Intergovernmental Oceanographic Commission

Annual report 2001

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8

Annual Report 2001

UNESCO

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Looking to Johannesburg ...and beyond

This report on the activities of the IOC in 2001 is published a few weeks before the World Summit on Sustainable Development (WSSD) in Johannesburg, South Africa. The Summit will be convened by the UN General Assembly to assess progress in the implementation of Agenda 21, ten years after its adoption in Rio de Janeiro in June 1992. But more important than establishing a scorecard of achievements in sustainable development, is the appeal to be made to countries around the world to define a concrete, focused agenda for the future implementation of Agenda 21. The outcome of Johannesburg must be a call for action, a list of concrete commitments that, in the area of sustainable development, will complement the International Development Goals from the UN Millenium Declaration.

IOC held an extraordinary session of its Executive Council in December 2001, to complete the IOC contributions to WSSD. The *Declaration of IOC*, adopted at that session, is important in two aspects. Firstly, it was transmitted to the Secretariat of the Summit as one of the official contributions of the UN Specialized Agencies to the process, with the purpose of informing the discussions leading up to Johannesburg. Secondly, in subscribing to the Declaration to the WSSD, the IOC Member States have agreed to a series of strategic, long-term commitments that we, as representatives of our Member States, shall strive to achieve during the next ten years. It is useful to recall here those commitments.

'*The Intergovernmental Oceanographic Commission affirms its will to*:

- *act as a focal point to encourage interactions in marine science and observations across relevant bodies of the UN System and other organizations;*
- *further develop partnerships in capacity building in marine science and services at regional and national levels, particularly with developing countries and taking also into account the African Process;*
- *develop GOOS as an operational system;*
- *promote the development and implementation of programmes on Integrated Coastal Area Management;*
- *participate fully in the necessary assessment of the global ocean environment, and periodic reporting on the state of the oceans;*
- *promote the use of scientific knowledge for management decisions and policy making and facilitate access to this knowledge;*
- *work to increase public awareness of the importance of the oceans and coasts for sustainable development and the future of humanity.'*

I take this to be a 'binding' commitment on our part. It shall be our responsibility to find the means to implement these goals. IOC has been fully engaged in promoting the Oceans and Coasts agenda in the process leading to Johannesburg, joining in this effort a wide coalition of IGOs, NGOs and other partners. IOC must play an equally important role coming out of Johannesburg.

Several related issues were discussed during our 35th Executive Council in June this year. The Informal Consultative Process on Ocean Affairs of the UN General Assembly (ICP)

was one of them. At each of its annual sessions, the General Assembly adopts an 'Ocean and Law of the Sea' resolution. The ICP was established experimentally for three years to assist the Assembly in its analysis of ocean-related issues. This is the last year of the experimental phase of the ICP and the General Assembly must decide what it wants to do with the process: to eliminate it, continue it for another three years, or give it a new mandate and structure.

Two observations regarding the ICP can be made. Firstly, the creation of the ICP reflects a real and difficult situation with respect to the coordination of ocean issues in the UN System. It requires the active participation of all the Divisions and Specialized agencies of the UN System. Secondly, the ICP, as a higher-level forum totally devoted to ocean affairs, represents a great opportunity to seek and obtain the high-level political support for an Oceans Agenda. Through ICP, the IOC has gained a greater recognition and we are registering increased attention to – and support for – our goals and activities. We work closely with a long list of partners: UNEP, IAEA, WMO, IMO, FAO, and, outside the UN System, the ICSU family.

Coordination on ocean issues in the UN is becoming an issue in its own merit – in part due to the disappearance, at the end of 2001, the Sub-committee on Oceans and Coastal Areas (ACC-SOCA). Many Member States would like to see a more gradual approach, where significant progress on ocean coordination can be attached to concrete measures and goals. In this context, IOC assigned great importance to the follow-up of the proposal, contained in UNEP's Decision 21/13, to develop a Global Assessment of the Ocean. Here again, IOC has been contributing significantly to the development of this initiative, and many of our partner organizations expect the IOC to play a leading role in coordinating that global assessment.

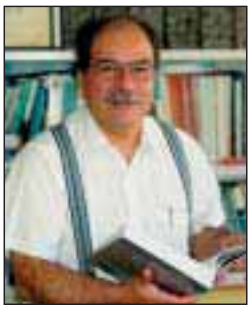
In December 2001, on behalf of IOC, I attended a meeting of the World Commission on the Ethics of Scientific Knowledge and Technology (COMEST) of UNESCO. On that occasion I made a proposal to set up an Expert Group on the Ethics of the Oceans. The idea was well received. Ethics is important for good governance, and IOC could lead a useful and timely reflection on many of the issues linked to ocean stewardship. I look forward to giving an appropriate follow-up to this initiative.

Finally, in 2001 IOC finalized the procedure to adopt the New Rules of Procedure for the Commission. The new text harmonizes the internal procedures of the Commission with the new Statutes approved by the General Conference of UNESCO. These are expected to ensure greater effectiveness in the work of the Commission. ■

Professor Su Jilan (PR China)
Advisor to the Administrator
Second Institute of Oceanography
State Oceanic Administration

From the Executive Secretary

A swinging pendulum: Science and technology at the service of sustainable development



The decade, that has taken us from the adoption of Agenda 21 in Rio de Janeiro in 1992 to the convening in Johannesburg of the World Summit on Sustainable Development in 2002, has been marked by the growth of increasing disparities between the worlds of the 'haves' and the 'have-nots'. Despite significant progress in implementing many of the principles and strategies outlined in Agenda 21, the promise of sustainable development remains unfulfilled. This mixed state of affairs was dramatically captured by the *Millennium Declaration*, which places poverty alleviation at the top of the agenda in the International Development Goals (see page 11 and website: www.developmentgoals.org/).

In Rio it was possible to focus the attention of the world on the threats to the environment posed by the intensive use of the natural resources and natural systems of the planet. For the first time, the long-term risks to the life-support system of the Earth were exposed and the leaders of the world agreed to take action.

The mood that has been setting in before Johannesburg emphasizes the increased inequalities and legitimately places the accent on human and social development. This swinging of the pendulum between two aspects of sustainable development requires a careful and balanced consideration of the picture as a whole. With the exception of the elimination of the emissions to the atmosphere of freon and other man-made gases which threaten the ozone layer, all the other factors and trends responsible for global and climate change remain unaltered or have been even further accentuated.

Part of the difficulty lies in the uncertainty of the final outcome of many natural processes that are inadvertently being modified as a result of development. On the other hand, the net effects on those natural processes that purposefully are being reversed by the concerted action of all the nations of the world are difficult to measure. The changes being promoted, because they involve the whole planet, will have very small effects that will take years or decades to be felt and will be extremely difficult to isolate from natural variability. For example, knowing whether or not the very expensive societal measures, agreed on to mitigate the effects of climate change, are taking effect will pose a difficult technological challenge.

The science and the technology to diminish these uncertainties are available. Coping with such uncertainties and with the associated risks to society posed by global change needs the urgent support of a single integrated observation effort for the ocean, atmosphere and land. Today we can develop a system capable of taking the pulse of the planet.

The progress in science and technology is never linear nor can the benefits to society of scientific progress be fully assessed a priori. The ongoing effort to remove the uncertainties of global change is already producing a superabundance of valuable environmental data and information. This information is slowly being used to reduce the risks inherent to the operation of many industrial systems, making them more efficient in their

consumption of energy and their use of resources. The real technological and organizational challenges lie in our ability to provide one coherent plan that integrates space and in situ observations across the ocean, atmosphere and land. Given the high stakes and the potential benefits involved, the costs are marginal.

Achievement of the full benefits of such a system for sustainable development will require the strengthening of the scientific and technical capabilities of countries, especially in the developing world, to use this information. This is possible and is being done. Today existing institutions at the national level can tap the hourly and daily flow of data and information originating in ocean and atmospheric services managed by IOC and WMO. These and other international organizations are training human resources and providing access to the new technologies. But more is needed as the products synthesizing environmental information become more sophisticated, requiring non-trivial skills to handle and interpret them correctly. This is one of the priority tasks for the Commission in the coming years that will require the design of a new and effective capacity-building effort.

More than ten years ago, even before Rio, the IOC had endorsed the development of the Global Ocean Observing System (GOOS), as a multi-purpose system, serving many needs beyond climate. Focusing first on the physics of the ocean, GOOS has enabled a level of in situ observation of the global ocean never achieved before. The observing systems making up GOOS, developed initially in support of research programmes, have evolved to become permanent ocean services coordinated internationally by the intergovernmental structure of IOC. The fully operational GOOS will contribute to our understanding of physical/chemical/biological cycles on a basin-wide scale, and will provide the information to develop an ecosystem-based approach to the management of oceans and coasts.

WMO, FAO and IOC, respectively, have been leading the development of the Global Climate Observing System (GCOS), the Global Terrestrial Observing System (GTOS) and Global Ocean Observing System (GOOS). These are the logical international institutions to help facilitate this process. GOOS and operational oceanography require the support of new institutions at national, regional and global levels. The new Joint Technical Commission for Oceanography and Marine Meteorology (JCOMM), which reports simultaneously to WMO in Geneva and to IOC in Paris, represents a giant step in our ability to implement an integrated system. As we move to monitor the quantity and quality of surface and ground water, to assess the total output of organic matter and fertilizers reaching the coastal zone or the changing chemistry of the atmosphere, we will see new mechanisms joining IOC, FAO, WMO, IMO and UNEP.

Fulfilment of the promise of sustainable development will ultimately depend on acquiring a better understanding of how the planet works as an integrated system, an understanding which depends critically on having good atmospheric, oceanic and terrestrial observations. Because of the scale at which the observations are needed, this will require the deployment of instrumental systems across national borders, and in and over many jurisdictional spaces. The full and open sharing of data between nations is an essential part of this effort – including making the

data available within sufficient time to be of operational use.

For the oceans, UNCLOS – the UN Convention of the Law of the Sea – provides a general framework which, complemented by the new fisheries and environmental agreements adopted in the last decade, is slowly testing and building up an integrated system of governance for oceans and coasts. The ability of the international community to provide appropriate stewardship for oceans and coasts depends on the success of these efforts. From the WSSD in Johannesburg we expect a strong political endorsement of the regional and coordinated implementation of all these international agreements.

For the IOC, as focal point of the UN for Ocean Science and Ocean Services, this translates into a more specific challenge, as outlined in the biennial report of the IOC to the General Conference of UNESCO: *'The long-term challenge for IOC is to define a global framework in which the development of GOOS as a single, permanent, global, public-oriented service, can be achieved, with the active contribution of different segments of the society, including the private sector. This requires demonstration of the economic benefits of a common shared strategy between the public and private sectors, the identification of the public and private services that can be derived and/or shared through a common observing platform and the appropriate segmentation of public and private products and users. Achieving this new vision will require the development, negotiation and adoption of international norms and agreements, especially in the area of data and information exchange and sharing.'* ■

Patricio A. Bernal,
Assistant Director-General, UNESCO

International development goals

Reducing extreme poverty: The proportion of people living in extreme poverty in developing countries should be reduced by at least one half by 2015.

Universal primary education: There should be universal primary education in all countries by 2015.

Gender equality: Progress towards gender equality and the empowerment of women should be demonstrated by eliminating gender disparity in primary and secondary education by 2005.

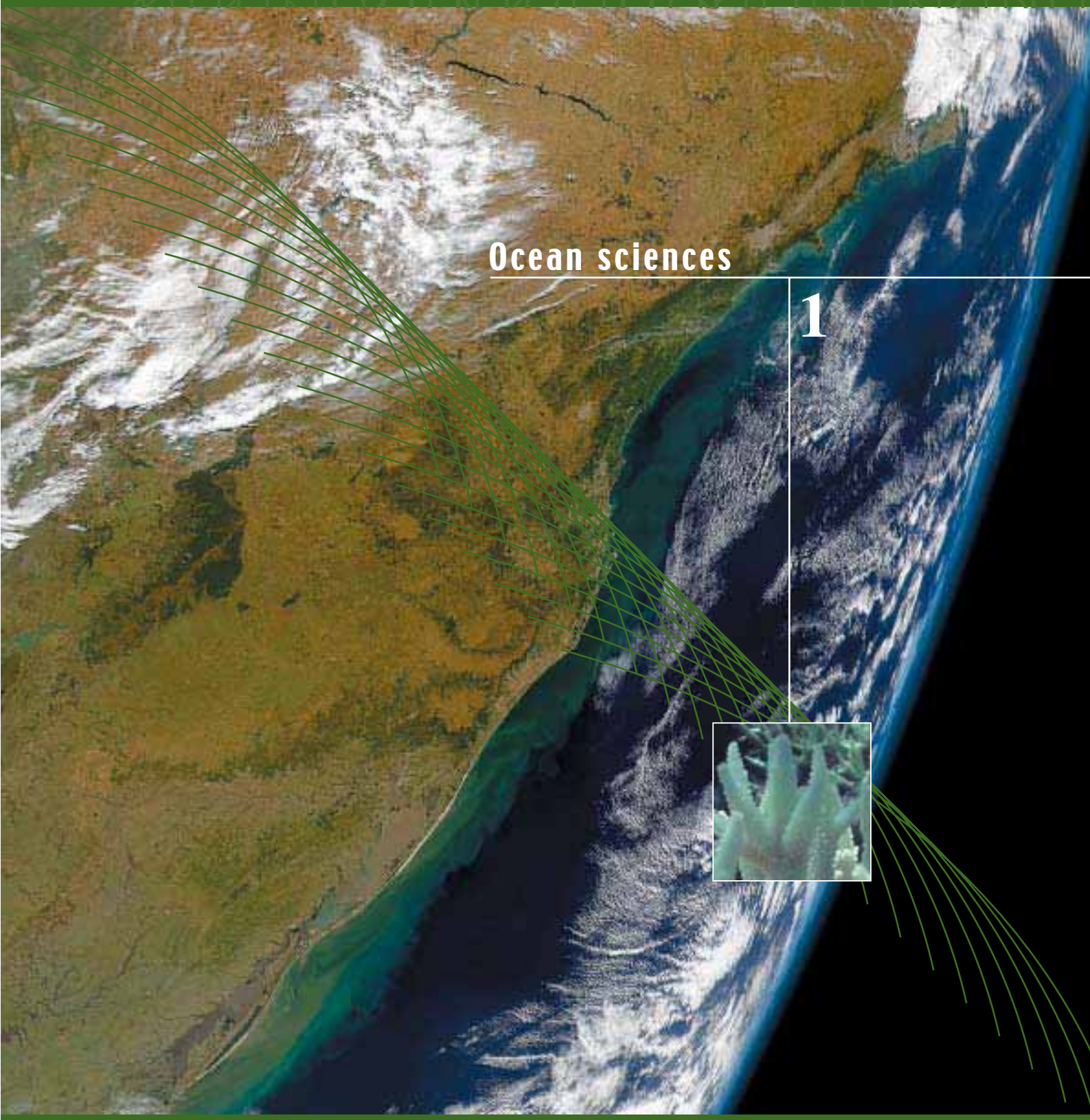
Infant and child mortality: The death rates for infants and children under the age of five years should be reduced in each developing country by two thirds the 1990 level by 2015.

Maternal mortality: The rate of maternal mortality should be reduced by three fourths between 1990 and 2015.

Reproductive health: Access should be available through the primary health-care system to reproductive health services for all individuals of appropriate ages, no later than the year 2015.

Environment: There should be a current national strategy for sustainable development, in the process of implementation, in every country by 2005, so as to ensure that current trends in the loss of environmental resources are effectively reversed at both global and national levels by 2015.

Note: The above International Development Goals (IDGs) were adopted on 8 September 2000 by the United Nations through its Millenium Declaration and were incorporated by UNESCO in its overall strategy for the period 2002 to 2007. They represent the broadest consensus that has ever been developed on a limited set of goals addressing the key challenges to humankind. The commitment, reaching well beyond the UN System itself, is based on more than a decade of major global conferences on: education, environment, human rights, women, population and development, small island developing states, human settlements, science and cultural policies. Although the adoption of the IDGs does not imply a diminished commitment to other goals accepted by the international community, IDGs will play a substantive role in defining the priorities for the international agendas in the coming decades and is playing a key role in the deployment of the UN resources in the field through the UN Development Group (UNDG).



Ocean sciences

1

1.1 OSP overview: restructuring in 2001

The year 2001 marked a restructuring of the IOC's Ocean Sciences Programme (OSP). In accordance with Resolution XX-6 of the 21st Session of the IOC Assembly, the activities of the Ocean Sciences Programme were restructured into three interactive lines of work consisting of:

- Oceans and Climate;
- Science for Ocean Ecosystems and Marine Environmental Protection (SOEMEP); and
- Marine Science for Integrated Coastal Area Management (ICAM).

The rationale for the new structure is based on external reviews of the current programmes. (See doc IOC/INF-1155, p. 134). The Oceans and Climate and the ICAM Programmes have been maintained in their already existing forms as two major components of the Ocean Sciences Section. The SOEMEP Programme was created as a new line of endeavour in the Ocean Sciences Section.

The formation of SOEMEP is based on the principle that the management of the ocean requires knowledge of the dynamics of marine ecosystems in relation to their structure, functioning, composition and stability as well as to the effects of exogenous biological, chemical and physical driving functions. This includes the understanding of the variability of living marine resources, as well as the factors affecting water quality including eutrophication, waste dumping and the source and fate of contaminants and their eco-toxicology. These factors are critically relevant to questions concerning the protection of the marine environment against sustained anthropogenic activities causing, or likely to cause, adverse effects on the marine environment, its resources and amenities, and regarding associated threats to human health. SOEMEP thus emphasizes the natural interdependency between the environment, the ecosystem, natural resources and sustainability; it provides an integrated framework to address interdisciplinary oceanographic research and marine environmental protection issues through the development of an ecosystems approach to management. In making the transition to the new structure, the activities previously carried out under the GIPME, OSLR and OSLNR Programmes are placed under the SOEMEP Programme. Following are the highlights of these activities in 2001 in the Ocean Sciences Section.

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1.2 Oceans and climate

A – CO_2 ACTIVITIES

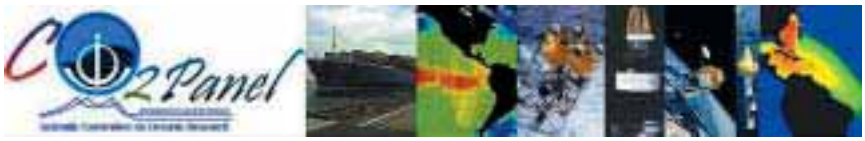
The SCOR-IOC Advisory Panel on Ocean CO_2

This Panel was actively engaged, during the past year, in a number of international coordination and planning activities to integrate ocean carbon measurements into oceanographic programmes being developed. These activities included: (i) the OOPC-CLIVAR/COOP-POGO Time Series Observatory Pilot Project; (ii) the JCOMM Ship Observations Team, in which the Panel is serving as an international coordinator of biogeochemical measurements made from Volunteer Observing Ships; and (iii) the CLIVAR basin panel meetings on repeat hydrography, where the Panel was asked to

serve as the international focal point for ocean carbon coordination in CLIVAR. To meet the Panel's requirement to advise GOOS and OOPC on the observational strategies needed to assess, model, and predict global ocean CO_2 fluxes, the Panel developed the scientific background report *A Global Ocean Carbon Observation System – A Background Document*. This document, to be published as a GOOS Technical Document and in shortened form in the scientific review *EOS*, is also being used as the ocean component of the IGOS Partners Integrated Global Carbon Observation Theme. The Panel has developed a website for disseminating information of interest to the international ocean CO_2 community, including links to ocean carbon research and observational programmes, a meeting calendar, information on measurement technology research and development, links to data set compilations and archives, and information on standards and reference materials. The Panel is developing a watching brief on ocean carbon sequestration (see below), also available on the website, which provides information for policymakers and the general public on the scientific and policy issues surrounding ocean carbon sequestration. SCOR and IOC, in close collaboration with the Panel, are discussing plans for an international science conference on ocean carbon sequestration, with the goal of synthesizing the current understanding and outstanding scientific questions regarding ocean sequestration. The results of this conference will be presented as a special issue of a peer-reviewed scientific journal.

The Panel's Second Session is scheduled to take place on 9 February 2002 at the School of Earth Science and Technology, University of Hawaii, USA.

Visit the website: http://www.ioc.unesco.org/iocweb/co2panel



Watching Brief on Ocean Carbon Sequestration

At the 21st Session of the IOC Assembly, CO_2 sequestration was recognised as an important issue, and it was agreed that the Commission should continue to monitor developments in this domain. The following information is an extract from the Watching Brief, which can be found on the CO_2 Panel's website (see above).

Rationale

Human activities have profoundly altered the Earth's global carbon cycle. These alterations are linked to globally rising temperatures, increases in severe weather events, and an ever-shifting and currently unpredictable pattern of droughts, floods, famine, and disease. Transitioning away from fossil fuel use and finding viable alternatives will be difficult, costly, and take a long time. We are now faced with a scientific and societal challenge of daunting proportions – determining if and how humans can 'manage' the global cycle of one of the Earth's key elements. One strategy being investigated is to enhance the ocean's natural capacity to absorb and store atmospheric CO_2, either by inducing and enhancing the growth of carbon-fixing plants in the surface ocean, or by short-circuiting the natural transfer of CO_2 dissolved in the surface ocean

to the deep ocean through direct injection of CO_2 into the deep ocean. Determination of the feasibility and efficacy of this process involves significant technological, economic, legal and scientific investigation. But perhaps more importantly, this will require involving the general public in these investigations, providing continuous, clear and unbiased information about the benefits, limitations, and possible consequences of actions and inactions. Public opinion will prove to be the deciding factor in any question of redirecting CO_2 in the environment, and they must be engaged as critical partners in this decision-making process.

This watching brief has been developed to provide a synthesis of the current scientific, technical, economic, and legal issues of ocean sequestration of CO_2 for the Member States of the Intergovernmental Oceanographic Commission, as well as other policy-makers and the general public.

IOC'S INVOLVEMENT IN ISSUES OF OCEAN CO_2 SEQUESTRATION

Agenda 21, the Action Plan for Global Sustainable Development, was adopted by more than 178 Governments at the United Nations Conference on Environment and Development (UNCED), held in Rio de Janeiro, Brazil, in June 1992. The Commission on Sustainable Development (CSD) was created in December 1992 to ensure effective follow-up of UNCED, to monitor and report on implementation of the agreements at the local, national, regional and international levels. Chapter 17 of Agenda 21 deals specifically with 'Protection of the oceans, all kinds of seas, including enclosed and semi-enclosed seas, and coastal areas and the protection, rational use and development of their living resources'.

Within the UN system, there was a need to coordinate activities aimed at implementing Chapter 17 of Agenda 21. As a result, the Administrative Committee on Coordination – Subcommittee on Oceans and Coastal Areas (ACC-SOCA) was established in 1993. Present member organizations include: IMO, UNESCO-IOC, UNEP, UNDP, FAO, WMO, IAEA, UNIDO, the secretariats of the UNFCCC and the Convention on Biological Diversity, and the World Bank.

The IOC is the SOCA sub-task manager for Programme Area E, 'Addressing critical uncertainties for the management of the marine environment and climate change'. In this programme area, section 17.102 of Agenda 21 on management-related activities states: 'Recognizing the important role that oceans and all seas play in attenuating potential climate change, IOC and other relevant competent United Nations bodies, with the support of countries having the resources and expertise, should carry out analyses, assessments and systematic observation of the role of oceans as a carbon sink.'

The SCOR-IOC Advisory Panel on Ocean CO_2 provides ready expertise and advice to SCOR, IOC, and other international organizations on issues of ocean carbon cycle science and observations. One specific Term of Reference for the Panel is to maintain a watching brief to advise IOC and SCOR on CO_2 sequestration in the ocean. At the 21st Session of the IOC Assembly, the Assembly was informed by the Executive Secretary of his participation in the April 2001 meeting of the American Society of Limnology and Oceanography (ASLO) in Washington DC, which discussed issues of ocean carbon sequestration. The Executive Secretary stated that this is an area of increasing concern, and that many Member States are already actively involved in these issues. Concerns include uncertainty of the effects of these processes on the ocean ecosystem, legal issues of pollution and dumping, and exploitation of the ocean commons. The Executive Secretary further stated that as these experimental and scientific issues signal a transition to larger, societal questions, the IOC, through the SCOR-IOC Ocean Carbon Advisory Panel, should maintain a watching brief on ocean CO_2 sequestration issues.

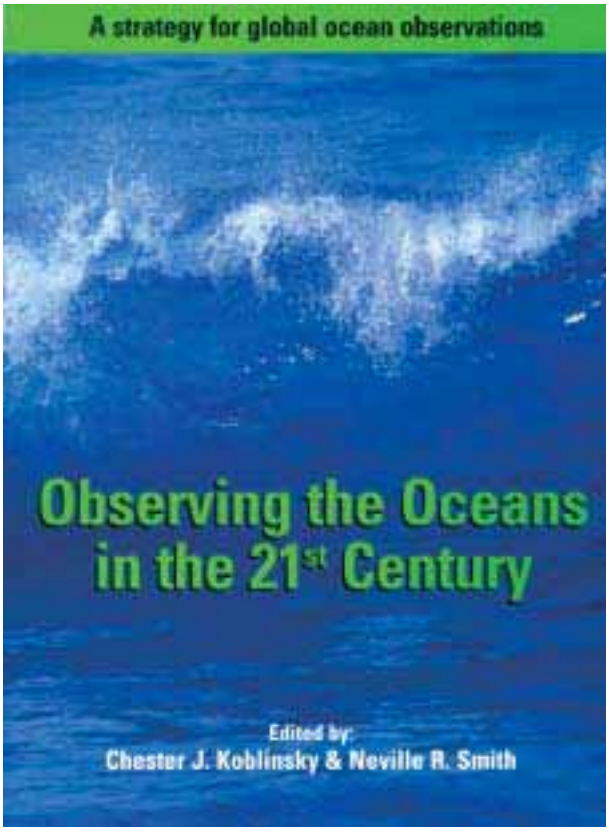
The Assembly noted that the issue of ocean CO_2 sequestration was a crucial one for the IOC, and the ensuing discussion among the Member States demonstrated that there is much interest, concern, and confusion in dealing with these complicated issues. The Assembly agreed the IOC should continue monitoring developments in ocean CO_2 sequestration and to maintain a watching brief of the environmental and science implications by the SCOR-IOC Ocean Carbon Advisory Panel. ■

B – Climate-related activities: OOPC, CLIVAR and WOCE

The Ocean Observations Panel for Climate (OOPC)

The Panel – administered by the IOC and co-sponsored by GCOS, GOOS and WCRP – is the primary scientific body for providing advice on requirements for ocean data for climate and related physical ocean systems. The OOPC maintains a strong partnership with JCOMM and CLIVAR, and with the ocean carbon community via the SCOR-IOC Advisory Panel on Ocean CO_2.

Good progress was made, in the follow up to 'OceanObs99', towards implementing the initial observing system. Highlight activities and developments in 2001 included workshops on sustainable ocean-climate observations for the Indian Ocean and the identification of ocean surface reference sites, movement toward consensus on carbon system requirements and a standard, well defined sea surface temperature (SST) product with known error bars. Major OOPC action items for 2001/2002 include: (i) an international workshop to evaluate the tropical mooring arrays against global broad objectives that are not restricted to ENSO, and in the context of other observing subsystems (e.g. Argo, SOOP and VOS lines, satellites); logistics and vandalism will be considered along with objective evaluations of the moorings for validation of satellite measurements; (ii) development of the project

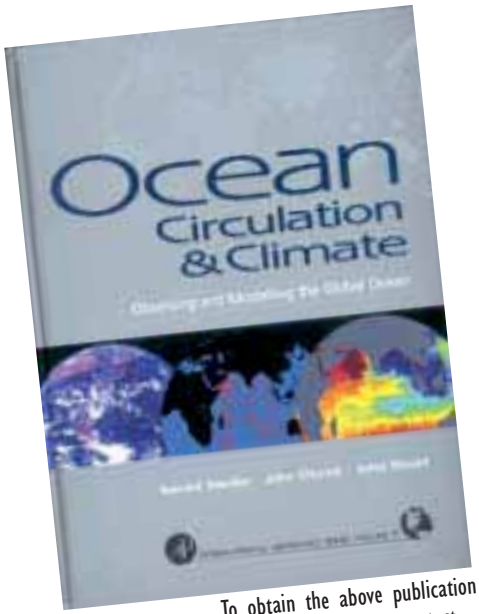


to establish ocean surface reference sites, (iii) the first meeting of the Time-Series Stations Science group, (iv) action on data management issues, (v) follow-up action for the Indian Ocean, (vi) assisting GCOS in preparation of a response to the request from the Conference of the Parties (CoP) to the UNFCCC for a 2nd Report on the Adequacy of the Observing System for Climate; and (vii) completion of the OceanObs99 monograph (see cover above and full reference on page 68).

The Climate Variability and Predictability Study (CLIVAR) and the World Ocean Circulation Experiment (WOCE)

These are projects of the WCRP with the most significant involvement and dependence on ocean science. The Joint Scientific Committee (JSC) for the WCRP, at its 22nd session in March 2001, stressed the importance of GODAE and the work of the OOPC to the WCRP, in particular to the implementation of CLIVAR. Other activities of WCRP include the Joint WCRP-SCOR Working Group on Air-Sea Fluxes, the Surface Ocean Lower Atmosphere Study (SOLAS), the Climate and Cryosphere (CliC) project, the Arctic Climate System Study (ACSYS), and the Coordinated Enhanced Observing Period (CEOP) and Global Atmospheric Boundary Layer Study of the Global Energy and Water Cycle Experiment (GEWEX). The JSC is encouraging greater interaction with the IGBP and the IHDP through joint planning and joint projects. In line with this thinking, WCRP became a joint sponsor with IGBP and IHDP of the Global Change Open Science Conference, convened in Amsterdam (The Netherlands) in July 2001.

The year 2001 was the penultimate year of WOCE insofar as constituting a part of WCRP. It was the year that major WOCE publications of enduring value began appearing, having spent years in preparation. These publications are serving to mark the significant achievements of this 20-year project. In April, the book *Ocean Circulation and Climate - Observing and Modelling the*

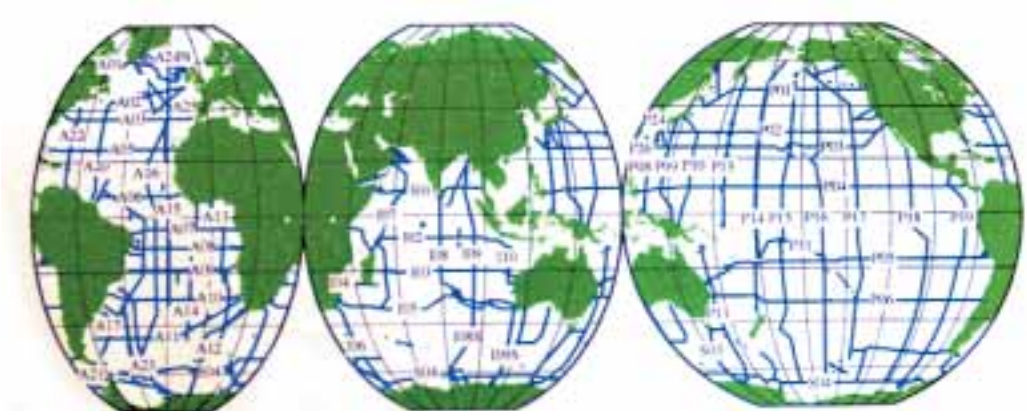


To obtain the above publication (ISBN 0-12-641351-7), contact –
US and Canada: Academic Press, ap@acad.com;
Other countries: Harcourt Publishers, Ltd., service@harcourt.com

Global Ocean was published (Academic Press, London 2001). It provides in one volume a broad-scale update of the state of our knowledge and the new tools we have as a result of WOCE for scientific study of the global ocean. Funding was also secured for the publication of a series of four Atlases (one for each major ocean) that will present the results from this unprecedented global hydrographic survey of the oceans' physical and chemical properties. The WOCE high-quality data sets will continue to be mined by future researchers and the steady flow of results will continue to have an impact on our understanding of the physics of ocean circulation and its role in climate. The WOCE online bibliography reached a total of 1600 publications in 2001 based on WOCE research. This number will continue to increase long after the programme ends. The last of WOCE's Analysis, Interpretation, Modelling and Synthesis (AIMS) phase workshops was held in August jointly with the IGBP's JGOFS programme. Its focus was the assessment of what we have learned about the storage and transport of physical chemical properties (including CO_2) in the ocean. This workshop, attended by almost 100 scientists, set the stage for fleshing out a plan, in collaboration with international and national ocean carbon programmes, to start reoccupation of the WOCE/JGOFS trans-ocean sections (see illustration below) during CLIVAR. WOCE science will be the focus of a major international conference to be held in San Antonio, Texas (USA) in November 2002 marking the end of the WOCE programme as a separate element of the WCRP.

It became forcefully clear in 2001 that the broad multi-disciplinary complexity of the CLIVAR project and its central role within WCRP presented a new set of realities that planners had to face. Among these are scientific as well as huge logistical and organizational challenges with which we have very little experience. They include the need to explore the potential links between phenomena of differing timescales, to bring closer together the often rather loosely linked communities of atmospheric and ocean researchers. They must also take into account biological and socio-economic considerations by developing constructive partnerships with IGBP projects and linking into initiatives that exploit our understanding of climate for the benefit of humankind.

CLIVAR has moved further towards its implementation. A workshop in Hawaii in February led to the formation of a CLIVAR Pacific sector panel that will guide CLIVAR implementation strategy across the wide range of climate phenomena and time scales that influence the Pacific region. A similar Atlantic panel has already met and the establishment of a Southern Ocean panel is in the offing. As an example of rapidly expanding interest in CLIVAR field implementation, a CLIVAR Tropical



WOCE/JGOFS
trans-ocean sections

Trans-ocean sections (WOCE one-time cruises including many JGOFS carbon sections)

For further information, consult the website: www.woce.org or direct enquiries may be addressed to: woceipo@soc.soton.ac.uk

Atlantic Variability Workshop, hosted by IOC-UNESCO in September 2001, attracted more than 120 attendees – an unexpectedly high number. Only a few years ago the number of scientists studying variability in the tropical Atlantic was of the order of a couple of dozen, not enough to consider mounting a large field campaign. Much of CLIVAR's implementation, in terms of ocean observations, is closely linked to the rapid development of the Argo array of profiling floats. By the end of the year approximately 600 of the projected floats (3,000 by 2005) were already reporting data in real time.

1.3 Science for Ocean Ecosystems and Marine Environmental Protection (SOEMEP)

A – Study Group on Benthic Indicators

Major progress was achieved by the IOC ad hoc Study Group of Benthic Indicators at its third meeting, held 28 February to 3 March in Charleston, South Carolina, USA. Datasets on coastal benthos and environmental conditions from different coastal regions of the world were combined into a global database, and statistical analysis identified robust relationships between an increasing sediment concentration of total organic carbon (TOC) and the biological state of benthic communities, which are currently being developed into a useful indicator of ecosystem health. Thus, three levels of low, medium or high concentrations of TOC respectively correspond closely with characteristic changes in species composition and diversity of the benthic communities across different geographic regions. The study group is currently in the final stages of preparing a draft paper on the results for submission to a scientific journal. To increase the global appliance of indicators, additional regional datasets will be added to the database.

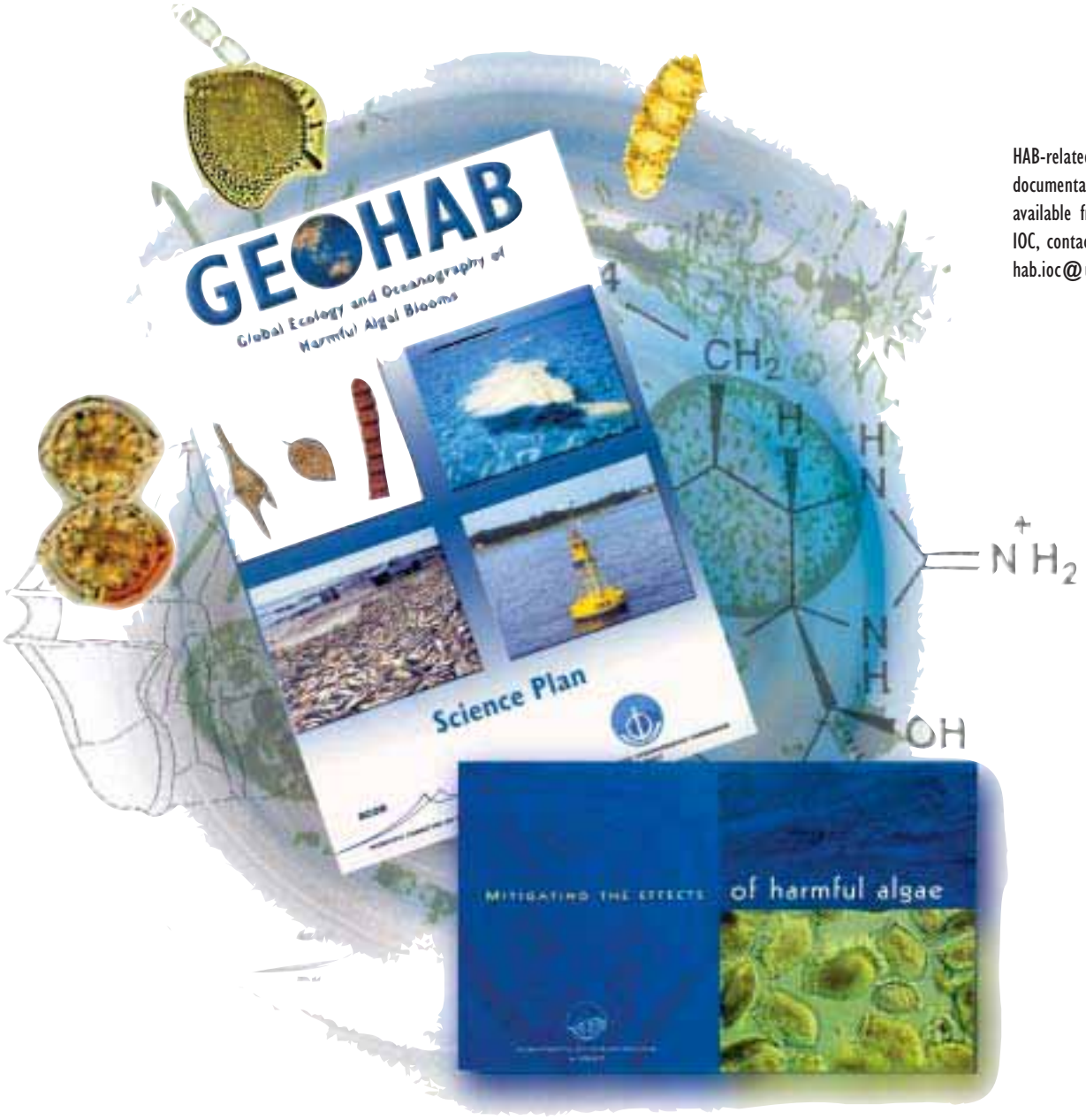
The longer-term outcome of this effort will be a series of environmental indicators that reflects biological conditions, is easy to use and is broadly applicable in detecting environmental stress of benthic communities. The results will be available on a website, which will also contain: (i) a database with data on marine benthos and environmental conditions from selected coastal areas of the world; (ii) guidelines and recommendations for the use of indicators in monitoring programmes; (iii) guidelines for analyses of specific monitoring data; and (iv) reference material and standards for comparing and interpreting results.

For more information, visit the website:
www.ioc.unesco.org/benthicindicators
or contact: o.vestergaard@unesco.org

B – Harmful Algal Bloom programme

The objective of the IOC Harmful Algal Bloom Programme is to provide services and capacity building to Member States in the domain of harmful algal bloom (HAB) research and mitigation.

Activities in 2001 continued to focus on the follow-up and implementation of the Resolutions of the Fifth Session of the IOC Intergovernmental Panel on Harmful Algal Blooms (IPHAB). This included publication of



HAB-related documentation, available from IOC, contact: hab.ioc@unesco.org

the Science Plan for the international IOC-SCOR research programme on the Global Ecology and Oceanography of HABs (GEOHAB). The GEOHAB mission is to foster international cooperative research on HABs in ecosystem types sharing common features, comparing the key species involved, and to study the oceanographic processes that influence their population dynamics. The work on developing an Implementation Plan was initiated at a meeting of the GEOHAB Scientific Steering Committee (SSC) in Shanghai, PR China. The meeting also provided advice to China on a major national research programme on HAB. GEOHAB is the first international research programme of its kind and will be a significant activity area for the Commission and SCOR for the next 10 to 15 years. The GEOHAB SSC is also charged with the fund-raising for, and establishment of, an international project office (IPO) for GEOHAB. France has offered to host the IPO within IFREMER, and complementary funds are sought. Canada has shown interest in contributing to the IPO and negotiations are underway.

The ICES-IOC Working Group on the Dynamics of Harmful Algal Blooms met in Dublin, Ireland, in March. A permanent term

of reference is the updating of the metadata database on Harmful Algal Events, HAE-DAT, which is on-line at the IOC server. The Working Group also examined possible ways of analysing historical data and fossil records. The Group interacts actively in GEOHAB and in 2000 it took the initiative towards an ICES/IOC-SCOR Study Group on GEOHAB Implementation in the Baltic Sea. In 2001 the Study Group met just prior to the Working Group in Dublin and is now developing an implementation Plan for GEOHAB in the Baltic. Other items reviewed by the Working Group were the potential sensitivity of HABs to climate changes as well as the use of remote sensing and in situ optical sensing technology in HAB dynamics studies. The latter resulted in a proposal for a workshop on 'Real time observation systems applied to HAB studies'. The GEOHAB SSC endorsed the proposal and the workshop will take place in June 2003 in Villefranche-sur-Mer (France).

Participants in the first training workshop on harmful algae in the Western African region held in Accra, Ghana, October-November 2001

Photos: Ole Vestergaard

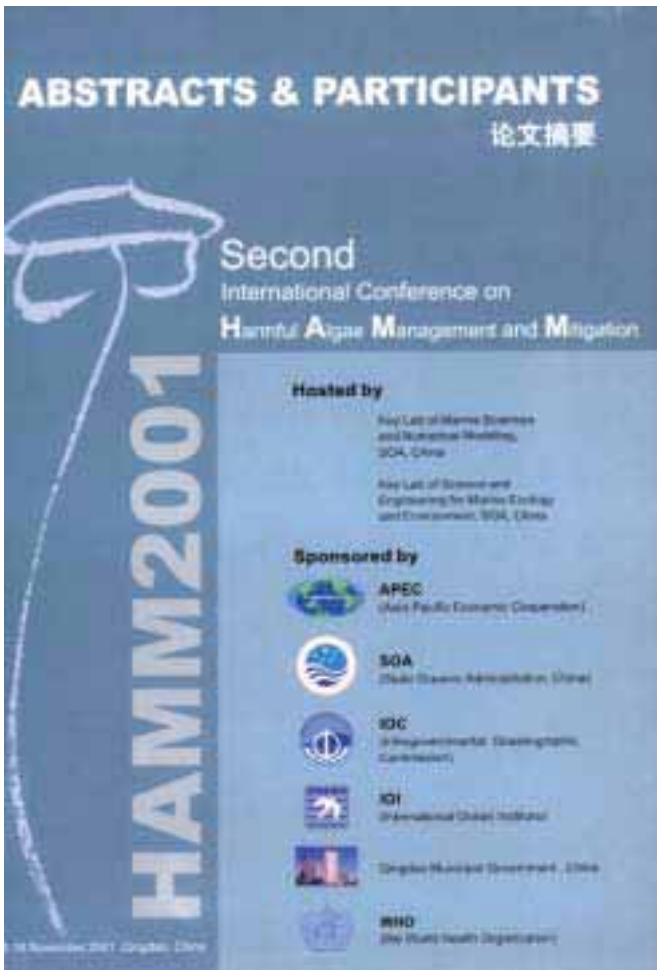
Capacity building continues to be a main component of the HAB Programme. Serving as the backbone in the implementation of the capacity-building effort are the IOC Science and Communication Centres on Harmful Algae in Copenhagen, Denmark, and Vigo, Spain. The centres (see p. 112) allow the IOC to offer training opportunities in close cooperation with institutions internationally recognized for their expertise. The courses at the two Centres train 30-40 people annually. Again in 2001 there were over 100 applicants for each course. A number of regional training courses were also offered. In this context, the cooperation with the University of Tokyo on HAB capacity building plays the same role in the WESTPAC region, as do the IOC HAB Centres for the international courses. A regional training workshop was held in Accra, Ghana, in October-November. In addition to the immediate objective of training, it aimed to formulate a project for a regional survey on the occurrence of potentially harmful microalgae. The workshop and the project formulation drew on East African expertise from a similar project implemented in the Western Indian Ocean, 1996-2000. The IOC assisted in an FAO-ROPME Training Course for the Gulf Region, held in Kuwait in September. The two IOC HAB Centres provide, in addition to the short-term training courses, a mechanism for North-South institutional twinning and cooperative research, and specific projects are ongoing with countries in South East Asia, Africa and Latin America. The results of the projects are published as papers in relevant scientific journals or in the IOC Reports series, as appropriate. In 2001 one output was the *Guide to Potentially Harmful Microalgae of the Western Indian Ocean*, published as No. 41 in the IOC Manuals and Guides series (see p. 133).

Within IOC/WESTPAC, training courses on Ecology and Physiology of Harmful Algae were held in March at the Department of Marine Science, Chulalongkorn University, and at Burapha University, Thailand. The Government of Japan sponsored the courses. For the first time, a scientist from the Democratic People's Republic of Korea participated in a training course of IOC/WESTPAC. The experience obtained will be useful to the trainees in designing and conducting research on ecology and physiology of harmful microalgae in their respective home countries. In August the 2nd IOC/WESTPAC/HAB Strategy Workshop was held as a special session of the Fifth WESTPAC Symposium in Seoul, Korea. The Workshop reviewed past and ongoing activities, and discussed the

future activities and focus of WESTPAC/HAB. The deliberations of the 1st and 2nd strategic workshops are being synthesized into a plan for WESTPAC/HAB to be presented to WESTPAC at its next session.

South America's regional HAB Working Group (FANSA) met in Uruguay in October to update its summary of harmful algal events recorded in each country of the region and to discuss the criteria adopted within each country for the definition of monitoring programmes. It also reviewed application of the IOC databases MON-DAT and HAE-DAT in FANSA countries as well as collaboration possibilities for regional capacity strengthening to face HAB problems. Capacity building and regional networking are the main objectives of FANSA, not only to strengthen research abilities and infrastructure but also to increase operational activity performance, protect public health and minimize other impacts. Priorities are focusing on GEOHAB and identifying financial support to conduct international cooperative research within the FANSA group.

The regional working group for HAB in the Caribbean (ANCA) promoted collaborative communication among small-budget monitoring activities in the region towards diminishing the risk of poisoning when concentrations of *Pyrodinium bahamense var. compressum* peaked during 2001, causing several poisoning events and casualties. Through its Participation Programme, UNESCO supported a project for the experimental implementation of molecular monitoring of HAB species in the region. Toxic cyanobacteria in fresh and brackish water reservoirs are recognized to be an increasing problem. The Second ANCA Meeting was postponed to early 2002.



The HAB Programme co-sponsored, with APEC and other organizations, the 2nd International Conference on Harmful Algal Management and Mitigation (HAMM, November 2001, Qingdao, PR China), and will publish the proceedings. This series of conferences was initiated with the support of the IOC.

Website: www.ioc.unesco.org/hab
IOC contact: Henrik Enevoldsen, henrike@bot.ku.dk

C – Coral Bleaching and Related Stress Indicators

Responding to increasing incidences of coral bleaching around the world, the IOC Study Group on Coral Bleaching and Related Indicators of Coral Reef Health was initiated with the express purpose of integrating, synthesizing and developing global research on coral bleaching, and to further new findings into the development of tools for improved observations, predictions and strengthen management interventions at national and global scales.

The specific objectives are to: (i) develop possible molecular, cellular, physiological or community indicators of coral bleaching capable of detecting stress responses due to changes in variables such as sea surface temperature and UV radiation; (ii) examine potential coral mechanisms for adaptation/acclimatization to global environmental change; and (iii) investigate long-term responses of coral reefs to large-scale changes in environmental variables.

The study group consists of scientists from developing as well as developed countries. It brings together expertise in specific fields of coral physiology and coral reef ecology. The group was convened for the first time in Paris, 9-11 April. On this occasion, key scientific questions were assessed and work hypotheses formulated relating to the nature and impacts of heat stress on corals. Over the next few years the group will engage in a series of targeted field studies, seminars and training workshops jointly with researchers and students in different regions. The first workshop will take place 25 February –18 March 2002 at Heron Island Research Station, University of Queensland on the Great Barrier Reef, Australia. Subsequent workshops are tentatively planned to be held in Mexico, the Philippines and in East Africa. The effort is being developed in partnership with national research institutions and a World Bank/GEF Targeted Research programme on anthropogenic stress and climate change impacts on the sustainability of coral ecosystems. For further information, contact IOC (o.vestergaard@unesco.org).

Photo: © Lorraine Parkin

By Professor Ove Hoegh-Guldberg
Chairman of IOC Coral Bleaching Study Group; Director, Centre for Marine Studies, University of Queensland, Australia

Impacts of bleaching on coral reef health: issues and action

Coral bleaching is rapidly developing as a major problem for the health for coral reefs worldwide. Unfortunately, the level of understanding of this phenomenon is limited and must be improved if management practices are to be effective in minimizing the detrimental impacts of increasing sea temperature, as is projected to occur over the next 50 years. This study group has thus been initiated with the timely goal of filling critical knowledge gaps in our understanding of the mechanism behind coral bleaching and the longer-term impacts of bleaching on coral ecosystems.

During the first meeting the group discussed different aspects of molecular and cellular responses to heat stress and other stressors disrupting the algal-coral symbiotic relationship, thus leading to bleaching. The participants looked at the subsequent ecological impacts, and the potential for developing indicators and tools to assess changes and predict longer-term impacts of coral bleaching. An overarching theme to be investigated is the issue of adaptation/acclimatization to increased sea surface temperature, the ability of corals to recover from bleaching and the possible new state of coral reefs at increasing frequency of mass bleaching events, as summarized in the following broader questions:

- Are coral reefs resilient in the face of projected climate change over the next 100 years?
- How is the primary factor temperature affected by other secondary factors?
- Why are some corals more immune than others?
- How fast will change occur within coral reef ecosystems?
- Can coral reefs recover and, if so, how fast?
- What factors influence the ability of reefs to recover?
- Is a phase shift permanent?
- What will be the final state of the ecosystem if coral abundance decreases dramatically?

To address these and related questions, a set of specific working hypotheses has been formulated, which will be investigated in a series of targeted investigations, spanning from the molecular and cellular levels of investigation to those more at the ecological level. One of the major ambitions of the experimental programme will be: (i) a more complete model of the mechanisms that trigger mass coral bleaching. This will enable better projections of the potential impact of climate change on coral reefs, and enable better prediction of the potential impacts to those human communities relying upon them as sustainable resources, and (ii) a series of indicators such as:

- molecular markers that will rapidly and easily distinguish heat stress from other types of stresses (e.g. sedimentation, metal contamination, nutrient stress) on coral reefs;
- cellular markers that will enable users to accurately anticipate and monitor the advent of coral bleaching or recovery;

Photo: © Ove Hoegh-Guldberg

- genetic markers that will enable insight into the tolerance and resilience of communities of reef-building corals.
- ecological markers that will enable users to monitor impacts of coral bleaching and to project how the changes are likely to impact on local ecosystem function.

A number of joint field experiments and training workshops will take place in 2002 and the coming years. The activities will be carried out in a collaborative effort bringing together scientists and students from developed as well as developing countries to integrate and disseminate existing knowledge and undertake joint investigations through a global network. The purpose is to accelerate global coral bleaching research and the transfer of expertise and technologies to the countries affected by coral bleaching to strengthen their capacity for research and management of coral bleaching impacts. ■

IOC contact: Ole Vestergaard,
o.vestergaard@unesco.org

What is coral bleaching?

By Professor Ove Hoegh-Guldberg

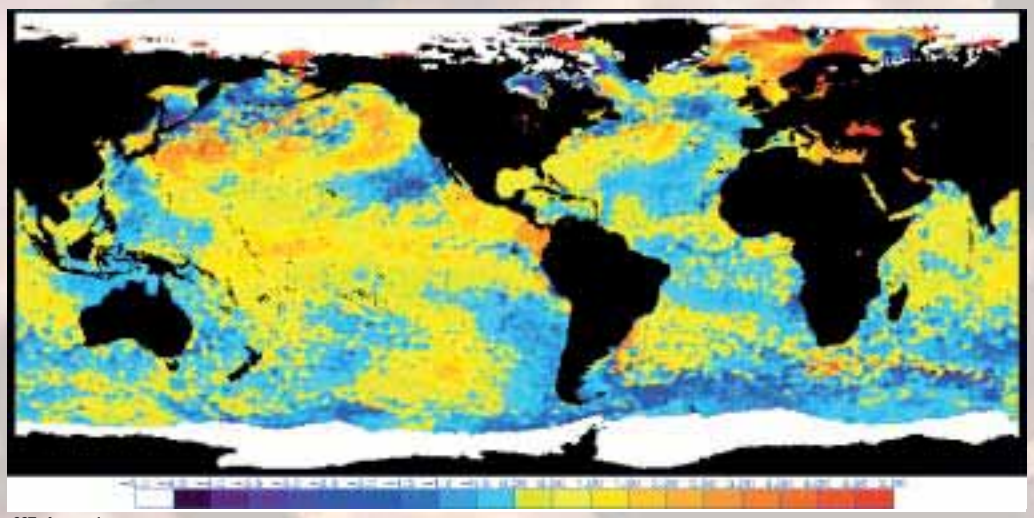
Reef-building corals, as the name would indicate, are central to coral reefs and are symbiotic with critical dinoflagellate algal symbionts commonly known as zooxanthellae. The latter provide the coral with most of its energy needs. Coral bleaching occurs when stressed corals expel their symbiotic algae, losing their brown colour. In the past 20 years, there have been six major bleaching events that have left corals reefs stark white across thousands of kilometres.

Photo: © Ove Hoegh-Guldberg

The dinoflagellate algae provide the coral with energy and nutrients from their photosynthetic processes. The animal host is supplied inorganic nutrients such as ammonia and phosphate from their waste metabolism. These compounds are in short supply in the nutrient-impoverished waters of coral reefs. Coral bleaching leads to mortality if the stress is prolonged or intense. In 1998, an estimated 16% of the world's reef-building corals died.

Coral bleaching can be triggered by a range of environmental and physiological stresses, such as warmer than normal seas, elevated solar radiation, pollution, reduced salinity and anoxia. The global episodes of mass bleaching have been tracked to short periods of elevated sea temperature. Corals live close to their upper thermal limit and when ocean temperatures rise + 1°C or higher above long-term monthly averages for the warmest months, bleaching begins. These conditions occur when skies are clear, water motion is minimal and winds are at their lowest.

A range of cellular phenomena is thought to occur within the cell. It is still unclear as to whether coral cells deliberately expel the symbiotic algae or whether bleaching is a response to host cell death in response to the algae becoming toxic to the coral at higher temperatures. Thermal stress has been shown to cause dysfunction of photosynthetic metabolism in the algae, leading to the production of toxic-free oxygen radicals. Researchers still debate whether it is primarily the light or dark reactions of photosynthesis that are affected. Studies have shown that corals may survive bleaching and recover. However, other studies have shown that subchronic damage may occur and result in reduced reproductive capacity and growth. These aspects, while little studied, may have great implications for the long-term health of coral ecosystems.



SST Anomaly

Photo: © Ove Hoegh-Guldberg

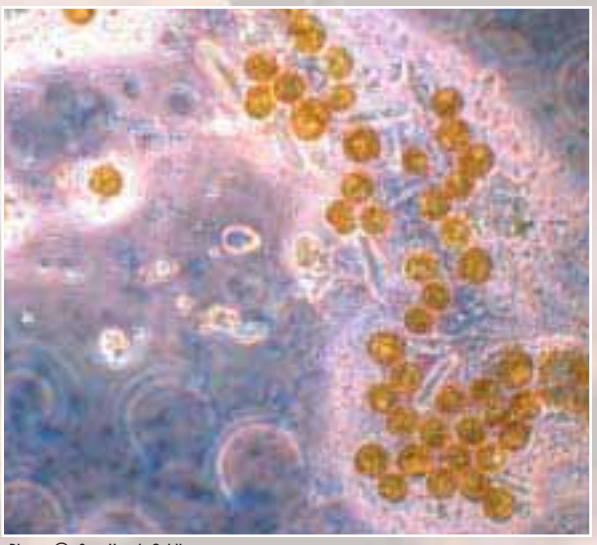


Photo: © Ove Hoegh-Guldberg

Linking new findings on molecular, cellular and ecological aspects of coral bleaching with remotely-sensed data on coral reef status and sea-surface temperatures is one component of a research effort being developed by IOC, World Bank/GEF and marine science institutions around the world. New observing, forecasting and management tools with regard to bleaching impacts are among the expected outputs.

Photo: © Ole Vestergaard

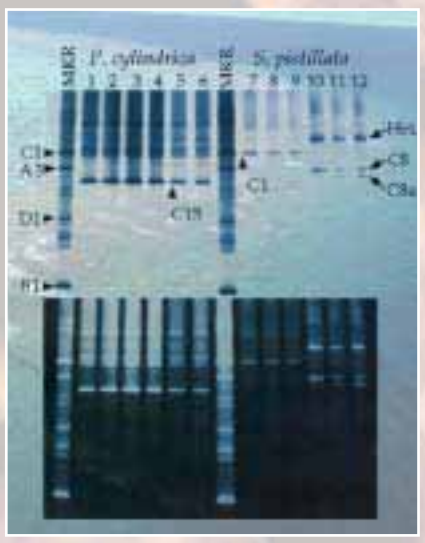


Photo: © Todd Lajeunesse

D – The Global Coral Reef Monitoring Network (GCRMN)

The Global Coral Reef Monitoring Network is active in all the world's major coral reef regions. The GCRMN is co-sponsored by the IOC, UNEP, IUCN and the World Bank. Funding is provided by the US Department of State, the US National Oceanic and Atmospheric Administration (NOAA), and the governments of Australia and the UK, with IOC/UNESCO responsible for overall coordination and guidance.

A major activity in 2001 was the five-year review of the GCRMN with the goal of assessing the effectiveness of the operations, suggesting future improvements and sustainable funding mechanisms for the GCRMN. The IOC, as Chair of the Management Group, led the organization of the four-person review team and developed the terms of reference. The team surveyed, through a global questionnaire, the coral reef community regarding GCRMN efficacy and held a meeting in April 2001 in Cebu City (Philippines) to analyze the survey results and generate recommendations.

Great Barrier Reef, Australia

Photo: © Ove Hoegh-Guldberg

The review team concluded that the GCRMN functions well in terms of encouraging, supporting and coordinating coral reef monitoring worldwide. The GCRMN has distinguished itself particularly in the production of the biennial *Status of Coral Reefs of the World* reports, which have become a global reference standard for major changes in coral reef systems. However, the review noted a need for further strengthening of the regional networks; better integration of biophysical and socio-economic data collection to support national and site level management of natural resources; and that funding support for GCRMN coordination should be strengthened.

The GCRMN Management Group, at its meeting in December 2001 in Maputo, Mozambique, responded to the review with several actions to improve the long-term sustainability of the network. These included establishing clearer governance mechanisms for GCRMN, strengthening the relationship between GCRMN and the International Coral Reef Action Network (ICRAN), and strengthening the GCRMN Management Group through the inclusion of the Convention on Biological Diversity (CBD) Secretariat.

During winter and spring 2002, data on the status of the world's coral reefs will be compiled from the various sources in the global network of coral monitoring activities for publication in the next *Status of Coral Reefs of the World* report by autumn 2002.

GCRMN South Asia node (India, Maldives and Sri Lanka)

The GCRMN South Asia network of India, Maldives and Sri Lanka, funded by the UK's Department for International Development (DFID), continues its efforts to build national capacity for monitoring the environmental status of reefs and the social and economic conditions of reef-dependent communities, as well as to strengthen and promote the management and more sustainable use of the resources that coral reefs provide.

In spring 2001, the project was evaluated at its mid-term by an independent consultant with the goal of strengthening the effectiveness and sustainability of the network. This included a review meeting held in Male (Maldives) in March 2001 with the participation of the national and regional GCRMN coordinators, project partners, DFID and IOC, in order to assess progress and provide guidance.

The review concluded that the development of national capacities to monitor the biophysical state of coral reefs at selected demonstration sites is progressing well, as is the final development of a regional coral reef database, which will provide environmental and socio-economic coral reef data to regional and local managers and to the global GCRMN data focal point – ReefBase. In addition guidance was provided on how to further develop the capacity for socio-economic data collection and how to better integrate and apply biophysical and socio-economic information in management of natural resources in order to secure more sustained livelihoods for reef-dependent communities. Additional input is being provided to the project to accelerate this process.

Ben Cattermoul, Regional Coordinator for GCRMN South Asia, being interviewed by Sri Lankan radio in Colombo.

In late 2001 Mr. Ben Cattermoul, UK, took over the role as Regional Coordinator for GCRMN South Asia, working from the IOC project office based at IUCN Sri Lanka in Colombo, Sri Lanka. At present the network is increasing its support to various projects and management efforts in the region by providing expertise, information and monitoring infrastructures.

For more information, visit the website: www.ioc.unesco.org/gcrmn,
or contact GCRMN South Asia at reefmonitor@eureka.lk
or IOC (o.vestergaard@unesco.org).

Fisheries at Weligama, Sri Lanka. Healthy coral reefs provide marine resources essential for the livelihoods of many people in tropical coastal areas

Photos: © Ole Vestergaard

E – Land-ocean-atmosphere biogeochemistry: New IOC modelling initiative

This initiative is led by Dr Sybil Seitzinger sybil@imcs.rutgers.edu

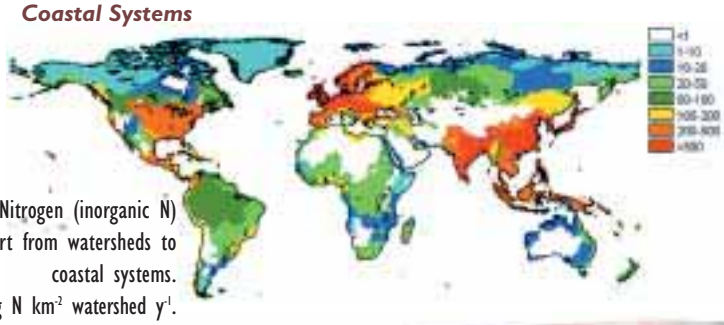
Symbols/abbreviations used in this article:

N = nitrogen
P = phosphorus
Si = silica
NOx = N oxides
N_2 = nitrogen gas

Global patterns of human activities on land and nutrient enrichment of coastal marine ecosystems: current conditions and future projections

Humans have dramatically altered the Earth's nitrogen, phosphorus, and silica cycles resulting in considerable environmental degradation. For example, nitrogen inputs to terrestrial ecosystems have more than doubled since pre-industrial times due to the fixation of N_2 gas into synthetic fertilizers and to the combustion of fossil fuels. A portion of this excess nitrogen (N) applied/deposited in terrestrial ecosystems enters rivers and is transported to downstream coastal ecosystems. As a result, coastal ecosystems worldwide are receiving increased nutrient inputs originating from human activities in their watersheds and airsheds. This nutrient enrichment in coastal ecosystems contributes to numerous environmental problems including increased algal growth, alteration and loss of seagrass habitats, increase in extent and duration of anoxic and hypoxic water, harmful algal blooms, and coral reef degradation, among other effects (NRC 2000[1]). In addition, nutrient enrichment is also increasing the anthropogenic emissions of nitrous oxide, a trace gas in the atmosphere that contributes to global warming and to the destruction of stratospheric ozone.

DIN Export from Watersheds to Coastal Systems



Nitrogen (inorganic N) export from watersheds to coastal systems. Units = kg N km^{-2} watershed y^{-1}. From S.P. Seitzinger and C. Kroeze 1998. Global distribution of nitrous oxide production and N inputs in freshwater and coastal marine ecosystems. *Global Biogeochemical Cycles* 12(1): 93-113.

Nutrient inputs to coastal ecosystems are not evenly distributed globally (see figure below). The uneven spatial pattern is the result of the global distribution of human population, and the activities associated with the production and consumption of food for those people and to support their energy needs.

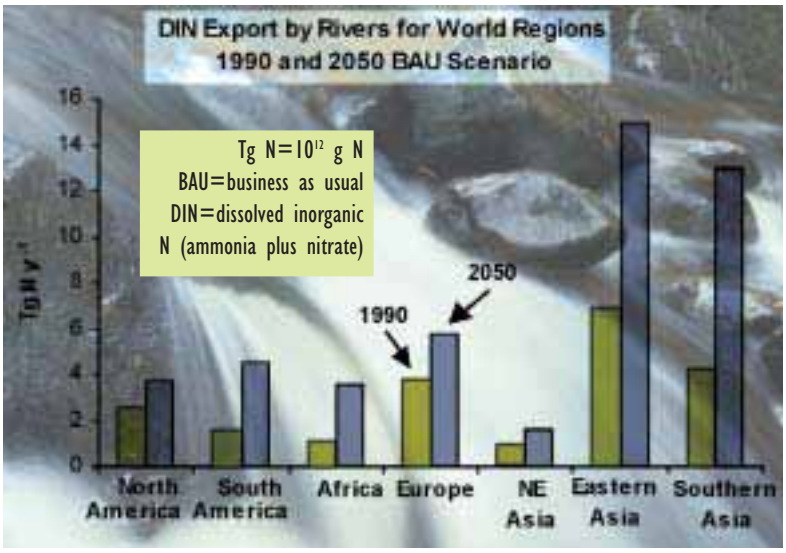
The human population is predicted to increase markedly over the next 50 years in certain world regions, notably southern and eastern Asia, South America, and Africa. Industrialization also is predicted to increase in many of these same world regions. Growing food for the expanding world population will require increased use of nitrogen and phosphorus fertilizers. Increased industrialization, with the associated combustion of fossil fuels and production of oxides of nitrogen (NOx), will result in increased atmospheric deposition of N. Both of these will undoubtedly lead to increased export of N and phosphorus (P) to coastal ecosystems with resulting water quality degradation. For example, inorganic N export to coastal systems is predicted to increase three-fold by the year 2050 from Africa and South America (see following figure). Substantial increases are predicted for Europe (primarily from eastern Europe) and North America. Alarmingly large absolute increases are predicted for eastern and southern Asia; almost half of the total global increased N export is predicted for those regions alone.

[1] USA NATIONAL RESEARCH COUNCIL [NRC Committee on the Causes and Management of Coastal Eutrophication, Ocean Studies Board and Water Science and Technology Board]. 2000. Clean Coastal Waters. *Understanding and Reducing the Effects of Nutrient Pollution.* National Academy Press, Washington, DC, USA, 393 pp.

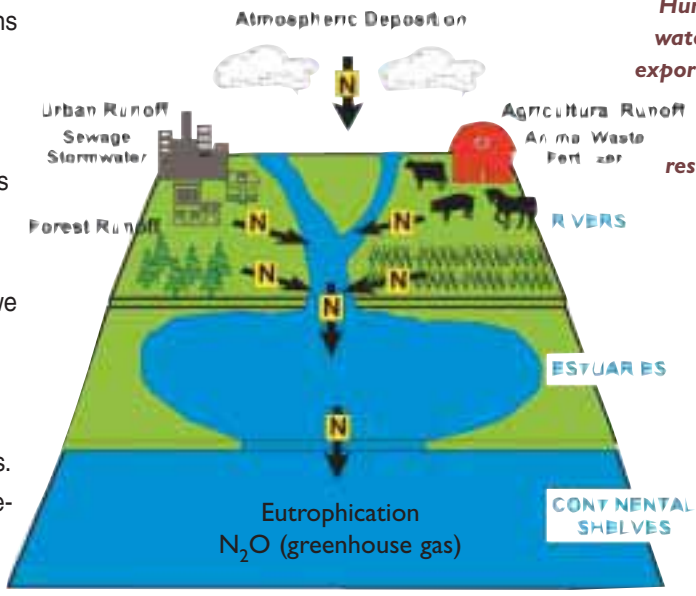
There are a number of international implications of the predicted increases in population and industrialization. First of all, where will the food be grown to feed the large population increases expected in Asia? A number of analyses conclude that a portion of that food will be grown outside of Asia (e.g., North America); thus the environmental effects (e.g., coastal eutrophication, high nitrate concentrations in drinking water) of producing that portion of the food to feed Asia will be transferred to those regions as well. Increased industrialization also has international implications (beyond the production of CO_2), because it results in increased oxides of N in the atmosphere that can be transported long distances and subsequently deposited outside the country of origin, again transferring the environmental effects across international boundaries.

UNESCO-IOC Initiative: The current known and potential future impacts of increased nutrient mobilization on human and ecosystem health and environmental quality warrants further development of spatially explicit global models to forecast (and hindcast) the export of N, P and Si to coastal ecosystems as a function of land-use, human activities and natural processes in watersheds. The IOC is forming a Working Group that will bring together experts in a number of fields to develop the next generation of spatially explicit, global nutrient models. Through the combined efforts of these individuals we hope to make significant new advances in understanding the relationship between human activities and natural processes on land and nutrient inputs to coastal systems. The model(s) developed will be made widely available to UNESCO/IOC member countries and others through the IOC website. This site will contain model output indicating current nutrient export rates and potential consequences for future nutrient export associated with various development/global change scenarios. There are also plans to have this nutrient modelling activity be conducted so that it could be potentially 'layered' within a larger social/policy/economic nitrogen modelling effort that is under consideration by other groups.

The first working group meeting for this new activity is scheduled for May 2002.



Predicted increases in N export to coastal systems by the year 2050. Model predictions from C. Kroeze and S.P. Seitzinger, 1998. Nitrogen inputs to rivers, estuaries and continental shelves and related nitrous oxide emissions in 1990 and 2050: *A global model. Nutrient Cycling in Agroecosystems* 52: 195-212.



Human activities in watersheds increase export of nutrients to coastal ecosystems resulting in coastal eutrophication

F – Working Group on Quantitative Ecosystem Indicators for Fisheries Management

A new joint SCOR/IOC Working Group (WG no. 119), on this topic, is developing theory to evaluate changes in marine ecosystems, both in state and processes, from environmental, ecological and fisheries perspectives. The tasks of the Working Group are to: (i) define generic indicators that can be used in marine environments, single species fisheries or for assemblage of exploited fish populations and marine ecosystems; (ii) formulate these indicators in mathematical or statistical terms; (iii) assess when values of an indicator are meaningful both statistically and/or ecologically (i.e. to test null hypothesis, sensitivity analysis); and (iv) apply these indicators to specific data-sets or using specific multi-species models (such as MSVPA, Ecopath, Ecosim, Ecospace, Osmose) in order to evaluate their usefulness.

NOTE:

Ecopath with **Ecosim** (EwE) system constitutes an ecological software set for PCs, and also represents a modelling approach towards ecosystems management (with EC funding).

Ecopath is a static, mass-balanced snapshot of the system.

Ecosim is a time dynamic simulation module for policy exploration.

Ecospace is a spatial and temporal dynamic module, primarily designed for exploring impact and placement of protected areas.

The first meeting of the Working Group took place in Reykjavik, Iceland (5-6 October), following the FAO conference on Responsible Fisheries in Marine Ecosystems. The conference was attended by 28 members of the working group (photo above).

The meeting established several Task Forces in relation to the terms of reference of the Working Group. Each Task Force will produce a draft discussion paper for the second working group meeting that will be held at the University of British Columbia, Vancouver, Canada in late 2002.

The second meeting of the Working Group is scheduled to take place in Cape Town (South Africa, 4-6 December 2002). Planning has also been initiated for an international symposium on ecological indicators to be held from 31 March to 3 April 2004, at UNESCO Headquarters in Paris. The Working Group plans to publish the proceedings of this symposium in the primary scientific literature, possibly as a special issue of a journal, such as the Journal of Fisheries Oceanography.

The working group has established a website (www.ecosystemindicators.org), which is expected to be a useful media for scientists to communicate. It includes information on the working group's objectives, membership, activities, the report of the first meeting, plans for the next meeting and the international symposium, and a list of readings on the topic of indicators of ecosystem health. The Working Group is co-chaired by Drs Philippe Cury, University of Cape Town (South Africa) and Villy Christensen, University of British Columbia (Canada).

G – Global Ocean Ecosystems Dynamics Programme (GLOBEC)

The Scientific Steering Committee (SSC) for GLOBEC met in Lima, Peru in late May 2001. The report of the meeting is available at the GLOBEC website (http://www.pml.ac.uk/globec/). Lima was selected as a site for the meeting in order to give Peruvian scientists an opportunity to be informed about GLOBEC (co-sponsored by SCOR, IOC and IGBP) and to interact with

GLOBEC SSC members. The meeting included a full day of presentations by GLOBEC and Peruvian scientists (primarily in Spanish) of GLOBEC and GLOBEC-relevant science at the Instituto del Mar del Perú (marine institute of Peru).

The SSC meeting agenda included a review of the activities of all current GLOBEC Focus Working Groups and Regional Programme Groups. The focus groups are responsible for implementing the various scientific components of GLOBEC as follows: Focus 1 on Retrospective Data Analysis; Focus 2 on Process Studies; and Focus 3 on Prediction and Modelling. The SSC agreed to establish a small planning group for the remaining Focus 4 on Feedback from Changes in Marine Ecosystem Structure. The group will develop a position paper concentrating on two case studies: a well-developed case (South Pacific Tuna) and an important, but innovative, case (the Arctic ecosystem). The case studies will trace the pathway: physical/ biological variability ➤ marine ecosystem responses ➤ impacts on human systems.

The regional and functional programmes of GLOBEC are well established. They include: Small Pelagics and Climate (SPACC), Southern Ocean GLOBEC (currently underway with a schedule of cruises to include the southern winter for the first time), the GLOBEC/ICES programme on Cod and Climate Change, and the GLOBEC/PICES programme on Carrying Capacity and Climate Change.

The SSC devoted much attention to planning for the Second GLOBEC Open Science Meeting, which will take place in Qingdao (PR China) in October 2002. Information on this meeting is available at GLOBEC website: http://www.pml.ac.uk/globec/main.htm

It is worth noting that the Focus 1 (Retrospective Data Analysis and Time-Series Studies) Group has been actively fostering cooperation between the Climate Change and GLOBEC researchers. To this end, an article is being prepared for the *GLOBEC Newsletter* providing problem-oriented examples that could benefit from collaborative CLIVAR/GLOBEC research. This working group hosted a workshop on 'Climate, Ecosystems and Fisheries in the Pacific: Seeking Fresh Approaches to Key Research Issues,' in Honolulu, Hawaii, in November 2000. A review paper is being developed that describes the value of, and the extra information gained from, long-time series data.

H – Use of Environmental Indices in Management of Pelagic Fish Populations

An IOC/GLOBEC-SPACC Study Group is addressing this topic. The Small Pelagics and Climate Change (SPACC) is a regional project of the Global Ocean Ecosystem Dynamics (GLOBEC) Programme and is concerned with how climate change may influence the productivity of small pelagic fish populations. The management of these stocks is severely handicapped because the mechanisms by which the environment influences population sizes are largely unknown. There is substantial environmental and fisheries related data available for many of the upwelling regions of the world. It is the purpose of this joint Study Group (SG) to examine those data, pertinent publications and other information in terms of elucidating relationships and ultimately indices that can be reliably used for managing these important fish stocks. Specifically targeted regions include upwelling regions off the west coast of Africa, South America, North America, Iberian Peninsula, and in the

Kuroshio/Oyashio currents where the very large fluctuations of clupeid fish stocks. The activity is a part of IOC's efforts to address environmental variability and ecosystem change in relation to the management and sustainable use of the marine environment. According to its terms of reference, the Group intends to:

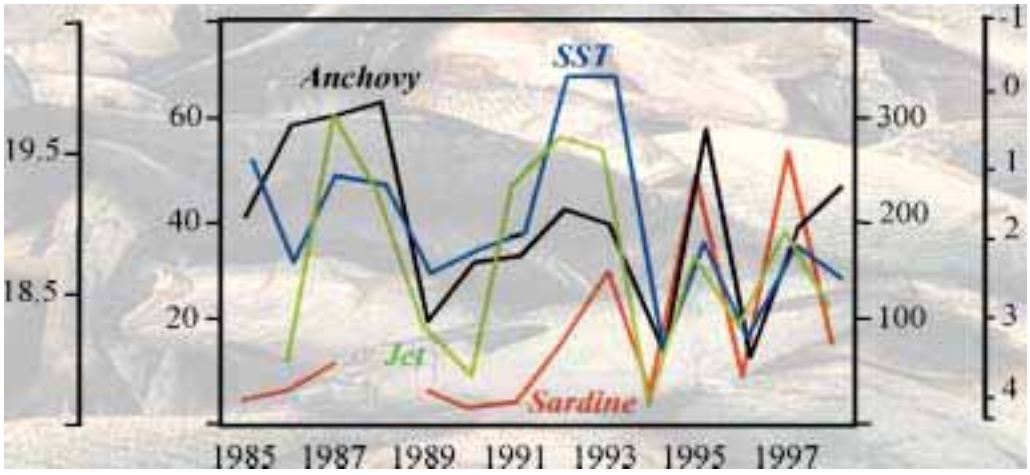
(i) provide a comprehensive review of the use of environmental indices (EI) as hindcasting/nowcasting and forecasting tools of the fluctuations of pelagic fish in selected areas;
(ii) develop a scientific framework to understand the linkages between environmental variables and pelagic fish fluctuations, at relevant spatial and temporal scales;
(iii) investigate the requirements to incorporate environmental indices into stock assessment models and operational management procedures; and
(iv) propose a set of environmental variables of use in the management of pelagic fish populations to be included in local and global monitoring programmes.

The first meeting of the joint Study Group (SG) was held at the Marine and Coastal Management Research Aquarium, Beach Rd, Cape Town, South Africa, 3-5 September 2001. In this first meeting the SG attempted to address the first three ToR, and drafted a plan of activities of the SG for the next 12 months to ensure that a response to the four terms of reference can be provided after the second meeting of the SG in 2002.

The report provides excellent summaries for: South African anchovy and sardine, Pacific sardine and northern anchovy, Peruvian anchoveta, Chilean pelagics, Northwest Pacific pelagics, Bay of Biscay pelagics, Sardine ICES Area IXa+VIIIc, Clupeids in the Baltic Sea, and the Black Sea stocks. It is expected that analyses on these stocks may bring information on other stocks forward for similar treatment.

The full text of the meeting report is available at the website http://www.pml.ac.uk/globec/ as *GLOBEC Special Contribution No.5*, 122 pp.

The meeting noted that of the 18 stocks considered, six are managed utilizing environmental information. These stocks are the: Californian anchovy and sardine; Peruvian anchovy (anchoveta); Japanese sardine; Brazilian sardine; and Baltic herring in the



Relationship between South African anchovy and sardine recruitment, Sea Surface Temperature (proxi for upwelling intensity) and a 'Jet index' (proxi for equatoward transport). The former estimated from acoustic surveys, the latter from satellite information. Courtesy of Claude Roy (IRD, Cape Town, South Africa).

Gulf of Riga. In some additional cases environmental information has been occasionally used, but not on a regular basis, (e.g. Bay of Biscay anchovy), or has been abandoned due to cutbacks in monitoring efforts (e.g. Black Sea stocks).

Specification of the underlying environmental processes, dominating in each case, appears to be a necessary step in order to complete the review and utilize the compiled information (e.g. common processes identified). The Group will consider the pattern of seasonal and inter-annual variation in sea-surface temperature and in wind-driven Ekman upwelling, based on alongshore wind speed, and will determine the level of association of these environmental variables with patterns of variability in growth and recruitment. A simulation analysis will be conducted to evaluate the benefits of using environmentally linked recruitment predictors in the management of anchovy stocks. A subgroup of the SG agreed to collaborate in an analysis of the synchrony and variability in production rates in stocks with long time series of data (e.g. Japanese sardine, California sardine, Peruvian anchoveta and California anchovy). This work will involve exploring density-dependent effects and variations in production versus variations in regional and global environmental time series. The group will try to quantify the degree of synchrony between proximate versus remote fish populations, preferentially using estimates of surplus production and recruitment.

The Study Group will conduct these activities through electronic mail, and will have its second meeting in December 2002 in Paris. Dr Manuel Barange, the Executive Director of GLOBEC Programme, is the convenor of the Study Group.

© Mirko Zanni, Festival Mondial de l'Image, Antibes, 2001 (see page 132)

I – Training-through-Research programme

The Training-through-Research (TTR) programme employs an innovative concept that directly interlinks the two major components of science education. TTR provides a dual but complementary function: (i) shipboard training of young scientists (including advanced students) specializing in ocean geosciences and (ii) providing for the advancement, through research, of general scientific knowledge concerning sea-bottom processes, structure and history. Carried out during recent years under IOC's crosscutting TEMA (Training, Education and Mutual Assistance in the marine sciences) programme, TTR's research component has now become part of the new IOC Ocean Sciences Programme.

In 2001, the TTR strategy was applied during the major international TTR-11 cruise on board the R/V *Professor Logachev* (Russia) from 25 July to 3 September in the Mediterranean-Black Sea Region and in the Northeast Atlantic. Participating in the cruise was an international team (67 in number) consisting of scientists and post- and undergraduate students from 13 countries (Belgium, Brazil, Georgia, Greece, France, The Netherlands, Portugal,

Drs Neil Kenyon, TTR Coordinator, and Lisa McNeill (both UK) discuss North Aegean Sea seismic data with students on board the R/V *Professor Logachev* (TTR-11 cruise).


Photo: © E. Kozlova

Russia, Spain, Turkey, UK, the Ukraine and USA). The cruise objectives were to: (i) study sea-floor processes, such as bottom current activity, slope processes, mud volcanism, neotectonics, geosphere-biosphere interaction etc. and (ii) train students in marine geoscience research. High-level on-the-job training of students and young scientists was accomplished through daily seminars, lectures and discussions on the data collected.

Prof. Jose Monteiro (Portugal), with students, examining ferro-manganese nodules sampled from sea mountains off Madeira Island (TTR-11 cruise).

The wide variety of research methods used on board also contributed to the multi-disciplinary nature of training. For example, near-bottom TV observations assisted students in understanding sea-floor processes. Some examples of TTR research findings follow.

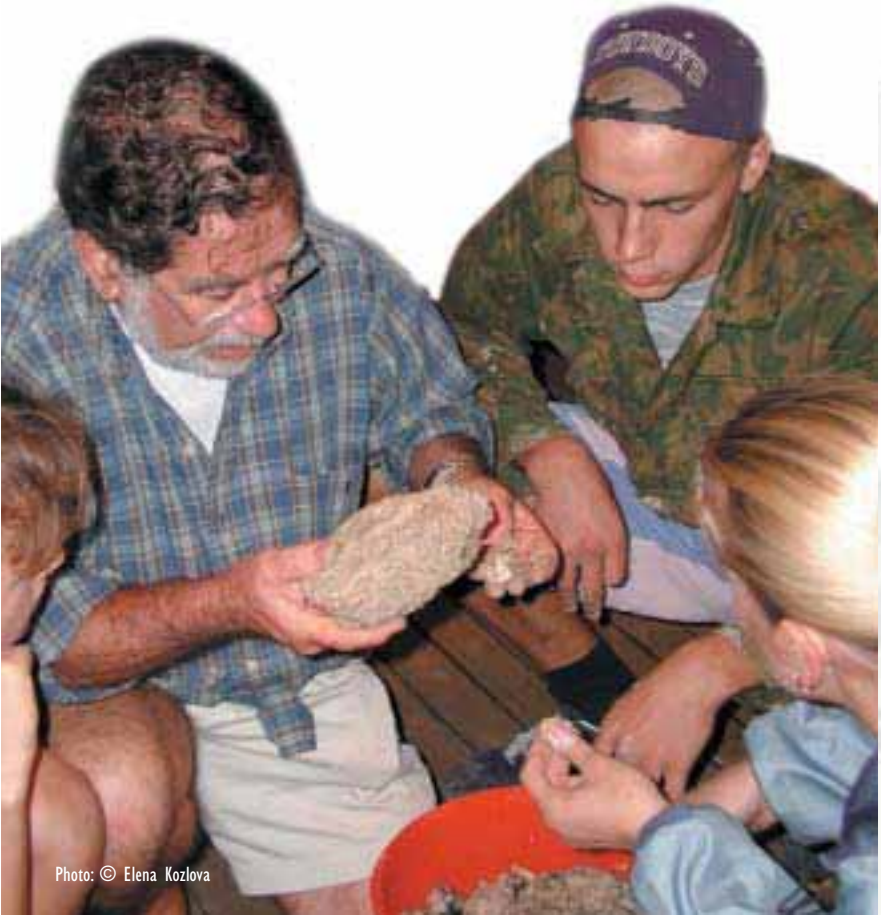


Photo: © Elena Kozlova

In the Black Sea, structures that control fluid discharge (e.g. faults on the continental margin and mud volcanoes in the central part of the sea) were studied in detail and massive methane hydrates were sampled in the areas of fluid venting. In the North Aegean Sea, the westward extension of the North Anatolian Fault towards central Greece (responsible in 1999 for two destructive earthquakes east of Istanbul) was investigated. A model was proposed for the distribution of trans-tensional deformation within the eastern North Aegean. In the Gulf of Valencia, a detailed mapping of large debris flow on the Ebro continental slope provided a better understanding of the main pathways and processes of sediment transport to the deep-water part of the Balearic Basin. The Gulf of Cadiz (intensively studied during the TTR-9 and 10 cruises) was revisited. Detailed investigations of structures related to gas discharge from the geosphere to hydrosphere were carried out. The most impressive result of the survey is the recognition of the fact that carbonate build-ups, known to exist in the area from limited dredging data obtained by Spanish scientists in 2000, are very widespread in this region and form extensive fields of massive carbon crusts and chimneys. This unusual phenomenon needs further investigations. The final part of the cruise was devoted to investigations of seamounts in the vicinity of the Madeira Islands. A large field of ferro-manganese nodules and very thick crusts located at the unusual depth of 1700-1900 metres were discovered.

International networking and co-funding constitute the backbone of TTR and a source of its strength. In addition to IOC's sponsorship, many countries contributed to the success of the 2001 cruise. For example, the Turkish

Government contributed with the provision of free passage through the Strait of Bosphorus and free port call in Istanbul. All the contributions are sincerely acknowledged. The overall conclusion by the TTR-11 cruise participants was that in 2001 the Training-through-Research programme carried out very successful field operations.

After the cruise, the participants analyzed the resulting new data – in their respective universities as well as by way of exchanges. Thus the impact of onboard training continued to be felt in research laboratories. In 2001, over 50 research papers were prepared on subjects of the TTR investigations.

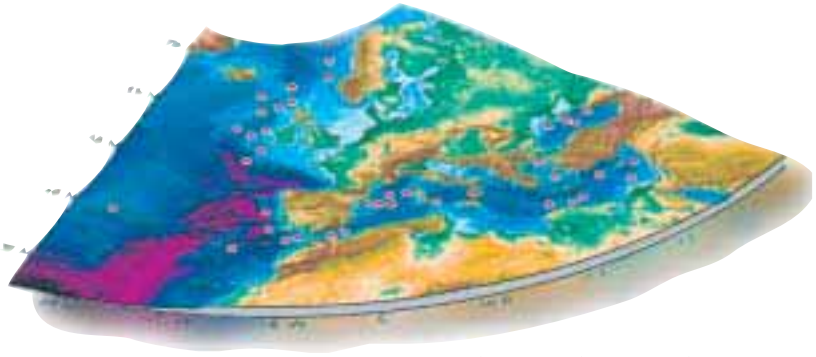


Image: A. Akhmetzhanov, SOC, UK

European continental margins and marginal seas: areas (red dots) of the TTR research since 1991.

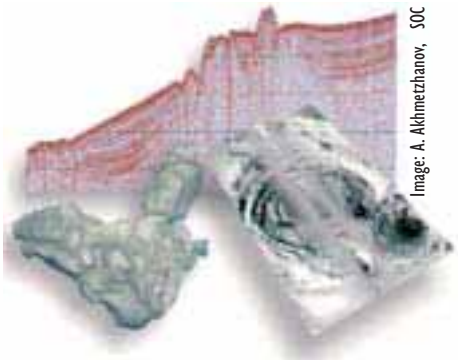


Image: A. Akhmetzhanov, SOC

Mud volcanism (seismic profile and side-scan image) and related gas hydrate occurences (bottom left of image) are among subjects of primary TTR research interest.

Towards the Geosphere-Biosphere Coupling programme

For over 10 years, some of the major areas of TTR study have concentrated on focused fluid and gas discharge from the seafloor into the hydrosphere, the composition of organic matter and hydrocarbon gases entrapped in sediments and carbonate crusts associated with fluid seeps on the sea floor, as well as microbial activity and its relation to focused fluid inflow. The study seeks to define the probable source of such fluid as well as to obtain a better understanding of the interaction between deep-formed hydrocarbons and subsurface sediments, which lead to gas hydrate accumulations and the formation of deep-water specific environments and ecosystems. Fluids discharging from the geosphere contribute to the global carbon cycle, as well as to climate change. TTR has organized a number of international meetings devoted to the above problems, e.g. 'Gas and Fluids in Marine Sediments' (1997), 'Geosphere-Biosphere Coupling' (1998); these subjects have also been discussed at other annual TTR conferences. One of the sections of a post-cruise meeting and international conference on 'Geological Processes on Deep-water European Margins' (January-February 2001, Moscow), with over 70 participants, was specifically devoted to the biosphere-geosphere interaction. The results have been published as *IOC Workshop Report* No. 175 (2001). At the 21st Session of the IOC Assembly (2001), a guest lecture was given by Prof. Luis Pinheiro (Portugal) on TTR research related to coupling processes between the geosphere, hydrosphere and biosphere.

It is on this basis that IOC, after restructuring its Ocean Sciences Programme, decided to invite TTR to consider becoming a core element for a future research programme on the Geosphere-Biosphere Coupling. The TTR Executive Committee discussed the subject in detail at its November 2001 meeting (UNESCO, Paris) and recommended that further discussions take place at the TTR conference on the 'Geosphere/ Biosphere/ Hydrosphere Coupling Processes, Fluid Escape Structures and Tectonics at Continental Margins and Ocean Ridges' (30 January to 2 February 2002, Aveiro University, Portugal).

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J – International Ocean Colour Coordinating Group

The International Ocean Colour Coordinating Group (IOCCG) was established in early 1996 to act as a liaison and communication channel between users, managers, and agencies in the ocean colour arena. The group aims to: (i) promote international cooperation in the distribution and use of ocean colour data; (ii) broaden the user community for ocean colour data, particularly in developing countries, through training courses and workshops; (iii) develop a consensus among users on key issues related to satellite ocean colour science and technology; (iv) organize workshops to resolve relevant issues; and (v) encourage the formation of an international calibration and validation network for ocean colour. IOCCG is sponsored by the major space agencies (NASA, NASDA, CNES, ESA, and EC) and other governmental or intergovernmental agencies, including NOAA, IOC, or universities that use or provide ocean colour data.

IOCCG continues to maintain a website (www.ioccg.org) that has proven to be invaluable to the ocean colour science community. Links were established on the IOCCG website to various in situ chlorophyll data sets. There were some overlaps between the various archives and a 10-year time lag between the time of data collection and storage in the database. Nevertheless, the data are extremely valuable for those trying to blend satellite data with in situ data.

At its meeting in January 2001, IOCCG reviewed the status of existing ocean colour satellite instruments and their products, as well as plans for new instruments. It also discussed plans for various publications arising from its activities, such as the report of a working group on ocean colour sensor calibration, to be entitled 'Calibration of Ocean-Colour Sensors to Common Standards.' Once again, IOCCG expressed its serious concern about the lack of planning for ocean colour observations after 2005 and will communicate this concern to various space agencies.

IOCCG will examine various aspects of operational ocean colour measurements through a new working group. The goals would be to promote the use of near real time (NRT) ocean colour products and to examine issues such as the problems associated with NRT acquisition, processing, distribution and storage of ocean colour data and products; expansion of an operational ocean colour user base; interagency differences in products; the role of operational versus science providers of ocean colour data; and the development of instruments and techniques for validating regional bio-optical algorithms.

A IOCCG training course on 'Ocean Colour: Techniques and Applications' was held in cooperation with the Indian Space Research Organization (ISRO) which continued the IOCCG tradition of offering at least one such event per year. Nine foreign and ten Indian scientists attended this training course. The lecturers included Drs Neumann, Platt, and Sathyendranath, as well as several local faculty members. The training programme included formal lectures on various aspects of ocean colour as well as hands-on experience in processing satellite ocean colour data, with an emphasis on data from the Indian OCM sensor. Such training courses meet a real need in the user community and also help to facilitate liaison and cooperation between students from various developing nations.

Marine science for Integrated Coastal Area Management 1.4

The objective of the IOC's Integrated Coastal Area Management (ICAM) Programme is to assist Member States in their efforts to build marine scientific and technological capabilities in the field of integrated coastal area management as a follow-up to UNCED, Agenda 21, Chapter 17. The Programme intends to help ensure that marine sciences are integrated into the development of national and regional ICAM programmes and plans, and assists through the exchange of experiences to develop a transectorial decision-making process and their corresponding institutions for the sustainable development of coastal areas.

Following a decision of the IOC Executive Council (33rd Session, Paris, June 2000), the second meeting of the Advisory Group of Experts on Integrated Coastal Area Management was convened at UNESCO Headquarters from 15-16 May 2001. The objectives of the meeting were to: (i) review and evaluate the progress and functionality of the Programme against expected programme outputs; (ii) review the role the of IOC/ICAM in relation to other programmes of IOC (OSP, GOOS, IODE); (iii) advise IOC on the implementation of key components of the Programme (in particular, training activities and the development of indicators for ICAM); and (iv) identify recommendations for future activities of the Programme, including cooperation with other international organizations, academic institutions and donor agencies. The report of the meeting is available on the IOC/ICAM website at: http://ioc.unesco.org/icam/

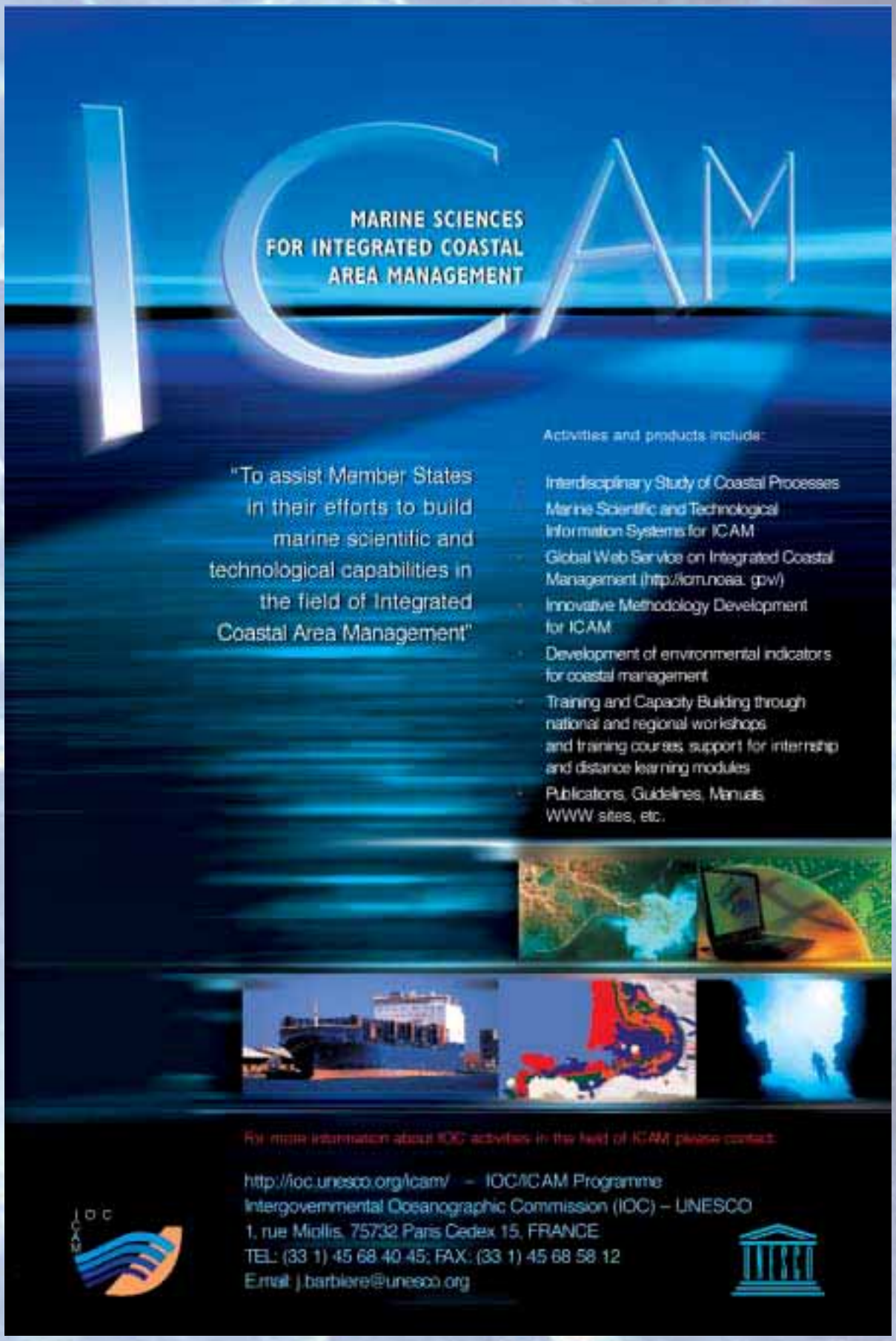
The following ICAM-related activities were implemented in 2001.

COASTS Synthesis

In 2001, the COASTS project was implemented through the organization of the second COASTS Workshop (Paris, 8-11 August). The goals of the project are to develop the scientific and technical basis necessary for the management and health of the coastal seas. The purpose of this study is to lay the groundwork needed for an overview and synthesis of the interdisciplinary global coastal ocean science (physical, biological, chemical and sedimentological). This will be done in the same spirit in which the physical synthesis was accomplished, which was published in 1998 as two volumes of *The Sea*: Volume 10 – *The Global Coastal Ocean: Process and Methods*, and Volume 11 - *The Global Coastal Ocean: Regional Studies and Synthesis*. In order to launch the 'COASTS Synthesis', a scientific workshop was organized in Paris and attended by 60 high-level scientists. The Synthesis, to be published in 2003, will encourage and facilitate coastal and shelf ocean sciences and technology on a global basis, as well as improve capabilities to carry out such studies. The workshop was co-sponsored by SCOR and the USA's Office of Naval Research (ONR).

New ICAM methodological manual

Following the first Methodological Guide on Integrated Coastal Management published by IOC in 1997, a second methodological manual was published in 2001, entitled *Steps and Tools towards Integrated Coastal Area Management*. Since the first


ICAM
MARINE SCIENCES
FOR INTEGRATED COASTAL
AREA MANAGEMENT
"To assist Member States in their efforts to build marine scientific and technological capabilities in the field of Integrated Coastal Area Management"
Activities and products include:
Interdisciplinary Study of Coastal Processes
Marine Scientific and Technological Information Systems for ICAM
Global Web Service on Integrated Coastal Management (http://iom.nodc.noaa.gov/)
Innovative Methodology Development for ICAM
Development of environmental indicators for coastal management
Training and Capacity Building through national and regional workshops and training courses; support for internship and distance learning modules
Publications, Guidelines, Manuals, WWW sites, etc.
For more information about IOC activities in the field of ICAM please contact:
http://ioc.unesco.org/icam/ – IOC/ICAM Programme
Intergovernmental Oceanographic Commission (IOC) – UNESCO
1, rue Miollis, 75732 Paris Cedex 15, FRANCE
TEL: (33 1) 45 68 40 45; FAX: (33 1) 45 68 58 12
E-mail: j.barbiere@unesco.org

edition was mainly focused on the use of natural science tools, more specifically the process of building up an information system, the 2001 edition emphasizes and integrates the socio-economic aspects within the ICAM process. The ICAM planning steps and cycle are described and analysed in detail through a number of selected case studies with practical recommendations for ICAM operators and managers. The second Manual was developed through the work of a group of French scientists and experts from IFREMER, IRD, CIRAD, the Conservatoire du Littoral, and the Universities of Perpignan, Brest and Montpellier, supported by the French National Committee for IOC. The guide is available in English, French and Spanish languages (see illustration p. 39).

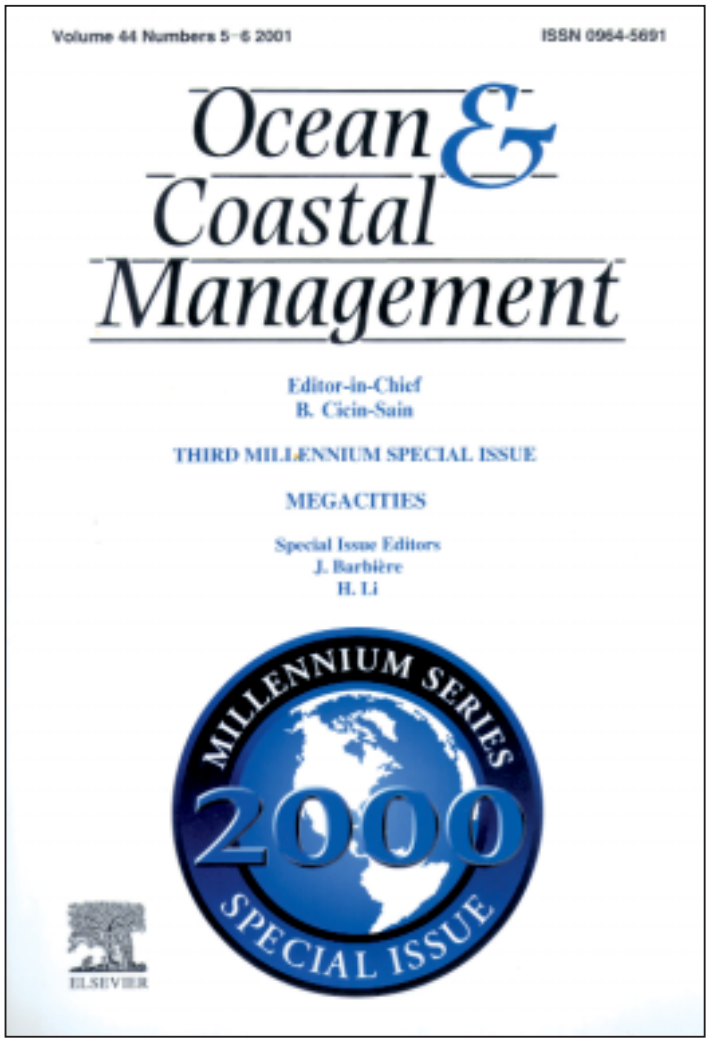
Following the IOC-SOA Workshop on Coastal Megacities (Hangzhou, China, September 1999), a Third Millennium special issue, on Megacities, of the journal *Ocean and Coastal Management* was published in June 2001, presenting a selection of papers from the Hangzhou Workshop (see adjacent illustration).

Cooperation with LOICZ of IGBP

IOC/ICAM has continued its strategic alliance with LOICZ of IGBP, with a specific emphasis on the LOICZ Basins Project. The Basins Project seeks to evaluate the role of catchment basins in the cycling of nutrients, sediments and water in coastal areas and to develop indicators of environmental change and sustainability. This project is implemented through a series of regional assessments.

In accordance with the recommendations of the 4th LOICZ Open Science Meeting (Bahía Blanca, Argentina, 1999), to include island-dominated regions in the global assessment of river catchment – coast interaction (under the Basins Project), a CariBas core group, supported by LOICZ and IOC/ICAM, held its synthesis meeting at the Rosenstiel School for Marine and Atmospheric Science (Miami, USA, June). Key investigators (mainly from the CARICOMP network) evaluated natural and human-induced flux changes in the coastal seas as well as impacts and critical loads in this heterogeneous area, which includes islands and continental mountainous countries.

Supported by START/NORAD and IOC/ICAM and hosted by UNEP's Regional Office for Africa in cooperation with the Pan-African START Secretariat (PASS), the second LOICZ AfriBasins workshop took



place in Nairobi, Kenya (29 October – 2 November). Two working groups (western and eastern coasts) identified coastal change and river catchment-based forcing of change in eight sub-regions by considering coastal geomorphology, coastal habitats/biodiversity, climatic conditions, people relationships (demography and other socio-cultural drivers), catchment size and seasonal runoff, land use and cover. A second task was to use this assessment to identify potential demonstration sites for future holistic studies on coastal change and human dimensions. For this purpose 'hot spots', important for future research evaluation and a project design applicable to various spatial and temporal scales, had to be identified. The workshop concentrated on the draft 'AfriCat' proposal, which was modelled after the ongoing 'EuroCat' project. The emphasis was on adjustment of this project draft to the African regional needs and case studies – a process that is continuous. In close co-operation with IOC and the Advisory Committee on the Protection of the Sea (ACOPS), results of this LOICZ effort complement the development of a set of African projects to be established through the Partnership Conference in Johannesburg (South Africa) in 2002.

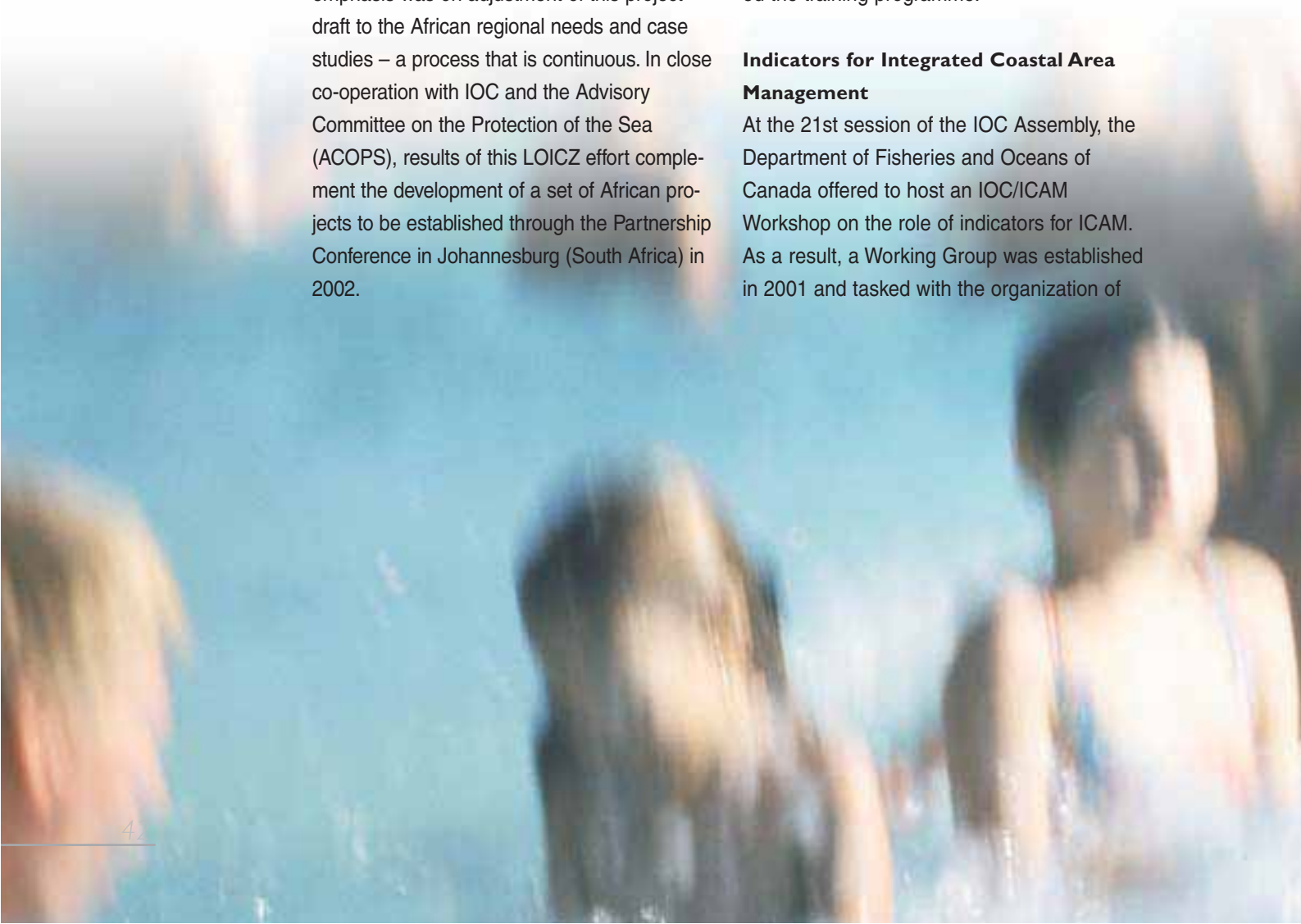
IOC/ICAM also supported the 2nd South American Basins (SAMBAS-II) Workshop, held in Fortaleza, Brazil, 1-3 May 2001.

MAMCOMP-2001

In cooperation with the Regional Organization for the Protection of the Marine Environment (ROPME), IOC organized the Training Programme in Modelling and Monitoring of Coastal Marine Processes (MAMCOMP-2001) in Al Ain, United Arab Emirates, 3-8 November. MAMCOMP 2001 focused on the following themes: coastal marine pollution, land-based activities and hydrological aspects; characterization of waste waters; environmental fluid mechanics; coastal transport models; storm surges and coastal flooding; environmental hazards; and integrated coastal management. Forty participants from ten countries of the IOCINDIO region attended the training programme.

Indicators for Integrated Coastal Area Management

At the 21st session of the IOC Assembly, the Department of Fisheries and Oceans of Canada offered to host an IOC/ICAM Workshop on the role of indicators for ICAM. As a result, a Working Group was established in 2001 and tasked with the organization of



the workshop. The main objective of the meeting, planned to take place in Ottawa in May 2002, is to improve the design and use of indicators pertaining to coastal management, focusing on the interaction of local ecosystem and socio-economic organization. In particular, the group is looking at the application of environmental, socio-economic and performance indicators for ICAM.

Coastal Zone '01 Conference

Once again, IOC attended and provided support to this biennial global ICAM conference, taking place this year in Cleveland, Ohio, USA (16-19 July 2001). IOC organized an international training workshop on Integrated Coastal Management (ICM), with a special focus on Science and Marine Protected Area (MPA) Management. This workshop was sponsored by IOC, NOAA and the Coastal Resources Center (University of Rhode Island), and was attended by 60 international participants including scientists, administrators, practitioners, and local community and NGO representatives. During the Coastal Zone Conference, a special session on coastal urbanization, with specific case studies from large African cities, was organized by IOC/ICAM. Six participants were sponsored to attend the conference and training workshop.

Sub-marine Groundwater Discharges (SGD) Project

As a result of the first SCOR-LOICZ-IOC-IHP inter-comparison experiment on SGD processes (Perth, Australia, November), the project's Steering Committee met in Catania, Sicily (Italy, 11-15 June) to present and assess the results of the field experiment and to discuss cooperation with other projects such as the IAEA-Coordinated Research Project 'Application of Isotopic Methods to Understand Groundwater-Seawater Interactions in the Coastal Zone' in the Mediterranean. During the meeting, Long Island (New York state, USA) was selected as the second site for the international SGD experiment. The Committee also agreed to develop a short document, to be published in 2002, presenting the SGD process and its implications for ICAM.

Ocean Sciences Programme participation in 2001 events

Event	Staff*	Venue	Dates
CLIVAR Pacific Sector Implementation	AA	Hawaii, USA	22-25 January
IOC Study Group on Benthic Indicators, 3rd meeting	OV	Charleston, SC, USA	28 Feb. – 3 March
ICES-IOC-SCOR Study Group on GEOHAB Implementation in the Baltic	HE	Dublin, Ireland	11–12 March
IOC-ICES Working Group on Harmful Algal Bloom Dynamics	HE	Dublin, Ireland	12-16 March
GEF-ACOPS-IOC Second Meeting of the Working Group on Integrated Problem Analysis (WGIPA-II)	JB	Mombasa, Kenya	14-18 March
1st Evaluation meeting of Phase II of the GCRMN South Asia Node	OV	Male, Maldives	27-30 March
OOPC-VI	AA	Melbourne, Australia	2-5 April
IOC Study Group on Coral Bleaching and Related Indicators of Coral Reef Health, 1st meeting	OV	Paris, France	9-11 April
LOICZ-IOC South American Basins (SAMBAS-II) Workshop	JB	Fortaleza, Brazil	1-3 May
GEOHAB Scientific Steering Committee Meeting	HE	Shanghai, PR China	2-6 May
33rd Liège Colloquium	UU	Liège, Bruxelles	7-11 May
Advisory Group of Experts on Integrated Coastal Area Management	JB	UNESCO, Paris	15-16 May
OOPC-CLIVAR-COOP-POGO Time Series Observatory Pilot Project	MH	Woods Hole, Mass., USA	21-23 May
GLOBEC Scientific Steering Committee	UU	Lima, Peru	23-26 May
GCRMN South Asia, 1st LogFrame revision	OV	Paris, France	27-28 May
Joint WHO-UNEP-ROPME Consultation for Planning the Preparation of the Water Quality Guidelines for Desalination	HE	Manama, Bahrain	28-31 May
3rd International Conference on Marine Pollution and Ecotoxicology	UU	Hong Kong (PR China)	10-14 June
SCOR-LOICZ-IOC-IHP Working Group on Submarine Groundwater Discharges in the Coastal Area	JB	Catania, Italy	11-15 June
WOCE-JGOFS Ocean Transports Workshop	MH	Southampton, UK	25-29 June

Event	Staff*	Venue	Dates
GESAMP Intersecretariat Meeting	UU	London, UK	28-29 June
Coastal Zone Conference (CZ-01) + Pre-Conference Training Workshop on Science for Management	JB	Cleveland, Ohio, USA	15-19 July
GCRMN South Asia, 2nd LogFrame revision	OV	Exeter, United Kingdom	16-17 July
IOC-Danida Training Workshop on Harmful Algae, University of Copenhagen	HE	Copenhagen, Denmark	6-17 August
COASTS Workshop	JB	UNESCO, Paris	8-11 August
GESAMP XXXI	UU	New York, NY, USA	13-17 August
2nd IOC WESTPAC-HAB Strategy Workshop / Fifth IOC/WESTPAC International Scientific Symposium, Seoul National University	HE	Seoul, R. of Korea	30 August
IOC-GLOBEC Study Group 1st Meeting	UU	Cape Town, S. Africa	3-5 September
CLIVAR Tropical Atlantic Variability Workshop	AA	Paris, France	3-6 September
CLIVAR Atlantic Basin Panel Meeting	MH	Paris, France	7-8 September
GEF-ACOPS-IOC Third Meeting of the Working Group on Integrated Problem Analysis (WGIPA-III)	JB	Cape Town, South Africa	11-13 September
Feasibilty Study for Global Assessment of the Marine Environment Process	UU	Reykjavik, Iceland	12-14 September
GEF-ACOPS-IOC First Meeting of the Working Group on the Programme of Intervention (WGPI-I)	JB	Cape Town, South Africa	14-15 September
4th meeting of the Steering Committee/Preparatory Committee of the African Process	JB	Cape Town, South Africa	17-18 September
IGOS Integrated Global Carbon Observation Theme Team Meeting	MH	Paris, France	20-21 September
36th CIESM Congress	UU	Monte Carlo, Monaco	24-28 September
FAO Conference on Responsible Fisheries in the Marine Ecosystem	UU	Reykjavik, Iceland	1-4 October
IOC-SCOR Working Group on Quantitative Indicators for Fisheries Management	UU	Reykjavik, Iceland	5-6 October
IOC Workshop on Census of Marine Life in South Asia	OV	Phuket, Thailand	10-12 October 2001
WOCE Analysis, Interpretation, Modelling and Synthesis (AIMS) workshop	AA	Fukuoka, Japan	16-22 October

EVENT	STAFF*	VENUE	DATES
Joint IAPSO-IABO Assembly	UU	Mar del Plata, Argentina	21-26 October
GCRMN South Asia – IUCN – Ministry of Fisheries, Sri Lanka: Protection and Management of Coral Reefs in South Asia	OV	Colombo, Sri Lanka	26 October
SCOR Executive Committee	UU	Mar del Plata, Argentina	29-30 October
Second LOICZ-IOC AfriBasins Workshop	JB	Nairobi, Kenya	29 Oct.-2 Nov.
IOCEA Workshop on Harmful Algal Blooms, University of Accra	HE	Accra, Ghana	29 October – 2 November
Training Programme in Modelling and Monitoring of Coastal Marine Processes (MAMCOMP-2001)	JB	Al Ain, United Arab Emirates	3-8 November
2nd International APEC-IOC Conference on Harmful Algal Management and Mitigation	HE	Qingdao, PR China	12-16 November
TTR Executive Committee meeting	UU, MH	Paris, France	17 November
IGBP-SCOR the Future Ocean Biogeochemistry	UU	Barcelona, Spain	1 December
Global Conference on Oceans and Coasts at Rio+10	JB	UNESCO, Paris	3-7 December
GCRMN South Asia, 3rd LogFrame revision and Task Planning	OV	Paris, France	6-8 December
IOC Study Group on Benthic Indicators, 4th meeting	OV	Tele-conference	11 December

***Staff members' initials**

AA: Arthur Alexiou; JB: Julian Barbière; HE: Henrik Enevoldsen; MH: Maria Hood; UU: Umit Unluata; OV: Ole Vestergaard.

IOC Ocean Sciences Programme (OSP) activities with capacity-building (TEMA) components in 2001

Activity	Host Country	Date	Sub-programme	M	F	RP* US$k	EB** US$k	CF*** US$k	Scope/countries of participants
Global Coral Reef Monitoring Network (GCRMN), South Asia component, Socio-Economic Monitoring Training Workshop, Vaavu Atoll	Maldives	Jan.	OSP	6	4	0	7k		National/Maldives
Global Coral Reef Monitoring Network (GCRMN), South Asia component, Socio-Economic Monitoring Training Workshop, Wandoor, Andaman Islands	India	Feb.	OSP	5	13	0	12k		National/India
IOCCG/Training Courses on Ocean Colour and Remote Sensing	India, Indonesia and S. Africa	Feb./Nov./ Dec.	OSP	n	n	10k		60k	India, Bangladesh, Canada, Iran, Philippines, Sri Lanka, Tanzania, Thailand, and Vietnam; Cambodia, Indonesia, Korea, Malaysia, Myanmar and Philippines; Kenya, Namibia, Madagascar, Comores, Angola, South Africa, Argentina
Fifth IOC/WESTPAC Training Course on Ecology and Physiology of Harmful Algae Chulalongkorn University and Burapha University	Thailand	March	OSP/HAB/ WESTPAC	10	3	0	20k Japanese Trust Fund		SE Asia/PRC, Indonesia, R. Korea, Philippines, Russia, Malaysia, P.D.R. Korea, Thailand, Singapore, Vietnam
Curso sobre Programas de Seguimiento de Fitoplancton Toxico y Ficotoxinas Marinas según las directivas Europeas	Spain	June	OSP/HAB	5	5	0	25k		Latin America/Chile, Costa Rica, Ecuador, Guatemala, Honduras, Mexico, Venezuela, Angola
Global Coral Reef Monitoring Network (GCRMN), South Asia component, Coral Reef Database Training Workshop, National Aquatic Research Agency, Colombo	Sri Lanka	July	OSP	6	2	0	3k		National/Sri Lanka
Global Coral Reef Monitoring Network (GCRMN), South Asia component, Coral Reef Database Training Workshop, Marine Research Center, Male	Maldives	July	OSP	5	1	0	3k		National/Maldives
The 8th IOC-DANIDA Training Course on the Biology and Taxonomy of Harmful Marine Microalgae, University of Copenhagen	Denmark	August	OSP/HAB	4	8	10k	25k		Global/Nigeria, China, Jamaica, Brazil, Canada, Russia, Malaysia, UK
Global Coral Reef Monitoring Network (GCRMN), South Asia component, Coral Reef Database Training Workshop, Zoological Survey of India, Chennai	India	Sept.	OSP	11	0	0	10k		National/India
Joint IAPSO/IABO Assembly (Support to participants)	Argentina	October	OSP	n	n	15k		200k	Croatia, Chile, China, India, Mexico, Nigeria, Russia, Slovenia, Turkey, Uruguay, Brazil
Regional IOCEA Training Workshop on Harmful Algae in West African Coastal Waters, University of Ghana	Ghana	October-November	OSP/HAB	14	3	2k	5k		West Africa/Ghana, Togo, Nigeria, Benin, Sierra Leone, Côte d'Ivoire, Senegal, Namibia

OTHER CAPACITY-BUILDING ACTIVITIES WITH IOC SUPPORT

Activity	Host Country	Date	Sub-programme	M	F	RP* US$k	EB** US$k	CF*** US$k	Scope/countries of participants
TTR cruise	Russia	25 July to 3 Sept.	OSP/TTR	42	25	15k		240k	Belgium, Brazil, Georgia, Greece, France, Netherlands, Portugal, Russia, Spain, Turkey, Ukraine, United Kingdom, United States of America
UNESCO Chair in Marine Geosciences	Russia	October	OSP/TTR	18	14	10k		17k	Belgium, Germany, France, Georgia, Netherlands, Portugal, Russia, Spain, Turkey, Ukraine, United Kingdom

SUPPORT TO THEMATIC CONFERENCES

Activity	Host Country	Date	Sub-programme	M	F	RP* US$k	EB** US$k	CF*** US$k	Scope/countries of participants
Geological Processes on Deep-water Continental Margins (TTR Annual Conference)	Russia	28 Jan. to 2 Feb.	OSP/TTR	42	16	5k		23k	Belgium, Brazil, Bulgaria, Georgia, Greece, France, Italy, Netherlands, Portugal , Russia, Spain, Turkey,United Kingdom
TTR Executive Committee Meeting (Moscow)	Russia	3 Feb.	OSP/TTR	6	3			7k	Belgium, Italy, Netherlands, Portugal, Russia, Spain, Turkey, United Kingdom
Training Workshop on Science and Marine Protected Area (MPA) Management.	USA	15-16 July	ICAM	42	38	13k		40k	All regions
Training Programme in Modelling and Monitoring of Coastal Marine Processes (MAMCOMP-2001)	United Arab Emirates	3-8 Nov.	ICAM	20	6	12k		15k	India, Iran, United Arab Emirates, Kuwait, Pakistan

KEY:

Funds

(in thousands of US$) for these activities are indicated as:

* RP = regular programme

** EB = extra-budgetary

*** CF = complementary funds from outside sources (exclusive of EB)

Other acronyms:

HAB = Harmful Algal Blooms

ICAM = Integrated Coastal Area Management

OSP = Ocean Science Programme

TTR = Training-through-Research

Participants:

M = male; F = female

n = information not available

Ocean services

2

2.1 International Oceanographic Data and Information Exchange (IODE)

IODE on the move

By Ben Searle, *Chairman, International Oceanographic Data and Information Exchange (IODE) Programme*

An overview

Based on a year or more of consolidating previous activities and as a result of the considerable interest in IODE expressed by the Member States at the Sixteenth Session of the IODE Committee in Lisbon (October 2000), IODE has embarked on a period of intense development and change. The year 2001 signified the movement of IODE activities towards expanding its support to the broader marine community and the introduction of a new data and information management paradigm based on the decentralization of data centres, the expanding role of data centres and the adoption of new Internet-based technologies to improve access to data sets. As a result of these activities, the IODE Programme has considerably strengthened its linkages with major initiatives such as GOOS and the new Joint WMO/IOC Technical Commission for Oceanography and Marine Meteorology (JCOMM). The most significant achievements of 2001 have been the forging of strategic partnerships and collaborative arrangements with a number of scientific and monitoring programmes.

At regional level, IODE has stepped up development of the ODINAFRICA project with the start of its 2nd phase (2001-2003). Similarly, Member States in the Caribbean and South America are now embarking on their own Ocean Data and Information network (ODIN), i.e. ODINCARSA.

The IODE Resource Kit (http://www.oceanteacher.org) has been transformed into the IODE 'OceanTeacher' programme. 'OceanTeacher' is now a sophisticated and powerful computer-based resource that can be used as a training and education package, but also provides a broad range of tools and applications suitable for managing marine data and information. It has been developed to support ODINAFRICA but is easily adaptable to other regions through the addition of baseline data sets for different areas.

The use of the Internet and its associated technologies provided a driver for many activities in 2001. As part of this effort, IODE established a sophisticated and comprehensive Internet portal (OceanPortal), providing access to a wide range of data, products and expertise for the broad marine community, including scientists, policy makers and the public. This capability results from the work of many people over the past few years and is expected to continue to grow and develop, providing a 'one-stop-shop' for marine data and information related products.

IODE has played a leading role in the development and introduction of ocean metadata systems with a significant revision of the Marine Environmental Data Information Referral Catalogue (MEDI); this activity has helped to forge links with other organizations and agencies such as NASA.
IODE is also strongly supporting data management activities within GOOS and JCOMM and, as a result of previously identified needs and the needs of operational programmes, IODE has initiated projects to strengthen its capabilities in biological, chemical, pollution and coastal data.

IODE has also been successfully promoting the end-to-end data management model

developed and perfected through the joint IOC/WMO Global Temperature and Salinity Profile Programme (GTSPP). A new surface salinity project has been started and, as a result of GTSPP's success, the end-to-end data management concept is now becoming an accepted approach to support ocean research and the operational needs of the broader marine community.
Finally, IODE has continued to strengthen its role as a developer and implementer of data and information standards for the marine sector with the initiative to develop a new Internet-based standard for data interchange using the eXtensible Markup Language (XML) as a framework and through its adoption of the ISO metadata standard in the MEDI application mentioned above.

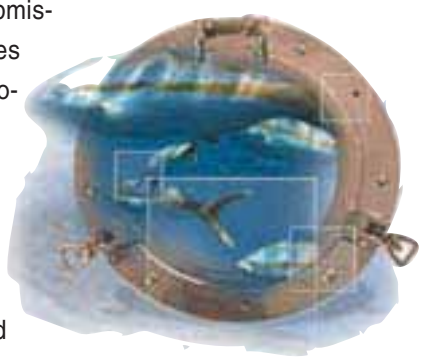
IODE made significant progress in 2001 and raised its flag in a number of new areas through the development or strengthening of strategic partnerships. The IODE community needs to further develop these new initiatives and continue to improve our ability to provide access to marine data and information in support of global, regional, national and local needs. ■

A – Marine Environmental Data Information Referral Catalogue (MEDI)

MEDI is a directory system for datasets, data catalogues and data inventories developed by IODE. The IODE Steering Group for MEDI was established during IODE-XVI to support the MEDI software system. The First Session of the IODE Steering Group for MEDI was held in Oostende, Belgium, 23-27 April, in collaboration with the Flanders Marine Institute (VLIZ). During its First Session the Steering Group reviewed the current status of the MEDI software tool and previewed the next release of the software (version 3.0), which will be Internet-based. The Group prepared a detailed list of required software changes. The report of this meeting is available as 'First Session of the IODE Steering Group for MEDI, First Session, Oostende, Belgium, 23-27 April 2001'; *Rep. Meet. Experts Equiv. Bodies IOC*, 2001. Following the recommendations made by the Steering Group, a beta version of the Internet-based software was released in December 2001; this has been tested by members of the Steering Group. The final release of Version 3.0 will be available in early 2002.

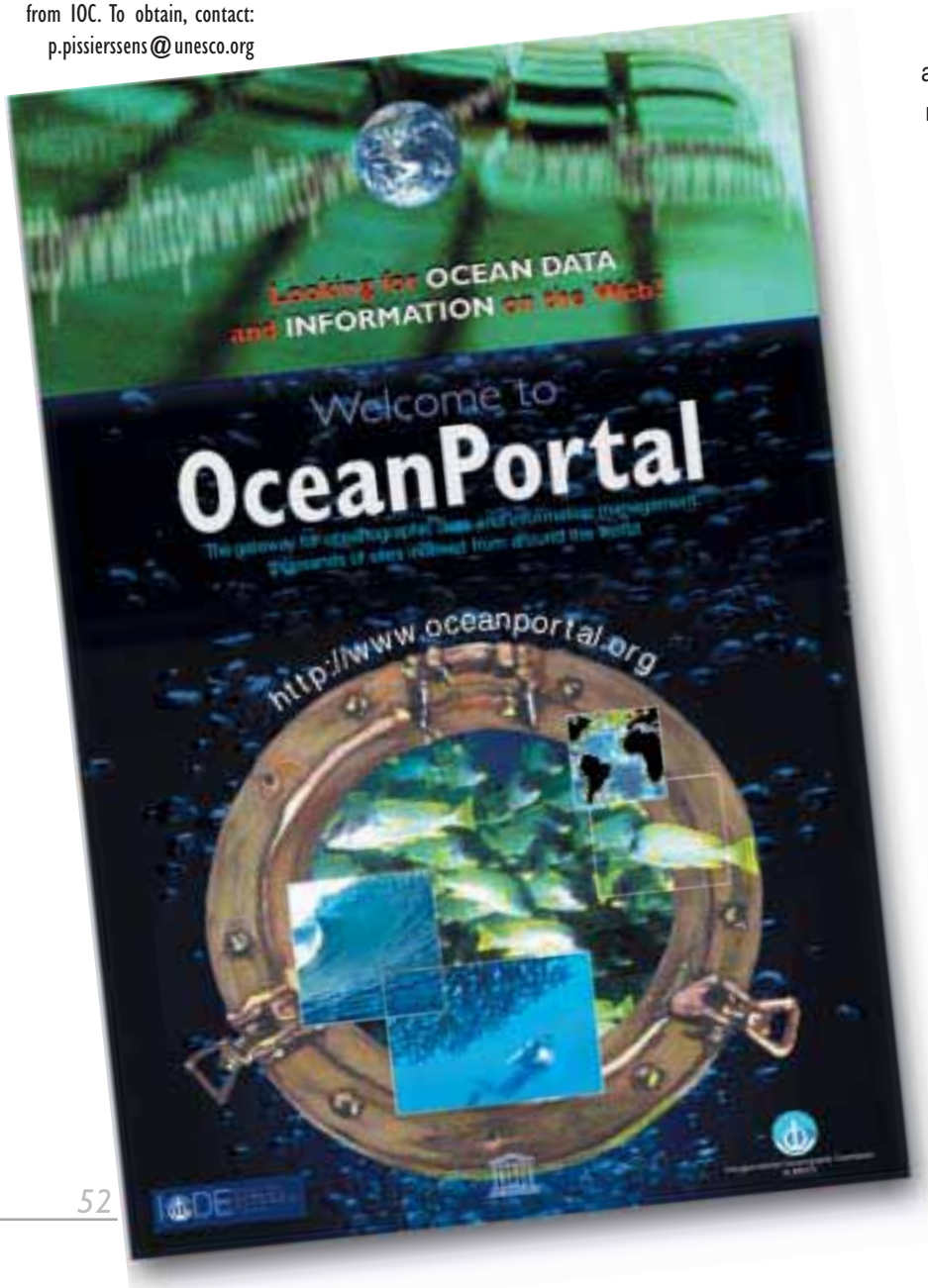
B – IOC's Ocean Portal

The OceanPortal (www.oceanportal.org) is a high-level directory of ocean data- and information-related websites. Its objective is to help scientists and other ocean experts in locating such data and information. The Portal was launched in July 2001 and includes descriptions of over 3000 ocean data and information-related websites.
The catalogue has been populated both by a detailed search undertaken by IOC, as well as through voluntary URL submissions. OceanPortal includes categories such as abstracts/bibliographies; associations/NGOs; commercial equipment/services; data catalogues; expertise sources; IODE/World Data Centres; meetings/events calendars; ocean libraries; on-line data servers; projects/agencies/institutes; protected



First meeting of IWG on IOC Oceanographic Data Exchange Policy (Brussels, May 2001)

The poster below, and two others on following pages, belong to a set of eight posters (40 X 60cm) available from IOC. To obtain, contact: p.pissierssens@unesco.org



areas/aquariums; publications/communications; research vessels; tools & references; and topical sites/education. In 2002 a powerful webcrawler/search engine will be added to enable searching the content of the catalogued websites.

C – Ocean Data Exchange Policy

The First Meeting of the Intergovernmental Working Group on IOC Oceanographic Data Exchange Policy (*top of page*) was held 29-31 May 2001 in Brussels, Belgium. During the discussions that took place, varying points of view were aired and some progress was made towards common grounds.

IODE regional projects 2.2

A – ODINAFRICA NETWORK BEGINS PHASE II

The Ocean Data and Information Network for Africa (ODINAFRICA) is being developed by IOC in cooperation with twenty Member States of Africa and with the support from the Government of Flanders. The participating States are Benin, Cameroon, Comoros, Côte d'Ivoire, Gabon, Ghana, Guinea, Kenya, Madagascar, Mauritania, Mauritius, Morocco, Mozambique, Nigeria, Senegal, Seychelles, South Africa, United Republic of Tanzania, Togo and Tunisia.

ODINAFRICA addresses data and information requirements identified by the Member States, in particular to:

- provide assistance with the development of National Oceanographic Data and Information Centres (NODCs) and establish their networking in Africa;
- provide training opportunities in marine data and information management, applying standard formats and methodologies as defined by IODE;
- assist with the development and maintenance of national, regional and Pan-African metadata, information and data-holding databases; and
- assist with the development and dissemination of marine data and information products responding to the needs of a wide variety of user groups utilizing national and regional networks.

ODINAFRICA's Phase I (1998-2000) concentrated on developing data management capacity in the IOCINCWIO region and provision of information services in the IOCEA region. The project's actual implementation started in 2001. The first year's activities concentrated on: (i) organizing national workshops, bringing together stakeholders involved in ocean-related activities (universities, research institutions, private sector etc); (ii) providing computer equipment; (iii) organizing a data management training course in Cape Town (South Africa) and an information management training course in Rabat (Morocco); (iv) providing operational support, including access to the Internet; and v) developing the ODINAFRICA website (public site and partner site) on http://www.odinafrica.net (or http://www.odinafrica.org). The institutions designated as the NODCs/DNAs by the participating Member States have now started developing national metadata databases and data archives. Dr Sekou Cissé (s.cisse@unesco.org), is the ODINAFRICA coordinator for the IOCEA region.

The 2001 ODINAFRICA review and planning workshop, which launched Phase II, was held in Nairobi, Kenya (14-17 November) and attended by ODINAFRICA National Coordinators (adjacent photos). There were also invited experts from Belgium and the USA who have been providing capacity-building support for both data and information management for the project. The participants reviewed the implementation status of the project and adopted a work plan and budget for the year 2002.

For more information on ODINAFRICA, in addition to the websites mentioned above, readers may contact: m.odido@unesco.org or p.pissierssens@unesco.org

For posters, see note on opposite page.

Mika Odido, *ODINAFRICA Coordinator and Regional Coordinator for the IOCINCWIO Region*

ODINAFRICA

The Ocean Data and Information Network for Africa builds a network of oceanographic data and information centres in Africa that will provide products and services contributing towards sustainable management and utilization of coastal and marine resources in Africa.

- Development and support of National Oceanographic Data and Information Centres (NODC) and their networking
- Training in marine data and information management
- National, regional and Pan-African metadata, information and databases
- Development of marine data and information products for multiple user audiences

Le réseau d'échange de données et d'information océanographiques pour l'Afrique met en place un réseau de centres de données et d'information et fournit des produits et des services qui contribuent à la gestion et à l'utilisation durables des ressources marines sur le continent.

- développement et soutien des centres nationaux de données et d'information marines et de leur réseau
- stages de formation dans le domaine de la gestion des données et de l'information marines
- bases de données et information, méta-données à l'échelle du pays, de la région et pour le continent africain
- développement de produits utilisant les données et l'information marines destinés à une multitude d'utilisateurs

Website: http://www.odinafrica.net

For more information on ODINAFRICA contact:

For the IOCEA region:
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Coordonnateur Régional
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Intergovernmental Oceanographic Commission of UNESCO

IODE

Impact of the ODINAFRICA Project in Tanzania: A success story

By Desiderius C. P. Masalu
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The Institute of Marine Sciences (IMS) was designated by the Government of Tanzania in 1996 to be Designated National Agency (DNA) on all matters pertaining to national oceanographic data and information. The institute has implemented several capacity building initiatives with the support of IOC, in the framework of the ongoing project for development of an Ocean Data Information Network for Africa (ODINAFRICA). These include: training for two staff members, one in oceanographic data management and another in marine information management; provision of two computers, printer and other peripherals to the data centre; provision of two computers, scanner, printer for the information centre; support for installation of full Internet access, and provision of support for operational expenses of the data and information centres which form the DNA. IMS has further established an Information and Communication Technology (ICT) unit to consolidate the progress made by the data and information centres. All these initiatives have enabled IMS to lay the foundation for the establishment of a fully-fledged National Oceanographic Data and Information Centre which will be an active member of the IODE system.

The DNA has achieved several successes. It has:

- Increased awareness among stakeholders and scientists in general (especially among local integrated coastal zone management (ICM) programmes/projects) on the need of having a sound data and information management system in Tanzania;
- Established a close working relationship with the Tanzania Coastal Management Partnership (TCMP) as one of the key stakeholders. In particular, the data centre is providing advisory services to local ICM programmes/project;
- Developed a functional coastal and marine resources and environmental metadata database with information related to integrated coastal management such as fisheries, coral reef and mangrove man-agement, other living resources (seagrass beds, marine mammals etc), and socio-economics. The metadata database includes several GIS maps of coastal districts and resources distribution and has been designed in a user-friendly manner; it can be searched in many different ways using keywords, surnames, country, type of publication etc. It allows scientists to edit/update their information and add new records in case that information is not available. IMS intends to hook the metadata database onto the Internet as soon as possible and will also produce CD-ROMs for distribution to users who do not have access to the Internet.
- Provided in-house training on data and information management to Tanzanians from various institutions such as the Computer Science Department of the University of Dar Es Salaam (UDSM) and the Tanzania Fisheries Research Institute (TAFIRI). In-house training was accomplished through presentations at meetings/workshop/seminars, e.g. at TCMP retreats;
- Developed a catalogue of the library holdings of IMS and aquatic and fisheries publication from/about Tanzania; and
- Provided information services, including bibliographic search and document delivery services.

Building on the achievements attained so far through IOC support, the data centre's activities will be focused on providing services to clients. This will include:

(i) Production of data and information products, such as data summaries etc.;
(ii) Strengthening, improving and expanding the data centre's capacity in data and information management and archiving;
(iii) Further improving the database in order to offer more services, such as data and information downloading and simple processing to show general trends and summaries; and
(iv) Actively searching and recovering the enormous amount of data and information presently available in grey literature (data archeology), and archiving them in a form and format that will make them readily available to the public. ■

B – Ocean Data and Information Network for the Caribbean and South America Region (ODINCARSA)

ODINCARSA is being developed, in the context of South America and the Caribbean, as a mechanism to optimize the potential and facilities of existing National Oceanographic Data Centres, to assist Member States to establish oceanographic data and information centres, and to promote the exchange of data, information and know-how through regional networking.

The development of ODINCARSA started with the network's first planning workshop, 24-26 October 2001, hosted by the Oceanographic Institute of the Ecuadorian Navy in the city of Guayaquil. The workshop was attended by participants from Argentina, Bahamas, Belize, Brazil, Chile, Colombia, Cuba, Dominica, Ecuador, Mexico, Panama, Peru, and Trinidad & Tobago. The United States and Spain participated as observers. In addition, the meeting welcomed IOC Vice-Chairman, Vice-Admiral Marcos Leal. The IOC Secretariat was represented by Mr Peter Pissierssens (Head, Ocean Services Section) and Dr

Cesar Toro (Head, IOCARIBE Office), and Dr Paul Geerders (IOC Consultant).

The Workshop defined the key priority activities of ODINCARSA as follows: (i) institutional support through advising Member States on establishment of NODCs/DNAs; (ii) capacity building/human resource development through regional data and information management training courses (including GOOS); (iii) infrastructure support through provision of equipment, software etc.; (iv) development of products and services such as regional metadata catalogue, regional expertise directory, regional GODAR, regional ocean database, regional union library catalogue; regional OceanPortal; (iv) sub-regional projects; and (v) establishing of linkages with other IOC programmes.

Rodney Martínez Güingla
Regional Coordinator for the Caribbean and South America ODINCARSA (IOC/IODE)

ODINCARSA

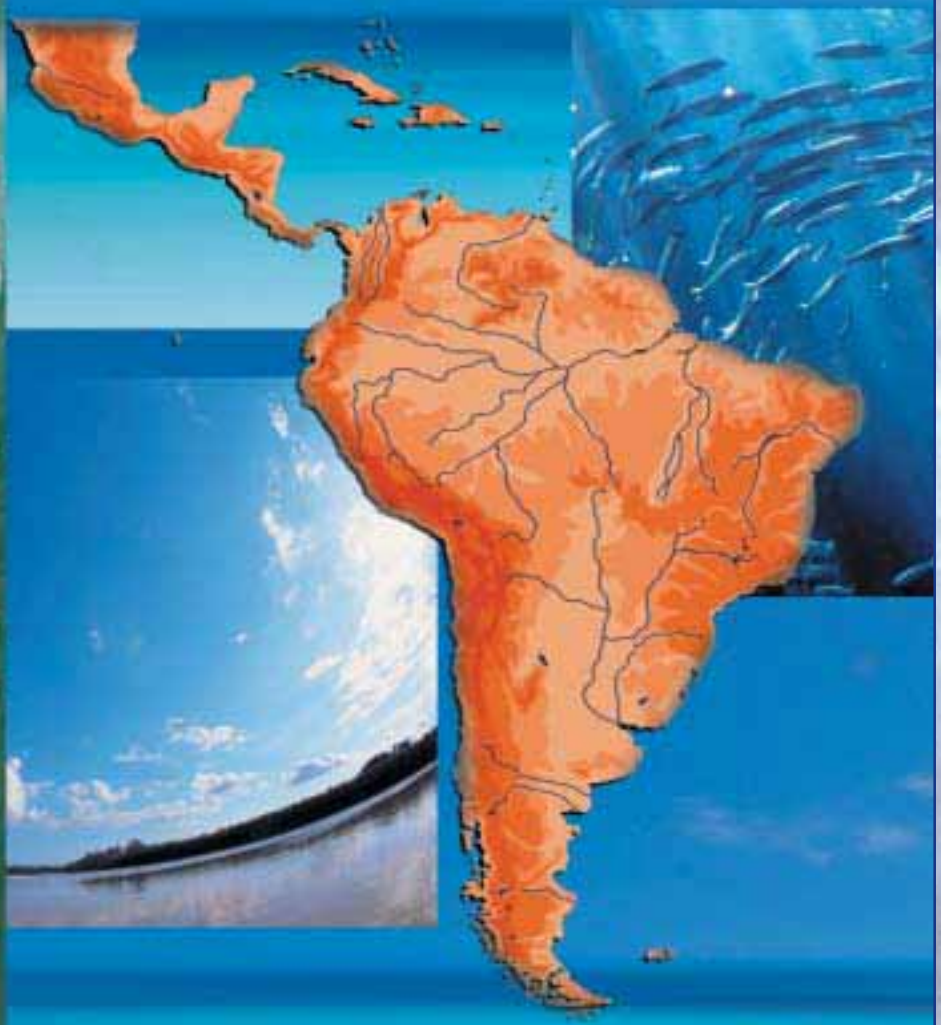
The Ocean Data and Information Network for the Caribbean and South America regions builds a network of data and information that will develop products and services towards sustainable management and utilization of coastal and marine resources.

- Development and support of National Oceanographic Data and Information Centres (NODC) and their networking
- Training in marine data and information management
- National and regional metadata, information and databases
- Development of marine data and information products for multiple user audiences
- Establishing strong linkages with ocean science and service programmes

La Red de Datos e Información Oceánica para las regiones del Caribe y América del Sur (ODINCARSA) está construyendo una red de Centros de Datos e Información para desarrollar productos y servicios orientados a una gestión y utilización sustentable de los recursos marinos y costeros.

- Desarrollo y ayuda para la operación de los Centros Nacionales de Datos e Información Oceanográfica (CNDO) y su red de trabajo
- Entrenamiento en la gestión de datos e información marina
- Metadata nacional y regional, información y bases de datos
- Desarrollo de productos de información y datos marinos para múltiples grupos de usuarios
- Establecimiento de fuertes lazos entre los programas de servicios y de ciencias del océano

Website: http://www.odincarsa.net



ODINCARSA should be seen as an important tool for the dissemination of information at the intra-regional and inter-regional level, as well as a regional data and information exchange mechanism providing access to oceanographic data and information to a variety of users. ODINCARSA will offer to provide data and information services and infrastructure not only to the traditional IODE commun-ity (and its users) but also to other IOC and related programmes such as GOOS, JCOMM, GLOSS, WOCE, Argo etc.

For further information:
Visit the ODINCARSA web site:
http://www.odincarsa.net,
or contact:
Rodney Martínez Güingla,
ODINCARSA coordinator,
cdmbac@inocar.mil.ec
or
Peter Pissierssens
p.pissierssens@unesco.org

2.3 Tsunami-related activities

By François Schindelé
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In 1960 and 1964, devastating tsunamis generated by earthquakes in Chile and Alaska prompted Member States to take steps to establish the Tsunami Warning System in the Pacific (TWSP). In 1965, IOC took the lead in coordinating the efforts of its Member States and formed the International Co-ordination Group for the Tsunami Warning System in the Pacific (ICG/ITSU). The Pacific Tsunami Warning Center (PTWC, in Hawaii) became the operational headquarters of the TWS. The warning system is based on earthquake data for the rapid initial warning, and sea-level data for confirming and monitoring the tsunami or canceling the warning. The TWS provides an international warning about one-half to one hour after the occurrence of an earthquake. Regional and local systems, such as those operated by Chile, France, Japan, the Russian Federation and USA, provide primarily domestic warnings about 5-20 minutes after the earthquakes and are effective for communities located close to the source region. The centres that operate those systems are part of the TWSP.

In addition, the IOC established the International Tsunami Information Center (ITIC), hosted by the USA in Honolulu (Hawaii) in support of ITSU and the TWSP. The main objectives of ITIC are to: (i) monitor and recommend improvements to the tsunami warning system, as well as disseminate information about tsunami activities of the warning system; (ii) gather and promulgate knowledge on tsunamis; and (iii) help make available all records pertaining to tsunamis.

To mitigate the tsunami hazard, it is critically important to: accurately assess the nature of the threat it poses; design, implement and improve warning techniques; and prepare at-risk areas so that they can take appropriate actions to reduce the impact of the hazard. The three essential actions, or main elements of the mitigation model, include: (i) hazard assessment, (ii) warning, and (iii) preparedness.

The Member States participating in TWSP focus their activities on reducing tsunami impacts through the implementation of the above three actions. The Eighteenth Session of the ICG/ITSU took place in Cartagena, Colombia, 8-11 October. The Group recog-

nized the importance of the network of sea level gauges utilized by the TWSP for detecting and evaluating tsunami waves in order to issue, continue and cancel tsunami warnings and watches. Member States were requested to review their existing sea level gauges, to upgrade them and to add new gauges if necessary. The multi-use of existing gauges, such as for national tidal networks and for research on long-term sea level change (for GOOS) must be encouraged to help the necessary long-term support and maintenance of the gauges.

The Group recommended the modification of the Warning Criteria to reflect that: (i) the reference magnitude is the moment magnitude (Mw); and (ii) the threshold of the information bulletin and the warning/watch should be upgraded.

The compilation of the Historical Tsunami Database for the Pacific (HTDB/PAC), as well as its conversion into a computerized version, have been among the ICG/ITSU priorities for the last decade. A CD-ROM of the HTDB/PAC was produced in 2001 (*Tsunamis in the Pacific, 47 BC – 2000 AD*). A web version as well as a mirror site of the database were created. The Group recommended that further actions be taken to improve the quality and completeness of the historical dataset that has been collected.

The Far East Tsunami Warning Center in Japan began operations in 2001 to provide the tsunami forecasts in the Japan Sea to all overseas authorities concerned.

Within the framework of the Rapid Determination of Focal Mechanisms (RDFM), based on the automatic results of the seismic stations from TREMORS (Tsunami Risk Evaluation through Seismic Moment from a Real-time System), the capability to provide all the parameters of the seismic sources of large earthquakes was demonstrated. This makes it possible to determine which part of the ocean will be threatened by a tsunami.

A revised version of the Intra-Americas Seas Tsunami Warning System proposal was prepared and presented during the ITSU XVIII. A Working Group was formed to finalize the document for submission in early 2002 to the Chairman of the IOCARIBE Regional Sub-commission and the Executive Secretary of IOC.

One of the important documents for ICG/ITSU and for the tsunami community is the *Tsunami Glossary*. The Glossary was published in 2001 on the ITIC website and produced on CD-ROM. The translation into Spanish was completed. The 2001 Visiting Expert programme was implemented.

An international scientific workshop was organized jointly with the IUGG Tsunami Commission in Cartagena (Colombia) in October 2001, in conjunction with the ITSU XVIII Session. This was the third workshop of a series dedicated to the Tsunami Programme Beyond 2000. This Workshop recommended the development of an international standard set of symbols and signs. An ad hoc intersessional study group was established by ICG/ITSU to pursue this recommendation.

A sad note was registered with the death of Richard 'Dick' Hagemeyer on 25 October, a key player in the tsunami warning and information activities. (See Annex II, 'In Memoriam', p. 130 of this report.)

2.4 Ocean mapping activities

General Bathymetric Chart of the Oceans (GEBCO)

The main GEBCO activities in 2001 centred around the constitution of a higher resolution (one-minute) grid to be incorporated in the Third Release of the *GEBCO Digital Atlas* (GDA) CD-ROM, to be published at the end of 2002. Additionally, the GEBCO Guiding Committee concentrated on the preparations for the GEBCO Centenary Conference, scheduled for 14-16 April 2003 in Monaco, and on the editing of the Centenary Volume, to be published in Germany in early 2003. More than 300 new geographical names were approved by SCUFN during the 18th Session of GEBCO Guiding Committee (April 2001 in Tokyo, Japan).

International Bathymetric Chart of the Mediterranean (IBCM) and its Geological/Geophysical Series.

The IOC Editorial Board for the Mediterranean focused on the preparation of the Second Edition of the *IBCM* in digital form for production on CD-ROM. France, Greece, Israel, Italy, Russia and Turkey have already started compiling bathymetric data in their areas of responsibility. As of 2001, the entire series of IBCM charts and its Geological-Geophysical series are now available for the users.

International Bathymetric Chart of the Western Indian Ocean (IBCWIO)

Sheets 03, 06 and 09, having been approved by 5th Session of the IBCWIO Editorial Board, were printed by the Head Department of Navigation and Oceanography of the Russian Navy. The sheets 04 and 07 were printed by the Hydrographic Office of Germany and will become available for users in September 2002. The Sixth Session of this Editorial Board will be held in July 2002 in Maputo, Mozambique.

International Bathymetric Chart of the Caribbean Sea and Gulf of Mexico (IBCCA)

Eighty percent of the sheets have been completed and currently exist in digital form. During the IBCCA Officers meeting in Havana, Cuba (December 2001), it was agreed that the printing will be carried out in the Hydrographic Service of the Mexican Navy. The 9th Session of the IOC Editorial Board for IBCCA, combined with training courses in marine cartography, will take place in Boulder, Colorado, USA in October 2002.

International Bathymetric Chart of the Central Eastern Atlantic (IBCEA)

Nine out of twelve sheets have already been printed by SHOM (France) and the Instituto Hidrográfico (Portugal); they will be available for users in June 2002.

International Bathymetric Chart of the Western Pacific (IBCWP)

Countries from the region continued compiling bathymetric data to incorporate in the 3-D release of the *GEBCO Digital Atlas*.

International Bathymetric Chart of South Eastern Pacific (IBCSEP)

In accordance with Resolution XXI-9 of the 21st Session of the IOC Assembly, this bathymetric project was established for the Eastern Pacific region. The Inaugural Session of the IBCSEP took place in October 2001 in Valparaíso, Chile. Some countries of the region (e.g. Chile, Colombia, Ecuador and Peru) have already started compiling bathymetric data.

For further information on these activities, including how to obtain the products, contact: d.travin@unesco.org or visit the IOC website: (http://ioc.unesco.org/iocweb).

Ocean Services participation in 2001 events

(Activities with TEMA input are indicated in blue)

Event	Venue	Dates
First Session of the IODE Steering Group for the Resource Kit (SG-ResKit)	Miami, Florida	19-23 March
First ODINAFRICA-II Data Management Training Course	Casablanca, Morocco	2-13 April
First Session of the IODE Steering Group for MEDI (SG-MEDI)	Oostende, Belgium	23-27 April
First Session of the Intergovernmental Working Group on Oceanographic Data Exchange Policy	Brussels, Belgium	29-31 May
18th Session of the International Coordination Group on the Tsunami Warning System in the Pacific	Cartagena, Colombia	8-11 October
Support to the 27th Annual IAMSLIC Conference and the 9th EURASLIC Conference (participants from Africa and Eastern Europe)	Brest, France	14-18 October
First ODINAFRICA-II Marine Information Management Training Course	Cape Town, South Africa	29 October – 9 November
First ODINAFRICA Review Workshop	Nairobi, Kenya	13-17 November
Steering Group for Underway Sea Surface Salinity Data Archiving Pilot Project (SG-USSSDAP)	Brest, France	15-16 November
Joint GOOS-Africa/ODINAFRICA Session	Nairobi, Kenya	20 November 2001
First Planning Workshop for the Ocean Data and Information Network for the IOCARIBE and South America regions (ODINCARSA)	Guayaquil, Ecuador	24-26 October
Global Conference on Oceans & Coasts at Rio + 10 'Toward the 2002 World Summit on Sustainable Development, Johannesburg'	UNESCO, Paris	3-7 December
Extraordinary Session of the IOC Executive Council	UNESCO, Paris	10-11 December
MEDAR/MEDATLAS II Final Workshop	Trieste, Italy	10-14 December
Internship support for Kenyan data manager	US NODC, USA	September/October 2001

Operational observing systems

3

3.1 Global Ocean Observing System (GOOS)

UNCED's Agenda 21 demands that an integrated and comprehensive global ocean observing and information system be created to provide the information needed for oceanic and atmospheric forecasting, for ocean and coastal zone management by coastal nations, and for global environmental change research. In response to this demand, the Intergovernmental Oceanographic Commission (IOC) of UNESCO, together with the World Meteorological Organization (WMO), the United Nations Environment Programme (UNEP), and the International Council for Science (ICSU), have been planning, implementing and co-ordinating an operational Global Ocean Observing System (GOOS).

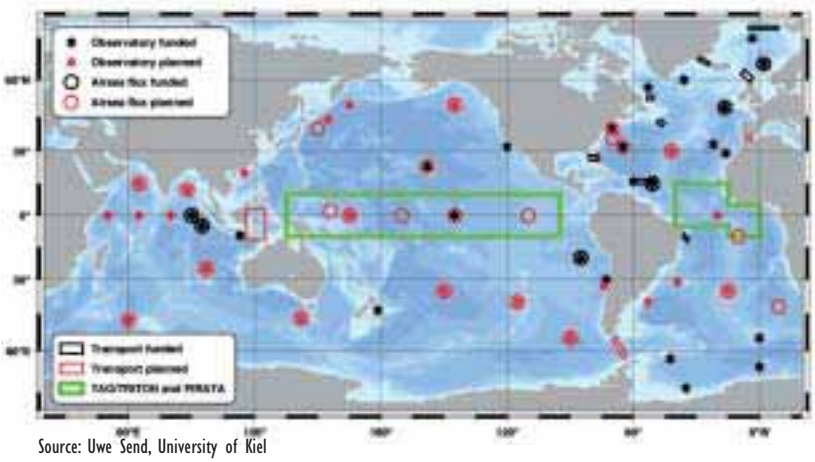
GOOS provides descriptions in real-time of the present state of the sea and its contents, and forecasts of these for as far ahead as possible, for a wide range of users. It also meets the needs of the UN Framework Convention on Climate Change (UNFCCC) by underpinning forecasts of changes in climate. While the aims of GOOS are operational, it includes research to develop new operational approaches and tools. GOOS makes and integrates observations across all the disciplines and data-gathering media from ships and buoys to satellites and aircraft, covering the sea and its contents, sea ice, and the air above the ocean. GOOS is being designed to meet the needs of a broad user community for particular services or products. It will operate as an end-to-end (or production line) system in which the data – and how they have been processed – are traceable from first observation to final product.

The System is already beginning to provide UN Member States with the ability to convert research results into useful products to meet societal needs. GOOS is already influencing national thinking and planning. Many countries are now planning or collecting their own coastal and ocean observations in line with the GOOS Strategic Plan and Principles. Many countries have created national GOOS Committees to develop contributions to GOOS at the national or regional level, by improving the way in which they do operational oceanography to meet management needs and address policy issues.

Implementation is being carried out at global, regional and local levels, with advice from two main design panels: one deals with all aspects of coastal seas, and the other with open ocean physical and biogeochemical processes. The advisory panels published scientific and technical design plans to advise Member States on how to implement GOOS in their own waters. The user community is being consulted regularly about the GOOS design, through stakeholder workshops, to ensure that the end products meet users' needs.

IOC contact: Colin Summerhayes,
GOOS Project Office (GPO),
c.summerhayes@unesco.org

Proposed network of time-series stations for measuring ocean variability over long time periods



Source: Uwe Send, University of Kiel

How GOOS is meeting its targets

By Prof. Worth D. Nowlin, Jr
Department of Oceanography, Texas A&M University (USA), Chairman, GOOS Steering Committee (GSC)

What are the GOOS targets?

Our first target is to provide complete initial strategic design plans for all elements of GOOS – an intergovernmental system to provide users with observations, products and services. International conventions constitute the first line of such users, but GOOS product users can include local communities within coastal nations as well. Our second target is to provide a strategy for the implementation of these designs that allow regional alliances and nations the flexibility to participate in accordance with their own interests. Our third target is to encourage intergovernmental cooperation in the implementation of the global network for the required observations and services. Our fourth target is to encourage and enable Regional GOOS Alliances to implement the regional enhancements needed for the solution of regional problems. Our fifth target is to recruit the resources required to build the capacity for observations, products and services as well as for local use of such information. In meeting these targets, it is important that GOOS maintain liaison with the other observing systems (WWW, GAW, GCOS, and GTOS).

Strategic designs

The initial design for the global GOOS module, dealing principally with climate and marine services, is complete and implementation is advancing. In 2000, the GOOS Steering Committee agreed to combine the development activities of the Health of the Ocean module (dealing mainly with marine pollution), the Living Marine Resources module (sustainable marine resources and bio-diversity), and the Coastal module (safe and efficient marine transportation, predicting and mitigating coastal hazards, and preserving and renewing healthy marine ecosystems) as well as to include issues of public health. The new Coastal Ocean Observations Panel (COOP), responsible for integrating these requirements, began work in 2000. It is anticipated that COOP's initial strategic design plan will be completed before the end of 2002. To help ensure that the design is consistent with the needs of the user community, this community is being consulted through a series of GOOS Users' Fora which are held in concert with each meeting of the COOP; those meetings are intentionally distributed throughout the globe so as to entrain as many diverse users as possible.

Implementation strategy

The Ocean Observations Panel for Climate (OOPC) continues to refine the strategy for implementation which was initially articulated in 1999 (IOC-WMO, 1999) and refined on the basis of the First International Conference on the Ocean Observing System for Climate (OceanObs, 1999). The OceanObs'99 Conference Statement is found in Koblinsky and Smith (2001) and at http://www.bom.gov.au/OceanObs99/Papers/Statement.pdf

It is anticipated that the COOP will complete its implementation plan for the broad coastal module by the end of 2003. Much of the implementation undoubtedly will be carried out by Regional GOOS Alliances (consisting of parties ranging from a single nation with a very great coastline to a large group of coastal nations). However, it is not yet clear how the responsibility for implementation will be divided among such Alliances and the JCOMM.

In general, it is expected that GOOS operational elements will progress from research

and development through a series of stages before becoming operational. These may be described as follows:

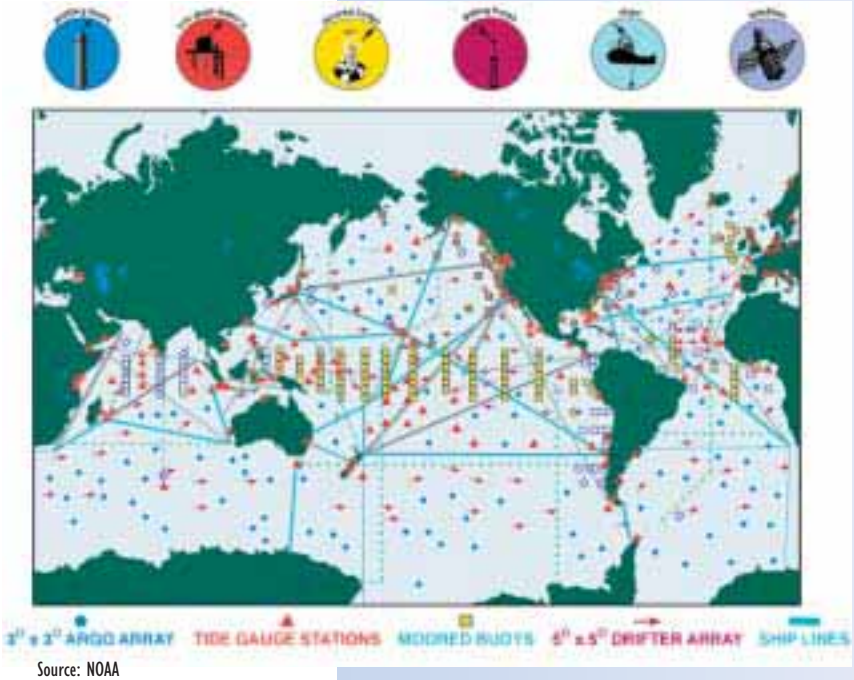
(i) development of an observational/analysis technique within the ocean community;

(ii) community acceptance of the methodology gained through experience within pilot projects, the principal objective of which is to demonstrate the utility of the methods and data;

(iii) pre-operational use of the methods and data by researchers, application groups, and other end users, to ensure proper integration within the global system and to ensure that the intended augmentation (and perhaps phased withdrawal of an old technique) does not have any negative impact on the integrity of the GOOS data set and its dependent products; and

(iv) incorporation of the methods and data into an operational framework with sustained support and for sustained use to meet societal objectives.

Proposed comprehensive observing system for climate and marine services



Source: NOAA

Many GOOS pilot projects are in progress; some are moving toward pre-operational status. During the past decade some of the pre-operational systems have moved to operational status (e.g. the ENSO Observing System) while others still must make that transition (e.g. altimetric satellites).

JCOMM and the Ocean Theme

As from 1998, the IOC and WMO began joint consideration of a mechanism to assist the joint implementation of operational marine meteorology and oceanography. In 2000, the WMO-IOC Joint Technical Commission for Oceanography and Marine Meteorology was approved by both agencies to replace the former WMO Commission for Marine Meteorology and the IOC-WMO Integrated Global Ocean Services System. The JCOMM met for the first time in Iceland during 2001. This Commission, consisting of four programme areas (observations, services, data and information management, and capacity building), has the long-term responsibility for the implementation of the global module of GOOS, which is the ocean module of the Global Climate Observing System, as well as marine services for the WMO and international conventions. The Management Committee of JCOMM is scheduled to meet for the first time in February 2002, and a series of initial meetings of the coordinating groups for the four Programme Areas will take place by the summer of 2002. Much hope is placed in the efficacy of this organization.

Another mechanism to assist with the implementation is the Ocean Theme concept, developed by the Integrated Ocean Observing Strategy (IGOS) Partners. The

first Ocean Theme document (Ocean Theme Team, 2001) describes, in a succinct but complete manner, the satellite observations deemed necessary to support the GOOS as well as a summary of associated in situ observations that are required. The Committee on Earth Observing Satellites (CEOS), an IGOS partner, has agreed that the Ocean Theme will be subject to a three-year rolling review process. Requirements will be fixed for two years; at the end of each year status reports will be given by CEOS on the satellite missions needed and by the observing system on the associated in situ elements. In the third year, the requirements will be re-examined and a new document issued at the year's end. In this manner, clearly stated requirements for satellite missions in support of GOOS will be set forth to the international satellite community and to all agencies associated with GOOS.

National and Regional GOOS Alliances

Nations are the basic building blocks for GOOS. All participating nations are encouraged to establish National GOOS Coordinating Committees involving all stakeholders within the nation. Many nations have begun to contribute to the global module of GOOS.

However, it is also natural that nations with similar interests in developing ocean-observing capability should be organizing themselves into Regional GOOS Alliances. EuroGOOS and NEAR-GOOS are prime examples of initial alliances, but many more now exist or are under development. Each of these alliances is structured somewhat differently and has different objectives. However, each must adhere to the GOOS principles, and each report their activities to the international GOOS Steering Committee. In December 2002 there will be the First GOOS Regional Forum, organized under the aegis of the Intergovernmental GOOS Committee (I-GOOS), where for the first time existing Alliances will have the opportunity to share aspirations, concepts and plans. This could well be the spring-board toward a 'federation' of Regional GOOS Alliances that could take a major role in the implementation of the coastal module of GOOS.

Capacity building

Critical to the success of GOOS is a successful capacity-building initiative. GOOS capacity-building principles have been adopted as have the initial elements of a capacity-building strategy. The GOOS Capacity Building Panel will meet for the first time in June 2002 in Geneva. It will meet simultaneously with the first meeting of the JCOMM Capacity Building Coordinating Group; some concurrent sessions are being planned. This coordination might even lead to a merger of activities. The JCOMM group will be supported by a JCOMM Capacity Building Resources Team.

For purposes of capacity building as well as regional GOOS development, the IOC has opened two new regional IOC Offices in partnerships with local governmental organizations. One office, in Perth (Western Australia), is focused on the Indian Ocean and nearby regions of the South Pacific; the other, in Rio de Janeiro, will serve GOOS developments in the equatorial and South Atlantic. Existing IOC offices in Cartagena (Colombia) and Bangkok (Thailand) assist with the IOCARIBE-GOOS and NEAR-GOOS, respectively.

Liaison

The international GOOS structure participates in activities of the other observing systems GCOS and GTOS, with the IGOS Partners and the JCOMM. Liaison includes developing relationships with ICES, PICES, UNEP's Regional Seas Programme and the Partnership for Observations of the Global Ocean (POGO).

Pertinent references

IOC (Intergovernmental Oceanographic Commission) of UNESCO, 1998: *The GOOS 1998*. GOOS Publication No. 42, Paris, 144 pp.

IOC-WMO, 1999: *Global Physical Observations for GOOS/GCOS: an Action Plan for Existing Bodies and Mechanisms*. GOOS Report No. 66; GCOS Report No. 51. 50 pp plus 9 annexes.

Koblinsky, Chester J., and Neville R. Smith (Editors), 2001. *Observing the Oceans in the 21st Century*. GODAE Project Office, Bureau of Meteorology, Melbourne, Australia. ISBN 0642 70618 2; 604 pp. (See cover, page 18)

Note: For more information on the preceding book – which is based on the peer-reviewed, fully edited and updated invited papers of the OceanObs99 Conference – including details on how to obtain it, contact: Val Jemmeson (v.jemmeson@bom.gov.au). The following CNES document contains the unedited proceedings.

OceanObs, 1999. International Conference on The Ocean Observing System for Climate (OceanObs99), Recueil des actes, Volumes I (solicited papers) & II (submitted papers). 18-22 October 1999, St. Raphael, France. (Published by CNES, Toulouse, France).

Ocean Theme Team, 2000: An Ocean Theme for the IGOS Partnership, Final Report from the Ocean Theme Team, 38 pp. Available online at: http://www.unep.ch/earthw/IGOS-Oceans-Final-0101.pdf

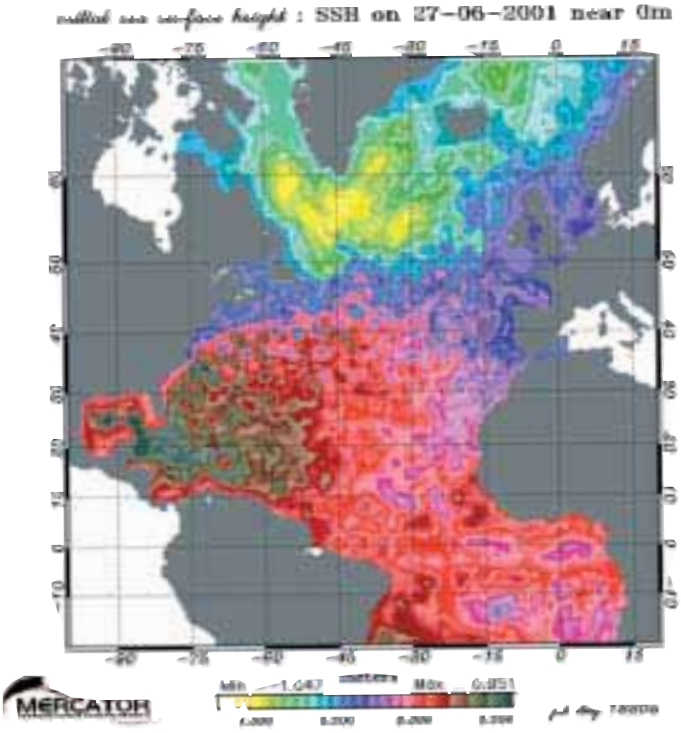
WMO, 2001: *Joint Technical Commission for Oceanography and Marine Meteorology*. First Session; Akureyri, 19-29 June 2001. Abridged Final Report with Resolutions and Recommendations. WMO No. 931. Geneva. 157 pp. ■

GOOS implementation in 2001 3.2

GOOS implementation will depend to a fair extent on the success of the newly created Joint WMO/IOC Technical Commission for Oceanography and Marine Meteorology (JCOMM), which held its first intergovernmental meeting in Akureyri, Iceland (19-29 June). The IOC's Committee on International Oceanographic Data and Information Exchange (IODE) has been co-opted as a full partner of the JCOMM Management Committee. (See following article on JCOMM.)

Implementation is partly represented by the GOOS Initial Observing System (GOOS-IOS), a collection of existing observing subsystems that was expanded in 2001 by the inclusion of the California Cooperative Fisheries Investigations (CalCOFI), and the Global Observing Systems Information Centre (GOSIC). In addition, the satellite missions that contribute to the GOOS-IOS were identified. JCOMM will take on the responsibility for day-to-day management of many of the components of the GOOS-IOS, which are themselves operated by groups of Member States. The European component of GOOS (EuroGOOS) is developing a European Directory of Initial Observing Systems (EDIOS), which will provide detailed information about the GOOS Initial Observing System in Europe.

Implementation also takes place through pilot projects like the Global Ocean Data Assimilation Experiment (GODAE), for which a Strategic Plan has been published and an Implementation Plan has been drafted. The establishment of the US GODAE Server, operated by the US Navy in Monterey (California), is the most significant recent development. This site will provide access to all GODAE data (either directly or via distributed access) as well as providing a range of products. A similar facility is being established in France.



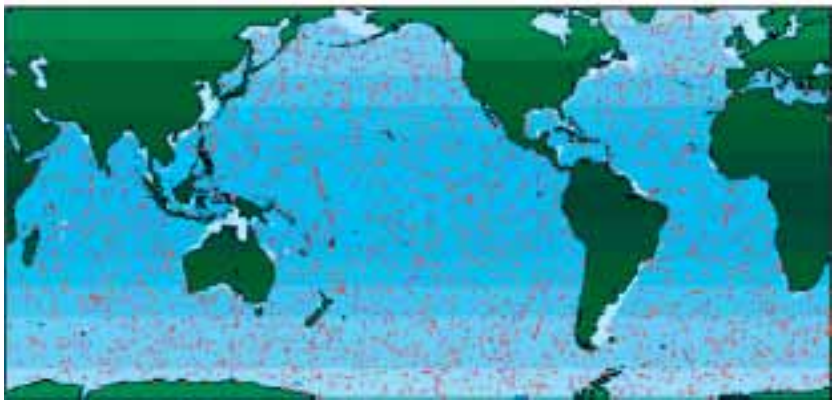
Output of French Mercator model (part of GODAE) showing one-week forecast of sea surface height in the Atlantic

GODAE itself has pilot projects, which are also pilot projects of GOOS. A GODAE High Resolution Pilot Project on sea-surface temperature (SST) is underway to develop high-resolution SST data sets and products using all available remote and in situ measurements and scientifically defensible definitions of SST. A first step was production of a Strategic Plan in mid-2001. The largest GODAE pilot project is the Argo project to seed the ocean with 3000 profiling floats that will all be operational during the period 2003-2005. This will provide the first-ever global coverage of the temperature and salinity of the upper ocean, an essential


An Argo float

ingredient in the improvement of numerical models and forecasts of the behaviour of the ocean, weather, and climate systems. Several countries have made financial commitments to the Argo project, including funds to support the recruitment of an Argo Technical Co-ordinator, who started work in February 2001 at the Argo Information Centre in Toulouse, and who will provide information on Argo to interested parties. The existing multi-national commitments to Argo include 984 floats already funded, and 2274 proposed over the next three years, which suggests that the project goals will be met. A regional implementation-planning meeting for Argo was held in Hyderabad (India) in July 2001 for the Indian Ocean.

Modelled distribution of the 3,000 Argo floats



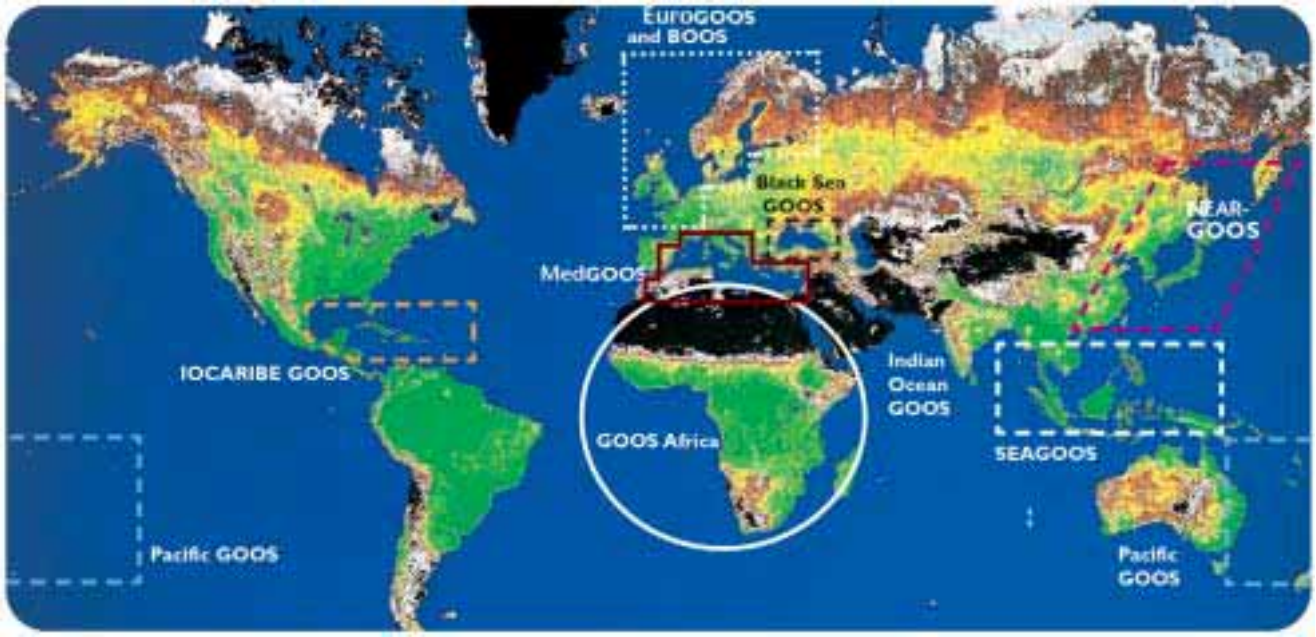
Relation of Argo deployments to Pacific Islands EEZs

The principal issue with Argo concerns global coverage. This will require nations to free some of their resources for use in remote regions. A second issue concerns deployment of floats in Exclusive Economic Zones (EEZs). The South Pacific Applied Geosciences Commission (SOPAC) is working with its member nations to secure permission to deploy floats within their collective EEZ.

GOOS is also being implemented regionally. A Regional Policy has been drafted to cover the management of the fast developing group of regional GOOS bodies.

Regional meetings were held to take forward the development of GOOS in the Caribbean (Miami, Florida, USA, in April), and the Black Sea (Poti, Republic of Georgia, 22-25 May). MedGOOS attracted major funding from the European Commission to expand development of the observing system in the Mediterranean. A meeting was held in Seoul, R. of Korea (27-31 August) to take forward the development of GOOS in the South-East Asian region. The development of remote-sensing and sea-level measurements in support of operational oceanography was the focus of a GOOS-AFRICA workshop in Nairobi (19-23 November). A planning meeting was held in New Delhi (India, 8-9 November) to take forward the development of an Indian Ocean GOOS.

The GOOS organization worked closely with the International Council for the Exploration of the Sea (ICES), and the Oslo-Paris (OSPAR) Commission, through a workshop in Bergen (5-7 September) to develop an ecosystem approach to observations for fisheries management in the North Sea.



Global distribution of regional GOOS bodies and national GOOS committees or contact points

EuroGOOS established a Baltic Operational Oceanographic System (BOOS), and a Northwest Shelf Operational Oceanographic System (NOOS), which are supported by a large number of national agencies. EuroGOOS is working towards operational ecosystems models and forecasts, in conjunction with ICES, the Helsinki Commission (HELCOM), and OSPAR.

A workshop co-sponsored by PICES (the Pacific equivalent of ICES), GOOS for North-East Asia (NEAR-GOOS) and IOC was held in Seoul (27-31 August) to develop a common approach to ocean forecasting in North-East Asia. NEAR-GOOS has embarked on a strategic planning exercise that should ultimately lead to the structured inclusion of chemical and biological parameters.

Contacts were strengthened between GOOS and UNEP's Regional Seas Programme, through participation of the IOC's GOOS Project Office in the 4th meeting of the Regional Seas Conventions and Action Plans in Montreal (Canada, 21-23 November). UNEP gave a presentation at the IOC Assembly (Paris, July) on these growing links, as a first step towards developing an IOC-UNEP Memorandum of Understanding (MOU) on this topic.

Continued implementation of GOOS at the national level is essential to facilitate GOOS development. Many coastal countries are planning or collecting their own coastal seas observations following GOOS principles. All IOC Member States are encouraged to form National GOOS Coordinating Committees involving a maximum of stakeholders. A consultant has been hired to collect information on commitments made by various countries to GOOS.

In order to ensure that global observations are made in a coherent and integrated way, IOC together with other UN agencies (WMO, UNEP, FAO and UNESCO) and the International Council for Science (ICSU) are members with the space agencies of a Partnership for an Integrated Global

Observing Strategy (IGOS). In January 2001 the Partners published an *Ocean Theme* document indicating the capabilities of and developments needed in space-based measurements to make GOOS work. The GOOS Project Office was involved with the wider scientific community in developing a background paper on an ocean observing system for carbon, which will inform the development of an Integrated Global Carbon Observing Theme by the IGOS Partners.

The global needs for observations for climate were presented to the Conference of the Parties (COP) to the UN Framework Convention on Climate Change by a consortium of agencies and observing systems, including GOOS, which was led by the Global Climate Observing System (GCOS). (The climate component of GOOS comprises the ocean component of GCOS). The COP is requiring Parties to develop Action Plans to implement climate monitoring systems, including ocean components that will form part of GOOS. This is to meet the urgent need to improve the quality, coverage and management of the Global Ocean Observing System, and especially to support the increase in the number of ocean observations, particularly in remote locations, called for by the COP.

W. "Bill" Erb, Head, IOC (GOOS) Office, Perth

IOC Office in Australia

The IOC's Perth Regional Programme Office is responsible primarily for developing GOOS in the Indian Ocean, South Pacific Ocean and in Australia. During 2001 strategy plans were drafted for these large areas, and secretariats were set up for PacificGOOS and IOGOOS (Indian Ocean GOOS). IOGOOS was established as a result of the New Delhi Summit, organized by the Perth Office and held in November. This Office also organized a workshop in Seoul (Republic of Korea) during August, where an ad hoc Working Group for SEAGOOS (South East Asia GOOS) was established. A WAGOOS (Western Australia GOOS) was established, with funding from Australia's Bureau of Meteorology. The University of Western Australia provided facilities for a secretariat on their campus.

The Perth Office also hosted a meeting of the Data Buoy Cooperation Panel (DBCP), which included a seminar/reception on GOOS at the Royal Perth Yacht Club. This event was moderated by Dr John Zillman, Director of the Bureau of Meteorology in Australia and President of WMO.

JCOMM takes its first steps 3.3

By Dr Savi Narayanan
JCOMM Co-President and Director, Marine Environmental Data Service, Canada

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

Subsequent to the establishment of JCOMM in 1999 by Thirteenth Congress of WMO and the Twentieth Session of the IOC Assembly, through a merger of the Commission for Marine Meteorology (CMM) and the Joint IOC-WMO Committee for IGOSS, considerable effort was made to actually implement JCOMM as the reporting and coordinating mechanism for all operational marine activities in both WMO and IOC. Such efforts focused on two fronts: enhancements of and re-aligning the activities of the existing elements of WMO and IOC transferred to JCOMM, and defining the JCOMM structure and the Terms of Reference of its sub-elements.

The member countries met at the first session of JCOMM (Akureyri, Iceland, 19-29 June 2001) to discuss the JCOMM structure, vision and mandate, and to develop a workplan for the intersessional period. Substantial support for the meeting as well as warm and generous hospitality were provided by the Icelandic Meteorological Office and by the City and University of Akureyri. At the opening ceremony, participants were welcomed by: Ms Siv Fridleifsdottir, Minister for the Environment; Mr Magnus Jonsson, Permanent Representative of Iceland to WMO; Mr Kristjan Thor Juliusson, Mayor of Akureyri; Professor G. O. P. Obasi, Secretary-General of WMO; and Dr Patricio Bernal, Executive Secretary of IOC. The Commission was also honoured by a visit during the second week of the session by Dr Olafur Ragnar Grimsson, President of Iceland, and by Dr John Zillman, President of WMO.

While the membership of JCOMM is still growing, at the time of the session the Commission had approximately 250 members from 122 Members of WMO and Member States of IOC. The session was attended by 113 participants from 42 Members/Member States and 11 international organizations. It was particularly pleasing to note that almost all the national delegations included approximately equal

JCOMM I Meeting (Akureyri, Iceland, 19-29 June 2001)

numbers of meteorologists and oceanographers. This was an indication of the importance that both communities placed on JCOMM, and it also ensured a good balance in the debates during the session and in the priority issues to be addressed by the Commission.

Iceland's President Olafur Ragnar Grimsson with IOC Executive Secretary Patricio A. Bernal at the presidential residence in Bessastadir, outside Reykjavik during a special audience on the occasion of JCOMM-1.

JCOMM is organized within four Programme Areas, each managed by a Coordinator and small Coordination Group – Services, Observations, Data Management and Capacity Building. Within each Programme Area, specific activities will be undertaken by a number of Expert Teams, Task Teams and Panels. Overall guidance and oversight for the work of the Commission will be provided by a Management Committee, chaired by the two co-presidents of JCOMM (Johannes Guddal and myself, Savi Narayanan), and including the four Programme Area Coordinators and a small number of other selected experts. The nine members of the Committee include four meteorologists, four oceanographers and one polar region expert. Even though there were a few vacant positions in the JCOMM organization, all but two were filled subsequent to the assembly.

Is spite of the ease of communication electronically, it is still necessary to meet face to face in order for each of the coordination groups and expert teams to build the teams and to have in-depth discussions on the future workplans. Consequently, meetings have been scheduled for 2002 for most groups.

In 2001, high priority was given to promoting JCOMM and establishing links with other organizations. Contacts have been made with marine sections of the Directorate Generale 12 (DG12) under the European Union (EU). DG12 is currently planning a large-scale future framework programme called the Marine Integrated Programme (MIP), and it became obvious that both JCOMM and MIP may benefit from pooling their resources. A joint meeting to discuss a potential 'joint venture' between JCOMM, the International Ocean Institute (IOI), and the EU Framework Programme 6 (FP6), and possibly EuroGOOS, was planned for 5 February 2002 at WMO secretariat. JCOMM also established links with the Coastal Panel of GOOS and the Partnership for Observations for Global Oceans (POGO) through active participation in their deliberations.

In order to establish a Storm Surge, Waves and Ocean Circulation Forecasting programme in South China Sea, JCOMM agreed to be a cosponsor – together with the Tropical Cyclone Programme secretariat at WMO, Geneva, WESTPAC/IOC, and the USA's Office of Naval Research, of a workshop in Hanoi, Viet Nam, in January 2002. Ten countries surrounding the South China Sea are expected to participate in this workshop, which will provide clear indications of the interests of these countries to engage in a form of cooperation that eventually could lead to the creation of a SEAGOOS.

JCOMM has been developing into a strong organization, prepared to take on the challenges as they arise. A large number of individuals from around the world are contributing their time and expertise to deliver on JCOMM's mandate. With the right support from the national governments and funding agencies, JCOMM should have no problem in maturing to become the organization envisioned by its members. ■

Contributors to the global observing effort 3.4

A – Global Sea-level Observing System (GLOSS)

The GLOSS Programme has been in existence for a decade and a half and is continuing to evolve. Over two-thirds of the nearly 300 stations in the GLOSS Core Network, proposed in the original Implementation Plan, are now operational (measured in terms of delayed-mode mean sea-level data sent to the Permanent Service for Mean Sea Level). The progress towards completion of the remaining third is slow, primarily owing to lack of funding and to the difficulties of operating gauges in some areas. Extensions to or concentrations of attention within the Core Network have included support for sites with long historical records (especially for climate change-related studies), for ocean circulation monitoring (as extensions of the sea level component of the World Ocean Circulation Experiment), and for ongoing satellite radar altimeter calibration. In addition, GLOSS has always emphasized the need for regional enhancement of the core network. The European, Mediterranean and Central American regions have taken particular initiatives in regional densification in the last few years through the ESEAS, MedGLOSS and RONMAC/CPACC Programmes respectively.

A major development in the last two years has concerned the need for an identified 'fast' GLOSS data stream for near-real time applications such as assimilation of sea-level data into ocean numerical models. To some extent, the 'fast' and the more familiar 'delayed mode' data sets can be considered to be different products, with the fast stream often requiring major upgrades to a gauge operator's hardware and data transmission equipment (and sometimes to staff time provision). A GLOSS Fast Center has been established at the University of Hawaii (USA), which at present is receiving fast data routinely from approximately 100 stations.

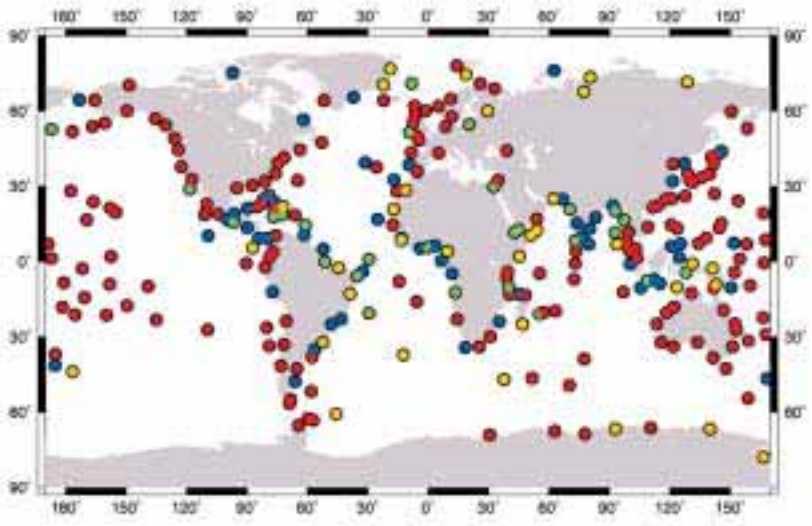
The search for funding of GLOSS activities has been rather more successful recently than in previous years. These funds will be concentrated on training and network development issues. For example, while no training courses have taken place since the last international GLOSS training course in Saudi Arabia in 2000, several are planned in the near future. In addition, the Permanent Service for Mean Sea Level (PSMSL) has taken the lead in the provision of web-based training information. Concerning network development, one demonstration project is being planned for two tide gauge stations in Ghana, with help from Indian experts, and others in the region are being considered. A major proposal for funding of GLOSS-Africa is in preparation, following the GOOS-Africa workshop in Kenya in November 2001. Meanwhile, scientists in Kenya have begun a website dedicated to GLOSS in the region, complementing a GLOSS web site in Brazil for South America.

Other recent highlights of GLOSS include the provision of a new *GLOSS Handbook* on the

Status of the GLOSS core network of stations, as of October 2001

Legend:

- Category 1: 'Operational' stations for which the latest data is 1998 or later
- Category 2: 'Probably operational' stations, for which the latest data is within the period 1988-1997
- Category 3: 'Historical' stations for which the latest data is earlier than 1987
- Category 4: For which no PSMSL data exist



Source: Philip Woodworth, PSMSL

web providing more detailed information on gauges in the Core Network and access to their data, and an updated manual on sea level measurement and interpretation. A data archaeology project has been started which initially will inventory valuable sea level data sets not so far in computer-compatible form. Also, a chairman (Prof. Gary Mitchum) has been appointed to the GLOSS Scientific Sub-group, which has begun work on several issues. Another working group, under the auspices of GLOSS and other bodies and chaired by Prof. Mike Bevis, is pursuing studies of the use of GPS at gauges in order to monitor vertical land movements. Meanwhile, the publication in 2001 of the *Intergovernmental Panel on Climate Change (IPCC) Third Assessment Report* – which contains a chapter on past and potential future global sea-level change – has stressed the continuing need for sea level measurements, as has the Coastal Ocean Observations Panel under GOOS. The latter has identified major requirements worldwide for sea-level recording at the coast.

For further information on recent GLOSS developments, consult:

(i) report of the 7th meeting of the GLOSS Group of Experts, 23-27 April 2001, (http://ioc.unesco.org/goos/docs/GOOS_116_GLOSS_GE7.pdf);

(ii) report of the GLOSS programme to the JCOMM-1 Conference, 19-29 June 2001, (http://www.pol.ac.uk/psmsl/reports.gloss/jcomm1/gloss_jcomm1_jun2001.pdf);

(iii) position paper on the status of GLOSS-Africa, prepared for the GOOS-Africa Conference, 19-23 November 2001, (http://www.pol.ac.uk/psmsl/programmes/gloss.info.html).

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B – The buoys programme

Implementation

The development of operational oceanography has been advanced significantly by the constant improvement of data buoy technology: e.g. more reliable transducers, low-power electronics and longer battery life. The implementation of drifting and moored data buoys in the high seas is being managed by the Data Buoy Cooperation Panel, which participates in the JCOMM Observation Programme Area. The Panel defined its implementation strategy to match the requirements expressed by the World Weather Watch, GOOS, and GCOS. The strategy provides a framework for the Panel's work, in the light of developing requirements for marine observations, and especially buoy data, to support operational meteorology, operational oceanography, marine scientific research and global climate studies. For example, deployments take availability of other in situ marine observing systems (e.g. VOS) into account. The Panel is working at increasing the quantity of buoy data available from data-sparse areas (e.g. the Panel is tentatively maintaining an array of 80 barometer drifters between 40°S and the Antarctic Circle).

Implementation is based upon so-called Action Groups, of which there are currently seven:

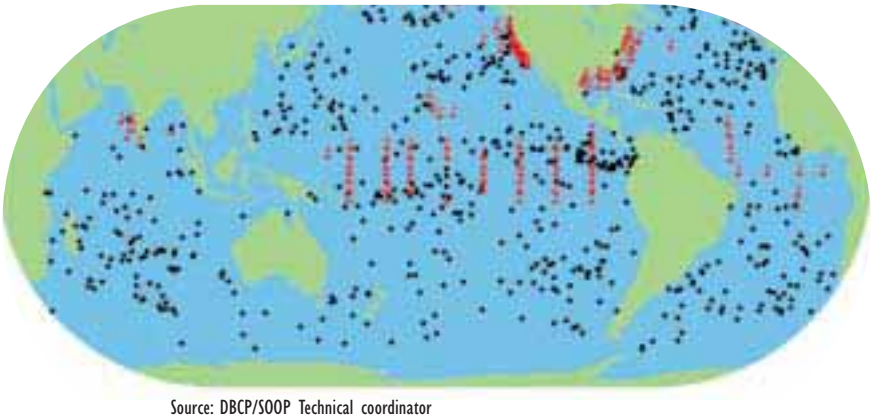
- The European Group on Ocean Stations (EGOS)
- The International Arctic Buoy Programme (IABP)
- The International South Atlantic Buoy Programme (ISABP)
- The International Programme for Antarctic Buoys (IPAB)
- The International Buoy Programme for the Indian Ocean (IBPIO)

- The Global Drifter Programme (GDP)
- The Tropical moored buoy Implementation Panel (TIP)

Status

In December 2001, data from over 1200 drifting buoys were collected through *'Service Argos'*. Among those buoys, nearly 55% had their data distributed on the Global Telecommunication System – GTS (see table below). However, it is becoming increasingly difficult to achieve GTS distribution for the remaining 45% either for practical reasons (short duration programmes, not relevant) or because the managers of the buoy programmes would not provide authorization (confidentiality). Thus priority had now been given to direct technical assistance in facilitating GTS distribution of buoy data for those relevant buoy programmes relevant for JCOMM. Based upon GTS reports received at Météo-France during the period 30 November to 6 December 2001, the following table indicates, for typical variables, the number of buoys reporting in BUOY format, the average number of reports per day, and the average delay (reception-time – observation time).

DB = drifting buoy; MB = moored buoy



Source: DBCP/SOOP Technical coordinator

DBCP network status, as of November 2001

Data Buoy Cooperation Panel (DBCP)
Visit the website:
http://www.pol.ac.uk/psmsl/reports.gloss/jcomm1/gloss_jcomm1_jun2001.pdf

For each variable are given the number of buoys reporting in BUOY format during the period 30 November to 6 December 2001 (GTS reports received at Météo-France), average number of reports per day, and average delay (reception-time – observation time).

Variable	Buoys	Reports/day	Average delay (min.)	Remark
Air pressure	287	6027	195	
Sea Surface temperature	682	7601	160	
Air temperature	148	1732	147	
Wind	113	1063	219	Mainly TIP moored buoys; small number of coastal buoys reporting in BUOY format
Air pressure tendency	205	3846	184	
Air relative humidity or dew point temperature	76	347	270	
Sub-surface temperatures	89	2845	273	Mainly TIP moored buoys; small number of drifting buoys with thermistor strings
Waves (height, period)	13	107	214	Small number of buoys

There are more than 200 moored buoys that transmit in SHIP format (e.g. USA, Canada). Most of these moored buoys are coastal buoys that measure basic meteorological variables such as air pressure, air temperature, and wind. Statistics for such buoys are not included above because the DBCP deals with drifting buoys and moored buoys in the high seas. Only a very small number of moored buoys in the high seas actually transmit in SHIP format.

Data management

Buoy data are archived by the IOC's International Oceanographic Data and Information Exchange (IODE) Responsible National Oceanographic Data Centre (RNODC) for drifting buoys, operated by the Marine Environmental Data Service (MEDS) of Canada, and by the JCOMM Specialized Oceanographic Centre (SOC) for drifting buoys, operated by Météo-France. The JCOMM Sub-group on Marine Climatology will be the overall repository of metadata for all ocean-observing systems, including drifting and moored buoys. The Panel is taking steps to eventually provide the JCOMM Sub-group with appropriate meta-data in required format.

Regarding real-time GTS distribution of buoy data, the Panel is taking steps to initiate distribution in BUFR code. Required software developments have been included within the *'Service Argos'* development programme for implementation in early 2003.

Evaluation, quality control

The DBCP evaluation group is monitoring the quality of buoy data and suggesting ways to improve buoy design. At the Panel's 17th session, the group reported that the life-time of SVP Barometer (SVPB) drifters significantly increased in the last 12 months especially regarding buoys just deployed and air deployment success rates. Deferred time quality control guidelines also permit to rapidly fix problems reported by meteorological centres (e.g. removing data from GTS). Thanks to improvements in data assimilation and modelling, comparisons of buoy data with first guess field show that the quality of buoy data is good (e.g. 1 hPa RMS for air pressure data).

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C – Measuring Upper Ocean Temperature and Salinity from Ships

by Etienne Charpentier and Yves Tréglos

Implementation

The primary goal of the Ship-of-Opportunity Programme (SOOP) is to fulfil upper ocean data requirements which have been established by GOOS and GCOS, and which can be met at present by measurements from ships of opportunity. SOOP's Implementation Panel (SOOPIP) is establishing itself as an operational programme and is therefore participating in the Joint WMO-IOC Technical Commission for Oceanography and Marine Meteorology (JCOMM) and particularly in its Ship Observations Team whose first meeting will be held in Goa, India, 25 February to 2 March 2002.

The SOOP is directed primarily towards the continued operational maintenance and coordination of the XBT ship-of-opportunity network but other types of measurements are being made (e.g. TSG, XCTD, CTD, ADCP, pCO_2, phytoplankton concentration). This network in itself supports many other operational needs (such as for fisheries, shipping, defense, etc.) through the provision of upper ocean data for data assimilation in models and for various other ocean analysis schemes. It is considered most important to have the SOOP focused on supporting climate prediction in order to ensure the continued operation of the present network. The OOPC & COOP Upper Ocean Thermal

Review clarified the role of SOOP in the context of other existing and/or developing ocean-observing programmes such as the Tropical Moored Buoy Implementation Panel (TIP), Argo, and Jason. The review recommended: (i) maintaining the network to support climate observations, and (ii) gradually (i.e. 5-year transition while Argo is implemented) evolving from broadcast sampling (low-density network) to line sampling (frequently repeated and high-density lines).

However, SOOP is now facing the following problems, including: (i) XBT probe cost increases, (ii) financial constraints vis-à-vis national priorities with regard to in situ and remote-sensing ocean observations leading to reduced budgets for some of the national XBT ship-of-opportunity programmes, (iii) national priorities within the national XBT SOOP programmes to address specific scientific and/or operational issues, (iv) logistical problems (e.g. availability of shipping, ships changing ownership, changes in ship crews), and (v) concerns with regard to the Protocol on Environmental Protection to the Antarctic Treaty (Madrid Protocol) since governments may restrict research activities south of 60°S where doubts exist on possible environmental impacts.

Status

SOOP is doing its best to find solutions to these problems but could not avoid an activity reduction since 1999, especially in the Atlantic and Indian Oceans. About 28 000 XBT probes were dropped in 1999 in global oceans (excluding the Mediterranean Sea which had 2,000 drops). During the first 6 months of 2000, about 12 000 probes were dropped from 77 different ships. It is estimated that to support the sampling recommended by the Upper Ocean Thermal review, about 35 000 probes would be needed every year. The figure on p. 80 shows that the Equatorial Atlantic and North Atlantic are well covered as is the North Pacific. The South Atlantic and Southern Oceans are under-sampled. The Indian Ocean is partially sampled.

Data management

The data management activities of the programme are undertaken in collaboration with the Global Temperature and Salinity Profile Programme (GTSPP) and the WOCE Upper Ocean Thermal Data Assembly Centre (UOT/DAC). GTSPP supports the real-time data exchange and quality control mainly via MEDS, Canada. This is the data provided for operational applications, such as ENSO prediction. The Science Centres (AOML, SIO, CSIRO/BMRC/JAFOOS), which are jointly operated by the GTSPP and the WOCE UOT/DAC Programme, are responsible for the scientific quality control and delivery of products from the high-resolution, delayed mode data set. This data set is managed by the global archive for both programmes (NODC, USA), as is usual for scientific research and climatology development. NODC agreed to make developments to permit access to the data via the Distributed Oceanographic Data System (DODS) and will therefore establish a DODS server in the next 6 to 12 months. Data distributed via DODS (in NetCDF) will be the best current copy of GTSPP data and will be updated on a monthly basis. An Upper Ocean Thermal data CD-ROM procured by WOCE contains all SOOP observations collected until 1999 plus other types of upper ocean thermal data (e.g. TAO). A version 3 of this CD-ROM will soon be published. All data on the CD-ROM will be cor-

rected for XBTs for which old fall-rate equation coefficients were used. SOOP data for 1999 and 2000 will be included in version 3.

In addition to GTS distribution of the data in BATHY format, quality controlled real-time data are also sent from MEDS to US/NODC and other clients three times each week. Real-time data provided by MEDS to clients are either for the whole world or a specific area. Both MEDS and US/NODC have clients that receive regular dispatches of data. Once a year, all data collected two years previously are divided into three oceans and forwarded for scientific QC in the USA (AOML and Scripps) and Australia (CSIRO/BoM/Joint Australian Facility for Ocean Observing Systems [JAFOOS]). The results are returned to US/NODC and updated into the archives. These centres also contribute to the WOCE DAC activities.

Evaluation, quality control

Extensive programme monitoring and data quality activities are implemented in conjunction with the Global Temperature Salinity Profile Programme (GTSPP). Feedback mechanisms have been instigated to ensure data flow and quality. These mechanisms have proven to be effective in increasing the amount of real-time data flow and data quality. Delayed mode data submissions are also being tracked to increase the amount of high-resolution data being made available to the global archives in a timely manner. GTSPP is introducing a data state indicator scheme where it will be easier for the users of the data to identify the type of data processing and quality control that was applied to the data. The use of unique data tags associated to every observation will also permit to filter out duplicates more easily.

SOOP is making available several publications. For example, the *Quality Control Cookbook for XBT Data* proposes methods to facilitate identification of erroneous features, the *GTSPP Real-time Quality Control Manual* (IOC Manuals and Guides No. 22, UNESCO, 1990) sets standards for quality control of real-time data and describes exactly the screening process that is employed, and the *Guide to operational procedures for the collection and exchange of JCOMM oceanographic data* (IOC Manuals and Guides No. 3, UNESCO, 3rd revised edition,1999) provides general guidance on operational procedures for the collection, encoding, quality control and exchange of oceanic surface and subsurface temperature, salinity and current (BATHY, TESAC and TRACKOB) data.

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Coverage of XBT SOOP lines in terms of number of transects per month for the first 6 months of 2001

Source: DBCP/SOOP Technical coordinator

Ship of Opporunity Programme (SOOP)

Visit the website:
http://www.brest.ird.fr/soopip/

D – Global Climate Observing System

by Dr Alan Thomas
Director, GCOS Secretariat,
WMO Headquarters, Geneva

The Global Climate Observing System (GCOS) was established in 1992 to ensure that the observations and information needed to address climate-related issues are obtained and made available to all potential users. It is co-sponsored by the World Meteorological Organization (WMO), the Intergovernmental Oceanographic Commission (IOC) of UNESCO, the United Nations Environment Programme (UNEP) and the International Council for Science (ICSU). GCOS is governed by a Steering Committee of senior scientists with programme management or operational experience and has three scientific advisory panels providing scientific advice: the Atmospheric Observation Panel for Climate (AOPC), the Ocean Observations Panel for Climate (OOPC), and the Terrestrial Observation Panel for Climate (TOPC).

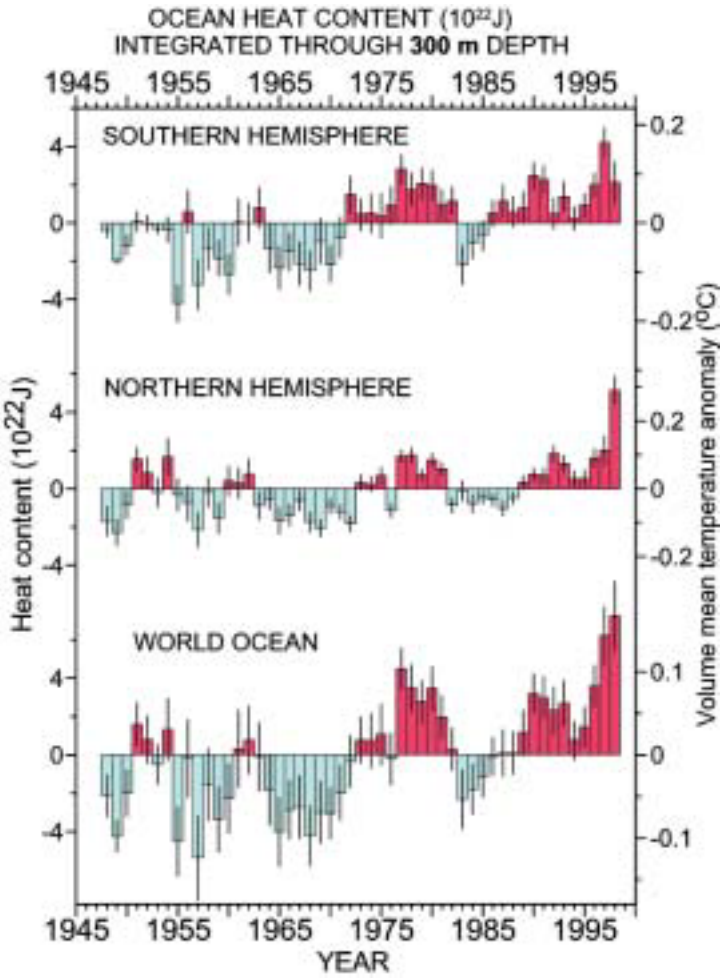
During 2001, GCOS continued to focus its efforts on implementation and extension of the global observing system for climate, and on interactions with the United Nations Framework Convention on Climate Change (UNFCCC) and its sponsors as well as other agencies in support of this system.

Implementation of the GCOS Baseline Networks

Under the leadership of the GCOS Science Panels (AOPC, OOPC, TOPC), progress was made in the implementation of the GCOS networks and systems. For example:

- The GCOS Surface Network (GSN) Monitoring Centres at the Japan Meteorological Agency (for temperature) and the Deutscher Wetterdienst (DWD) (for precipitation) are fully operational and have produced semi-annual reports on the availability of GSN data for the last two years. For the GCOS Upper-Air Network (GUAN), the European Centre for Medium-Range Weather Forecasts (ECMWF) provides monitoring data to the Hadley Centre of the UK Met Office, which publishes monthly statistics on the GUAN Web site. The World Data Center for Meteorology, Asheville (North Carolina, USA), of the National Climatic Data Center (NCDC), acts as the GSN

Warming of the World Ocean



Courtesy of:
Sydney Levitus, National Oceanographic Data Center, NOAA (USA)

and GUAN Archive and provides access to the historical data from both networks. Establishment of this data management infrastructure is allowing performance weaknesses to be identified and ultimately improved, as well as providing access to the data.

- In response to Resolution 3 of WMO EC-LII, GCOS has sought closer ties with the WMO Technical Commissions in implementing the GCOS networks. The WMO Commission for Basic Systems (CBS) at its 12th session requested the existing monitoring centres of CBS and GCOS to take steps to improve the monitoring of CLIMAT and CLIMAT TEMP reports, which are the basis for GSN and GUAN reports. Closer interaction with the WMO/IOC Joint Technical Commission for Oceanography and Marine Meteorology (JCOMM) has also been initiated.
- Solid progress was made in the implementation and operation of the GOOS/GCOS ocean observing networks for climate (e.g. VOSClim, ASAP, DBCP, the TAO/TRITON array and the Argo initiative), thanks in large part to the strong efforts of the OOPC, the Global Ocean Observing System (GOOS) and the establishment of JCOMM.
- Further progress was made toward the establishment of a global climate network for hydrology (GTN-H, the Global Terrestrial Network – Hydrology) through a meeting hosted by DWD in June with the support of the WMO Hydrology and Water Resources Department, Global Terrestrial Observing Systems and GCOS. A major goal of the GTN-H, for which Canada has agreed to provide the initial coordinator, will be to produce global products for key hydrological variables.

Interactions with the UN Framework Convention on Climate Change (UNFCCC)

On behalf of its sponsors, the GCOS Secretariat continued its interaction with the UNFCCC/Conference of Parties (COP) and its Subsidiary Body for Scientific and Technological Advice (SBSTA) through participation in the 14th and 15th sessions of SBSTA, held in conjunction with COP-6bis and COP-7, respectively. GCOS reported on the status of activities pursuant to Decision 5/CP.5 and recent developments in global observing systems for climate:

- In response to Decision 5/CP.5, GCOS has developed a Regional Workshop Programme, which seeks to build capacity in ten regions having recognized deficiencies in global observing systems for climate. The Programme is to assist countries on a regional basis to develop Regional Action Plans and obtain financial support for improving their observing systems for climate. The Programme is a part of the Global Environment Fund/United Nations Development Programme (GEF/UNDP) National Communications Support Programme and, as such, has received significant support from GEF through UNDP. GCOS is working closely with UNDP to ensure the full involvement of Non-Annex I climate change teams. The two phases of the programme are the:

  (i) *Pilot Project*, which was completed in 2001, consisting of two Regional Workshops for the Pacific Island countries and for countries in eastern and southern Africa; it was designed to refine workshop methodology. Besides GEF/UNDP support, contributions were received from UNEP, WMO, the USA, and Australia. Reports from these workshops are

available on the GCOS homepage (http://www.wmo.ch/web/gcos/gcosho me.html); and the
(ii) *Full Project*, which will be implemented from 2002 to 2005. GEF has approved a GCOS proposal for the Full Project, but matching funds will be needed from donor countries and international organizations. The Full Project will be launched in March 2002 for the countries of Central America and the Caribbean with sponsorship by the Organization of American States, WMO, UNEP, Canada and the USA. Later in 2002, a regional workshop will be held in East Asia.

- The 'Global Climate Observing System: progress report on developments in the global observing systems and activities related to decision 5/CP.5', submitted to SBSTA-15/COP-7, reviewed deficiencies in GSN and GUAN, developments in the climate components of the Global Ocean Observing System (GOOS) and Global Terrestrial Observing System (GTOS), and the needs for improved continuity and calibration of satellite observations.
- The Parties to the UNFCCC were requested in Decision 4/CP.4 and 5/CP.5 to prepare detailed reports on their programmes of systematic observations. The GCOS Secretariat, together with the UNFCCC Secretariat, began the process of synthesizing and analyzing the information on systematic observations submitted during 2001. The GCOS Steering Committee proposed in addition that this material be used to prepare a second 'Report on the Adequacy of the Global Observing Systems', following on from the first Adequacy Report submitted to COP-4 in 1998, to assess how well existing systems and planned improvements will meet the needs of the Convention. This Report will draw upon international scientific experts and will take into account the conclusions of the IPCC Third Assessment Report (TAR). SBSTA 15 at COP-7 endorsed this proposal and invited GCOS to submit a final report to SBSTA-18 in mid-2003.

The Year 2002 will be a demanding one with: the preparation of the 'Second Report on The Adequacy of Global Observing Systems'; the organization of two more Regional Workshops; the completion of the first two Regional Action Plans as requested by SBSTA 15; and the submission of an Interim Report to SBSTA 16 on the synthesis and analysis of the detailed reports from Parties.

New training scheme for global observations

By Dr Shubha Sathyendranath,
Executive Director,
Partnership for Observation of the Global Oceans (POGO)

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POGO-IOC-SCOR Fellowship Programme for 2001

The Fellowship Programme was conceived at the Second POGO Meeting in São Paulo (Brazil) in November-December 2000, and implemented for the first time in 2001. Priority areas were identifiied as:

- Argo floats
- Fixed-point time-series observations
- Biological observations
- Emerging technologies for ocean observations

The Fellowship Programme was implemented with financial support from IOC and SCOR. The announcement went out in April 2001, and the competition was open for two months. A total of 42 applications were received. There were ten applications from India, twelve from South America, and five from Indonesia. There were no applications from Africa.

The applications were screened independently by a committee of three, with representation from SCOR, IOC and POGO. In making their selection, the committee considered the following factors:

(i) quality of the application;
(ii) relevance of the application to the priority areas identified in the Fellowship Announcement;
(iii) evidence that the training will lead to capacity building with potential lasting impact on regional observations; and
(iv) the need to maximize regional distribution of the awards.

This year, thirteen fellowships were offered to oceanographers from developing countries and economies in transition. The host institutions were in North America, Europe and Australia. All were accepted; some of the visits were completed.

In some instances, host supervisors felt that the POGO fellowship was insufficient to cover reasonable expenses for food, lodging and transport, and offered to supplement the POGO Fellowship. Such contributions to the programme are gratefully acknowledged. In fact, we acknowledge the efforts from all the supervisors and colleagues at the various host institutions who agreed to devote time and energy required for the training. The programme would not have been viable without such efforts from prominent scientists and their teams.

This report will not be complete without mentioning two negative responses that were received on the Fellowship Programme, at the time of its launch. One scientist suggested that POGO should cover expenses at the host institute: for example, pay for the time of the technicians who may be involved in the training. Another stated that POGO should concentrate more on training courses as being more cost-effective. These were the only two negative responses received.

In general, the responses were overwhelmingly positive. All the people involved in each Fellowship (the Fellowship holder, the supervisor at the parent institute and the supervisor at the host institute) were requested to submit short reports at the end of the training period. The reports received were very encouraging. They indicate that these exchanges should lead to effective capacity building in the host institute and facilitate longer-term collaborations between the institutes concerned. All concluded that the programme serves a useful purpose. To quote a host supervisor from the USA:

'The fellowship program provides an excellent opportunity for young investiga-

tors and technicians to be immersed in a professional environment, have contact with experts in the field, and develop stronger links with present or potential colleagues. POGO provides a mechanism to develop technical skills. POGO helps to develop scientific understanding by young foreign students and technical personnel. More importantly, POGO helps develop good will and understanding between different cultures. This is a wonderful program, and all efforts should be made to ensure its continuity.'

There is tremendous interest in the Programme at all levels, both in the oceanographic institutions of the developing nations, as well as among leading scientists who are eager to contribute to this initiative. It is seen to be filling a niche in capacity building through specialized training that is not filled by intensive courses or participation in scientific meetings. It helps build an esprit de corps among oceanographic institutions around the world, and serves as a stepping stone to building collaborations.

The co-sponsors of the programme – IOC and SCOR – have both indicated that they are satisfied with the initial programme, and have already made financial commitments for 2002 at the same level as this year. The Fellowship plan was discussed at the GOOS Steering Committee meeting in Chile in April 2001, and the comments received were very positive.

From the perspective of the Secretariat, this has been one of the more time-consuming activities that were undertaken this year. Learning from the experience of this year, steps have been taken to streamline the administration of the activity in 2002. The announcement for the 2002 Fellowships is on the POGO web page; the first deadline is 30 April 2002. ■

Demography of POGO-IOC-SCOR Joint Fellowship Programme

Countries/parent institutions/names of fellowship recipients

Argentina: Naval Service of Research and Development - Silvia Blanc
Brazil: Universidade de São Paulo - Luiz V. Nonnato
Chile: Catholic University of Valparaíso - César Hormazábal
Chile: Universidad de Concepción - Marcel Ramos
China: Second Institute of Oceanography - Guo Ming and Liu Zenghong
Estonia: Estonian Marine Institute - Liis Sipelgas
India: National Institute of Oceanography - V.S.N. Murty
India: Space Applications Centre - Beena Kumari
Pakistan: National Institute of Oceanography - Samina Kidawai
Russia: P. P. Shirshov Institute of Oceanology - Andrei Y. Ivanov
Uruguay: Instituto Nacional de Pesca / DINARA - Ana Laura Martínez Goicoechea
Venezuela: Margarita Marine Research Station (EDIMAR) - Glenda Arias

Host Institutions

Australia: CSIRO, Canberra
Canada: Bedford Institute of Oceanography
Canada: Dalhousie University
Canada: Institute of Ocean Sciences
Denmark: Danish Institute of Fisheries and Marine Research
USA: Atlantic Oceanographic and Meteorological Laboratory (two fellows)
USA: Columbia University
USA: Old Dominion University (two fellows)
USA: University of Hawaii
USA: University of South Florida
USA: University of Washington (two fellows)

Males/Females

Female: 6; Male: 7

Operational Observing Systems programme participation in 2001 events

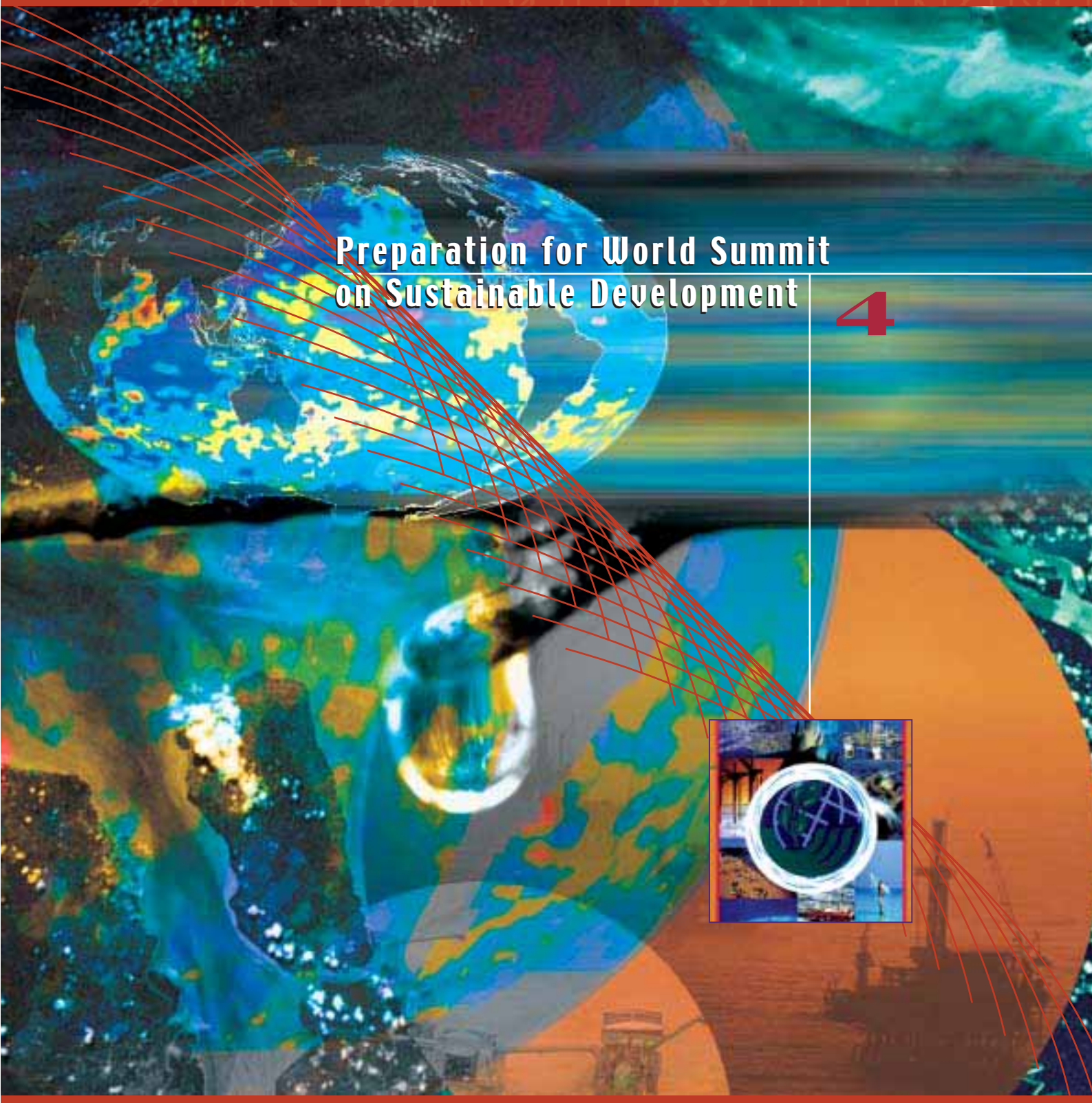
(Events with TEMA input are highlighted in blue)

Event	Staff*	Venue	Dates
French Oceanography Committee	CS	Paris, France	11-12 Jan
IPCC Conference	AA	Shanghai, PR China	17-20 Jan
SEREAD Steering Committee Meeting	WE	Auckland, New Zealand	23-24 Jan
5th Meeting of the International GODAE Steering Team	AA	Nouméa, New Caledonia	12-15 Feb
Meeting between IOC and EuroGOOS Officers	CS, AA, PB	Paris	16 Feb
Pacific GOOS Executive Committee Meeting	WE	Nouméa	17 Feb
ICSU Scientific Unions Meeting	CS	Paris	19 Feb
WMO/VCP Meeting	WE	Melbourne, Australia	26-28 Feb
4th Session of the GOOS Steering Committee	CS	Viña del Mar, Chile	12-16 Mar
WCRP JSC Meeting	AA	Boulder, Colorado, USA	19-24 Mar
3rd Argo Science Team Meeting	EC, MB, WE	Sidney, BC, Canada	20-22 Mar
CLIVAR Ocean Observation Panel	AA, WE	Hobart, Australia	27-30 Mar
GCRMN South Asia Evaluation Meeting	NC	Male, Maldives	28-30 Mar
UK GOOS Meeting	CS	London, UK	29 Mar
NOAA Conference on Expanding Opportunities in Marine & Atmospheric Sciences	JA	Jackson, Miss., USA	30 Mar-7 Apr
3rd Meeting of IOCARIBE-GOOS Advisory Group and Oceanology International	CS	Miami, Florida, USA	1-5 Apr
GCRMN	NC	Cebu, Philippines	1-7 Apr
OOPC-VI	AA	Melbourne	2-5 Apr
7th GLOSS Group of Experts Meeting	TA	Honolulu, Hawaii, USA	23-27 Apr
Presentation of SeaKeepers	all	Paris	24 Apr
WAGOOS Consultations	WE	Melbourne	May 8
CLIVAR Scientific Steering Group 10th Meeting	AA	Toulouse, France	14-18 May
Black Sea GOOS Start-up Meeting	TA	Poti, Georgia	22-25 May
G3OS Directors', G3OS Sponsors' & IGOS Partners' meetings	CS, MH	Paris	31 May-1 Jun
2nd COOP Meeting	TA	Trieste, Italy	5-8 Jun
WMO Executive Council	CS	Geneva, Switzerland	5-15 Jun
JCOMM-I	CS, YT, EC, PB	Akureyri, Iceland	19-29 Jun
3rd EU Operational Forecasting Cluster Workshop	TA	Brussels, Belgium	19-21 Jun
I-GOOS-V	CS	Paris	28-30 Jun
IOC Assembly	all	Paris	2-13 Jul
Indian Ocean Argo Implementation Meeting	EC, MB	Hyderabad, India	26-27 Jul

8th Session of the International South Atlantic Buoy Programme (ISABP)	JT	Mar del Plata, Argentina	30 Jul-4 Aug
Heads of Marine Agencies Meeting	WE	Canberra, Australia	10 Aug
SEREAD Steering Committee	WE	Suva, Fiji	20-21 Aug
1st Implementation Planning Meeting for the Establishment of SEAGOOS	MK,TS, WE	Seoul, R. of Korea	27-31 Aug
NEAR-GOOS Ocean Forecasting Workshop	TS, MK	Seoul	27-31 Aug
8th Session of PIRATA Steering Group	JT	Paris	29-31 Aug
6th Session of the Coordinating Committee for NEAR-GOOS	TS, MK	Seoul	31 Aug
CLIVAR Tropical Atlantic Variability Workshop	AA	Paris	3-6 Sep
IOC/ICES SG-GOOS North Sea Meeting	CS	Bergen, Norway	5-7 Sep
OOPC-CLIVAR Moorings Network Evaluation Workshop	AA	Seattle, Washington, USA	10-12 Sep
Black Sea GOOS Drafting Group	TA	Varna, Bulgaria	17-18 Sep
MedGLOSS Round Table at CIESM Meeting	TA	Monaco	25 Sep
Pacific GOOS Remote Sensing Workshop	WE	Nouméa	25-27 Sep
I-GOOS/UNCLOS Meeting	CS	Paris	2-3 Oct
Coordinating Group for Meteorological Satellites	CS	Capri, Italy	22-25 Oct
DBCP-XVII	YT, EC	Perth, Australia	22-26 Oct
Western Australia Marine Science Seminar	WE	Perth	23 Oct
Argos-JTA-XXI	YT, EC	Perth	29-31 Oct
Managing Climate Risks Workshop	AA	Berlin, Germany	25-26 Oct
5th NEAR-GOOS Data Management Training Course	TS	Tokyo, Japan	5-16 Nov
CEOS Plenary	PB	Kyoto, Japan	6-7 Nov
IGOS Partners	PB	Kyoto	8 Nov
GOOS Africa Remote Sensing Workshop	CS, JA, WE	Nairobi, Kenya	19-23 Nov
UNEP Regional Seas Workshop	CS	Montreal, Canada	21-23 Nov
EuroGOOS Annual Meeting	TA	Copenhagen, Denmark	22-23 Nov
I-GOOS/Rio +10 Meeting	TA	Copenhagen	23 Nov
POGO Meeting	PB	Nova Scotia, Canada	27-29 Nov
Oceans and Coasts at Rio + 10	all	Paris	3-7 Dec
WOCE SSG-28	AA	San Diego, California, USA	3-7 Dec
EGOS Management Committee Meeting	YT	Paris	4-5 Dec
GODAE IGST-6	AA	Stennis, Miss., USA	4-7 Dec
Extraordinary Session of the IOC Executive Council	all	Paris	10-11 Dec

***Staff members initials**

AA: Arthur Alexiou; CS: Colin Summerhayes; EC: Etienne Charpentier; JA: Justin Ahanhanzo; JT: Janice Trotte; MB: Mathieu Belbéoch; MH: Maria Hood; MK: Maarten Kuijper; NC: Ned Cyr; PB: Patricio Bernal; TA: Thorkild Aarup; TS: Tsuyoshi Shiota; WE: William (Bill) Erb; YT: Yves Tréglos



Preparation for World Summit on Sustainable Development

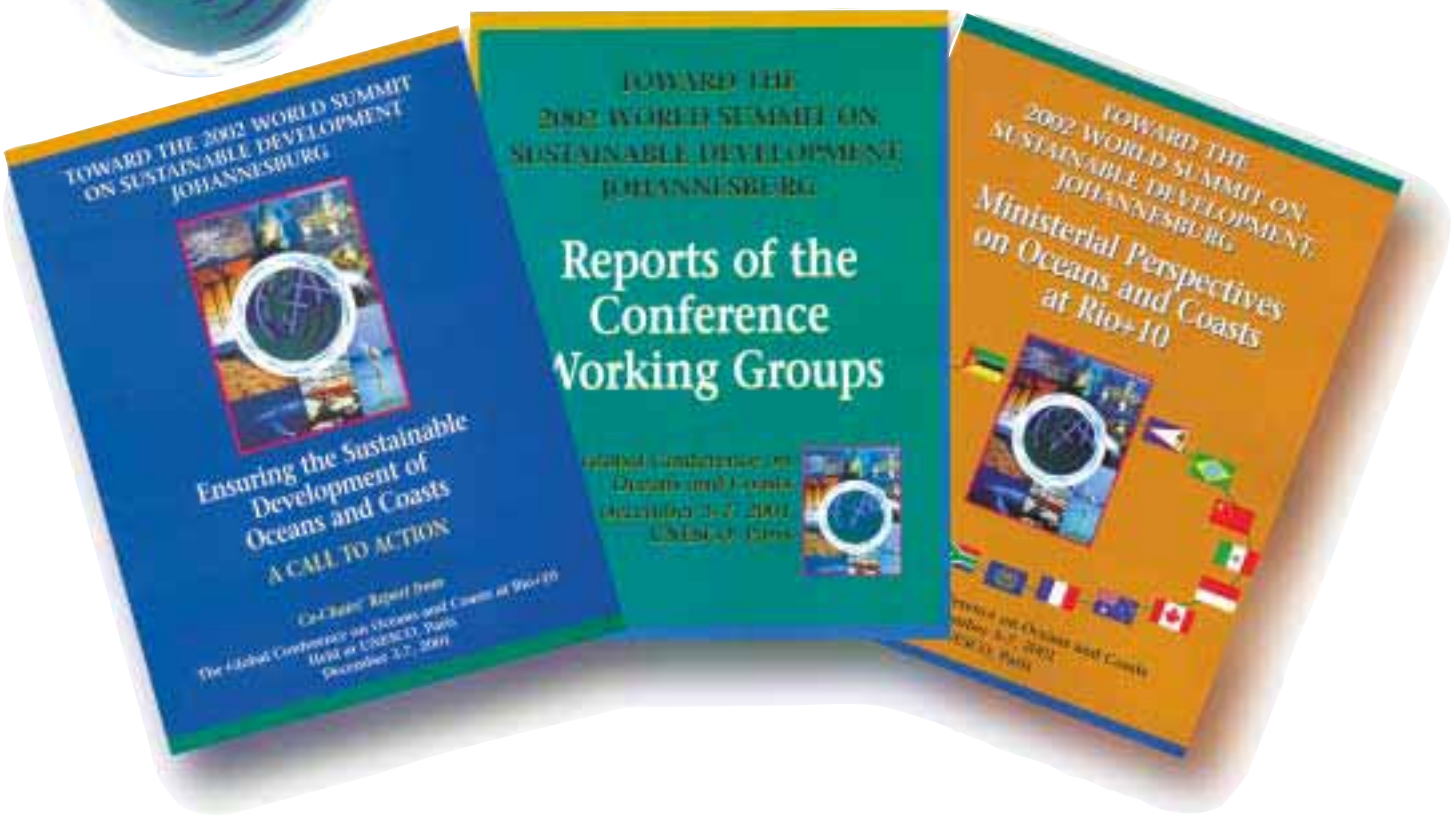
4

IOC and partners gear up for WSSD

In response to the UN General Assembly resolution A/RES/55/199 soliciting a 'Ten-year review of progress achieved in the implementation of the outcome of UNCED', and in view of the preparations for the organization of the World Summit on Sustainable Development (WSSD), the 21st IOC Assembly decided to convene an Extraordinary Session of the IOC Executive Council for the purpose of approving a declaration addressed to the WSSD.

The Extraordinary Session of the IOC Executive Council took place 10-11 December 2001 at UNESCO-IOC Headquarters, Paris. On this occasion, the Executive Council approved the '*Declaration by the Intergovernmental Oceanographic Commission of UNESCO to the World Summit on Sustainable Development*' to be made available at the WSSD in Johannesburg, 26 August – 4 September 2002.

In addition, IOC promoted the organization of the 'Global Conference on Oceans and Coasts Rio+10: Toward the 2002 World Summit on Sustainable Development in Johannesburg' that took place from 3-7 December 2001 at UNESCO Headquarters, Paris, France. The Conference, co-organized by IOC and the University of Delaware's Center for the Study of Marine Policy (CSMP), was supported by numerous international and national organizations with an interest in oceans. The Conference was attended by more than 450 participants from over 60 countries, including 13 ministers and vice-ministers and ocean experts from governments, intergovernmental organizations (IGOs), NGOs, academic and scientific institutions as well as interested experts from industry. The conference participants sought to: (i) provide an overall assessment of progress achieved regarding oceans and coasts in the ten years since the UN Conference on Environment and



Development (UNCED) in Rio (June 1992); (ii) identify new and continuing challenges; (iii) examine cross-cutting issues among various ocean and coastal sectors; (iv) consider options for concerted action on outstanding cross-sectoral issues; and (v) provide recommendations for the oceans and coasts agenda of the WSSD. The Conference was organized into 17 panels, with presentations on selected topics followed by discussion periods. Eight Working Groups composed of NGO, IGO and government representatives also met throughout the week to assess information presented by the panels and prepare recommendations on: (i) harmonizing international agreements; (ii) targeting donor aid; (iii) assessing and managing the marine environment; (iv) marine biodiversity and protected areas; (v) integrated ocean and coastal management; (vi) sustainable fisheries and aquaculture; (viii) regional and small island perspectives; and (ix) capacity building. The co-Chairs' Summary was presented in January 2002 to the WSSD PrepCom II, to inform the WSSD process. Other outputs also include a volume on Ministerial Perspectives presented at the Conference and several special issues in specialized journals with papers submitted to the Conference (see publications on p. 90). ■

For more information on IOC's activities in relation to WSSD, contact: Julian Barbière, j.barbiere@unesco.org

Declaration

DECLARATION BY THE INTERGOVERNMENTAL OCEANOGRAPHIC COMMISSION OF UNESCO TO THE WORLD SUMMIT ON SUSTAINABLE DEVELOPMENT

The world oceans and their adjacent seas, and the living and non-living resources they contain, are a necessary element for the survival of life as we now know it. The sustainability of the air we breathe, the water we drink, the food we eat and the climate in which we live is dependent upon the oceans. The oceans also provide for the cultural, social and economic well-being of people. It is the oceans that make life on earth uniquely sustainable within the solar system. Sustainable development is highly dependent on the wise management of the oceans and coasts based on scientific knowledge.

Governments must work together. The collective effort of all states is required to resolve global issues. Government cooperation at global and regional levels is necessary. We need strong global and regional institutions to support this, and to bring science and policy makers together. The countries whose economies and social structures depend on the ocean must be able to address local problems. For this it is essential that we build the capacity of all countries.

Governments placed the protection and preservation of the oceans and their resources at a high level of priority in Agenda 21 of UNCED.

As the sole UN organization specialized in ocean science and services, the Intergovernmental Oceanographic Commission of UNESCO has many notable achievements over the last decade in support of UNCED:

- **support of research into ocean climate and long-term weather variations in cooperation with the World Climate Research Programme which allows early forecasting of El Niño events, such as happened in 1997/98;**
- **the Global Ocean Observing System (GOOS) has been initiated in concert with companion UN agencies and ICSU, with an initial focus on the open ocean and a fast developing parallel focus on monitoring and forecasting in coastal seas;**
- **improved systems for exchange and availability of ocean data and information;**
- **a programme on Integrated Coastal Area Management is focusing attention on many of the high priority environmental problems in coastal areas;**

- better knowledge of ocean features, processes and the impacts of human actions on the state of the marine environment;
- strengthened regional mechanisms in ocean sciences and in the capacity of developing countries in marine research and services;
- leadership of the UN 1998 International Year of the Ocean; and
- substantial contribution to the UN Ocean Informal Consultative Process.

Much has been achieved. Much remains to be done over the coming years. The Intergovernmental Oceanographic Commission affirms its will to:

- act as a focal point to encourage interactions in marine science and observations across relevant bodies of the UN System and other organizations;
- further develop partnership in capacity building in marine science and services at regional and national levels, particularly with developing countries and taking also into account the African Process;
- develop GOOS as an operational system;
- promote the development and implementation of programmes on Integrated Coastal Area Management;
- participate fully in the necessary assessment of the global ocean environment, and periodic reporting on the state of the oceans;
- promote the use of scientific knowledge for management decisions and policy making and facilitate access to this knowledge; and
- work to increase public awareness of the importance of the oceans and coasts for sustainable development and the future of humanity.

The Member States of the Intergovernmental Oceanographic Commission ask that the WSSD reaffirm the importance of the oceans for sustainable development; promote the IOC as the key marine science body of the UN; and encourage governments and funding organizations to provide the resources necessary to implement IOC priorities, including support for IOC activities for marine science capacity building in developing countries.

Statement by the Honourable Rejoice Mabudafhasi, MP, Deputy Minister of Environmental Affairs and Tourism, Republic of South Africa

Paris, 10 December 2001,
Delivered to the Extraordinary Session,
IOC Executive Council, UNESCO

Introduction

Distinguished participants, I am honoured to deliver this address. Let me take this opportunity to thank the IOC for hosting the Executive Council meeting at this opportune time. Those of you who attended last week's conference will agree with me that it is through such meetings that we are well on our journey to Johannesburg – a journey that we ought to take beyond Johannesburg in a practical and implementable way, for all participating partners to influence not just the environment but directly the quality of life of so many people.

Through initiatives like Rio + 10 and the GPA Intergovernmental Review, which I attended the previous week, we are able to determine a meaningful Agenda for Johannesburg.

During the deliberations last week two distinct areas of information emerged: Accomplishments since the Rio Summit and issues to be addressed to achieve the noble objectives of Agenda 21. Together with this, five overarching themes crystallized.

Before getting into the overarching issues let me briefly describe the legacy of the 1992 Rio Summit.

The many international agreements promoting sustainable development have been unable to reverse or halt the effects of the globalization process, which has effectively reinforced global inequality, deepening and widening the rift between the rich and poor.

The root cause of much of the discussion during the week centred on the failure to integrate international systems for trade, finance and investment with the goals of sustainable development. The challenge for the next ten years will be to integrate the priorities of these sectors, and eliminate perceptions that these priorities compete with each other.

Other issues that perpetuate this Rio legacy are:

- the plethora, fragmentation and lack of coordination of conventions and institutions;
- the development initiatives are underfunded and ineffective;
- complex ocean and coastal governance systems hinder developing country participation and co-ownership;
- donor funds are limited and not necessarily in line with country priorities;
- poor implementation of development targets; and
- shortcomings in international conventions.

Returning to the second area of discussion, the issues to be addressed to achieve the noble objectives of Agenda 21 are:

- environmental protection;
- resource conservation and sustainable use;
- socio-economic and resource development;
- ocean and coastal governance; and
- data management and information sharing.

Environmental protection

Future sustainable development or management of ocean and coastal resources depends on achieving a level of environmental protection sufficient to ensure public health and food security. This is especially relevant to developing States where marine industries often dominate coastal economies. It is therefore important that ocean and coastal environments, with their associated biodiversity, be protected from potential threats posed by anthropogenic activities at all scales. Counters to all threats must focus on precautionary measures for pollution prevention and reduction of habitat degradation. In specific cases, designated projects to enhance environmental rehabilitation are required, not least in reversing past losses to key ocean and coastal resources through the recovery of associated biodiversity.

Resource conservation and sustainable use

The world's ocean and coastal environments exhibit wide biodiversity and ecological potential, thereby necessitating the greatest possible protection. Such protection is essential for ensuring that a genetically diverse fauna and flora are preserved so as to maximize the potential for sustainable resource development, thereby contributing to the alleviation of poverty.

To date, the need for economic stability has largely been driven by developed States, which ultimately results in exploitation of ocean and coastal resources in the developing world. This has both caused limited access to these resources for developing States and compromised resource sustainability by encouraging profit-orientated exploitation at the expense of conservatory practices.

Solutions to this issue require development of equitable partnerships between the developed and developing worlds.

Socio-economic and resource development

Several presentations throughout last week emphasized the link between socio-economic development and the environment. The underlying theme here was finding mechanisms to integrate management in real ways and to strengthen the examples that have begun to show some results.

A key constraint in the sustainable development of ocean and coastal resources has been the extent of prevailing poverty. This has forced many poor developing States to sacrifice their natural environments and resources to provide for some level of health, food and political security.

Ultimately, as a result of the tremendous pressure on our limited resources, there is a need to investigate alternative sustainable livelihood options to sustain our coastal communities.

Ocean and coastal governance

The expressed purpose of many international marine, fisheries or coastal agreements is to promote long-term resource sustainability and to ensure global political stability by removing sources of conflict (economic or otherwise). There has been consensus this week that the complexity and scope of agreements has often prejudiced their implementation. This is especially true for developing countries, which, due to a general lack of capacity or through excessive duplication of functions cannot participate fully in these initiatives. This has tended to favour developed States.

There are some current and planned projects to develop capacity. However, I wish to urge current negotiations and those to take place over the next few years to appreciate the current levels of capacity, so as to not marginalize developing States further.

Data management and information sharing

A message to take forward to the WSSD is that the success of global, regional and national actions likely to emanate from the WSSD will be critically dependent on a reliable system of information exchange. This requires recognition of the importance of, and commitment to, information exchange to facilitate appropriate partner initiatives and coordination of activities.

In identifying the above five issues, I have tried to comment on the larger, overarching issues. I am sure that in the fine print there are many more issues, the result of the deliberations of a combination of experts from diverse fields of expertise.

What should be the focus of WSSD?

We must understand that WSSD is about sustainable development, equity, alleviation of poverty and ensuring economic and food security and all the underlying aspects that underpin this concept.

So many times last week as well as at the GPA Intergovernmental Review the previous week, we heard that interventions at the regional level should be encouraged. In many parts of the world, regional initiatives have proved to be successful. Ownership is a key ingredient to success.

Poverty and inequality are the greatest threats to global sustainable development in the twenty-first century. I think that all participants would agree, but we would emphasize that this be consciously acknowledged in planning a strategy for this century.

To make serious inroads into addressing inequalities, there must be serious interventions, even paradigm shifts in terms of trade, investment and debt relief.

Governments alone cannot address the myriad partnerships with business, industry and civil society are critical.

National and regional projects should serve as the delivery agents for such partnerships, so as to encourage ownership. The point that ownership produces the best results has been made several times this week and must not be ignored. The 'African Process' and the 'New Partnership for Africa's Development' serve as models of such delivery agents.

What should be the achievements of WSSD next year?

A renewed commitment to Agenda 21. This renewed commitment must take the form of setting in motion definite and practical implementing mechanisms.

We must find ways of implementing a global commitment to eradicate poverty for sustainable development.

WSSD must also find ways to impact on the economic factors that underpin the marginalization of the developing world, with special reference to trade, finance and investment.

Ultimately the WSSD must produce a Johannesburg Programme of Action with clear commitments, deliverable targets, monitoring mechanisms, definite time frames and resources, which are readily accessible.

We should not forget that sustainable development rests on three related pillars:

- economic development,
- social development, and
- environment.

Oceans and coasts fit into the environment pillar.

In conclusion, let us ensure that WSSD will not be just like any other resolution-generating conference, but that concrete deliverable actions with suitable timeframes and achievable objectives will be the outcome of this major global event.

Distinguished participants, there is no doubt that the ocean unites the peoples of the world. We need to be united in our actions and act in unity, so significantly reflected in the theme of the Summit.

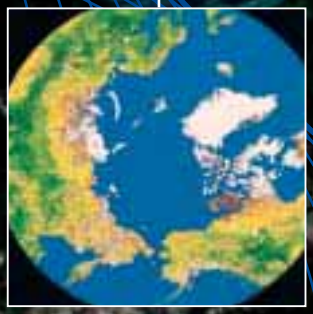
I thank you,

Rejoice Mabudafhasi

"PEOPLE, PLANET, PROSPERITY"

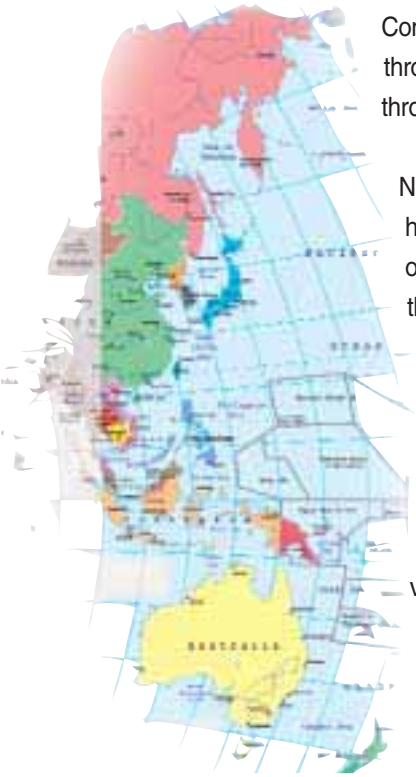
Regional activities

5



IOC's programmes in the various regions of the world are carried out in part by the Commission's regional sub-commissions, committees, centres and special offices for certain programmes. The 2001 activities executed by them are summarized in this section as well as being discussed in other sections of the report. For further information, consult the IOC website: http://ioc.unesco.org/iocweb, then click on 'Select a programme', and under 'Regional programmes' click on the regional programme desired.

5.1 IOC Sub-commission for the Western Pacific (WESTPAC)



Since its establishment in 1989, the IOC Sub-commission for the Western Pacific has advanced the implementation of the Commission's activities in the region, both through IOC's global programmes but also through specific ones tailored to the region.

NEAR-GOOS is developing guidelines on how to establish a capacity in operational oceanography in the countries of the region through the integration of data sets and research from across the region. To this end, in August a special workshop was organized entitled 'NEAR-GOOS Ocean Environment Forecasting' that brought together relevant marine scientists who contributed to this discussion from their varying backgrounds and perspectives. The subsequent Session of the Coordinating Committee included the outcome of this workshop in their deliberations on the strategic plan.

The Japan Oceanographic Data Centre (JODC) continued its series of annual training courses on NEAR-GOOS Data Management by organizing a training course in November. The course used the IODE Resource Kit as a teaching tool.

The year 2001 also saw the initiation of another GOOS Regional Alliance in the WESTPAC – namely SEAGOOS – that will focus on Southeast Asia. Scientists of the region participated in a workshop to identify areas of common interest: climate and tropical cyclones, coastal dynamics and pollution, and ecosystems and fisheries. The workshop also discussed a mechanism to facilitate the planning of SEAGOOS in its preparatory phase.

The Fifth International IOC/WESTPAC Scientific Symposium was held in Seoul, Republic of Korea. It was hosted by the Ministry of Maritime Affairs and Fisheries and attended by more than 220 scientists from almost all over the WESTPAC region. The symposium was organized in four parallel sessions covering papers on: (i) ocean forecasting in the NEAR-GOOS region; (ii) ocean dynamics and climate in general; (iii) atmospheric inputs to the marine environment; (iv) harmful algal blooms; (v) marine pollution and monitoring; (vi) ecosystem and population dynamics; and (vii) marine geology and sediment dynamics. The first day featured a series of addresses by keynote speakers in each of these subjects.

Note: The area maps provided in this section are intended only to locate for the reader the approximate marine area of the regional sub-commission, committee or special programme, and to give a general view of the countries involved in the regional activities. It should not be taken as an exact representation of the corresponding Member States nor of their borders, nor of the exact delimitation of marine areas under study.

The IOC/WESTPAC International Cooperative Study of the Gulf of Thailand continued to operate a website (http://www.start.or.th/got), which functions as an on-line regional data management and information system for the Gulf of Thailand and surrounding waters. Efforts are underway to introduce a curriculum on the oceanography of the Gulf of Thailand for high school students, as well as to prepare a textbook dedicated to the physical oceanography of Southeast Asia for the various universities in the region.

In March, a training course on the 'Physiology and Identification of Harmful Algal Blooms' was organized in Bangkok, Thailand. The WESTPAC-HAB group has also continued with the preparation and distribution of reference materials and relevant documents to participating scientists in the region. In conjunction with the IOC/WESTPAC Scientific Symposium, held in Seoul, Republic of Korea, HAB scientists moreover discussed a strategy to strengthen the HAB network in the region. This strategy will be synthesized for the next session of the WESTPAC Sub-commission in 2002.

In October, IOC convened a workshop in Phuket, Thailand to explore the potential for possible Census of Marine Life (CoML) projects in the Southeast Asian region. Many regional as well as overseas scientists participated in the workshop that led to plans for (i) a coordinated effort to assess patterns of the marine biodiversity and genetic uniqueness in the region in support of marine biodiversity action planning; and (ii) a research project into the historical dimension of changes in marine populations and their repercussions in this region. This activity was financed by a grant of the Sloan Foundation to IOC.

The Northwest Pacific Action Plan (NOWPAP) is one of UNEP's Regional Seas Programmes. Japan, the People's Republic of China, Republic of Korea and the Russian Federation are participating in the implementation of the Action Plan. IOC is the implementing agency for two of the sub-programmes under NOWPAP, namely the 'Establishment of a Comprehensive Database and Information Management System (NOWPAP/1)' and the 'Establishment of a Collaborative Regional Monitoring Programme (NOWPAP/3)'. To this end, in May IOC/WESTPAC organized two expert meetings in Beijing, China, that discussed a plan of action for each of the two sub-programmes to foster international cooperation in marine environmental protection in the region.

IOC/WESTPAC further collaborated with the Andaman Sea Pilot Project by the Coastal Regions and Small Islands (CSI) platform of UNESCO with the objective of providing indigenous people inhabiting protected natural and cultural heritage sites with the knowledge, skills and tools to enable them to take shared responsibility for the management of those sites.

IOC/WESTPAC Member States

Australia, PR China, Fiji, France, Indonesia, Japan, DPR Korea, R Korea, Malaysia, New Zealand, Philippines, Russian Federation, Samoa, Singapore, Solomon Islands, Thailand, Tonga, United Kingdom, United States of America, and Viet Nam.

For more information on WESTPAC, contact the secretariat at westpac@samart.co.th or visit the Sub-commission website at http://ioc.unesco.org/westpac/index.htm

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5.2 IOC Sub-commission for the Caribbean and Adjacent Regions (IOCARIBE)

The work and activities of IOCARIBE traversed a period of positive evolution in 2001, especially during the last months of the year. Implementation of the recommendations of IOCARIBE VI proceeded as planned, especially by supporting the work of several ad hoc regional experts groups. The IOCARIBE Board of Officers played an active role in promoting the interaction and unity amongst Member States of the Sub-Commission.

Dr Cesar Toro, a Norwegian citizen, was appointed head of the IOCARIBE Secretariat as from 1 May 2001. A consultative meeting of the IOCARIBE Secretary with the Board of Officers was held in Miami, Florida (USA), 12-14 June 2001, where, among other actions, the decision was adopted to hold IOCARIBE VII, 25-28 February 2002 in Veracruz, Mexico.

The IOCARIBE Secretariat, in coordination with IOC Headquarters, continued to enhance and strengthen links with other UN agencies. A Memorandum of Cooperation between IOCARIBE and UNEP was prepared and will be signed in Veracruz in February 2002. Joint efforts with other agencies and NGOs continued.

Following IOCARIBE-VI recommendations, the ad hoc Advisory Group for IOCARIBE-GOOS held three sessions devoted to the drafting of a strategic plan for GOOS in the region; the draft plan was presented at the Oceanology International Americas meeting in Miami on 5 April. Progress was made, through smaller meetings and e-mail, in developing the strategy document. A fourth meeting of the ad hoc Advisory Group is scheduled for Veracruz where the strategy will be further outlined as well as the TOR for a Steering Committee.

Progress was made towards establishing the Ocean Data and Information Network for the IOCARIBE and South America Regions (ODINCARSA), and a workshop for that purpose was held 24-26 October in Guayaquil, Ecuador. The ODINCARSA project has received strong support from regional Member States and links are foreseen with programmes such as GOOS and IODE. This project is also discussed on p. 56, Section 2 of this report.

A workshop (Miami, 9-11 January) was held to review current knowledge of the status of humpback whales in the eastern Caribbean and to discuss, plan and co-ordinate future relevant research. A research proposal for visual surveys of humpback whales in the eastern Caribbean was presented by the project co-ordinator, Dr Steven Schwartz, to the International Whaling Commission in July. Following an IOCARIBE recommendation, a project was established for the 'Monitoring, Assessment and Sustainable Management of the Large Marine Ecosystem of the Caribbean and Adjacent Regions' (CLME). In this connection, a workshop to gain GEF pipeline entry and prepare a GEF PDF-B Proposal was

held at NMFS, SEFSC in Miami (19-21 September). Planned as initial efforts are the establishment of a mechanism for regional cooperation, a review of the existing knowledge concerning the threats to the CLME, and the development of a Strategic Action Programme (SAP, an ecosystem-wide assessment system) to redress the damage to the CLME and overcome the gaps in the knowledge essential to its sustainability and management. The GEF project will also focus on strengthening coordination in the assessment and monitoring of ecosystem changes, the development of institutional capacity, on direct support of priority activities identified in the SAP as well as support for national and international activities directed toward the long-term sustainability and economic development of the marine resources of the ecosystem.

The report of the IOCARIBE Group of Experts (GE) Meeting on Ocean Processes and Climate (La Parguera, Puerto Rico, USA, 22-26 November 1995) was issued in 2001.

A major proposal, entitled 'Caribbean Planning for Adaptation to Climate Change' (CPACC), was completed. CPACC is to be submitted, on behalf of the CARICOM nations, to the Global Environment Fund through the Organization of American States. It includes installing and operating eighteen GOES (Geostationary Operational Environmental Satellite) -reporting sea-level/weather stations in eleven countries. The IOCARIBE GLOSS Regional Coordinator is acting as a technical expert on the project. Although the tide gauges involved are limited to use by CARICOM nations, CPACC will significantly modernize observations, especially in the eastern Caribbean, and will act as a model for others to emulate.

In the aftermath of Hurricane Mitch, five more tide gauges, part of the GLOSS system, were installed under the auspices of RONMAC (sea-level observing network for Central America). These are identical to the Caribbean Planning for Adaptation to Climate Change systems and are 100% compatible with modern GOES-reporting sea-level/weather systems.

In October, the Eighteenth Session of ICG/ITSU (Cartagena, Colombia) was invited to comment on the text of a tsunami-related project proposal in preparation for its submission to the next session of the IOCARIBE Sub-commission. The ICG/ITSU considered and accepted the proposal in principle, then formed a working group to address outstanding issues.

The second meeting of the IOCARIBE Working Group on HAB (IOCARIBE/ANCA), which was expected to be held in 2000, was postponed until January 2002. On that occasion a new Board will be nominated.

Progress was made towards the establishment of the International Bathymetric Chart of the Caribbean and Gulf of Mexico (IBCCA). This is discussed under 'Ocean Mapping', p. 60, Section 2 of this report.

The 21st session of the IOC Assembly (Paris, France, 3-13 July 2001) stressed the importance of developing a plan for the evaluation and upgrading of scientific research and training components in regional projects. Member States were encouraged to work together towards this goal. In response, the Sub-commission convened a workshop (Manzanillo, Colima, Mexico, 14-16 November) bringing together an IOCARIBE ad-hoc group of experts, in order to formulate the strategic science plan 2001-2010.

In September, Dr Toro had informal contacts with Chair Members of the Intra-American Seas Initiative. As a result both parties confirmed their interest in strengthening their links. Efforts will be made to propose concrete areas of cooperation within their main common areas of activity.

C. Toro

Specific enquiries concerning IOCARIBE's activities may be addressed to:
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c.toro@unesco.org, *or*
Iocaribe@cartagena.cetcol.net.co
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Fax: 57 5 660 0407

More information on IOCARIBE is available at the IOC website: http://ioc.unesco.org/iocweb; click on 'Select a programme', and under 'Regional programmes' click on IOCARIBE.

The IOCARIBE Member States and Territories:

SIDS/Antilles:* Antigua & Barbuda, Bahamas, Barbados, Belize, Dominica, Grenada, Guyana, Haiti, Jamaica, St. Kitts & Nevis, St. Lucia, St. Vincent & The Grenadines, Surinam, and Trinidad and Tobago.

SIDS/Central America: Costa Rica, Guatemala, Honduras, Nicaragua, Panama, and Dominican Republic.

Caribbean/Central-South America: Brazil, Colombia, Cuba, Mexico, and Venezuela

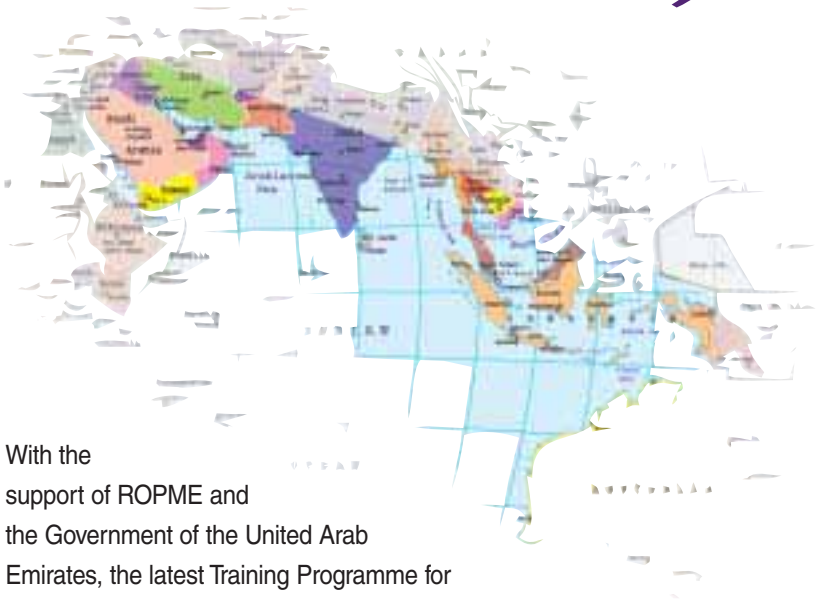
Europe & Northern America:
France: French Guyana, Guadeloupe, Martinique, St. Barthelmy, and St. Martin.
The Netherlands: Aruba, Netherlands Antilles, Bonaire, Curacao, Saba, St. Eustasius and St. Martin.
United Kingdom: Anguilla, Bermuda, British Virgin Islands, Cayman Islands, Montserrat, and Turks & Caicos.
USA: Continental USA, Puerto Rico, and U.S. Virgin Islands.

*SIDS = Small Island Developing States

IOC Regional Committee for the Central Indian Ocean (IOCINDIO) 5.3

Our understanding of the oceanographic processes of the Indian Ocean as a water body is still inadequate. There are huge gaps in data availability. Basin-scale studies – with the collaboration, cooperation and contribution from the Ocean countries – are needed. However, countrywide developments in the region are quite promising. But still, cooperation in the region needs to be intensified to bring most of the countries to a suitable level in oceanographic sciences and services. The top priority of the area is capacity building, both in terms of manpower and infrastructure. Marine pollution, coastal zone management, storm surge studies and climate research are other priority areas in the region. For this purpose, the IOC Regional Committee for the Central Indian Ocean (IOCINDIO) has been constituted to promote oceanographic activities in the region and to ensure that the IOC activities in the region take into account all the specific interests and needs of the relevant Member States.

With a view to understanding the problems of coastal marine environment, coastal hazards as well as integrated coastal management, and to developing scientifically trained manpower, the Indian Institute of Technology (Delhi) organized a comprehensive training programme on Integrated Coastal Management with the active support of IOC. In most developing countries the majority of personnel responsible for coastal zone management and environmental impact analysis are drawn mainly from traditional fields of physical, biological and engineering sciences. Many of them do not have specialized training to address problems of coastal marine waters, natural and man-made hazards and marine policy issues, all of which are of major concern in most developing countries.



With the support of ROPME and the Government of the United Arab Emirates, the latest Training Programme for Monitoring and Modelling of Coastal Marine Processes (MAMCOMP-2001), took place 3-8 November 2001, Abu Dhabi, UAE. This course followed a recommendation of the 2000 IOCINDIO-III Session in Teheran and was the first time it took place outside of India. The meeting was attended by about 35 participants from eight countries of the region, and included UNEP representatives. The next MAMCOMP Training Course has been organized by the Iranian National Centre for Oceanography with the collaboration of IOC and ROPME and will be held in Tehran, Iran, 5-11 May 2003.

In consultation with the Member States of IOCINDIO and with GLOSS, a regional proposal was prepared for the Indian Ocean Sea Level Observing Network (IOSLON), and circulated for comments from Member States. Based on the responses, a sub-regional proposal on IOSLON was prepared for implementation of the project in Bangladesh, Iran, Iraq, Sri Lanka and India at an estimated cost of US$ 174 000. The proposal is for the installation, operation and maintenance of tide gauges at locations suggested by Member States of IOCINDIO. It

Participants at the GCRMN South Asia database training workshop (held at the Zoological Survey of India in Chennai, September 2001) were introduced to the newly developed regional coral reef database.

Photos: Ole Vestergaard

was expected that the entire work (including installation, personnel training, etc.) would take about a year.

The IOC (GOOS) Office in Perth funded the editing of IOCINDIO's Storm Surge Proposal for the Bay of Bengal, which is currently under review. In November 2000, eight scientific meetings were convened in Perth and coordinated by the Office. Over 800 participants were involved including those at the workshop on 'Sustained Observations of Climate in the Indian Ocean (SOCIO)' chaired by Gary Meyers of CSIRO. SOCIO focused on Indian Ocean observing needs to support science and societal development. As a contribution to that meeting an Indian Ocean Strategy paper was drafted suggesting a mechanism for organizing GOOS in the region and the paper is now posted on the GOOS web site.

The strategy paper remains a draft and the countries of the region must now take it further. To assist in this process the IOC Perth Office organized a meeting in New Delhi during November 2001. It was hosted by India's National Institute of Oceanography in Goa. The intent is to develop a leading group from within the region in support of the Indian Ocean observing systems, who can influence the scientific, operational and organizational planning. The New Delhi meeting will be followed by a major workshop in early 2002, intended to implement the results of the SOCIO meeting. It will seek to either put in place or improve upon Indian Ocean observing and data systems. The core group of advocates from the New Delhi meeting plus others will hopefully participate in this meeting to plan the observing systems. The workshop will be organized by the Ocean Observations Panel for Climate, in cooperation with the IOC Perth Office, and the organizers will seek a large participation from within and outside the region.

Member States in the IOCINDIO region

Australia, Bangladesh, France, India, Indonesia, Iraq, Islamic Republic of Iran, Kuwait, Malaysia, Maldives, Myanmar, Oman, Pakistan, Qatar, Saudi Arabia, Sri Lanka, Thailand, United Arab Emirates and United Kingdom

New IOCINDIO Web page:
http://www.incoir.org/iocindio/default.htm
IOCINDIO contact for further information:
Dr Nasser Hadjizadeh Zaker, IOCINDIO Chairman
President of Iranian National Centre for Oceanography (INCO)
No. 51, Bozorgmehr Avenue,
P.O. Box: 14155-4781,
Tehran, Iran, 14168
Tel: 98 21 6416556, 6414844
Fax: 98 21 6419978
inco@istn.irost.com

Contact in the IOC Secretariat:
Julian Barbière (j.barbiere@unesco.org).

IOC Regional Committee for the Cooperative Investigation in the North and Central Western Indian Ocean (IOCINCWIO) 5.4

During the period under review, the institutions participating in the ODINAFRICA project in the region made good progress in developing their national oceanographic data and information centres (NODCs). These centres are now providing useful services and products to a wide range of users. The project also endeavoured to make linkages to other initiatives and programmes in the region such as GOOS-Africa, GLOSS, and the African Process for integrated Coastal Management. During the third meeting of the Contracting Parties to the Convention for the Protection, Management and Development of the Marine and Coastal Environment of the Eastern Africa region (Maputo, Mozambique, 5-7 December 2001) ODINAFRICA was identified as one of the activities for implementing a new theme on 'cross-cutting issues' in the 2002-2003 work plan. The theme comprises two major components, namely: dissemination and exchange of information and emerging issues. More information on ODINAFRICA can be found on p. 53, section 2 (on IODE) of this report.

The implementation of the pilot phase of the project on assessment of shoreline changes and coastal erosion was completed for selected sites in Kenya (Bamburi-Shanzu beach), Mozambique (Macaneta) and Tanzania (Kunduchi). The study involved the classification and assessment of susceptibility to change through: (i) systematic compilation of information required for classification of the shoreline from sources that are published or otherwise accessible; (ii) confirming the interpretation of the desk study by identifying and mapping the distribution of various facies occurring within the study area, and (iii) use of historical data (sequential maps, aerial photographs, satellite images or consultation with local communities, experts, and administrators) to assess the potential for erosion and accretion.

Six Member States from IOCINCWIO (Kenya, Mauritius, Mozambique, Seychelles, South Africa and Tanzania) participated in the GEF Medium-Sized project on 'Development and Protection of the Coastal and Marine Environment in Sub-Saharan Africa', which is being implemented by IOC-UNESCO in collaboration with ACOPS, UNEP, and GPA as part of the African Process.

Cooperation between IOC and the Western Indian Ocean Marine Science Association (WIOMSA) were strengthened in 2001. IOC co-sponsored a six-month (March-September 2001) regional training course on 'Learning and Performing: Developing Skills for Coastal Management in the Western Indian Ocean region', held in Zanzibar in collaboration with WIOMSA. In addition it provided support for the second WIOMSA Scientific Symposium on 'Advances in Marine Sciences in Eastern Africa: Setting the Research Agenda', held 22-26 October 2001, in Dar es Salaam, Tanzania. There were over 80 oral and poster presentations, divided into five groups as follows: Social Sciences Management and Research programmes; Ecology (Mangroves, Corals, Seagrasses, Seaweeds and Planktons); Fisheries and Marine Mammals;

See page 137

Groundwater, Geology and Physical Processes; and Pollution, Pesticides and Nutrients.

The rate of implementation of the IOCINCWIO Work Plan slowed down following the ending of the 10-year cooperation agreement with Sweden through which substantial extra-budgetary resources were provided for implementation of activities in the period 1989-2000. The fifth session of IOCINCWIO, initially planned for 2001, was re-scheduled to 2002.

MEMBER STATES IN THE IOCINCWIO REGION

Comoros, Eritrea, France, Kenya, Madagascar, Mauritius, Mozambique, Seychelles, Somalia, South Africa and Tanzania.

For more information contact:
Mika Odido
Head of IOCINCWIO Project Office
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Mombasa 80106, Kenya
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Fax: 254-11-475157
m.odido@unesco.org
(Also see page 53 under ODINAFRICA)

5.5 IOC Regional Committee for the Central Eastern Atlantic (IOCEA): Project Office to open

The year 2001 has been one of mounting enthusiasm for IOCEA, as the IOC and its partners prepared to open, on 1 January 2002, a project office for the region. The Project Office will be hosted by the Nigerian Institute for Oceanography and Marine Research at Victoria Island, Lagos. Mr Larry Awosika of the Institute has been designated to assume the position and responsibilities of Head of the Office.

The Office and its Head will carry out all the normal functions of IOC representatives and act as a liaison between the IOC, on the one hand, and the Member States and institutions of the region on the other. Among the assigned tasks are: the coordination, implementation and monitoring of IOCEA's programmes, which includes assisting in the planning and organization of meetings, workshops, training courses and other activities, particularly those related to capacity building. Promotion of the IOC and its overall role as well as maintaining relations with relevant partners -– plus identifying new ones – also figure amongst the duties of the Office and its Head.

MEMBER STATES IN THE IOCEA REGION

Angola, Benin, Cameroon, Cape Verde, Congo, Côte d'Ivoire, Gambia, Ghana, Guinea, Guinea-Bissau, Mauritania, Morocco, Nigeria, Portugal, Senegal, Sierra Leone, and Togo.

For *further information on this office and on IOCEA matters, contact:*
Larry Awosika (l.awosika@unesco.org)

The African Process for the Development and Protection of the Coastal and Marine Environment in Sub-Saharan Africa 5.6

The African Process for the Development and Protection of the Coastal and Marine Environment in Sub-Saharan Africa is the result of a merger of two initiatives: PACSICOM (July 1998), and the Cape Town Conference on Development and Protection of the Marine and Coastal Environment in sub-Saharan Africa (December 1998). These two events resulted in the strengthening of a unified political awareness amongst African governments concerning the need to develop an integrated approach towards the development and preservation of coastal and marine resources. One of the main outputs of the Cape Town Conference was the recommendation to organize a Partnership Conference in 2002, which would bring African States and the donor community together with a view to seek and increase support for the development of project proposals for Sub-Saharan Africa.

The five principal objectives of the African Process are to:

(i) identify areas, sites or living resources that are either suffering measurable degradation (i.e. hot-spots) or threatened with future degradation (sensitive areas) and to determine, through root-cause analysis, the leading causes of these impacts, taking into consideration scientific, technical and socio-economic factors;

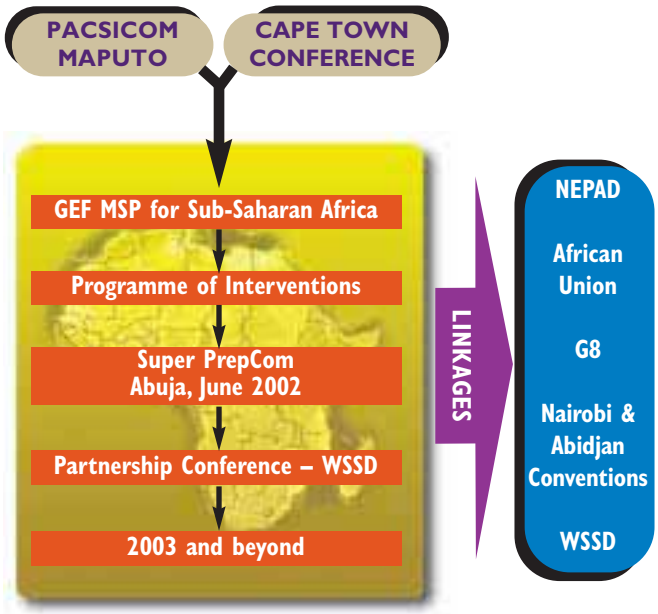
(ii) put together a programme of interventions, including demonstration projects and pre-investment studies, addressing problems of regional priority. Some projects are regional in scope, and focus on groups of countries united by geographic location or identified common problems. Site-specific projects of priority for the participating countries are also included.

(iii) strengthen existing regional institutions, in particular the Nairobi and Abidjan Conventions, and establish synergies with relevant programmes and projects;

(iv) provide a framework for facilitating the mobilization of resources for the sustainable development of the marine and coastal environment, given that available funds for such projects are very limited; and

(v) produce a self-sustaining model that can be replicated in other regions or thematic areas in order to develop interventions that contribute to the goals of sustainable development.

The African Process has been supported politically by the OAU, AMCEN, and the regional Preparatory Committee for Africa to WSSD. More recently, following the establishment of the New Partnership for Africa's Development (NEPAD), which incorporates the Millenium Africa Recovery Programme/New African Initiative (MAP/NAI), and the Omega Plan; the African Process has been recognized as the marine component of the Environmental Action Plan of NEPAD.



Several African ministers and deputy ministers of environment attending the 4th Preparatory Committee meeting (Cape Town, 17-18 September) for the Partnership Conference of the African Process; the conference is to be held during the WSSD in Johannesburg.

Left to right: Mr Bleu Laine (Côte d'Ivoire), Ms Nyamekye (Ghana), Mr Kachamila (Mozambique), Ms Mabudafhasi (South Africa), Chief (Dr) Imeh Okopido (Nigeria), and Mr. Katana Ngala (Kenya).

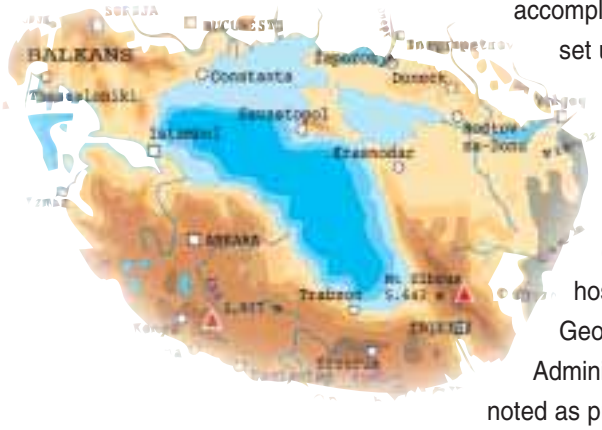
ACOPS was designated as facilitator of the African Process and was assigned the task of developing a GEF Medium-Sized Project (MSP) proposal as a tool for preparing a set of proposals addressing the marine and coastal issues affecting eleven countries. These Sub-Saharan countries (Côte d'Ivoire, Gambia, Ghana, Kenya, Mauritius, Mozambique, Nigeria, Seychelles, Senegal, South Africa and Tanzania) are participating in the project, the ultimate goal of which is to develop a sound portfolio of proposals for interventions for these countries, basically responding to items (i) and (ii) above. ACOPS and IOC implement the GEF MSP with support from GPA and UNEP.

Five working groups, each led by a regional coordinator assisted by two experts with multi-disciplinary backgrounds, are spearheading the development of project proposals. These teams will liaise with country coordinators in each of the eleven countries.

The GEF MSP will result in a portfolio of environmental projects: the objectives of the proposals must be to address the priority environmental issues identified, and the field activities must relate to the selected hot spots and sensitive areas.

For further information, contact:
Julian Barbière (j.barbiere@unesco.org)

5.7 Black Sea region

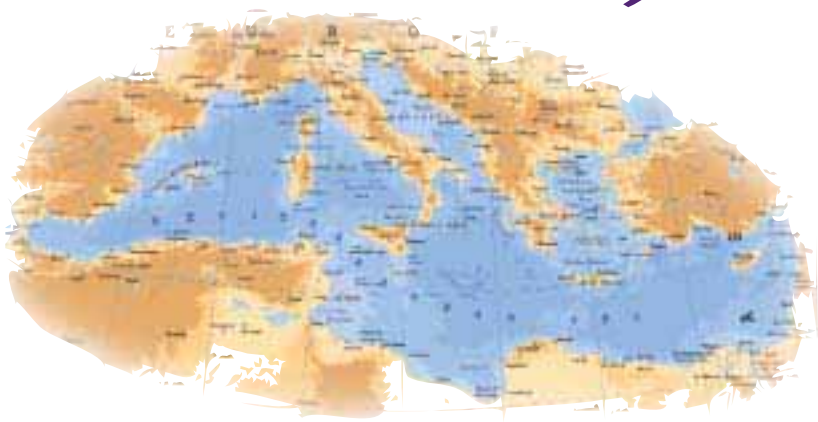


In 2001, the highlight development in the Black Sea region was the marked progress accomplished in the project to set up a Black Sea GOOS network. This progress was sparked by the Second Black Sea GOOS Workshop (24-28 May), which was hosted in Poti (Republic of Georgia) by that city's Port Administration. Also to be noted as providing impetus in the project's implementation was the signing of a Memorandum of Understanding by all the relevant Member States of the Black Sea region participating in the development of the Black Sea GOOS.

Another step forward came with the decision to establish a Black Sea GOOS secretariat at the Middle East Technical University in Erdemli, Turkey. This secretariat, co-sponsored by the UNESCO Office in Venice (Italy), will coordinate and provide guidelines for all national activities undertaken in the region within the project's framework. However, as usual, the determining efforts in developing a viable GOOS network in this – as in other – regions are those made at country level by local and national authorities. In this respect, the year 2001 saw great strides of achievement towards the implementation of the project.

These developments were also mentioned on p. 70 in the GOOS part of Section 3.
For further information, contact:
t.aarup@unesco.org

Mediterranean region 5.8



Several activities concerned with the development of research, operational oceanography and services across the Mediterranean, including MedGOOS, MedGLOSS, ICAM and data exchange under IODE, took place. These efforts encompass a strong component in training, education and mutual assistance (TEMA).

Cooperation with the European Union continued in the implementation of the regional IOC/IODE GODAR project MEDAR/MEDATLAS. The project, started in 1998, will be completed by the end of the year at developing a comprehensive and quality-checked database of marine physical and bio-chemical parameters. Twenty-seven IODE Data Centres participate in the project. The project was culminated by the organization of a final workshop in Trieste, Italy (10–15 December), and the publication of the observed data, gridded data, maps and related document on CD-ROM for further scientific, educational, industrial and governmental use. The Member States of the Mediterranean Sea seek future cooperation in marine data and information exchange through an on-line approach to database development and the organizing of networks to facilitate operational data exchange. The continuation of the project will help keep momentum which was gained during the implementation of the MEDAR/MEDATLAS Project, and will be based on the project results.

The MedGOOS Association currently consists of sixteen marine agencies and institutions from thirteen countries. A MedGOOS secretariat has been established in Malta with support from IOC. The secretariat is charged with developing MedGOOS (see also Section 3 of this report). A meeting of the MedGOOS community in Rabat (November 1999) led to the development of plans for a 'Mediterranean Network to Access and Upgrade Monitoring and Forecasting Activity in the Region' (MAMA). A proposal to the European Commission (EC) for funds for MAMA has been successful at the level of 2.4 million Euros. In the meantime, the EC-funded Mediterranean Forecasting System Pilot Project (MFSPP) has successfully come to the end of its first phase and funds for phase II are being sought.

MedGLOSS, jointly sponsored by CIESM and IOC, contributes to MedGOOS, and the plans for MedGLOSS were outlined during a workshop in May 2000 in Haifa, Israel (*IOC Workshop Report* No. 180 to be published in 2002), with development of the logistic and legal framework for data exchange as its major focus.

Plans were initiated for a follow-up in 2002 (in Turkey) to the Conference on the Oceanography of the Eastern Mediterranean and the Black Seas, held in Athens in February 1999.

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u.unluata@unesco.org

OTHER CENTRES/OFFICES

The IOC also has other special centres/offices as follows.

- IOC Science and Communication Centre on Harmful Algae,
  University of Copenhagen,
  Oster Farimagsgade 2D,
  1353 Copenhagen K, Denmark.
  Tel: (45) 33 13 44 46; Fax: (45) 33 13 44 47; e-mail: hab@bot.ku.dk
  Programme Coordinator: Henrik Enevoldsen: henrike@bot.ku.dk

H. Enevoldsen

- IOC-IEO Science and Communication Centre on Harmful Algae (Vigo Centre),
  Instituto Español de Oceanografía
  Centro Oceanográfico de Vigo
  36390 Vigo, Spain.
  Tel: (34) 986 49 21 11;
  Fax: (34) 986 49 20 03;
  vigohab@vi.ieo.es
  Local staff: Mónica Lion

- IOC Perth Programme Office
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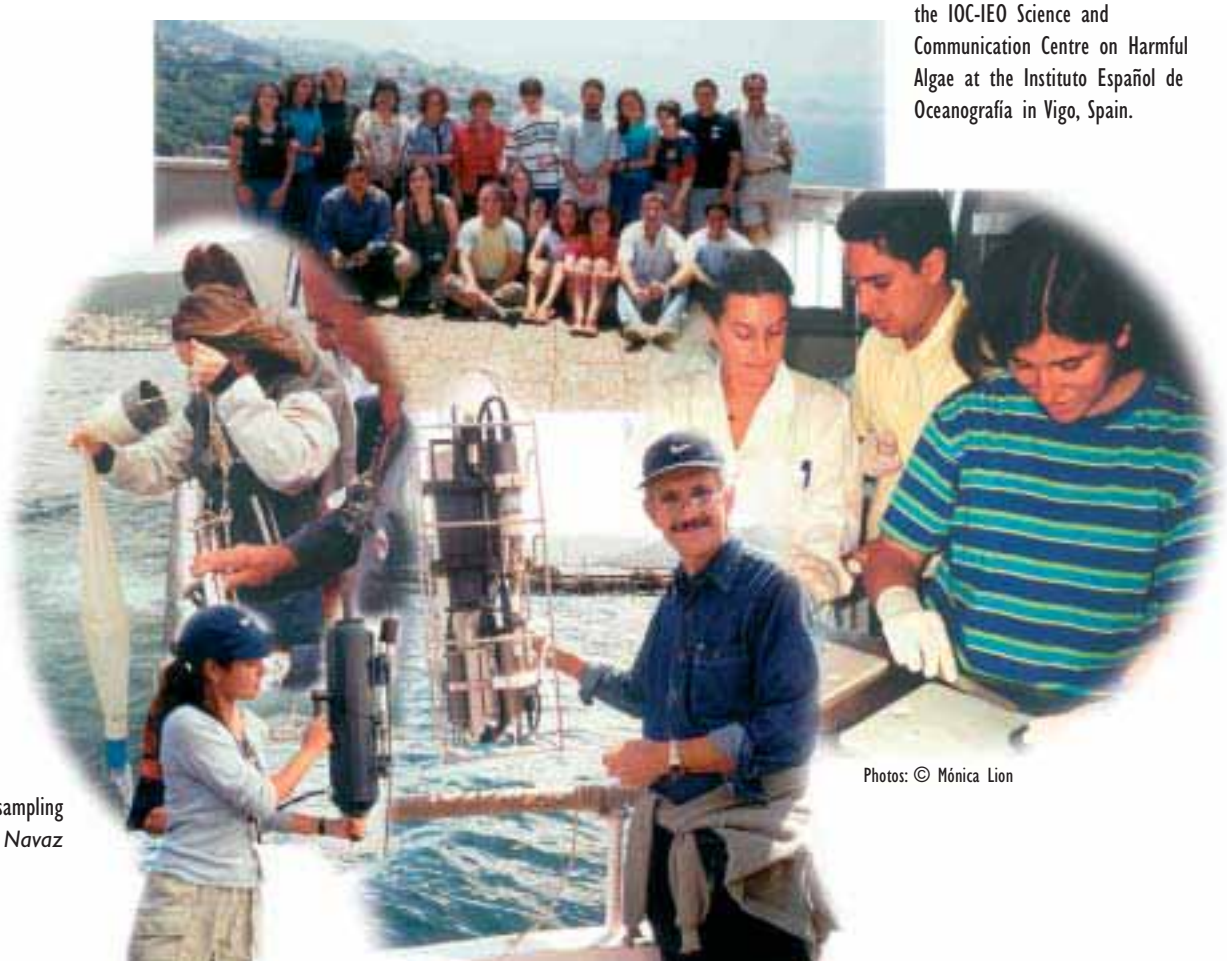
  Fax: (61-8) 9226 0599;
  iocperth@bigpond.com
  Head of Office: William Erb
  (see page 72), w.erb@bom.gov.au

- ODINAFRICA Project Office for the IOCEA Region
  (See p. 53, section 2 of this report)

(Below): Activities during the 5th IOC-AECI-IEO Course on Toxic Phytoplankton and Marine Phycotoxins in June, organized by the IOC-IEO Science and Communication Centre on Harmful Algae at the Instituto Español de Oceanografía in Vigo, Spain.



Photos: © Mónica Lion

Water sampling on board O/V *J. M. Navaz*

International cooperation

6

6.1 Cooperation with other organizations

A – UN Open-ended Informal Consultative Process on Ocean Affairs (ICP)

The United Nations Informal Consultative Process (ICP) was established by the General Assembly (Resolution 54/33) to facilitate its annual review of developments in ocean affairs. ICP's first meeting was held at the UN Headquarters, 30 May to 2 June 2000.

At the 33rd Session of the IOC Executive Council, an Intersessional Intergovernmental Working Group was formed to ensure adequate input from the IOC Member States to the discussions at the second ICP meeting, 7-11 May 2001 (Resolution EC-XXXIII.16). The Working Group met in Lisbon, Portugal, 29-30 March 2001. The Executive Secretary brought the conclusions of the Working Group to the attention of IOC Member States by circular letter No. 1689 rev., inviting them to participate actively in the deliberations of the second ICP meeting in New York. At the 2nd session of the Informal Consultative Process, the Commission was represented by its: Chairman, Prof. Su Jilan; first Vice-Chairman, Dr David Pugh; Executive Secretary, Dr Patricio Bernal; and the Head of the IOC Ocean Science Section, Dr Umit Unluata.

The discussions at the 2nd Session were organized around two areas: (i) marine science and the development and transfer of marine technology, including capacity building; and (ii) coordination and cooperation in combating piracy and armed robbery at sea. The first area of focus was considered in two parts, involving: (a) improving structures and effectiveness; and (b) priorities in marine science and technology. The Executive Secretary provided presentations that led off the discussions on both parts of the first area of focus. He indicated two approaches for pursuing ocean science: science for understanding and science for development. He further noted three strands of ocean sciences: scientific understanding, science for providing a sound basis for policy formulation and monitoring and forecasting states of the oceans. The international aspects of ocean science in relation to research, the human dimension of global change and ocean observations at global level through GOOS were stressed. In addressing the issue of priorities in marine science, the Executive Secretary pointed out oceans and climate, ocean ecosystems and integrated coastal area management as priority areas.

As Chairman of the Subcommittee on Oceans and Coastal Areas (SOCA) of the Administrative Committee on Coordination (ACC), the IOC Executive Secretary also presented an overview of the structure and functions of ACC, and outlined current activities of SOCA. He pointed out that the ACC was undergoing a phase of reviewing its mechanism in order to improve coordination and that, in that respect, SOCA itself was in a period of transition. In that connection, he stressed that, while the structure for coordination might undergo changes, the function

and goal of coordination in ocean affairs would remain and would be carried out.

The 2nd session of the Informal Consultative Process marked a turning point for IOC's visibility within the UN System and among the various international organizations, including NGOs. The issues discussed and the recommendations suggested for adoption by the General Assembly at its Fifty-sixth Session encompass several important areas concerning IOC and its programmes. These recommendations supported the role of IOC as the UN focal point in marine science: coordinating marine research and ocean services, including ocean observations and related capacity building. The Commission was encouraged to continue developing its role as the focal point for marine scientific research. A request was made to strengthen IOC so that it will have the resources needed to promote effective international cooperation in marine science and to carry out the tasks set out in these conclusions. The full report of the work of the ICP at its second meeting (A/56/121) is available at http://www.un.org/Depts/los/consultative_process/consultative_process.htm

Resolution A/RES/56/12, adopted at the 56th Session of the General Assembly in November 2001, incorporates many of the recommendations of the second ICP session. In particular, the resolution urges relevant bodies of the United Nations System to develop, with IOC acting as a focal point, appropriate interactions in the field of marine science with regional fisheries organizations, environmental and scientific bodies or regional centres foreseen by Part XIV of the UN Convention on the Law of the Sea. The resolution also calls for a more effective collaboration and coordination between the relevant parts of the Secretariat of the United Nations and the United Nations as a whole, in ensuring the effectiveness, transparency and responsiveness of the mechanism for coordination on ocean issues.

The resolution also requested that the third meeting of the Informal Consultative Process be held in New York, 8-15 April 2002, and recommended two areas of focus for discussions: (i) protection and preservation of the marine environment; and (ii) capacity building, regional cooperation and coordination, and integrated ocean management, as important cross-cutting issues to address ocean affairs, such as marine science and the transfer of technology, sustainable fisheries, the degradation of the marine environment and the safety of navigation.

B – Feasibility Study for establishing a regular process for the assessment of the state of the marine environment

The Governing Council (GC) of the United Nations Environment Programme (UNEP), at its 21st Session in February 2001, adopted Decision 21/13 on the global assessment of the marine environment. This decision underlines the consensus of the GC on the need to examine the feasibility of establishing a regular process for the assessment of the state of the marine environment with active involvement by governments, regional organizations and agreements. In the discussions leading to the adoption of UNEP's GC Decision 21/13, reference was made to the success of the Intergovernmental Panel on Climate Change (IPCC), where governments are involved both in the formulation of policy-relevant questions and in the review of the conclusions.

Decision 21/13 requested the Executive Director of UNEP, *'in co-operation with IOC/UNESCO and other UN agencies, the CBD Secretariat, and the Regional Seas Programmes to explore the feasibility of establishing a regular process for the assessment of the state of the marine environment*'. The decision emphasizes the need to build on existing assessment processes such as the Joint Group of Experts on the Scientific Aspects of Marine Environmental Protection (GESAMP) and the Global International Water Assessment (GIWA). It also requests that a progress report be submitted on this issue to the twenty-second session of the GC in February 2003.

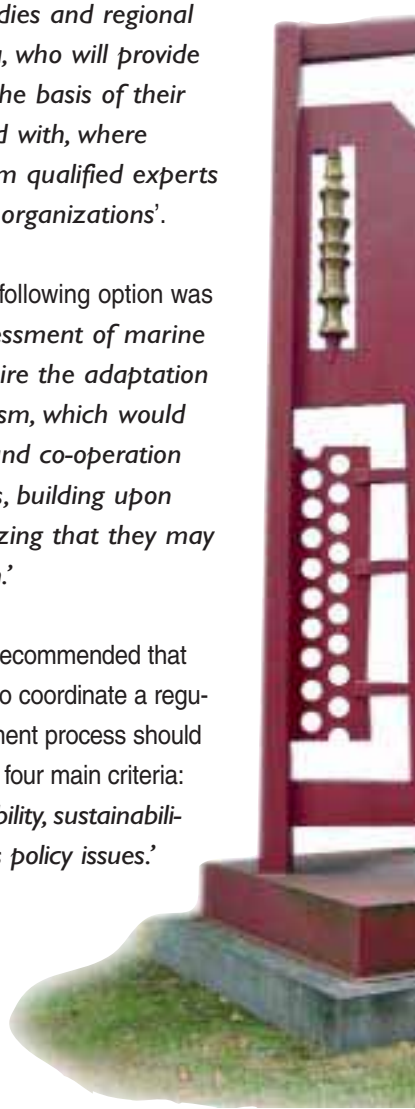
The first informal consultative meeting on the 'Feasibility Study for Establishing a Regular Process for the Assessment of the State of the Marine Environment' was held at Reykjavik in September 2001, and was attended by 37 representatives of international bodies, regional organizations, national governments, and other concerned organizations. The meeting was the first stage in exploring the feasibility of an assessment process. The meeting's objectives were to determine: (i) whether or not an assessment process was needed; (ii) whether a process would be feasible; (iii) what resources were available; (iv) who should be the principal users, and what did they require from the process; (v) what should be the scope of the assessment; (vi) what the central goals of the assessment would be, and whether options were available to satisfy these goals; (viii) which main criteria were needed for a mechanism to undertake the assessment; and (ix) what should be the next steps taken in the development of the process.

The detailed report of the Reykjavik meeting is available at the website www.unep.org/marine-assessment/. The primary goal of the assessment, as established by this meeting, is to '*provide, on a regular and timely basis and for use by policy makers, scientific assessments of the state and trends of all aspects of marine ecosystems. These assessments shall include consideration of socio-economic implications and identify scenarios so as to assist policy makers in addressing marine-related issues. The assessments should take the form of technical scientific reports, supplemented by summaries for policy makers'*.

'*The mechanism and process to create such assessments must be transparent and independent. The assessments will be done by experts identified by governments, relevant UN bodies and regional organizations, inter alia, who will provide their contributions on the basis of their individual expertise and with, where appropriate, advice from qualified experts and non-governmental organizations*'.

To meet these goals the following option was adopted: '*A regular assessment of marine ecosystems would require the adaptation of an existing mechanism, which would work in co-ordination and co-operation with other mechanisms, building upon their work and recognizing that they may also require adaptation.'*

Participants in Reykjavik recommended that the mechanism selected to coordinate a regular global marine assessment process should demonstrate the following four main criteria: '*cost effectiveness, credibility, sustainability, and ability to address policy issues.'*



Sculpture by Robert Jacobsen (1912-1993, Denmark). Over the decades many artists and Member States have donated works to UNESCO in a spirit of support for international cooperation in education, science, culture and communication.

C – Joint Group of Experts on the Scientific Aspects of marine Environmental Protection (GESAMP)

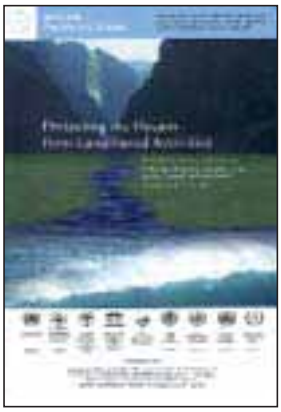
IOC continued in 2001 to contribute to the activities of GESAMP. GESAMP is a joint inter-agency advisory group sponsored by IMO, FAO, UNESCO/IOC, WMO, WHO, IAEA, UNEP and the Division for Ocean Affairs and the Law of the Sea of the UN Secretariat.

The two reports prepared by the GESAMP Working Group on Marine Environmental Assessments (MEA) on the state of the marine environment were published in early 2001 as *GESAMP Reports and Studies* No. 70 and No. 71. They have been disseminated widely to governments, international organizations and the marine environmental management community. One of these reports, entitled *A Sea of Troubles; Issues in Focus*, deals with the state of the marine environment and addresses current major issues and emerging problems. The second report, entitled *Land-based sources and activities affecting the quality and uses of the marine, coastal and associated freshwater environment*, deals with the assessment needs of the Global Programme of Action for the Protection of the Marine Environment from Land-based Activities (GPA). These reports have been peer-reviewed by more than 70 experts worldwide and are available in electronic form at the website http://gesamp.imo.org/.

GESAMP was established in 1969 in response to a request by the UN Administrative Committee on Coordination (ACC), which noted that organizations within the United Nations System should, in order to avoid duplication of efforts, together develop a mechanism for interdisciplinary consideration of marine pollution problems. At its seventh session in 1999, the UN Commission on Sustainable Development (CSD) called upon the Sponsoring Organizations of GESAMP to review its methods of work with a view to improving its effectiveness and inclusiveness, whilst maintaining its status as a source of agreed independent advice. In March 2000, UNEP recommended that an evaluation be carried out on the productivity and efficiency of GESAMP and on its operational procedures.

In May 2000, the eight United Nations sponsoring agencies of GESAMP agreed to carry out an independent and in-depth evaluation of the achievements of GESAMP, its impact, scope, working methods and future role. A GESAMP Evaluation Team (ET), consisting of four independent scientists, was subsequently established to carry out this evaluation.

In its report of July 2001, the GESAMP ET concluded that the United Nations, its Member States and other organizations require an effective, efficient and independent group to provide advice on issues relating to marine environmental protection and management and sustainable development of marine resources and amenities based on sound scientific principles. The GESAMP ET strongly recommended that GESAMP continue playing that role. However, major changes will be necessary in the structure of GESAMP, its operational procedures and products. These changes will be necessary for GESAMP to set priorities, examine issues more effectively, provide appropriate and timely advice, and enhance its profile, visibility and responsiveness towards those requesting its advice, and thus contribute to capacity-building



GESAMP Reports and Studies, No. 71

activities. In detailed recommendations, the GESAMP Evaluation Team gave the building blocks for a new structure for GESAMP.

In the light of the recommendations of the Evaluation Team, the process of developing a new structure of GESAMP – in consultation with its experts, co-sponsoring agencies, governments and other organizations – was launched and is expected to be completed in 2002. The process will take into account the developments concerned with the feasibility study initiated by the UNEP Governing Council's Decision 21/13 on the establishment of a regular process for the assessment of the state of the marine environment. GESAMP held its Thirty-first Session at the United Nations Headquarters in New York from 13 to 17 August 2001. The main topics considered at this session included: recommendations of the Evaluation Team; the feasibility study for establishing a regular process for assessing the state of the marine environment; evaluation of the hazards of harmful substances carried by ships; the final draft of the revision of GESAMP Reports and Studies No. 64 entitled: *Revised GESAMP Hazard Evaluation Procedure for Chemical Substances Carried by Ships*; a proposal by its Working Group on Environmental Impacts of Coastal Aquaculture to work on the issue of implementing the precautionary approach and risk assessment with specific reference to coastal aquaculture development; a draft scoping document regarding aquatic environmental hazard assessment methods for application in seafood safety-risk assessment and management; and ballast water management.

D – Cooperation with ICSU and SCOR

A sound cooperation exists between the International Council for Science (ICSU) and IOC in several global research programmes, such as: (i) WCRP involving CLIVAR, GOOS and GCOS, SCOPE and (ii) IGBP involving GLOBEC, LOICZ. Furthermore, IOC and ICSU's Scientific Committee on Oceanic Research (SCOR) are co-sponsors of GLOBEC and GEOHAB. IOC and ICSU also co-operate in the World Data Centres Panel, with GODAR and GOSIC as projects implemented jointly including close communication/ coordination on data policy issues.

Cooperation between ICSU-SCOR and IOC was strengthened in 2001 through the co-sponsorship of: the SCOR-IOC CO_2 Panel (see Section 1), the COASTS Conference (Section 1); the first meeting of the SCOR-IOC Working Group 119 on Quantitative Ecosystem Indicators for Fisheries Management (section 1); and the GLOBEC-IOC ad hoc Study Group on Use of Environmental Indices in the Management of Pelagic Fish Populations (See p. 33, section 1). In 2001 IOC, SCOR and SCOPE continued their collaboration on the production of a prospective book on Ocean Science: 'Oceans 2020: Science for Future Needs', prepared with the active contribution of the scientific community in a special workshop that took place in Postdam (Germany), 2-8 October 1999. The launching of 'Oceans 2020' will take place during WSSD in Johannesburg.

At the 21st IOC Assembly, SCOR invited IOC to support and participate in the new IGBP research programme: Surface Ocean – Lower Atmosphere Study (SOLAS). This research programme is concerned with the quantitative understanding of the key biogeochemical-physical interactions and feedbacks between the ocean and the atmosphere, and how this

coupled system affects and is affected by climate and environmental change.

In 2001, SCOR continued to assist the International Geosphere-Biosphere Programme (IGBP) in developing the ocean component of IGBP's Phase II. IOC has been a participant of this development through the IGBP-SCOR planning committee that was formed for identifying the future of ocean research in Earth System Science. Towards finalizing the research programme, the Committee met in Barcelona in December 2001.

Follow-up to UNCED and UNCLOS 6.2

A – UN Conference on Environment and Development (UNCED)

The ACC Sub-committee on Oceans and Coastal Areas (ACC SOCA)

This Sub-committee of the Administrative Committee on Coordination has been the task manager of Chapter 17 of UNCED's Agenda 21. IOC has chaired the Sub-committee since 1999 and has been the secretariat of ACC SOCA since its establishment in 1993.

At its two meetings in January and May 2001, SOCA focused on reporting tasks, in particular with regard to Chapter 17 of Agenda 21 and the forthcoming World Summit on Sustainable Development (WSSD), to be held 26 August to 4 September 2002. The Subcommittee also discussed its assistance towards the coordination of and cooperation in the implementation of the GPA. Furthermore, SOCA had devoted considerable attention to the *United Nations Atlas of the Oceans*, for which it acted as coordinator and manager. This project is aimed at integrating dispersed databases and poorly catalogued information available at the United Nations agencies and presenting the material on a single website and on a compact disk. The Atlas project, which was partly financed and supported by the United Nations Foundation, is expected to reach completion in 2002.

ACC has been undergoing a review of its mechanism in order to improve coordination and, in that respect, SOCA itself was in a period of transition during 2001. In the year 2000 ACC established two new High-Level Committees on Programmes (HLCP) and on Management (HLCM). SOCA welcomed the new approaches to coordination advocated by the HLCP, noting that international coordination and cooperation is of vital importance in addressing all aspects of oceans and coastal areas. The cooperation between the relevant parts of the United Nations

Extracts from a *UN Atlas of the Oceans* leaflet under preparation for printing in 2002.

Note: The Ocean Services Section (activities reported in Part 2 of this report) is the unit within the IOC Secretariat that coordinates the Commission's participation in the Atlas project.

Secretariat for the purposes of ensuring better coordination of the United Nations' work on oceans and seas is thus considered imperative. The existence of a mechanism such as ACC SOCA is needed. The Sub-committee expressed its conviction regarding building on existing mechanisms through innovative and more integrated approaches for effective coordination and cooperation.

In carrying out its review of the subsidiary bodies, ACC concluded, in November 2001, that all existing subsidiary bodies should cease to exist by the end of the year 2001, and that future inter-agency support requirements of HLCP would best be handled through ad hoc, time-bound, task-oriented arrangements, using a lead agency approach, or by addressing requests to existing inter-agency networks or expert groups.

B – UN Convention on the Law of the Sea (UNCLOS)

Advisory Body of Experts on the Law of the Sea (ABE-LOS)

IOC organized the First Meeting of its Advisory Body of Experts on the Law of the Sea (ABE-LOS I), 11-13 June at UNESCO Headquarters in Paris, France. This event was held in accordance with the recommendations of Twentieth Session of the IOC Assembly (Paris, 29 June - 9 July 1999) and the Thirty-third Session of the IOC Executive Council (Paris, 20-30 June 2000).

Based on the results of a consultation of Member States as well as on the decisions of the Second Meeting of the United Nations Informal Consultative Process on Oceans (ICP, New York, 7-11 May 2001) – the meeting discussed the:

(i) transfer of marine technology,

(ii) procedure related to Article 247 of UNCLOS on marine scientific research (MSR) projects undertaken by or under the auspices of international organizations, and

(iii) establishment of general criteria and guidelines to assist States in ascertaining the nature and implications of marine scientific research (Article 251 of UNCLOS); this was in connection with the IOC's second questionnaire on the practice of States in the field of MSR and transfer of marine technology (TMT).

A detailed analysis of the questionnaire, canvassing Member States priorities, will be carried out and the results submitted to the Second Meeting of ABE-LOS (ABE-LOS II), to be held at El Jadida, Morocco, 6-9 May 2002. It will be also forwarded to the UN/DOALOS for the Report of the Secretary General to the Fifty-eighth Session of the United Nations General Assembly.

The report of the First ABE-LOS meeting can be found at http://www.ioc.unesco.org/unclos/

Advisory Board of Experts on the Technical Aspects of the Law of the Sea (ABLOS)

The IOC/IHO/IAG Advisory Board of Experts on the Technical Aspects of the Law of the Sea (ABLOS) organized the 8th Session of its Business Meeting in Monaco (17 October 2001). Dr Ron Macnab, IOC representative, was elected Chairman of the Advisory Board for the next biennium. IOC presented a document outlining the Commission's intention to develop capacity building concerning UNCLOS through the design and delivery of training courses on the implementation of Article 76 of UNCLOS (Definition of the Continental Shelf). This activity would

Participants at the ABLOS Conference on 'Accuracies and Uncertainties in Maritime Boundaries and Outer Limits', IHO, Monaco, 18-19 October (organized together with the 8th ABLOS Business Meeting, held at same venue on 17 October).

respond to the request of the President of the 11th Meeting of States Parties to UNCLOS and of the Chairman of the Commission on the Limits of the Continental Shelf (CLCS) who invited relevant scientific organizations to provide training that would enable developing States to prepare their submissions to the CLCS. The terms of the cooperation with ABLOS are underway.

Special Arbitration

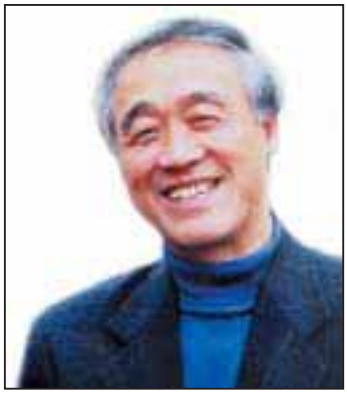
In accordance with Article 2 (2) of Annex VIII of UNCLOS, IOC will update its established list of experts in the field of marine scientific research as of 10 January 2002.

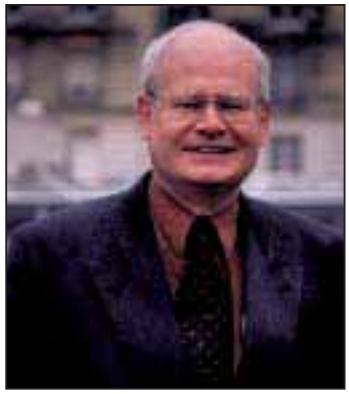
The full list of experts can be found in the IOC website at http://www.ioc.unesco.org/unclos/

Annexes

IOC OFFICERS ELECTED IN JULY 2001

Chairman
Prof. Su Jilan
(PR China)
Advisor to the Administrator
Second Institute of Oceanography
State Oceanic Administration





Vice-chairman
Dr David Pugh
(United Kingdom)
Southampton Oceanography Centre

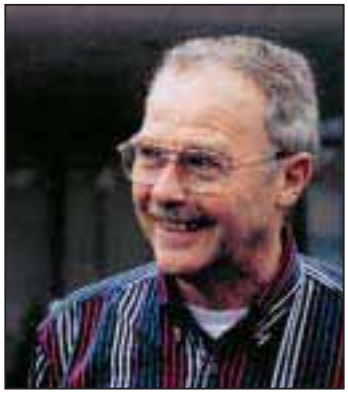
Vice-chairman
Admiral Marcos Leal
(Brazil)
Director
Directorate of Hydrology and Navigation (DHN)

Vice-chairman
Dr Sergey Khodkin
(Russian Federation)
Deputy Head
Federal Service for Hydrometeorology and Environmental Monitoring

Vice-chairman
Dr Thomas Olatunde Ajayi
(Nigeria)
Director
Nigerian Institute for Oceanography and Marine Research

Vice-chairman
Dr K. Radhakrishnan
(India)
Director
Indian National Centre for Ocean Information Service (INCOIS)

Past-chairman
1995 - 1999
Mr Geoffrey L. Holland
(Canada)
Canadian Oceans Ambassador,
Department of Fisheries & Oceans



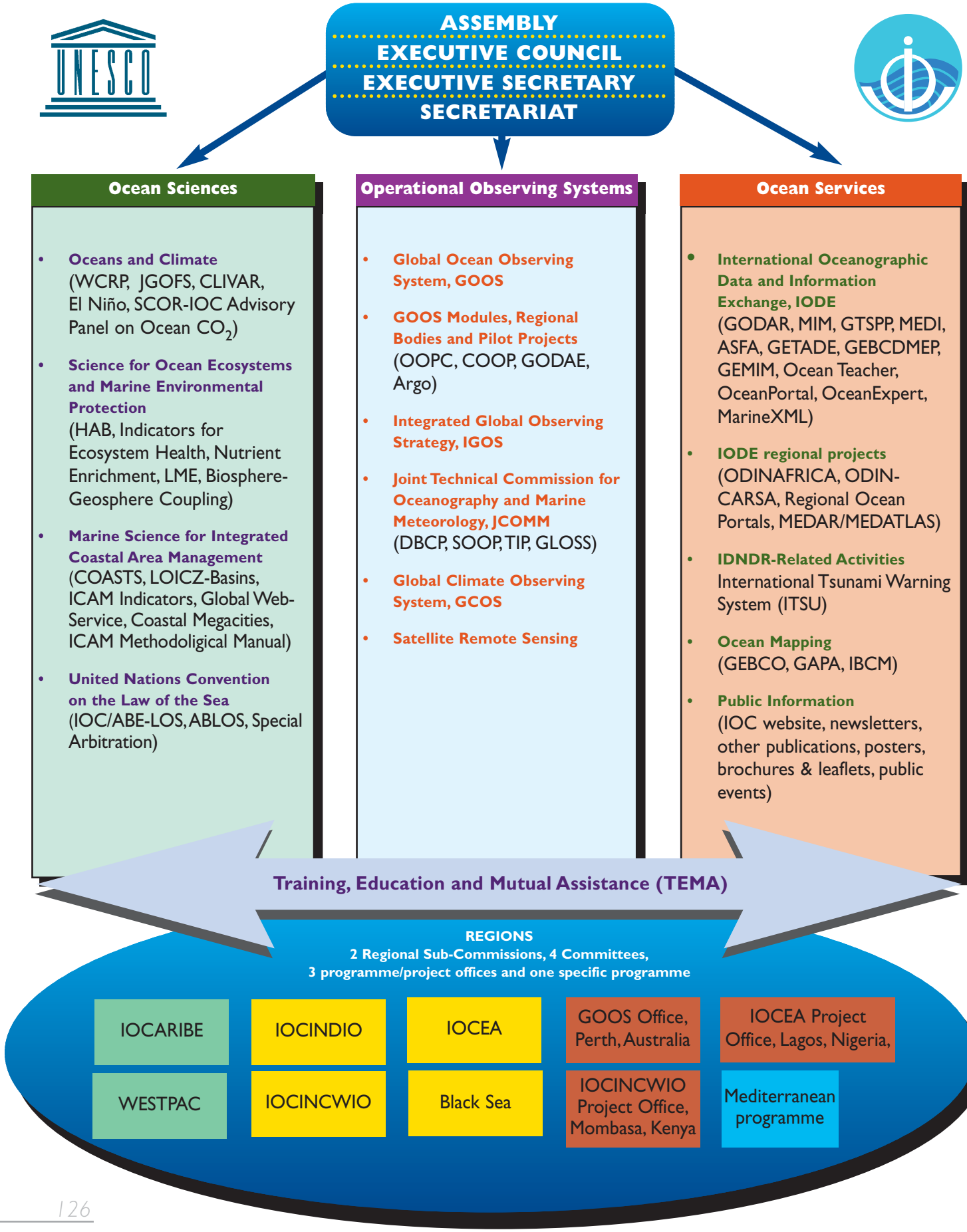
The new IOC Rules of Procedure, approved in July 2001, indicate that the Officers of the Commission shall consist of the Chairperson and five Vice-Chairpersons. The five Vice-Chairpersons shall be nationals of Member States of different electoral groups (as listed in Appendix II of the Rules of Procedure).

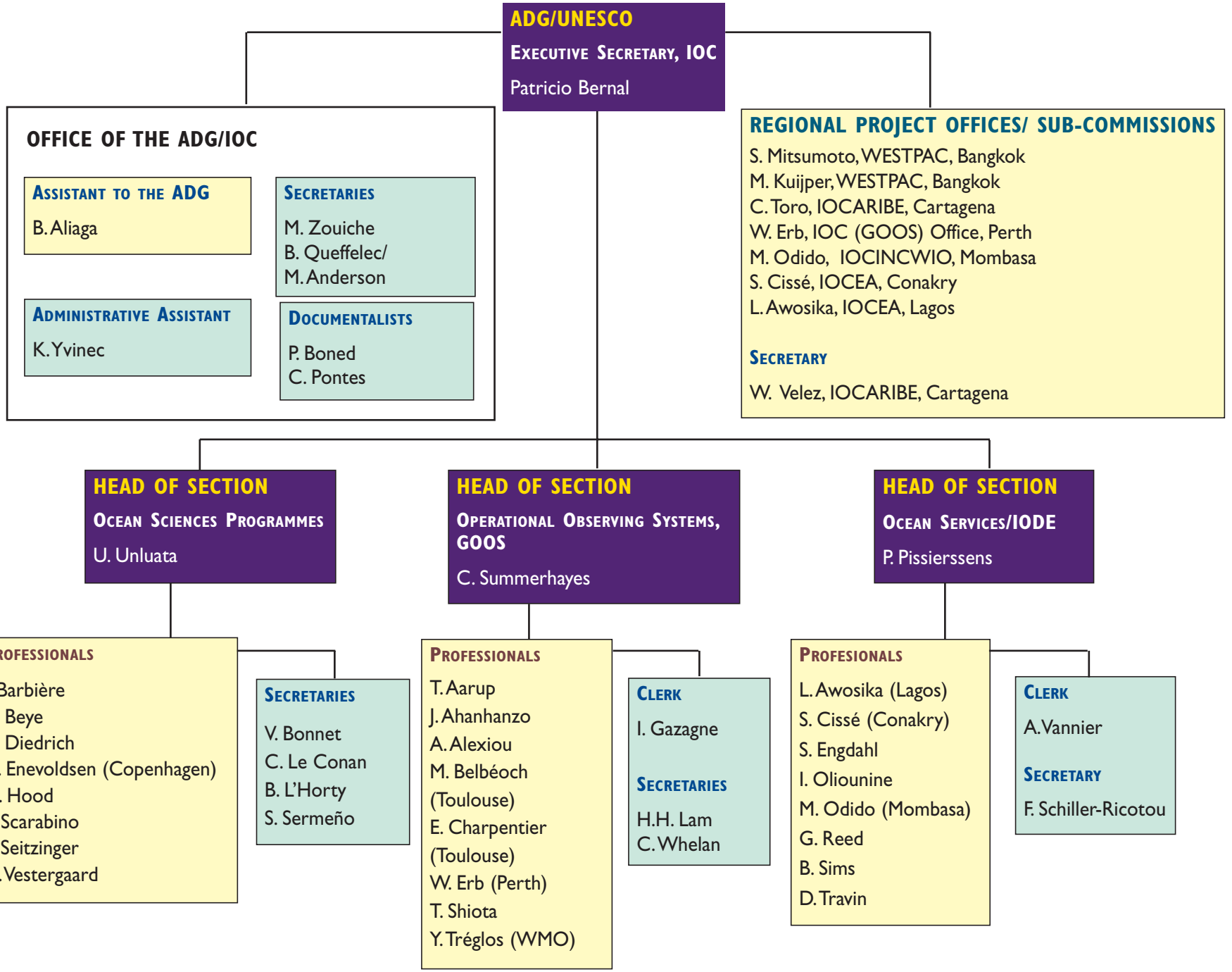
List of IOC Member States (129)

AFGHANISTAN	(11 March	1991)
ALBANIA	(26 January	1993)
ALGERIA	(Jul. 1964/Nov.	1965)
ANGOLA	(26 October	1982)
* ARGENTINA	(Before November	1961)
* AUSTRALIA	(Before November	1961)
AUSTRIA	(Oct. 1962/Jun.	1964)
AZERBAIJAN	527 January	1998)
BAHAMAS	(29 January	1979)
BANGLADESH	(29 October	1982)
BARBADOS	(18 December	1985)
* BELGIUM	(Before November	1961)
BELIZE	(22 September	1995)
BENIN	(23 October	1986)
* BRAZIL	(Before November	1961)
BULGARIA	(Oct. 1967/Dec.	1969)
CAMEROON	(Nov. 1971/Nov.	1973)
* CANADA	(Before November	1961)
CAPE VERDE	(20 August	1984)
* CHILE	(Before November	1961)
* CHINA	(Before November	1961)
* COLOMBIA	(Oct. 1967/Dec.	1969)
COMOROS	(08 February	2000)
CONGO	(Nov. 1961/Sep.	1962)
* COSTA RICA	(28 February	1975)
CÔTE D'IVOIRE	(Before November	1961)
CROATIA	(24 December	1992)
* CUBA	(Before November	1961)
CYPRUS	(05 December	1977)
Democratic People's Republic of KOREA	(31 October	1978)
DENMARK	(Before November	1961)
DOMINICA	(21 September	1999)
DOMINICAN REPUBLIC	(Before November	1961)
ECUADOR	(Before November	1961)
* EGYPT	(Oct. 1969/Nov.	1971)
EL SALVADOR	(16 February	1993)
ERITREA	(12 November	1993)
ESTONIA	(10 March	1992)
ETHIOPIA	(05 March	1976)
FIJI	(09 July	1974)
* FINLAND	(Before November	1961)
* FRANCE	(Before November	1961)
GABON	(26 October	1977)
GAMBIA	(30 August	1985)
GEORGIA	(09 July	1993)
* GERMANY	(Before November	1961)
* GHANA	(Before November	1961)
GREECE	(Oct. 1962/Jun.	1964)
GUATEMALA	(Dec. 1965/Oct.	1967)
GUINEA	(01 May	1982)
GUINEA-BISSAU	(26 January	1984)
GUYANA	(20 July	1977)
HAITI	(23 March	1976)
ICELAND	(Oct. 1962/Jun.	1964)
* INDIA	(Before November	1961)
* INDONESIA	(Oct. 1962/Jun.	1964)
* IRAN, Islamic Republic of	(03 June	1975)
IRAQ	(Oct. 1969/Nov.	1971)
IRELAND	(07 November	1978)
ISRAEL	(Before November	1961)
* ITALY	(Before November	1961)
* JAMAICA	(Oct. 1967/Dec.	1969)
* JAPAN	(Before November	1961)
JORDAN	(06 April	1975)
* KENYA	(Nov. 1971/Nov.	1973)
KUWAIT	(13 November	1974)
LEBANON	(Oct. 1962/Jun.	1964)
LIBYAN ARAB JAMAHIRIYA	(11 March	1974)
MADAGASCAR	(Dec. 1965/Oct.	1967)
MALAYSIA	(Jul. 1964/Nov.	1965)
MALDIVES	(20 May	1987)
MALTA	(Oct. 1969/Nov.	1971)
MAURITANIA	(Before November	1961)
MAURITIUS	(Oct. 1969/Nov.	1971)
* MEXICO	(Before November	1961)
MONACO	(Before November	1961)
* MOROCCO	(Before November	1961)
* MOZAMBIQUE	(08 April	1981)
MYANMAR	(07 June	1988)
** NAMIBIA	(25 April	2001)
NETHERLANDS	(Before November	1961)
NEW ZEALAND	(Nov. 1961/Sep.	1962)
NICARAGUA	(17 November	1977)
* NIGERIA	(Nov. 1971/Nov.	1973)
NORWAY	(Before November	1961)
OMAN	(16 November	1982)
PAKISTAN	(Before November	1961)
PANAMA	(Oct. 1967/Sep.	1969)
* PERU	(Dec. 1965/Oct.	1967)
* PHILIPPINES	(Oct. 62/Jun.	1964)
POLAND	(Before November	1961)
* PORTUGAL	(Oct. 1969/Nov.	1971)
QATAR	(20 July	1976)
* REPUBLIC OF KOREA	(Before November	1961)
ROMANIA	(Before November	1961)
* RUSSIAN FEDERATION	(Before Nov.	1961)
SAINT LUCIA	(14 September	1992)
SAMOA	(10 April	1978)
SAUDI ARABIA	(14 June	1978)
* SENEGAL	(Oct. 1967/Sep.	1969)
SEYCHELLES	(27 February	1979)
SIERRA LEONE	(19 April	1974)
SINGAPORE	(Dec. 1965/Oct.	1967)
SLOVENIA	(16 June	1994)
SOLOMON ISLANDS	(11 May	1982)
SOMALIA	(10 July	1974)
* SOUTH AFRICA	(Oct. 1967/Sep.	1969)
* SPAIN	(Before Nov.	1961)
SRI LANKA	(Jun. 76/Jan.	1977)
SUDAN	(26 August	1974)
SURINAM	(21 January	1977)
SWEDEN	(Jul. 1964/Nov.	1965)
SWITZERLAND	(Before Nov.	1961)
SYRIAN ARAB REPUBLIC	(Oct.1969/Nov.	1971)
THAILAND	(Before Nov.	1961)
TOGO	(22 October	1975)
TONGA	(03 January	1974)
TRINIDAD & TOBAGO	(Oct. 1967/Sep.	1969)
TUNISIA	(Before Nov.	1961)
* TURKEY	(Nov. 1961/Sep.	1962)
* UKRAINE	(Nov. 1961/Sep.	1962)
UNITED ARAB EMIRATES	(02 June	1976)
* UNITED KINGDOM OF GREAT BRITAIN & NORTHERN IRELAND	(Before Nov.	1961)
* UNITED REPUBLIC OF TANZANIA	(Oct. 1967/Sep.	1969)
* UNITED STATES OF AMERICA	(Before Nov.	1961)
URUGUAY	(Before Nov.	1961)
VENEZUELA	(Oct. 1962/Jun.	1964)
* VIET NAM	(Before Nov.	1961)
YEMEN	(22 May	1960)

* Members of the Executive Council
** On 25 Arpil 2001, Namibia became the 129th Member State.

IOC STRUCTURE




ADG/UNESCO
EXECUTIVE SECRETARY, IOC
Patricio Bernal
OFFICE OF THE ADG/IOC
ASSISTANT TO THE ADG
B. Aliaga
SECRETARIES
M. Zouiche
B. Queffelec/
M. Anderson
ADMINISTRATIVE ASSISTANT
K. Yvinec
DOCUMENTALISTS
P. Boned
C. Pontes
REGIONAL PROJECT OFFICES/ SUB-COMMISSIONS
S. Mitsumoto, WESTPAC, Bangkok
M. Kuijper, WESTPAC, Bangkok
C. Toro, IOCARIBE, Cartagena
W. Erb, IOC (GOOS) Office, Perth
M. Odido, IOCINCWIO, Mombasa
S. Cissé, IOCEA, Conakry
L. Awosika, IOCEA, Lagos
SECRETARY
W. Velez, IOCARIBE, Cartagena
HEAD OF SECTION
OCEAN SCIENCES PROGRAMMES
U. Unluata
HEAD OF SECTION
OPERATIONAL OBSERVING SYSTEMS, GOOS
C. Summerhayes
HEAD OF SECTION
OCEAN SERVICES/IODE
P. Pissierssens
PROFESSIONALS
J. Barbière
D. Beye
A. Diedrich
H. Enevoldsen (Copenhagen)
M. Hood
V. Scarabino
S. Seitzinger
O. Vestergaard
SECRETARIES
V. Bonnet
C. Le Conan
B. L'Horty
S. Sermeño
PROFESSIONALS
T. Aarup
J. Ahanhanzo
A. Alexiou
M. Belbéoch (Toulouse)
E. Charpentier (Toulouse)
W. Erb (Perth)
T. Shiota
Y. Tréglos (WMO)
CLERK
I. Gazagne
SECRETARIES
H.H. Lam
C. Whelan
PROFESIONALS
L. Awosika (Lagos)
S. Cissé (Conakry)
S. Engdahl
I. Oliounine
M. Odido (Mombasa)
G. Reed
B. Sims
D. Travin
CLERK
A. Vannier
SECRETARY
F. Schiller-Ricotou

IOC PERSONNEL IN 2001

Headquarters personnel, shown in the photo (left to right):
Bottom row: Silvia Sermeño, Virginie Bonnet, Melissa Anderson, Brigitte L'Horty, Cherie Whelan, Colin Summerhayes, Ho Hien Lam, Bernardo Aliaga, Cigié Pontes;
Middle row: Irene Gazagne, Umit Unluata, Christiane Le Conan, Patricio Bernal, Peter Pissierssens, Maria Hood, Dmitri Travin, Patrice Boned, Thorkild Aaarup;
Top row: Julian Barbière, Adrian Vannier, Benjamin Sims, Françoise Schiller-Ricotou.

Headquarters personnel not shown in the above photo:
Justin Ahanhanzo, Arthur Alexiou, Dienaba Beye, Amy Diedrich, Sten Engdahl, George Grice, Iouri Oliounine, Betty Queffelec, Greg Reed, Victor Scarabino, Sybil Seitzinger, Tsuyoshi Shiota, Yves Tréglos, Ole Vestergaard, Ksenia Yvinec.

Notes:
1. The above listing includes permanent staff and temporary personnel at IOC Headquarters, Paris.
2. Field staff/personnel: WESTPAC: Shigeki Mitsumoto, Maarten Kuijper; IOCARIBE: César Toro, W. Vélez; Perth: W. (Bill) Erb;
Mombasa: Mika Odido; Conakry: Sekou Cissé; Lagos: Larry Awosika; Toulouse: Etienne Charpentier, Mathieu Belbéoch

In 2001 the staff of the IOC, along with the larger oceanographic community, lost two dear friends who will long be remembered also as excellent colleagues – George Grice and Dick Hagemeyer. The following words are intended to give tribute to these two stalwart individuals; but we find it difficult to express completely our admiration for them and for their lifelong endeavours and accomplishments, as well as our sentiments and regrets that they are no longer among us.

On behalf of the Commission,

Patricio A. Bernal
Executive Secretary, IOC of UNESCO

GEORGE DANIEL GRICE
1929 – 2001

George was greatly respected as an accomplished scientist and appreciated as a guiding intellect, particularly in his capacity as senior scientific advisor to the Executive Secretary of the IOC. Furthermore, a long and distinguished career in ocean science preceded George's arrival at IOC of UNESCO. Born in Charleston, South Carolina (USA), he worked most of his life in the northeastern USA, but always retained a certain southern flair in his personal approach to life and circumstances, always with a colourful, down-to-earth witticism at the ready. His academic achievements are exemplified by his steady progression at Woods Hole Oceanographic Institution, where from his rank of Senior Scientist he acceded to the posts of Chair of the Biology Department and Associate Director for Scientific Operations. His participation in research programmes, both national and international, and his competence as a scientific author bear testimony to his stature as an all-around respected expert in his field.

George worked since 1997 in the IOC Secretariat at UNESCO Headquarters, Paris. He led the establishment of the Global Coral Reef Monitoring Network and supervised the development of the Ocean Sciences and Living Resources (OSLR) Programme of the Commission. In the year leading up to his death, and in his capacity as the Senior Science Advisor, he coordinated the external review of the Commission's Ocean Science programmes, and laid the foundations for a new structure that will allow the IOC to more adequately meet the challenges of emerging priorities in ocean science research.

During his time in UNESCO, the IOC staff and others collaborating with George grew to rely on his world-class expertise and guid-

ance. George's involvement in a project meant work of the highest quality and his contributions provided an added mark of respect and distinction for the IOC. We also came to rely on his renowned warmth and humour to add spice to our daily routines and to see us through the often frustrating and difficult task of international programme administration. We are deeply affected by this loss and still find it difficult to ignore the void that has been left by George's untimely parting. As the news of his death reached the international oceanographic community, we received many letters of condolences and words of appreciation for George and his work from all over the world. He will long be remembered by all those whose lives and work he touched, and we know that our ability to see further is because we have stood on the shoulders of this giant.

RICHARD 'DICK' HAGEMEYER
1924 – 2001

Dick Hagemeyer was a long-time contributor to the joint activities with which IOC has been associated concerning tsunami warning systems and relevant services. Dick had served as the USA's National Contact for the International Coordinating Group of the Tsunami Warning System in the Pacific (ICG/ITSU) since 1983. He was also Manager of the USA's Tsunami Program since that time. He held these positions while simultaneously filling the post, in Honolulu, of Pacific Regional Director of the USA's National Weather Service. His contributions to tsunami programmes, both national and international, were an important aspect of his 51-year career with NOAA and the National Weather Service. He was Chairman of ICG/ITSU from 1987 to 1993.

Among the sympathetic words pronounced at Dick's passing were those of Scott Gudes (Acting Undersecretary of NOAA): 'Dick had three loves in his life – his wife, Helen, the people and culture of the Pacific and the National Weather Service. He will be sorely missed for his leadership as well as his enthusiasm for the National Weather Service and for NOAA.' Likewise, this remarkable man is remembered and mourned by those involved in the Tsunami Program. Not only was he a familiar face in the international arena of related activities, but also he was known as a very active supporter of developments to improve the tsunami warning system. He promoted the establishment of the Historical Tsunami Database, strengthened the tsunami warning system by facilitating the introduction of modern technology for tsunami observations and communication, widened cooperation with scientific circles by supporting the TIME (IOC's Tsunami Inundation Modelling Exchange) project and contributed his wisdom and knowledge, nerves and heart to many other small and large initiatives of the ICG/ITSU.

Under Dick's skilful guidance, the Pacific Tsunami Warning Center (PTWC) was modernized to become the nucleus of the operational system and a highly effective infrastructure for the dissemination of tsunami warnings around the Pacific. In consideration of Dick's tireless and persistent efforts to improve the tsunami warning system through projects of national and international cooperation as well as through his strong advocacy within the agency for PTWC's mission and requirements, the USA's National Weather Service moved quickly to recognize Dick's contributions by renaming and re-dedicating the PTWC in his honour.

A ceremony was held at the Center on 1 December 2001. Attending were his wife, Helen, other family members, friends, co-workers and dignitaries, and following an appropriate Hawaiian blessing it became the Richard H. Hagemeyer Pacific Tsunami Warning Center.

The Dick and Helen Hagemeyer Undergraduate Scholarship in Meteorology has been established. The address is: c/o The American Meteorological Society, 45 Beacon Street, Boston, MA 02108-3693, USA. Enquiries and contributions are welcome.

28TH WORLD FESTIVAL OF UNDERWATER FILMS AND PICTURES

by Daniel Mercier and Gary Wright

Again in 2001, the IOC supported the 'Festival Mondial de l'Image Sous-Marine' – an annual film and photography festival that for over a quarter century has been striving to bring increased global public attention to the beautiful, but sometimes fragile, underwater environment. One could say that the festival is based on the argument that since divers carry out their activities of leisure and work in this environment, they are thus rightfully in the front ranks of those who wish to make its wonders widely known but who also endeavour to protect it for future generations.

The 2001 version of the Festival took place officially from 31 October to 4 November, in the 'Palais des Congrès' of Antibes Juan-les-Pins on the French Riviera. The various contests attracted some 800 entries from 42 countries. The total attendance was estimated at about 25,000 visitors, many of them professionals – including a number of well-known personalities – in diving and other ocean-related sectors and hailing from some 50 countries. The event was highly publicized in the international press by the 200 or so journalists covering it. For example, the BBC News compared two French cities succinctly as follows: Antibes as representing, for the magical underwater world, what Cannes does for the tinselly movie industry.

Beyond the limits of the official dates, the festival's impact was felt in many corners of the globe. For example, this year's prize-winning films were viewed in virtually every continent (in about twenty French cities and thirty in other countries), with showings totaling 166 projection-days.

The Commission values its association with this public awareness effort. Since 1998 IOC has sponsored one of the Festival's film prizes, specifically the contest to select the underwater film that best promotes research on and the protection of the ocean. This year's IOC film prize was awarded to Mr Rémy Tezier (France) for his treatment of green turtles.

The IOC was inscribed in the distinguished 'high patronage' list and the Executive Secretary was a member of the festival's 'Comité d'Honneur'. Dr Bruno Voituriez – physical oceanographer and director of a fisheries research centre (IRD, IFREMER and University of Montpellier II) in Setes, France – represented the Commission on one of the juries that selected the prize-winning films.

Prominent among the preliminary activities leading up to the Festival was the poster-drawing contest. This year's entries came mostly from Italy, Russia, the Ukraine and USA.

Photo: Seyda Baret

Shown in the above photo is the 2001 winner, Miss Chiara Anzelmo (Italy), holding the poster (with the motto 'help water, help life') and accompanied by D. Mercier (right), as well as (right to left) G. Altman, President of

ANMP, and M. Molinari of the French Ministry of Youth and Sport.

This drawing was reproduced on 12 000 posters distributed throughout the world and appeared on tens of thousands of smaller documents and leaflets, all bearing IOC's logo together with those of the other sponsors. Both IOC and the local UNESCO Club were among the supporters of the poster-drawing contest.

The Festival was generally acclaimed by the press as outstanding in its genre. The organizers, especially its founding president Daniel Mercier and the Spondyle Club, expressed the hope that this broad-scale pedagogical action will contribute to a keener public awareness of the seas and oceans and that it will lead to a positive change in the behaviour of the planet's human inhabitants. ■

In the adjacent photo (taken in the Ukraine), Daniel Mercier, central figure in the festival's tradition, is surrounded by young participants in the poster-drawing campaign.

Source: Spondyle Club

For more information on the festival (particularly the next one: 30 October to 3 November 2002), readers can visit the website: www.underwater-festival.com *or contact*: spondyle@wanadoo.fr

IOC PUBLICATIONS

Each year the IOC publishes numerous documents and other publications in support of its programme activities and to promulgate the scientific and organizational information resulting from the various conferences, meetings, training courses and other activities that have benefited from the Commission's support. Although the tendency is to make much of this documentation and information available electronically, certain titles are also printed for greater accessibility in cases where the Internet is either impractical or not possible.

IOC TECHNICAL SERIES

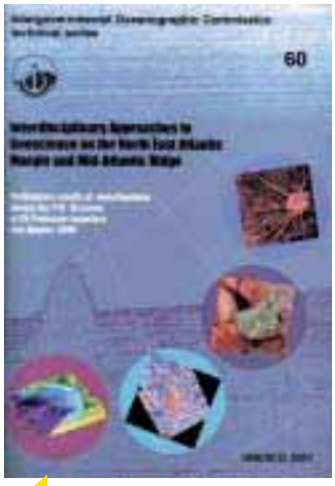
Kenyon, N.H. et al. (eds.). *Interdisciplinary Approaches to Geoscience on the North East Atlantic Margin and Mid-Atlantic Ridge*, 2000. 2001. 134 pp. (Technical Series, 60). (English)

IOC MANUALS AND GUIDES

Potentially Harmful Microalgae of the Western Indian Ocean – A Guide Based on a Preliminary Survey / *Microalgues potentiellement nuisibles de l'Océan indien occidental* – un guide basé sur une étude préliminaire, 2001. 2001, 105 pp. (Manuals and Guides, 41). (English/French)

IOC WORKSHOP REPORTS

International Conference and Ninth Post-Cruise Meeting of the Training-Through-Research Programme, Moscow-Mozhenka, Russia, 2001. *Geological Processes on Deep-water European Margins*. 2002. 99 pp. (Workshop Reports, 175). (English)



Interdisciplinary Approaches to Geoscience on the North East Atlantic Margin and Mid-Atlantic Ridge

MedGLOSS Workshop and Coordination Meeting for the Pilot Monitoring Network System of Systematic Sea Level Measurements and Black Seas

IOC Annual Report

MedGLOSS Workshop and Coordination Meeting for the Pilot Monitoring Network System of Systematic Sea Level Measurements and Black Seas, Haifa, Israel, 2000. 2001. 119 pp. (Workshop Reports, 176). (English)

International Conference on the International Oceanographic Data & Information Exchange in the Western Pacific (IODE-WESTPAC) 1999 - ICIWP '99, Pelangi Beach Resort, Langkawi, Malaysia, 1999. 2001. 52 pp. (Workshop Reports, 169). (English , electronic only).

Ocean Circulation Science derived from the Atlantic, Indian and Arctic Sea Level Networks, Toulouse, France, 1999. 2001. 146 pp. (Workshop Reports, 171). (English, electronic only)

IOC-Flanders-IPIMAR Workshop on Ocean Data Management in the IOCINCWIO Region (ODINEA Project), Lisbon, Portugal, 2000. 2001 46 pp. (Workshop Reports, 172). (English , electronic only)

IOC-SOPAC Regional Workshop on Coastal Global Ocean Observing System (GOOS) for the Pacific Region, Apia, Samoa, 2000. 2001. 35 pp. (Workshop Reports, 174). (English , electronic only)

First Planning Workshop for the "Ocean Data and Information Network for the IOCARIBE and South America regions (ODINCARSA)", Guayaquil, Ecuador, 2001. 2001. 45 pp. (Workshop Reports, 169). (English , electronic only)

TRAINING COURSE REPORTS

First ODINAFRICA-II Training Course in Marine Data Management, Casablanca, Morocco, 2001. 2001. 35 pp. (Training Course Reports, 60) (English, French, in electronic only)

First ODINAFRICA-II Training Course in Marine Information Management, of Cape Town, South Africa, 2001. 2001. 57 pp. (Training Course Reports, 61). (English, electronic only)

IOC ANNUAL REPORT

IOC Annual Report 2000. 2001. 195 pp. (Annual Report Series, 7). (English, French, Spanish), (see cover this page)

INFORMATION DOCUMENTS

IOC/INF-1155 *IOC Ocean Science Section: A Basis for Restructuring*. 2001. 38 pp. (English)

IOC/INF-1150 *Strategic Design Plan for the IOC-WMO-UNEP-ICSU-FAO Living Marine Resources Panel of the Global Ocean Observing System (GOOS) - Tracking Change in Marine Ecosystems*. 2001. 87 pp. (English)

IOC/INF-1159 *The Global Ocean Observing System (GOOS) regional groups: a discussion paper*. 2001. 14 pp. (English , electronic only)

IOC/INF-1160 *Principles of the Global Ocean Observing System (GOOS) Capacity Building*. 2001. 22 pp. (English, Spanish, French)

IOC/INF-1161 *The Joint Communication of the Chairpersons of the Five Scientific Programmes of UNESCO and the views of the Executive Board at its 161st Session* (May – June 2001). 2001. 13 pp. (English/French)

IOC/INF-1163 *First Session of the Intergovernmental Working Group on IOC Oceanographic Data Exchange Policy*, Brussels, Belgium, 2001. 2001. (English).

IOC/INF-1166 Rules of Procedure, November 2001. (English/French/ Spanish/Russian).

REPORTS OF GOVERNING AND MAJOR SUBSIDIARY BODIES

Third-third Session of the Executive Council, Paris, 2000. (Reports of Governing and Major Subsidiary Bodies, 86). (English, French, Spanish, Russian)

Third-fourth Session of the Executive Council, Paris, 2001 (Reports of Governing and Major Subsidiary Bodies, 87). (English, French, Spanish, Russian)

Extraordinary Session of the Executive Council, Paris, 2001. (Reports of Governing and Major Subsidiary Bodies, 88). (English, French, Spanish, Russian)

Sixth Session of the IOC Sub-Commission for the Caribbean and Adjacent Regions, 1999. (Reports of Governing and Major Subsidiary Bodies, 89). (English)

Twenty-first Session of the Assembly, Paris, 2001. (Reports of Governing and Major Subsidiary Bodies, 90). (English, French, Spanish, Russian)

IOC Committee on International Oceanographic Data and Information Exchange, Sixteenth Session, Lisbon, 2000. 2001. (Reports of Governing and Major Subsidiary Bodies, 92). (English)

REPORTS OF MEETINGS OF EXPERTS AND EQUIVALENT BODIES

Fourth Session of the IOC-WMO-UNEP-ICSU-FAO Living Marine Resources Panel of the Global Ocean Observing System (GOOS). Hawaii, 2000. (Reports of Meetings of Experts and Equivalent Bodies, 160). (English)

Eighth Session of the IODE Group of Experts on Technical Aspects of Data Exchange, USA, 2000. (Reports of Meetings of Experts and Equivalent Bodies, 161). (English)

Third Session of the IOC-IUCN-NOAA Consultative Meeting on Large Marine Ecosystems (LME), France, 2000 (Reports of Meetings of Experts and Equivalent Bodies, 162). (English)

Fifth Session of the IOC-WMO-UNEP-ICSU Coastal Panel of the Global Ocean Observing System (GOOS), Poland, 2000. (Reports of Meetings of Experts and Equivalent Bodies, 163). (English)

Third Session of the IOC-WMO-UNEP-ICSU Steering Committee of the Global Ocean Observing System (GOOS), France, 2000. (Reports of Meetings of Experts and Equivalent Bodies, 164). (English)

Second Session of the ad hoc Advisory Group for IOCARIBE-GOOS, Cuba, 2000. (Reports of Meetings of Experts and Equivalent Bodies, 167). (English, French, Spanish)

First Session of the Coastal Ocean Observations Panel, Costa Rica, 2000. (Reports of Meetings of Experts and Equivalent Bodies, 166). (English)

First GOOS Users' Forum, 2000. (Reports of Meetings of Experts and Equivalent Bodies, 167). (English)

Seventh Session of the Group of Experts on the Global Sea Level Observing System, USA, 2001. (Reports of Meetings of Experts and Equivalent Bodies, 168). (English)

First Session of the Advisory Body of Experts on the Law of the Sea (ABE-LOS), France, 2001. (Reports of Meetings of Experts and Equivalent Bodies, 16). (English, French)

Fourth Session of the IOC-WMO-UNEP-ICSU Steering Committee of the Global Ocean Observing System, Chile, 2001. (Reports of Meetings of Experts and Equivalent Bodies, 170). (English)

First Session of the IOC-SCOR Ocean CO_2 Advisory Panel, France, 2000. (Reports of Meetings of Experts and Equivalent Bodies, 171). (English)

Twenty-first Session of the Assembly

First GOOS Users' Forum

Third Session of the ad hoc Advisory Group for IOCARIBE-GOOS, USA, 2001. (Reports of Meetings of Experts and Equivalent Bodies, 173). (English, French, Spanish)

Second Session of the Coastal Ocean Observations Panel and GOOS Users' Forum, Italy, 2001. (Reports of Meetings of Experts and Equivalent Bodies, 174). (English)

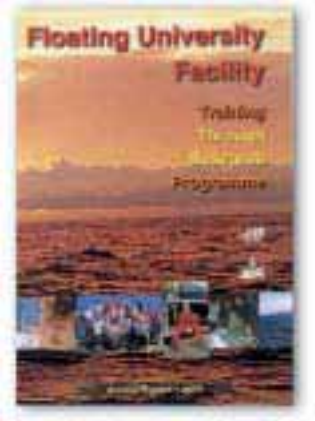
Second Session of the Black Sea GOOS Workshop, Georgia, 2001. (Reports of Meetings of Experts and Equivalent Bodies, 175). (English)

Fifth Session of the IOC/WESTPAC Coordinating Committee for the North-East Asian Regional – Global Ocean Observing System (NEAR-GOOS), Republic of Korea, 2000. (Reports of Meetings of Experts and Equivalent Bodies, 176). (English)

First Session of the IODE Steering Group for the Resource Kit, USA, 2001. 2001. 19 pp. (Reports of Meetings of Experts and Equivalent Bodies, electronic only). (English)

First Session of the IODE Steering Group for MEDI, Belgium 2001. Rep. Meet. 2001. (Reports of Meetings of Experts and Equivalent Bodies, electronic only). (English)

First Session of the IODE Steering Group for Underway Sea Surface Salinity Data Archiving Pilot Project, First Session, France 2001. 2001. (Reports of Meetings of Experts and Equivalent Bodies, electronic only).



Floating University Facility – Training Through Research Programme, Annual Report

NEWSLETTERS

GOOS News. The News and Views from the IOC GOOS Project Office, Paris, No. 11, December 2001.

Harmful Algae News, Paris, No. 22, August 2001.

Window. Western Indian Ocean Waters, Paris, Vol. 12, No. 2, June 2001. No. 3, September 2001.

POSTERS

Intergovernmental Oceanographic Commission (IOC). Poster (40 x 60 cm)

International Oceanographic Data and Information Exchange (IODE). Poster (40 x 60 cm)

Ocean Data and Information Network for Africa (ODINAFRICA). Poster (40 x 60 cm)

Ocean Data and Information Network for the Caribbean and South America Regions. Poster (ODINCARSA) (40 x 60 cm)

OceanPortal. Poster (40 x 60 cm)

OceanTeacher. Poster (40 x 60 cm)

Global Directory of Marine (and Freshwater) Professionals (GLODIR). Poster (40 x 60 cm)

Integrated Coastal Area Management Programme (ICAM). Poster (40 x 60 cm)

NON-SERIAL TITLES

Floating University Facility – Training Through Research Programme, Annual Report 2000. 2001. 37 pp. (non-serial) (English)

Notes:

1. Further information can be found on the IOC website: http://ioc.unesco.org

2. Enquiries or requests for any of the above titles may be addressed to the IOC Documentalist, Mr Patrice Boned (p.boned@unesco.org), fax: 33-1-45 68 58 10

Funding for IOC Programmes

A wide spectrum of activities is described within the body of this annual report, which highlights the relevance of the IOC programmes for 2001. In concert with national and non-governmental initiatives, the implementation of IOC programmes and related staff costs during 2001 was financed through income from UNESCO as part of its regular programme allocation, as approved by the UNESCO General Conference, and from extra-budgetary resources, notably those provided by IOC Member States and partner organizations through their contributions to the IOC Trust Fund and contributions for specific projects through creation of UNESCO Funds-in-Trust. This annex, the financial report, does not consider other contributions (either direct or in-kind), provided by Member States in support of the Commission's programme execution, which do not enter into the budgetary flow of IOC.

With regard to the regular programme allocation, the approved 30 C/5 (UNESCO Programme and Budget for 2000-2001) shows funding for the Intergovernmental Oceanographic Commission at a total of $6 244 200 ($2 577 900 for programme costs and $3 666 300 for staff costs) for the biennium 2000-2001. (*All figures in this annex are in US dollars.*)

The initial projection in funding, approved by the 20th Session of the IOC Assembly, as a basis for future planning, was based on a total of $2 960 000 from the UNESCO Regular Programme and upon an estimate of extra-budgetary resources of $4 000 000.

The allocation of $2 577 900 for programme costs represented a decrease of 16% ($487 000 less) compared to the previous biennium. Furthermore, the $3 666 300 allocated for staff costs includes a P-4 post ($230 000) serving the Secretariat for WESTPAC, entailing the abolition of one P-5 post at Headquarters.

A – Income

TABLE 1.
Summary of the IOC Income in 2001

Type of funding	Programme	Personnel	Total
Regular Programme allocation (UNESCO budget according to 30 C/5)	1 288 950	1 833 150	3 122 100
Contributions to the IOC Special Account (IOC Trust Fund)	1 602 219	264 093	1 866 312
SUB-TOTAL	**2 891 169**	**2 097 243**	**4 988 412**
Contributions for specific projects to UNESCO Funds-in-Trust	1 078 629	260 702	1 339 331
GRAND TOTAL	**3 969 798**	**2 357 945**	**6 327 743**

TABLE 2.
2001 contributions to the IOC Special Account UNESCO IOC Funds-in-Trust (US$)

Contributor	Total	Component	Purpose
ACOPS	35 980.00		ICAM/African Process
Australia	9 338.60	5 177.00	WESTPAC symposium
		4 161.60	ITSU
Barbados	5 000.00		Rio+10 Conference on Oceans
Belgium	4 280.69		IODE
Brazil	79 642.31	20 050.16	Cooperation projects/ Capacity building
		59 592.15	Rio+10 Conference on Oceans
Canada	38 712.90	9 677.42	IOCEA
		9 677.42	Argo Coordinator
		9 803.92	Argo Coordinator
		9 554.14	Programme activities
China	20 000.00		Programme activities
Denmark	18 181.82		HAB Manual
9th HAB Conference Organizing committee	12 000.00		9th HAB Conference
ESA	13 147.50		GLOSS
FAO	24 000.00	12 000.00	OSLR (Honolulu Conference 2000)
		12 000.00	COOP-III
Finland	15 000.00		GOOS-Africa
France	144 776.11	42 555.79	Rio+10/ABE-LOS/UNCED follow-up
		27 432.98	Programme activities
		15 244.90	Argo Coordinator & GLOSS
		8 384.00	Argo Coordinator
		9 701.30	GOOS-Africa
		40 071.24	Programme activities
		1 385.90	CLIVAR
ICSU	20 000.00		GOOS
India	25 000.00		IOCINDIO/Storm surges project
IOI	3 958.20		ICHO-VI publication project
Korea (Republic of)	32 890.34	850.00	ITSU
		24 985.00	Rio+10 Conference on Oceans
		7 055.34	Rio+10 Conference on Oceans
The Netherlands	24 293.38	5 000.00	Rio+10 Conference on Oceans
		19 293.38	COOP-II; Med-GOOS; GOOS-Africa; ICAM
New Zealand	2 000.00		ITSU - Pacific Tsunami Database
SCOR	15 000.00		COASTS meeting
Spain	22 614.88		HAB/Vigo Centre
Sloan Foundation	29 000.00		Census of Marine Life meeting
UNDP	20 000.00		Caspian Floating University project
UNEP	18 000.00		Coastal GOOS/COOP-III
UNESCO Venice Office	10 000.00		Black Sea GOOS
United Kingdom	41 876.33	10 000.00	GLOSS
		17 000.00	GOOS
		4 000.00	GEBCO Centenary
		10 743.00	Argo Coordinator
		133.33	Ocean Mapping

Contributor	Total amount 2001	Component	Purpose
United States of America	1 060 202.55	600 000.00	Programme activities (general)
		20 000.00	Argo for Indian Ocean meeting
		5 000.00	IBCSEP, Valparaiso
		5 000.00	GEBCO
		3 936.00	ITSU
		86 240.00	Argo Coordinator
		10 000.00	IODE/MEDI
		25 000.00	GODAE
		74 000.00	Seconded personnel - Ocean Science
		50 000.00	Seconded personnel - Ocean Science
		20 000.00	GLOSS
		64 277.00	Contract Univ. of Delaware
		15 000.00	Support for meetings/travel (GOOS)
		25 000.00	Support for meetings/travel (GOOS)
		10 000.00	COOP-II
		10 000.00	SEAGOOS-WESTPAC
		2 500.00	ICHO-VI publication project
		5 000.00	IOCARIBE Strategic Science Plan meeting
		24 000.00	COASTS meeting (Harvard Univ.)
		5 249.55	ITSU (U. of Puerto Rico)
WMO	7 229.65		GOOS
TOTAL	1 752 125.26		
Interests	114 187.00		
GRAND TOTAL*	**1 866 312.26**		

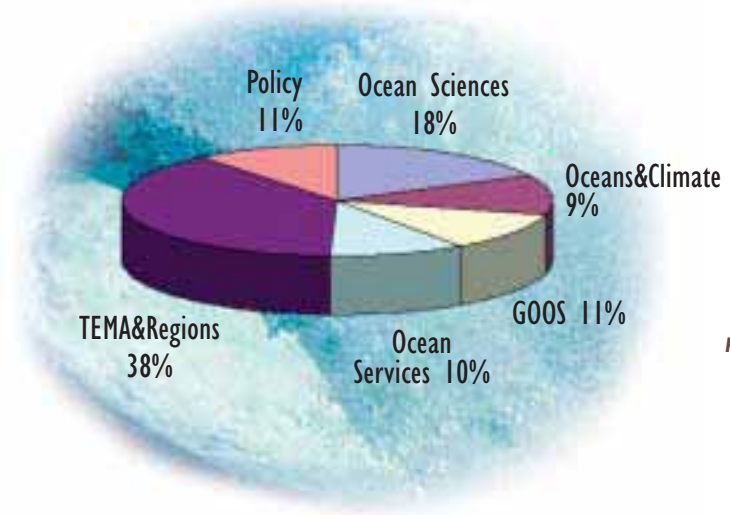
* Earmarked – $1 055 067
Non-earmarked – $811 245

TABLE 3.
2000-2001 contributions to the UNESCO IOC Funds-in-Trust (US$)

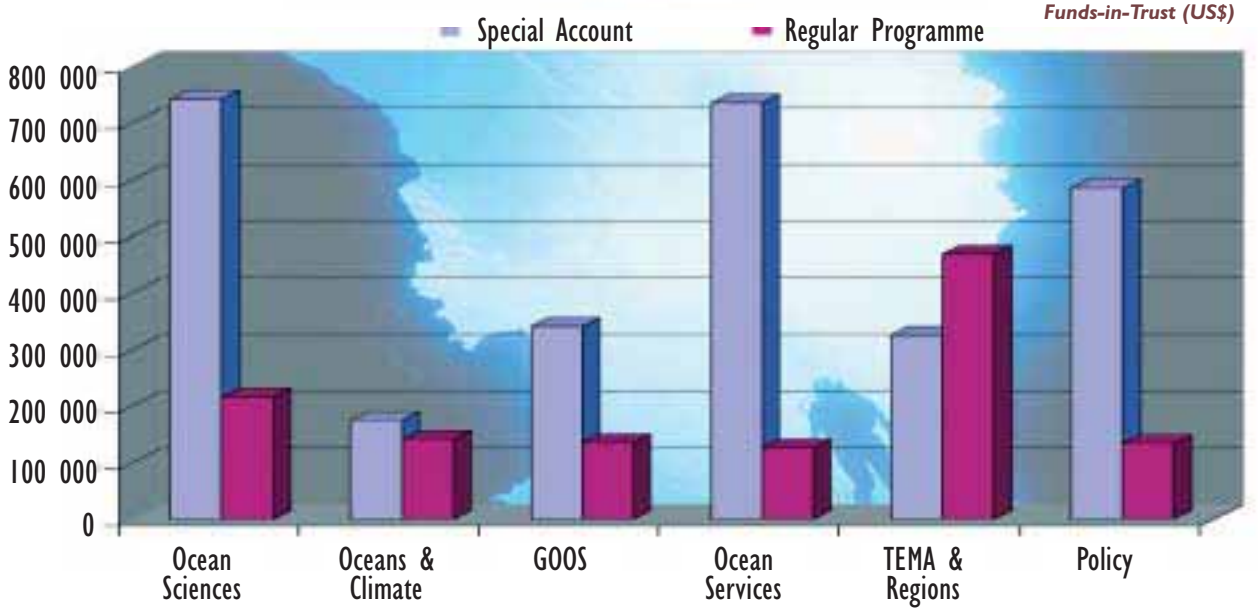
Contributor	Purpose	2001 ($)
Belgium (The Government of Flanders)	ODINAFRICA	592 784
United Kingdom (DFID)	GCRMN	175 788
Denmark (DANIDA)	HAB	192 500
WMO	DBCP	126 259
UNEP	GCRMN	175 000
UNEP	Coastal GOOS	2 000
The Government of Japan	WESTPAC	75 000
TOTAL		**1 339 331**

B – Expenditures

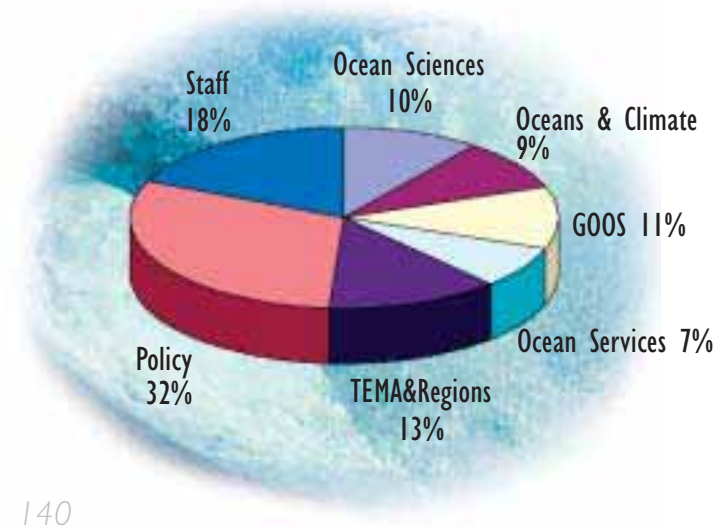
UNESCO Regular Programme allocation 2001 – expenditure breakdown by main programmes axes



Programme expenditure 2001 – UNESCO Regular Programme versus Extra-Budgetary funds (Special Account and project-related Funds-in-Trust (US$)



IOC Special Account – expenditure breakdown by main programme axes & staff (table in US$)



Programme	Amount
Ocean Sciences	199 305
Oceans & Climate	175 000
GOOS	212 569
Ocean Services	143 547
TEMA & Regions	250 922
Policy	584 869
Staff	349 013
TOTAL	1 915 225

Annex V Acronyms

ABE-LOS	Advisory Body of Experts on the Law of the Sea (IOC)
ABLOS	Advisory Board of Experts on the Technical Aspects of Law of the Sea
ACC	Administrative Committee on Coordination (of the UN System)
ACOPS	Advisory Committee on Protection of the Sea
ACSYS	Arctic Climate System Study (WCRP)
ADCP	Acoustic Doppler Current Profiler
AECI	Agencia Española de Cooperación Internacional (Spanish Agency for International Cooperation)
AGU	American Geophysical Union
AIMS	Analysis, Interpretation, Modelling and Synthesis (WOCE)
AMCEN	African Ministerial Conference on the Environment
ANCA	HAB working group for the Caribbean
ANMP	Association Nationale des Moniteurs de Plongée (professional diving instructors' association, France)
AOML	Atlantic Oceanographic and Meteorological Laboratory (NOAA)
AOPC	Atmospheric Observation Panel for Climate
APEC	Asia-Pacific Economic Cooperation
Argo	GODAE global profiling float project (not an acronym)
Argos	Service Argos, Inc. (global data telemetry and geo-positioning services company)
ASAP	Automated Shipboard Aerological Programme
ASLO	American Society of Limnology and Oceanography
BATHY	Bathythermograph Report, or code for reporting temperature profile observations
BBC	British Broadcasting Corporation
BC	British Columbia (Canada)
BMRC	Bureau of Meteorology Research Centre (Australia)
BoM	Bureau of Meteorology (Australia)
BOOS	Baltic Operational Oceanographic System
BUFR	Binary Universal Form for the Representation of meteorological data (WMO) [BUFR is the new WMO standard for point data (i.e. observations at discrete points, as opposed to gridded data)]
BUOY	BUOY is the name of the code for reporting buoy observations
CalCOFI	California Cooperative Oceanic Fisheries Investigations (USA)
CariBas	Caribbean Basins project (LOICZ)
CARICOM	Caribbean Community
CARICOMP	Caribbean Coastal Marine Productivity (launched by UNESCO)
CBD	Convention on Biological Diversity (Rio de Janeiro, 1992)
CBS	Commission for Basic Systems (WMO)
CD-ROM	compact disk – read only memory
CEB	United Nations System's Chief Executives Board for Coordination (new name for ACC)
CEOP	Coordinated Enhanced Observing Period (GEWEX)
CEOS	Committee on Earth Observation Satellites
CIESM	International Commission for the Scientific Exploration of the Mediterranean Sea
CIRAD	Centre de coopération Internationale en Recherche Agronomique pour le Développement (center for international cooperation in agronomy research for development, France)
CLCS	Commission on the Limits of the Continental Shelf (UN)
CliC	Climate and Cryosphere project (WCRP)
CLIMAT and CLIMAT TEMP	* (see endnote, p. 148)
CLIVAR	Climate Variability and Predictability Programme (WCRP)
CLME	Large Marine Ecosystem of the Caribbean and Adjacent Regions

Editor's note: An effort was made to regroup, in this annex, all the acronyms that appear in the main text, with a few additional ones that are used in relevant fields of activity. There are a few entries (such as Argo, BUOY, SHIP etc.) in this list that are not acronyms, but short names the inclusion of which was deemed useful for the reader.

CMM	Commission for Marine Meteorology (WMO)
CMS	Centre for Marine Studies (University of Queensland, Australia)
CNES	Centre National d'Etudes Spatiales (French national space centre/agency
CO_2	carbon dioxide
COASTS	Coastal Ocean Advanced Science and Technology Studies
COMEST	World Commission on the Ethics of Scientific Knowledge and Technology (UNESCO)
CoML	Census of Marine Life
COOP	Coastal Ocean Observations Panel (GOOS)
COP	Conference of the Parties (to the UNFCCC), also CoP
CPACC	Caribbean Planning for Adaptation to Climate Change
CRP	coordinated research project
CSD	Commission on Sustainable Development (UN)
CSIRO	Commonwealth Scientific and Industrial Research Organization (Australia)
CSMP	Center for the Study of Marine Policy (University of Delaware, USA)
CTD	conductivity-temperature-depth probe
DANIDA	Danish International Development Assistance
DBCP	Data Buoy Cooperation Panel (WMO-IOC)
DFID	Department for International Development (UK)
DINARA	Dirección Nacional de Recursos Acuáticos (Uruguay's aquatic resources authority)
DNA	Designated National Agency (IODE)
DOALOS	See UN/DOALOS
DODS	Distributed Oceanographic Data System
DWD	Deutscher Wetterdienst (German weather service)
EC	European Commission, also Executive Council (e.g. WMO or IOC)
ECMWF	European Centre for Medium-Range Weather Forecasts
EDIMAR	Estación de Investigaciones Marinas de Margarita (marine research station, Venezuela)
EDIOS	European Directory of the Initial Ocean-observing System
EEZ	Exclusive Economic Zone
EGOS	European Group on Ocean Stations (DBCP)
EI	Environmental Indices
ENSO	El Niño-Southern Oscillation (ocean/atmosphere interaction study)
EOS	AGU's weekly newspaper of geophysics, also NASA's Earth Observing System
ESA	European Space Agency
ESEAS	European Sea Level Service
ET	Evaluation Team (GESAMP)
EURASLIC	European Association of Aquatic Sciences Libraries and Information Centres
FANSA	HAB working group for South America
FAO	Food and Agriculture Organization of the United Nations
G30S	Sponsors Group for the Global Observing Systems (GCOS, GOOS and GTOS)
GAW	Global Atmosphere Watch (WMO)
GC	Governing Council (of UNEP)
GCOS	Global Climate Observing System (WMO-ICSU-IOC-UNEP)
GCRMN	Global Coral Reef Monitoring Network
GDA	GEBCO Digital Atlas (GEBCO Database)
GEBCO	General Bathymetric Chart of the Oceans
GEBCDMEP	IODE Group of Experts on Biological and Chemical Data Management and Exchange Practices
GEF	Global Environment Facility (World Bank-UNEP-UNDP)

GEOHAB	Global Ecology and Oceanography of HABs (IOC-SCOR)
GESAMP	Joint Group of Experts on the Scientific Aspects of Marine Environmental Protection (IMO-FAO-UNESCO-WMO-WHO-IAEA-UN-UNEP)
GEWEX	Global Energy and Water Cycle Experiment (WCRP)
GIPME	Global Investigation of Pollution in the Marine Environment
GIS	Geographic Information System
GIWA	Global International Water Assessment
GLOBEC	Global Ocean Ecosystems Dynamics Programme (SCOR, IOC, IGBP/ICSU)
GLODIR	Global Directory of Marine (and Freshwater) Professionals
GLOSS	Global Sea-Level Observing System
GODAE	Global Ocean Data Assimilation Experiment
GODAR	Global Oceanographic Data Archaeology and Rescue Project (IODE)
GOES	Geostationary Operational Environmental Satellite (NOAA)
GOOS	Global Ocean Observing System (IOC-WMO-UNEP-ICSU)
GOSIC	Global Observing Systems Information Center
GPA	Global Programme of Action for the Protection of the Marine Environment from Land-based Activities (UNEP)
GPO	GOOS Project Office
GSC	GOOS Steering Committee
GSN	GCOS Surface Network
GTN-H	Global Terrestrial Network – Hydrology
GTOS	Global Terrestrial Observing System (FAO-UNEP-WMO-UNESCO-ICSU)
GTS	Global Telecommunication System (WWW)
GTSPP	Global Temperature and Salinity Profile Programme (IOC-WMO)
GUAN	GCOS Upper-Air Network
HAB	harmful algal bloom
HAE-DAT	metadata database on Harmful Algal Events
HAMM	Harmful Algal Management and Mitigation (international conferences)
HELCOM	Baltic Marine Environment Protection Commission (Helsinki Commission)
HLCM	High-Level Committee on Management
HLCP	High-Level Committee on Programmes
HTDB/PAC	Historical Tsunami Database for the Pacific
IABO	International Association for Biological Oceanography (member of SCOR)
IABP	International Arctic Buoy Programme (DBCP)
IAEA	International Atomic Energy Agency
IAG	International Association of Geodesy
IAMSLIC	International Association of Aquatic and Marine Science Libraries and Information Centres
IAPSO	International Association for the Physical Sciences of the Ocean (IUGG)
IASI	Intra-American Seas Initiative
IBCCA	International Bathymetric Chart of the Caribbean Sea and the Gulf of Mexico
IBCEA	International Bathymetric Chart of the Central Eastern Atlantic
IBCM	International Bathymetric Chart of the Mediterranean
IBCSEP	International Bathymetric Chart of the South Eastern Pacific
IBCWIO	International Bathymetric Chart of the Western Indian Ocean
IBCWP	International Bathymetric Chart of Western Pacific
ICAM	Integrated Coastal Area Management (also name of IOC programme)

ICES	International Council for the Exploration of the Sea
ICG/ITSU	International Coordination Group for the Tsunami Warning System in the Pacific (IOC)
ICM	integrated coastal zone management
ICP	Informal Consultative Process (full name: UN Open-ended Informal Consultative Process on Ocean Affairs)
ICRAN	International Coral Reef Action Network
ICSU	International Council for Science
ICT	Information and Communication Technology
IDGs	International Development Goals
IEO	Instituto Español de Oceanografía (Spanish institute of oceanography, in Vigo)
IFREMER	Institut Français de Recherche pour l'Exploitation de la Mer (French Research Institute for the Exploitation of the Sea)
IGBP	International Geosphere-Biosphere Programme (ICSU); also known as Global Change Programme
IGO	intergovernmental organization
I-GOOS	Intergovernmental GOOS Committee (IOC-WMO-UNEP)
IGOS	Integrated Global Observing Strategy
IGOSS	Integrated Global Ocean Services System (IOC-WMO)
IGST	International GODAE Steering Team
IHDP	International Human Dimensions Programme on Global Environmental Change (ISSC-ICSU)
IHO	International Hydrographic Organization
IHP	International Hydrological Programme (UNESCO)
IMO	International Maritime Organization
IMS	Institute of Marine Sciences (Tanzania)
INCO	Iranian National Centre for Oceanography
INCOIS	Indian National Centre for Ocean Information Service
INEGI	Instituto Nacional de Estadística, Geografía e Informática (Mexican institute of statistics, geography and computer science)
IOC	Intergovernmental Oceanographic Commission (UNESCO)
IOCARIBE	IOC Sub-commission for the Caribbean and Adjacent Regions
IOCCG	International Ocean Colour Coordinating Group
IOCEA	IOC Regional Committee for the Central Eastern Atlantic
IOCINCWIO	IOC Regional Committee for the Cooperative Investigation in the North and Central Western Indian Ocean
IOCINDIO	IOC Regional Committee for the Central Indian Ocean
IODE	International Oceanographic Data and Information Exchange (IOC)
IOGOOS	Indian Ocean GOOS
IOI	International Ocean Institute (Malta)
IOS	Initial Observing System (GOOS)
IOSLON	Indian Ocean Sea Level Observing Network
IPCC	Intergovernmental Panel on Climate Change
IPHAB	IOC Intergovernmental Panel on Harmful Algal Blooms
IPIMAR	Instituto de Investigação das Pescas e do Mar (Portuguese institute for fisheries and sea research)
IPO	International Project Office (for GEOHAB)
IRD	Institut de Recherche pour le Développement (France's research institute for development. Formerly: France's scientific research institute for development through cooperation – ORSTOM)
ISABP	International South Atlantic Buoy Programme
ISO	International Organization for Standardization

ISRO	Indian Space Research Organization
ISSC	International Social Science Council
ITIC	International Tsunami Information Center
IUCN	World Conservation Union (formerly International Union for the Conservation of Nature)
IUGG	International Union of Geodesy and Geophysics
IWG	Intergovernmental Working Group (on IOC Oceanographic Data Exchange Policy)
JAFOOS	Joint Australian Facility for Ocean Observing Systems
Jason	USA-France oceanographic/climate monitoring/research and prediction mission
JCOMM	Joint Technical Commission for Oceanography and Marine Meteorology (WMO-IOC)
JGOFS	Joint Global Ocean Flux Study (IGBP)
JSC	Joint Scientific Committee for the WCRP (WMO-ICSU-IOC)
JSG	Joint Study Group
JTA	Joint Tariff Agreement (Argos)
JODC	Japan Oceanographic Data Centre
LME	large marine ecosystem
LOICZ	Land-Ocean Interaction in the Coastal Zone (IGBP)
MAMA	Mediterranean Network to Access and Upgrade Monitoring and Forecasting Activity in the Region
MAMCOMP	Monitoring and Modelling of Coastal Marine Processes
MAP/NAI	Millenium Africa Recovery Programme/New African Initiative
MEDAR/MEDATLAS	Mediterranean Data Archaeology and Rescue / Mediterranean (and Black Sea) Atlas
MedGLOSS	Mediterranean GLOSS
MedGOOS	Mediterranean GOOS project
MEDI	Marine Environmental Data Information Referral Catalogue
MEDS	Marine Environmental Data Service (Canada)
MFSPP	Mediterranean Forecasting System Pilot Project
MIP	Marine Integrated Programme
MON-DAT	IOC metadata database on Design and Implementation of Some Harmful Algal Monitoring Systems
MOU	Memorandum of Understanding
MP	Member of Parliament
MPA	marine protected area
MSP	Medium-Sized Project (GEF)
MSR	marine scientific research
MSVPA	multi-species virtual population analysis
NASA	National Aeronautics and Space Administration (USA)
NASDA	National Space Development Agency of Japan
NCDC	National Climatic Data Center (USA)
NEAR-GOOS	North-East Asian Regional GOOS
NEPAD	New Partnership for Africa's Development
NetCDF	Network Common Data Form: an interface for array-oriented data access and a freely-distributed collection of software libraries for C, Fortran, C++, Java, and perl that provide implementations of the interface
NGO	non-governmental organization
NMFS	National Marine Fisheries Service (NOAA)
NOAA	National Oceanic and Atmospheric Administration (USA)
NODC	National Oceanographic Data Centre (IODE)
NOOS	Northwest Shelf Operational Oceanographic System

NORAD	Norwegian Agency for Development Cooperation
NOWPAP	Northwest Pacific Action Plan
NRC	National Research Council (USA)
NRT	near real time
OAU	Organization of African Unity
OceanObs99	Ocean Observing System for Climate (1st International Conference on)
OCM	Ocean Colour Monitor
ODIN	Ocean Data and Information Network
ODINAFRICA	Ocean Data and Information Network for Africa (IOC and Flanders)
ODINCARSA	Ocean Data and Information Network for the IOCARIBE and South America regions
ODINEA	Ocean Data and Information Network for Eastern Africa (IODE)
ONR	Office of Naval Research (USA)
OOPC	Ocean Observations Panel for Climate (GCOS-GOOS-WCRP)
OOS	Operational Observing Systems (IOC programme section)
OPC	Ocean Products Center (USA)
OS	Ocean Services (IOC programme section)
OSLNR	Ocean Sciences in Relation to Non-Living Resources
OSLR	Ocean Sciences in Relation to Living Resources
OSP	Ocean Sciences Programme (IOC programme section)
OSPAR	Oslo Paris (Commission/Convention) for the Protection of the Marine Environment of the North-East Atlantic
PACSICOM	Pan-African Conference on Sustainable Integrated Coastal Management
PASS	Pan-African START Secretariat
pCO_2	measurement of CO_2 concentrations in the atmosphere and ocean
PDF-B	format for submitting proposals
PICES	North Pacific Marine Science Organization
PIRATA	Pilot Research Moored Array in the Tropical Atlantic
POGO	Partnership for Observation of the Global Oceans
PR China	People's Republic of China
PSMSL	Permanent Service for Mean Sea-Level
PTWC	Pacific Tsunami Warning Center
QC	quality control (of data)
RDFM	Rapid Determination of Focal Mechanism
RNODC	Responsible National Oceanographic Data Centre (IODE)
RONMAC	Red de Observación del Nivel del Mar para América Central (sea-level observing network for Central America)
ROPME	Regional Organization for the Protection of the Marine Environment (HQ in Kuwait)
R/V	research vessel
SAHFOS	Sir Alister Hardy Foundation for Ocean Science
SAMBAS	South American Basins (workshops)
SBSTA	Subsidiary Body for Scientific and Technological Advice (UNFCCC)
SCOPE	Scientific Committee on Problems of the Environment (ICSU)
SCOR	Scientific Committee on Oceanic Research (member of ICSU)
SCUFN	Sub-Committee for Undersea Feature Names
SEAGOOS	South East Asia regional GOOS
SEFSC	Southeast Fisheries Science Center (Miami, Florida, USA)
SEREAD	Scientific Educational Resources and Experience Associated with the Deployment of Argo
SG	Study Group or Steering Group

SGD	submarine groundwater discharges
SHIP	report of surface observation from a sea station
SHOM	Service Hydrographique et Océanographique de la Marine (France)
SIO	Scripps Institution of Oceanography (University of California, USA)
SOA	State Oceanic Administration (PR China)
SOC	Specialized Oceanographic Centre (JCOMM), also Southampton Oceanography Centre (UK)
SOCA	Subc-ommittee on Oceans and Coastal Areas (of UN ACC)
SOCIO	Sustained Observations of Climate in the Indian Ocean (workshop)
SOEMEP	Science for Ocean Ecosystems and Marine Environmental Protection (IOC programme)
SOLAS	Surface Ocean – Lower Atmosphere Study (WCRP)
SOOP	Ship-of-Opportunity Programme
SOOPIP	SOOP Implementation Panel
SOPAC	South Pacific Applied Geoscience Commission
SPACC	Small Pelagic Fishes and Climate Change Programme (of GLOBEC)
SSC	Scientific Steering Committee
SST	sea surface temperature
START	Global Change System for Analysis, Research and Training (IGBP)
SVP	Surface Velocity Programme (WOCE)
SVP-B	SVP barometer (Lagrangian drifters)
TAFIRI	Tanzania Fisheries Research Institute
TAO/TRITON	Tropical Atmosphere Ocean project / Triangle Trans-Ocean buoy Network (Japan)
TAR	Third Assessment Report (IPCC)
TCMP	Tanzania Coastal Management Partnership
TEMA	Training, Education and Mutual Assistance in the Marine Sciences (IOC cross-cutting provision/programme)
TESAC	code for reporting temperature, salinity and currents from a sea station
3-D	three-dimensional
TIME	Tsunami Inundation Modelling Exchange Project (IOC)
TIP	TAO Implementation Panel
TMT	transfer of marine technology
TOC	total organic carbon
TOPC	Terrestrial Observation Panel for Climate
ToR (or TOR)	terms of reference
TRACKOB	report of marine surface observations along a ship's track
TREMORS	Tsunami Risk Evaluation through Seismic Moment from a Real-time System
TSG	thermo-salino-graph
TTR	Training-through-Research
TWS	Tsunami Warning System in the Pacific (or TWSP)
UAE	United Arab Emirates
UDSM	University of Dar Es Salaam
UK	United Kingdom (of Great Britain, Scotland and Northern Ireland)
UN	United Nations
UNCED	UN Conference on Environment and Development
UNCLOS	United Nations Convention on the Law of the Sea
UN/DOALOS	UN Division for Ocean Affairs and the Law of the Sea
UNDP	United Nations Development Programme
UNDG	UN Development Group
UNEP	United Nations Environment Programme

UNESCO	United Nations Educational, Scientific and Cultural Organization
UNFCCC	United Nations Framework Convention on Climate Change
UNIDO	United Nations Industrial Development Organization
UOT/DAC	Upper Ocean Thermal Data Assembly Centres (WOCE Coordination Group)
URL	uniform (or universal) resource locator (address of a www page)
USA	United States of America (also US)
USSSDAP	Underway Sea Surface Salinity Data Archiving Pilot Project (IODE)
UV	ultra violet
VCP	Voluntary Cooperation Fund Programme (WMO or IOC)
VLIZ	Flanders Marine Institute (Belgium)
VOS	Voluntary Observing Ship (for WMO)
VOSClim	VOS Climate Project
WAGOOS	Western Australia GOOS
WCRP	World Climate Research Programme (WMO-ICSU-IOC)
WDC	World Data Centre
WESTPAC	IOC Sub-commission for the Western Pacific
WGIPA	Working Group on Integrated Problem Analysis (see ICAM events)
WHO	World Health Organization
WIOMSA	Western Indian Ocean Marine Science Association
WMO	World Meteorological Organization
WOCE	World Ocean Circulation Experiment (WCRP)
WSSD	World Summit on Sustainable Development (Johannesburg, 2002)
WWW	World Weather Watch (WMO)
www	World-Wide Web
XBT	Expendable Bathythermograph
XCTD	Expendable conductivity-temperature-depth probe
XML	eXtensible Markup Language

* These are WMO indicators, not acronyms, for kinds of messages sent via the GTS. CLIMAT ('Report of monthly values from a land station') refers to a monthly report which contains mean, maximums and minimums of temperature and precipitation, water vapour, sunshine, pressure, etc. (normally based on the hourly measurements at a station, which are reported via 'SYNOP' reports). TEMP is a report of the observation from a radiosonde release (temperature, pressure, humidity and wind), normally done twice a day. Averaging of (typically 60) daily TEMP values produces the data for a CLIMAT TEMP report ('Report of monthly aerological means from a land station'). Details on exactly what is measured, and how, are in the WMO Manual on Codes and the Manual on the Global Observing System. One can think of SYNOP and TEMP as weather-related data, and CLIMAT and CLIMAT TEMP as climate-related data (hence the choice of 'CLIMAT').

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