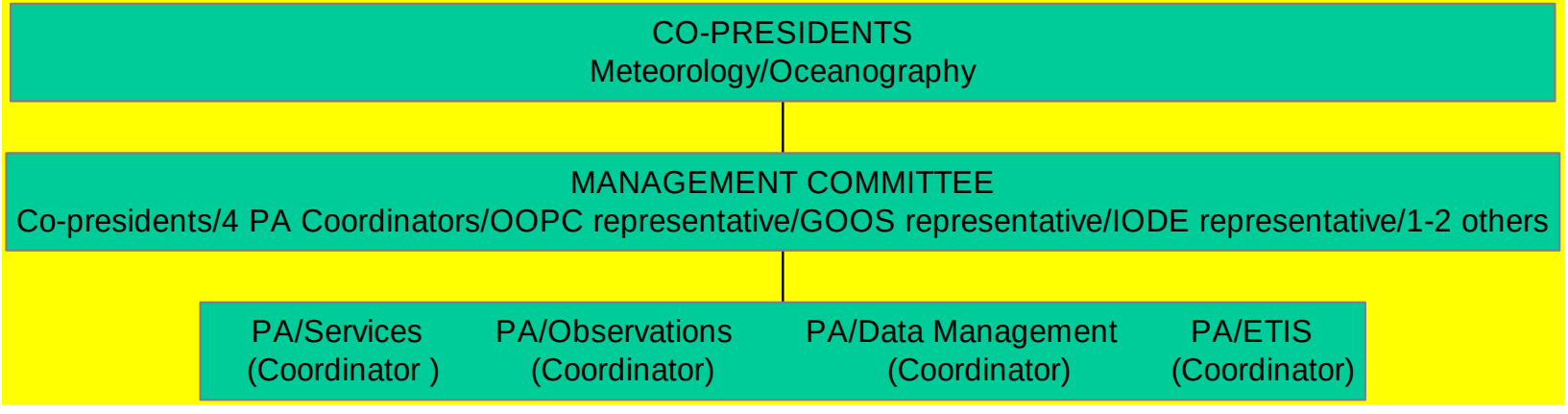
Figure 4. Schematic of the data flow for Argo, from several originators (collectors/operators) through some advanced communications system, and ultimately to the user community (scientists and operational centres and others). Two paths will be supported: one a fast, automated route, the other with more considered quality control and processing procedures. *Argo* estimates that around 10% of the total resources should be devoted to this latter component.

JCOMM Ideal


Services/Users
Mar Safety
Metocean Users
Global Cli.
Op. Met.
Env. Pro.
Data Management
Real Time
NRT
Data Providers
Surface/Met
Sub-surf.
Sea Lev.
Sat.
ETIS

Annex VII

JCOMM



EXISTING BODIES AND PROGRAMME AREAS

	Observations	Services	Data Management	ETIS
ASAP	x		x	
DBCP	x		x	x
GLOSS	x	x	x	x
GTSPP		x	x	
Marine Climate		x	x	x
Maritime Safety		x		
MPERSS		x		x
Regional	x	x	x	x
Sea-ice/Polar	x	x	x	
SOOPIP	x	x	x	
TIP	x	x	x	x
Training				x
VOS	x		x	x
Waves		x		x

DRAFT PROVISIONAL AGENDA

1. OPENING OF THE SESSION

2. ORGANIZATION OF THE SESSION

   2.1 Consideration of the report on credentials
   2.2 Adoption of the agenda
   2.3 Establishment of committees
   2.4 Other organizational matters

3. REPORT BY THE CO-PRESIDENTS OF THE COMMISSION

4. REPORTS BY THE CHAIRMEN OF WORKING GROUPS AND REPORTING BODIES

5. SCIENTIFIC INPUT

6. MARINE METEOROLOGICAL AND OCEANOGRAPHIC SERVICES

7. DATA MANAGEMENT

8. OBSERVING SYSTEMS

9. REVIEW OF TECHNICAL REGULATIONS OF INTEREST TO THE COMMISSION

10. GUIDES AND OTHER TECHNICAL PUBLICATIONS

11. EDUCATION AND TRAINING, TECHNOLOGY TRANSFER AND IMPLEMENTATION SUPPORT

    11.1 Specialized education and training
    11.2 Technology transfer and implementation support
    11.3 Regional development

12. RELATIONSHIP WITH OTHER PROGRAMMES OF WMO AND IOC

    12.1 GOOS
    12.2 GCOS
    12.3 CBS, CCl, CIMO
    12.4 IODE
    12.5 WCRP

13. RELATIONSHIP WITH OTHER ORGANIZATIONS AND BODIES

    13.1 UN System Agencies (ICSPRO, ACC/SCOCA)
    13.2 UNCED follow-up, CSD
    13.3 FCCC
    13.4 Non-UN System organizations
    13.5 Industry and commerce

14. LONG-TERM PLANNING

15. SCIENTIFIC LECTURES

16. ESTABLISHMENT OF WORKING GROUPS AND NOMINATION OF RAPPORTEURS

17. INTERSESSIONAL WORK PROGRAMME

18. REVIEW OF PREVIOUS RESOLUTIONS AND RECOMMENDATIONS OF CMM AND IGOSS AND OF RELEVANT RESOLUTIONS OF THE EXECUTIVE COUNCILS OF WMO AND IOC

19. ELECTION OF OFFICERS

20. DATE AND PLACE OF THE SECOND SESSION

21. CLOSURE OF THE SESSION

OUTLINE INTEGRATED WORK PLAN

SERVICES

Highest Priority

- RSMCs: MPERSS, waves and storm surges, others
- Guides: marine meteorology, marine climatology, GLOSS, waves, sea ice
- JCOMM/GOOS Services and Products Bulletin

Others

- Adapt marine and ocean model output to meet needs
- Long-term planning
- Testing user response to services
- GMDSS – SafetyNET and NAVTEX: extend coordination of NAVTEX services
- Outreach: web services, publications, directories
- Manuals, regulations
- MPERSS evaluation and verification
- Wave model verification
- Sea ice products; links to ACSYS for climate
- Consolidated suites of products and services

DATA AND INFORMATION MANAGEMENT

Highest priority

- Telemetry: Inmarsat-C, Argos, bandwidth questions (**lead role to DBCP**)
- Data assembly: GTSPP (specialists, automated, delayed consolidation, off-line), GLOSS (real time) (**lead role to GTSPP**)
- Climatologies: sub-surface, GDSIDB, waves, VOS
- Codes and formats: and issue for all (**lead role to SOOPIP**)

Others

- Long term plans

- Standards, QC, agreed procedures: constant review, specialized, automated (fast, slow, very slow) (**all involved**)
- Metadata: digital images of platforms, general, information on systems (**lead role VOS group**)
- RNODCs, SOCs, SACs, DACs, YACs, etc (**lead role IODE**)
- Web technologies
- Data exchange: GTS, internet, etc

OBSERVATIONS

Highest priority

- User requirements: science based (already in **Action Plan**)
- Technical issues: manuals (c.f. GLOSS), VOS and SST, PMOs (SOOP and VOS), telemetry
- Cost-effectiveness (technology and science)

Others

- Long term plans
- Coordinated systems (c.f. COSNA), VOS, etc, avoid multiple looks at scientific requirements
- Remote sensing: satellite (pass to CBS and GOSSP), ROSE
- Evaluation
- Science linkages: OOPC (primary), waves WG, WGNE, C-GOOS

ETIS/TEMA

Highest priority

- Workshops/seminars: explaining services/use of/need for
- Software exchange; technology sharing
- Training -GLOSS
  -Marine start integration
  -PMOs
- Web/outreach

Others

- Manuals and guides
- Other training of “volunteers”
- Electronics Products Bulletin
- Regional interface -WMO
  -IOC
  -GOOS
  -action groups of DBCP
- Publications
- Long-term plan, priorities
- Information on methods, technology, new automation

Notes

1. Give priority to broadly-based activities
2. Convenors encouraged to consider broader remits: e.g. waves + surge + coastal, SOOP + VOS
3. Outreach take broader framework

JCOMM ORGANIZATIONAL

Highest priority

- Coordination of programme areas
- Transition to JCOMM
- Structure

Others

- Policy and regulatory
- External: Agenda 21, UNFCCC, etc.
- Connections to CBS, IODE and wider WMO/IOC
- Meetings, etc.
- Regional links
- Integration of manuals, guides, etc.
- Linking operations, science and bureaucracy