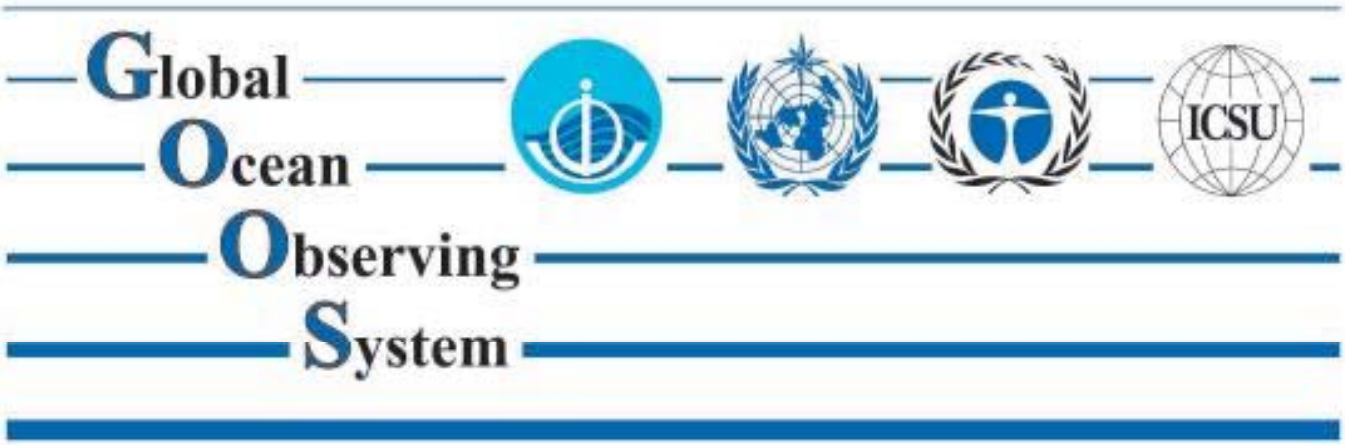

Intergovernmental Oceanographic Commission
Reports of Meetings of Experts and Equivalent Bodies

IOC-WMO-UNEP-ICSU Steering Committee of the Global Ocean Observing System (GOOS)

Seventh Session
26 - 29 April 2004
Brest, France

GOOS Report No. 142 **UNESCO**

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Paris, May 2004
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ABSTRACT

The 7th session of the GOOS Steering Committee, meeting in Brest, France, from 26-29 April 2004, addressed GOOS developments, progress with the design activities of the Ocean Observations Panel for Climate and the Coastal Ocean Observations Panel, and progress in implementing GOOS through the Joint Technical Commission for Oceanography and Marine Meteorology. Considerable progress is being made in implementing GOOS at the global and regional levels, especially through GOOS Regional Alliances. Good progress is being made in implementing the Argo profiling float programme and the Global Ocean Data Assimilation Experiment. A coastal GOOS Implementation Plan is expected shortly. GOOS Regional offices are performing well. The Panel paid particular attention to new developments in operational oceanography, which were introduced through a set of presentations from operators. More attention needs to be given in future to the practical implementation of GOOS and the creation of GOOS products. An economic case for GOOS needs to be built by economists to underpin the call for additional resources from government. GOOS is a key element of the Integrated Global Observing Strategy shared with the space agencies, and is poised to make a significant contribution to the design of a 10 year plan for Earth Observations. A new Director for the GOOS Office is expected to be appointed within a few months.

(SC-2004/……)

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1. OPENING AND WELCOME

1.2 WELCOME, INTRODUCTIONS, SPONSOR ORGANIZATION'S COMMENTS

The Chairman, Dr James Baker, opened the seventh session of the Global Ocean Observing System (GOOS) Steering Committee (GSC) at 09.00 on Monday 26 April 2004, in the IFREMER Centre de Brest, France.

Dr Jean-Francois Minster, Director-General of IFREMER, welcomed the Committee to Brest and IFREMER, noting that this was IFREMER's 20th anniversary year. He reminded participants that GOOS was making great strides, and that GOOS and operational oceanography were attracting progressively higher attention from policy makers both at the European level, through the GMES (Global Monitoring for Environment and Security) programme, and at the global level through the GEO (Group on Earth Observations) process. Operational oceanography is already being implemented in Europe through GMES and the European Commission's Framework programme. The French MERCATOR project, which is a contribution to the Global Ocean Data Assimilation Experiment (GODAE), is already working well, raising scientific questions that have led to rapid improvements in the quality of products, which are now being widely used by the scientific community. In closing he reminded participants of the sad demise of Christian Le Provost, the recent Chair of the Global Sea Level monitoring programme (GLOSS).

Peter Dexter welcomed participants on behalf of the World Meteorological Organization (WMO), noting that WMO is impressed with the progress of GOOS and is working actively through JCOMM to implement the physical components of GOOS. WMO is trying to raise the interest of meteorological agencies in GOOS so that they can contribute more to it and benefit more from it. There will be some difficulties in funding all GOOS and JCOMM activities over the next 4 years, due to a 30% budget cut in the marine budget of WMO.

John Field, as a member of the Executive Committee for the Scientific Committee on Oceanic Research (SCOR) welcomed participants on behalf of the International Council for Science (ICSU), noting that GOOS is a tremendously important development that will serve the needs of ocean scientists around the world.

Dr Baker noted that GOOS had now been in the planning stage for 10 years, since 1994 when the Joint Scientific Steering Group for GOOS (J-GOOS) first met, and that we are now moving increasingly towards full implementation, which has already begun for instance through the activities of the new Joint WMO/IOC Technical Commission for Oceanography and Marine Meteorology (JCOMM), and through the Partnership for an Integrated Global Observing Strategy (IGOS). As an example of the progress made, El Niño forecasts are now routine. The GEO process is giving GOOS very high-level attention from politicians' world-wide, which may in due course lead to increased funding for operational oceanography.

Dr Baker thanked Dr Colin Summerhayes, former Director of the GOOS Project Office (GPO) for his long service to GOOS, and noted that Dr Summerhayes was currently aiding the GSC through the good offices of the Scientific Committee on Antarctic Research (SCAR).

Apologies were received from Dr T. Trull, Dr S. Narayan, Dr W. Nowlin, and the GTOS and UNEP representatives, who were unable to attend the meeting.

1.2 LOGISTICS

Dr Summerhayes introduced the documentation for the meeting. Participants adopted the agenda and timetable with minor amendments.

1.3 FORMATION OF SESSIONAL WORKING GROUPS

The Chairman invited the Committee to nominate individuals to serve on one or other of the sessional working groups designed to address (i) implementation and liaison with other programmes; and (ii) the work programme and budget.

2. GOOS DEVELOPMENTS

2.1 GPO REPORT INCLUDING STATUS OF NEW GPO DIRECTOR

Dr Summerhayes reported briefly on the progress and plans of the GPO. GOOS has been given a budget increase from UNESCO for 2004-2005, which will be focused on expansion in four topic areas: regional development, remote sensing, modelling, and development of the global tide gauge network. Staffing levels remain roughly similar to those in 2003, at around 10.5 man years/year. New staff have been taken on in particular to offset retirements, and to increase the effort available to support the growing development of JCOMM.

A short list of candidates for the position of the new Director of the GPO is under consideration by the Director-General of UNESCO, and a decision is expected soon.

The Committee expressed its satisfaction with the work of the staff of the GOOS Project Office, and was pleased to note the increased budget and its focus on remote sensing, modelling, and sea-level measurements.

2.2 PERSPECTIVES FOR GOOS FROM DIRECTOR GPO

Dr Summerhayes offered his view on priority issues to be considered at GSC-VII. As GOOS moves towards full implementation it is essential that more attention be paid to user requirements and the development of products and services that offer valuable outputs to the wider community. In that context, consideration needs to be given to the inter-relations between GOOS and JCOMM, which has a Products and Services Programme Area. In the area of Capacity Building, attention needs to be focused on the three newly funded areas of remote sensing, modeling and sea-level measurement. The Committee should also make sure that the proposed merger between the GOOS and JCOMM capacity building panels is effective. Regional development is important as a means of ensuring that GOOS becomes truly global by engaging as many as possible of the developing countries. Regional development will require extensive capacity building. A basin-scale vision is being applied to the development of GOOS in the Indian Ocean. There is ample scope for similar basin-scale developments of GOOS in the North Atlantic, in partnership with the International Council for the Exploration of the Sea (ICES), and in the North Pacific (in partnership with PICES, the Pacific equivalent of ICES). Finally, while it looks as if the Argo project will successfully seed the ocean with some 3000 profiling gloats by 2006, these will not tell us about the complex oceanographic processes associated with ocean circulation beneath ice-covered seas in the polar regions. Modified Argo floats are needed for that purpose. The advent of the proposed International Polar Year (IPY) in 2007-2008 offers an opportunity for developing such floats.

In discussion, the Chairman emphasized the need for the Committee to consider during its deliberations (below) how to further implement GOOS, and how to supply physical, chemical, and biological information to users.

2.3 PERSPECTIVES FOR GOOS FROM CHAIR I-GOOS

Silvana Vallerga, Chairperson of the Intergovernmental Committee for GOOS (I-GOOS), gave an I-GOOS perspective on the future of GOOS.

It is possible to improve local marine environmental services in every region by exploiting the Global Ocean Observing System. This is the special contribution that GOOS will make to operational oceanography. We must build on the achievements of OOPC for the global perspective, and COOP for the

coastal perspective. The scientific community is developing new methods to link Global and Coastal; we must articulate the strategy.

Each region has different problems and solutions. Each region will exploit differently the potential offered by GOOS. Even if the Global System is resourced by the climate customer, exploiting GOOS for local environment services will require substantial additional resources. Capacity building will be funded by - Nations; - Regions (European Union, others); - Global aid agencies (World Bank, UNDP etc). We must make a convincing case. Some funding agencies are not convinced that local marine environmental services can be improved by exploiting GOOS. Others accept it in principle, but are not ready to fund it, because we have not yet explained: how it will be done; how much it will cost. We need a powerful, clearly presented case. We need to prepare that case. It must: be simple; explain how it will be done; show how it will work in different regions; quote the results of successful trials; and deal with the economics.

How can we prepare that case? We must involve all stakeholders: I-GOOS with the 129 Member States; GSC with the scientific community; and the 13 GRAs with their local stakeholders.

We have established tools for GRAs. There is a GOOS Regional Forum, a tool for: gathering information; exchanging best practice; and raising awareness. We need a tool to: distil the information; make decisions; and speak with a single coherent voice. The chairs of GRAs are each responsible for planning the development of marine services in our individual regions. Now they need to work together to create a single coherent strategy that will convince all the funding agencies. It has been accepted that the chairs of the GRAs should make this formal by working together as a GOOS Regional Council (GRC), a decision-making body for the GOOS regions acting together.

The Mission of the GRC is to build a coherent strategy for improving local marine environmental services by exploiting the Global Ocean Observing System. The members will be the Chairpersons of the GOOS Regional Alliances. The I-GOOS chair will act as chair, in the interim period, before approval of the GRC by I-GOOS, then the chair will be elected by the GRC. The GPO Director will act as Secretary. The GRC is a decision-making body for the GOOS regions acting together. It will decide the strategy for pursuing its mission with a 5 years forward look. It will meet once a year, back to back with either the GOOS Regional Forum or I-GOOS meetings. It will report to IOC through the I-GOOS chair. Resources are needed to make GRC effective; it is up to the regions to find these funds. The European Commission is providing support through the GOOS Regional Alliances Network Development (GRAND) project. With the help of GRAND we can work together to develop a coherent regional strategy.

The Committee welcomed the development of the GOOS Regional Council as a mechanism for managing the interactions between the GRAs, and was pleased to see that new funds had been found to support the activities of the GOOS Regional Forum. The Committee agreed with the emphasis on bringing together the GRAs and the Large Marine Ecosystem projects from each region, and with the links being developed at top level between GOOS and the LME Management Group that meets annually at IOC. The Committee would like to see a closer link develop between that group and COOP management. It would be desirable, where feasible, for GRA representatives and LME representatives to approach GEF together concerning the funding for future LME projects in which GOOS will be involved.

Action 1: IOC to be asked to invite COOP leadership and Chair of GOOS Regional Council to attend the next meeting of the LME management group in Paris, so as to cement links between Coastal GOOS and the LME process.

2.4 MERSEA/GMES

The Director-General of IFREMER outlined the European Commission's approach to the development of operational oceanography, where priorities for investment would depend on relevance to Europe, economic benefits, and the maturity of the observing system elements. The programme would start with pilot projects operating to 2007 to demonstrate what is feasible. Careful consideration needs to be given to the architecture of the system and to its governance. New models need to be developed for funding the operational activities proposed. The main driver is the development of the Monitoring for Environment and

Security (GMES) programme, which has important overlaps with the GEO process, and its marine element - the MERSEA project.

Yves Desaubies, of IFREMER, gave a comprehensive presentation on MERSEA and the development of and benefits from operational oceanographic activities, with specific examples related to the Prestige oil spill.

The Committee was pleased to see that operational oceanography is being actively developed in Europe under the umbrella of the GMES/MERSEA programme and with the active assistance of EuroGOOS. It noted that the end result is likely to be a permanent operational ocean observing system for Europe. Although Black Sea GOOS is not directly involved in MERSEA, the Committee noted with approval that EuroGOOS will help Black Sea GOOS to benefit from MERSEA developments. GMES/MERSEA should be promoted as strongly contributing to GEO.

2.5 VERSION 2.0 OF STRATEGIC PLAN FOR GOOS

The Chairman noted that Action 44 from GSC-VI had called for a small inter-sessional working group to start work on developing Version 2.0 of the Strategic Plan for GOOS. One of the inputs needed by that group was the final position of the IOC on the Review of GOOS. Because the IOC Assembly in June 2003 decided that it needed to follow-up on certain aspects of the GOOS Review (see item 2.6, below), it was felt inappropriate to start detailed work on the development of a new GOOS strategy until the follow up was complete and approved by the IOC. Now that the follow-up group has completed its work, it is hoped that the IOC will approve the results at the Executive Council meeting in June 2004, following which work can begin on the GOOS strategy. The Committee agreed that the Strategic Plan should among other things address the scientific and societal questions that could be answered by GOOS including the specific questions for the OOPC and COOP.

Action 2: The inter-sessional working group from GSC-VI Action 44 to begin its work on revising the GOOS Strategic Plan, following the IOC Executive Council's final decisions on the follow-up to the GOOS Review.

2.6 FOLLOW-UP TO REVIEW OF GOOS

On behalf of Dr Radhakrishnan, the Chairman of the IOC Inter-sessional Working Group (ISWG) on the Follow-up to the GOOS Review, Colin Summerhayes reported on the conclusions of the ISWG, which will be delivered to the next session of the IOC Executive Council in June 2004.

The Committee noted that the ISWG was proposing that many of the original recommendations made by the original GOOS Review Group and considered by the GSC at its 6th session should be accepted as written.

The Committee agreed that from its perspective the modifications suggested by the ISWG to the original recommendations of the Review Group were acceptable, but believed that the proposed new name for the GSC of "The GOOS Scientific Steering Committee" suggested too narrow a remit for what the GSC was actually required to do in order to provide the appropriate advice to I-GOOS. The Committee recommended that the new name for the GSC should be "The GOOS Scientific and Technical Steering Committee", and that the acronym GSC should be retained (just as ICSU changed its name but kept its acronym).

Action 3: The GPO to advise the Executive Secretary IOC of the Committee's recommendation that the GSC be renamed the "GOOS Scientific and Technical Steering Committee", with the acronym GSC.

The Committee noted that any changes that were recommended to the GSC would require agreement by the other sponsors of the GSC, since the GSC is constructed under a MoU signed by IOC, WMO, UNEP and ICSU.

Action 4: IOC Secretariat to discuss with GSC co-sponsors any changes thought necessary to the GSC MoU, following the IOC Executive Council's deliberations in June 2004.

3. OOPC

3.1 REPORT ON OOPC

Dr Ed Harrison (Chair OOPC), reported on activities being undertaken by the OOPC, including (i) progress with and plans for GODAE and Argo; (ii) developments in the Arctic; (iii) Time Series stations; (iv) the linkages to and collaboration with CLIVAR; and (v) the ocean component of the 2nd Adequacy Report on Observing Systems that was presented by GCOS on behalf of GOOS and others to the Conference of the Parties to the UN Framework Convention on Climate Change (UNFCCC).

OOPC is charged with developing recommendations for a sustained global ocean observing system, in support of WCRP, GOOS and GCOS climate objectives, including phased implementation. It is helping to develop a process for ongoing evaluation and evolution of system recommendations. And it supports global ocean observing activities by involved parties, *via* science advice and agreed observing plans. Next steps include: (i) sustaining proven ocean satellite data streams and *in situ* activities; (ii) obtaining global coverage with: (a) initial composite surface system; (b) initial composite subsurface system; (c) improved ocean data system, including telcoms; (d) increased effort on ocean analysis & reanalysis; and (e) maintaining strong linkages with research programs for data collection, indicators, observing system evaluation, new technology, new science, etc. The GCOS 2nd Adequacy Report incorporates these "Next Steps" as recommendations, in support of IPCCC & UNFCCC goals. The Adequacy Report notes that over-arching issues are the lack of global coverage with proven networks, and the lack of frameworks to sustain observations. The Report has been accepted by UNFCCC SBSTA and COP-9, with call for reporting on ocean observing system implementation progress. However, that begs the question of whether or not we have the frameworks needed to achieve ocean satellite requirements, and to accomplish and sustain *in situ* observations. Recent research on key climate issues illustrates the need for, at least, the recommended initial global ocean climate observing system. Dr Harrison gave a number of examples indicating on the one hand growing knowledge of how the system was varying, and on the other hand the need to ascertain what surface and subsurface signals we need to look for in order to monitor variability.

Since OOPC-7 there has been good progress on many aspects. Many liaison and coordination efforts are underway. There has been some progress on implementation, but additional support and activities are needed. Discussions are underway about how to evaluate progress, and on what information products to develop.

The relationship with CLIVAR has been further enhanced, and CLIVAR developed the "Next Steps" jointly with OOPC. The CLIVAR Basin Panel sends representatives to OOPC meetings. At OOPC-8 they reaffirmed that the "Next Steps" are essential to the success of CLIVAR ocean goals. The CLIVAR-OOPC linkage is essential, as climate research sponsors fund much of the existing global ocean observing activity, and research vessels are one of the keys to sustained global implementation. CLIVAR is helping OOPC with development of recommendations for higher latitudes and transports, and with ocean carbon survey coordination. Together they are developing a Global Synthesis and Observations Project (GSOP).

The World Climate research Programme's Climate and Cryosphere programme (CliC) is also represented at OOPC meetings. Sea-ice satellites are stimulating considerable research; OOPC will be kept abreast of developments. The International Polar Year will lead to enhanced observing efforts, which are now being planned.

In December 2003, the *in situ* ocean observing system for climate was roughly 45% complete, with variation between different observing system elements. Long-term support is generally lacking. There is some uncertainty about future satellite commitments. Various research activities are estimating uncertainties in ocean climate products.

For the future, the sponsors of sustained observing systems want 'measures' of interest as routine products – not just data. OOPC is therefore working on a preliminary set of ocean climate indices – and has asked for help from the CLIVAR Basin Panels and CliC.

At this time it is now possible to surf the Web and access values of the indices for the familiar 'recurring patterns' of marine surface climate variability, such as the NAO, the PDO, and ENSO. The OOPC web site will make access to these indices available by Summer 2004. We now need to agree on definitions for a suite of recurring patterns of climate variability (ENSO, NAO, PDO, AO), in addition to indices of sea level and sea ice and subsurface properties, such as heat, salt, carbon content change, and ocean transports

While the climate observing system is justified on the basis of its utility to support: ocean and climate forecasting, climate state assessment, and climate science, nevertheless we now need to evaluate and report on progress toward global implementation of the Next Steps, to estimate uncertainties in ocean analyses and derived ocean climate information products relative to estimated relevant ocean climate signals, and to develop a user community feedback process (coastal and global).

Turning to GODAE, good progress is being made. The GODAE Data Servers are working and improving. Several GODAE Comparison Projects are underway, the North Atlantic being furthest advanced. GODAE High Resolution SST Pilot Project products will become available in 2004. There will be a GODAE Summer School in September 2004, and a second GODAE Symposium in November 2004. Argo is well underway, with one third of the 3000 floats in the water, and commitments in place for the other 2/3.

The OOPC faces several important issues, among them: how to manage expectations, and not over-promise? It is essential to get sponsors to accept the importance of 'sustained research' observations. OOPC will need to establish how to foster climate quality standards and operating procedures for operational entities (satellite and *in situ*); how to establish effective partnerships between operational and research organizations to sustain and oversee the system; how to improve the evaluation/feedback process; how to get agreement on definitions of surface recurring pattern indices; how to develop subsurface indices; how to develop ocean 'data models'; how to improve integrated ocean climate data bases; how to better communicate deployment opportunities; and how to continue to develop research community engagement at all levels in the 'system'.

The Committee recognized the existence of data gaps and the lack of long term support for open ocean measurements in the climate observing system. The Committee was pleased to see the considerable progress being made by the OOPC towards the eventual full establishment of the ocean observing system for climate, and with the close links being developed with CLIVAR and CliC. The Committee noted the need for completion of the Argo network as a key component of the observing system and a key contribution to the success of GODAE. The Committee noted that a summary of the GODAE symposium will be presented to GSC-VIII.

The Committee agreed that the research community, through its sustained observing activities, is critically important to the success of GOOS.

3.2 CARBON OBSERVING SYSTEM

Dr Harrison also briefed the Committee on activities being undertaken to monitor ocean CO_2, drawing on a presentation prepared by Maria Hood. The UN Mandate for IOC Ocean Carbon Programmes is that the United Nations Conference on Environment and Development (UNCED) Action Plan for Global Sustainable Development (Agenda 21) notes that "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." Within GOOS, ocean carbon is an activity of the OOPC. Requirements for ocean carbon measurements for GOOS are being developed by the International Ocean Carbon Coordinating Project (IOCCP), with advice from the SCOR –IOC CO_2 Panel.

Fundamental questions about carbon storage in the oceans are being addressed both at national and international levels. At present, predictive models about what will happen to carbon dioxide differ significantly. We cannot improve predictions without better understanding of the controlling processes. This is no longer just an academic issue, because disagreements in predictions impact baseline targets for emissions reduction. Differences between models imply differences in ecosystem services of trillions of dollars. This is a big incentive for research.

The IOCCP is working with national, regional and international programs and data centers to provide a global view of ocean carbon by: developing a compilation and synthesis of ocean carbon activities and plans; working with international research programs to fully integrate carbon studies into planning activities; standardizing methods, qc/qa procedures, data formats, and use of certified reference materials; and supporting regional synthesis groups and creating regional databases. The rationale for the main observing system elements is set out in GOOS report 118. The main elements are: (i) Repeat Hydrography; (ii) Surface pCO_2 Network; (iii) Time Series Stations; and (iv) Satellite Remote Sensing. Under these headings the report addresses: Applications, Sampling Requirements, Methods, and Inventories. Also needed are: Technology Development; Ocean Process Studies; and Modelling. The existing Repeat Hydrographic Sections system includes 31 lines funded, and 7 with funding-pending. There is no international agreement on "the survey" strategy. The existing VOS Carbon Network system includes 18 lines operating, and 4 planned for a 2004 start. The existing Time Series Network system includes an incomplete inventory. 9-10 stations are operational or planned for a 2004/5 start measuring pCO_2 or DIC. The existing Remote Sensing/Ocean-Colour system includes satellite missions adequate to meet requirements for the medium-term. The *in situ* network must be enhanced through times series and SOOP measurements. The Next Steps include transitioning from science plans to implementation.

The Committee was very pleased to see the considerable progress that had been made towards developing international coordination for ocean carbon measurements, and towards the development of an ocean carbon observing system in support of climate measurements.

3.3 CLIMATE OBSERVING SYSTEM

The GCOS Steering Committee has strongly endorsed the need for: (i) free and unrestricted exchange of data for essential climate variables; (ii) integrated global climate products based largely on satellite data or on climate reanalysis of historical data to meet user needs (e.g., UNFCCC); (iii) internationally approved observing standards - especially for the terrestrial domain; and (iv) enhanced capacity building and improvements in climate observing systems in developing countries.

GCOS represents GOOS (OOPC) at meetings of the UNFCCC, which has been addressing the need for Research and Systematic Observation. The UNFCCC has invited Parties to provide detailed reports on global climate observing systems, using guidelines developed by GCOS. It asked GCOS to organize regional workshops to identify priority capacity-building needs and deficiencies in climate observing systems. And it urged Parties to address deficiencies in observing systems, capacity building needs and funding options. Finally, GCOS has been considering the development of a GCOS Cooperation Mechanism, to facilitate funding implementation.

Last year, GCOS presented the UNFCCC COP-9 with the Second Report on the Adequacy of the Global Observing Systems for Climate, which calls for improvements in the observing system for climate. Adequacy Report, the UNFCCC concluded that Parties should commit to the full implementation of integrated global observing systems for climate, sustained on the basis of a mix of high-quality satellite and *in situ* measurements, dedicated infrastructure and targeted capacity-building. It requested GCOS to develop a phased 5- to 10-year implementation plan, including an open review of the plan, by COP-10 (Nov. 2004). The plan will address the actions needed to implement the findings of the Report. A draft will be available for open review and comment in May 2004, and the plan will be completed by COP-10 (December 2004 – Buenos Aires). At present the degree of implementation of the "essential climate variables" needed for GCOS varies widely. The Plan will be a blueprint for balanced actions for networks, satellite data, data systems and integrated climate products. It will signal priority actions in accord with UNFCCC needs, feasibility and cost effectiveness.

In the oceans, new technology has allowed the ocean community to design and commence implementation of an initial ocean climate observing system that is well focused on the UNFCCC needs. The UNFCCC agreed that the first priority is the full implementation of this system together with its associated data, analysis and product capabilities. GOOS and GCOS have been asked to provide progress on the initial ocean climate observing system for a report to SBSTA 22 –in June 2005. A key issue for the Implementation Plan is what is the framework/forum for interested countries to plan for and make commitment to the implementation of a global ocean observing system for climate?

GCOS is developing Regional Workshops in accordance with the UNFCCC's Parties wish to facilitate capacity building. The objectives of the programme are to: (i) assist developing countries to report on systematic observation to UNFCCC (reporting guidelines); (ii) identify national and regional needs and deficiencies in climate data (e.g., contribution to baseline networks); (iii) improve the linkage between national Climate Change Coordinators and observing system practitioners; and (iii) initiate the development of a regional Action Plan for improving observing systems, including identification of 'priority' needs and a strategy for mobilizing resources. The workshops enable identification of deficiencies in climate observing systems. They are supported by GEF and individual (agency) donors. Six workshops and Regional Action Plans have been developed. Future workshops are targeted for Central Asia, South & Southwest Asia, Eastern and Central Europe, and the Mediterranean region. Resource mobilization and regional infrastructure are the main issues. Capacity-building is intended to address deficiencies in the climate observing networks in developing countries and to bring forward specific proposals, including funding.

It is agreed that GCOS needs to develop a coordinated multi-governmental approach to address the need for stable long-term funding for priority systems, especially for least developed countries and SIDS. The GCOS Cooperation Mechanism will consists of a Cooperation Board – as primary means to establish and direct priority improvement projects; and a Cooperation Fund – as means for aggregating voluntary Contributions from multiple donors (both in-kind and financial). It will be open to any agency within a Member Country of the GCOS intergovernmental sponsors (WMO, IOC, UNEP and FAO). It will focus on management issues (e.g., priorities) and the mobilization of resources. Resources may be expected to fund some of the Sea Level measurements needed for climate purposes.

The Committee was pleased to see the progress being made by GCOS in gaining the attention of and meeting the needs of the national representatives participating in the meetings of the UNFCCC, and with the high priority being assigned to the further development of the ocean observing systems for climate.

Action 5: Noting that the ninth session of the UNFCCC Conference of Parties in decision 11/CP.9 invited the "Global Climate Observing System secretariat, in conjunction with the Global Ocean Observing System secretariat, to provide information to the Subsidiary Body for Scientific and Technological Advice, at its twenty-second session, on progress made towards implementing the initial ocean climate observing system", SBSTA of the UNFCCC has requested that GCOS provide a report on the status of progress toward implementation of the initial global ocean observing system at its next meeting, the GSC requests that the IOC, through the I-GOOS and through its own efforts, gather information on national enhancements to the Next Steps recommended last year, and provide this information to the GCOS Secretariat by 31 January 2005.

In particular, it is requested the nations provide information on long-term national commitments, and increases, to the following global ocean observing system activities:

1. XBTs made available for coordinated implementation via the JCOMMM SOOP;
2. Surface drifting buoys made available for coordinated implementation via the JCOMM DBCP;
3. GLOSS Core tide gauge stations reporting annually to the JCOMM PSMSL and also the number fitted with GPS or Doris receivers;
4. Volunteer Observing Ships participating in the JCOMM VOSClim air-sea observations programme;
5. Surface pCO_2 observing activities being coordinated *via* the IOCCP;

6. Repeat hydrography/carbon inventory survey lines being supported and coordinated *via* the International CLIVAR&IOCCP repeat survey programme;
7. Ocean Time Series Reference Site moorings supported;
8. Argo profiling floats participating in the Argo programme and coordinated *via* the Argo Science Team;
9. Support for satellite missions for:
   a. Topex/Poseidon class altimetry,
   b. TRMM class microwave SST and rainfall,
   c. SeaWifs class ocean color,
   d. Ocean surface vector winds;
10. Annual reporting of ocean surface and subsurface observations to the relevant international programme or World Data Center;
11. Participation in GODAE, or other ongoing ocean climate analysis activities.

4. IMPLEMENTATION

4.1 *IN SITU* IMPLEMENTATION VIA JCOMM

The WMO Secretariat representative, Peter Dexter, provided an update on JCOMM activities during the past year relevant to GOOS. Specific points of interest include:

(i) Both WMO Congress and the IOC Assembly in 2003 approved the MoU on JCOMM Rules and Procedures. The two Governing Bodies also expressed substantial support for the Commission and its work programme, and recognized its role as an implementation mechanism for global GOOS;

(ii) The Expert Team on waves and surges has begun preparation of a JCOMM Guide to storm surge analysis and forecasting;

(iii) A detailed proposal has been prepared for the further development of the JCOMM Operational Centre in Toulouse (JCOMMOPS), to provide support for all components of the *in situ* ocean observing system;

(iv) An expert group has been established on instrument standardization, testing and intercalibration, cross-cutting all components of the Observations Programme Area, to initially compile a catalogue of existing practices and procedures under JCOMM;

(v) Some proposals have been prepared to try to address the developing problem of the unequal sharing of the costs of marine data collection through INMARSAT, to be presented to the WMO Executive Council;

(vi) The VOSClim Project is now operational, with data and associated metadata and quality monitoring results available through the project web server. In early 2004, some 110 of the planned 200 ships have been recruited to the project;

(vii) The Expert Team on Data Management Practices, now merged with the IODE Group of Experts on Technical Aspects of Data Exchange, has developed and is implementing three pilot projects, closely related to and coordinated with the OIT Project and other data management activities of WMO and IOC;

(viii) The special seminar to celebrate the 150th anniversary of the Brussels Maritime Conference of 1853 was a major success, with some 150 participants, and presentations involving both the history and the science of the development of operational meteorology and oceanography. The CLIMAR-II workshop which followed the seminar was also a success, and a selection of the papers presented there will be published in a special edition of the International Journal of Climatology;

(ix) Publication of a JCOMM booklet in four languages, including the new JCOMM logo.

The third session of the JCOMM Management Committee (Geneva, March 2004) took a number of decisions of direct relevance to GOOS:

(i) Approval of the provisional agenda and documentation plan for JCOMM-II (Halifax, September 2005). Preparation of the documentation will begin in the third quarter of 2004. It is likely that document input from GOOS may be required before GSC-VIII;

(ii) Agreement on JCOMM involvement in the IPY, 2007/08, and the preparation of a JCOMM position paper outlining this involvement;

(iii) Review of the GEO process and agreement on JCOMM involvement;

(iv) Commencement of work on a JCOMM Strategy Document;

(v) Establishment of a Task team on JCOMM Satellite Data Requirements, to report directly to the Management Committee;

(vi) Approval of the detailed merger plan for the JCOMM Capacity Building Coordination Group and the GOOS Capacity Building Panel.

Finally, the GSC noted and supported the forthcoming major JCOMM ocean products and services workshop, Ocean Ops 04, which would take place in Toulouse, 10-15 May 2004, hosted by Meteo-France and cosponsored by WMO and IOC through JCOMM and GOOS. Some 60 papers were to be presented, and a review of the results and preparation of follow-up action would take place the following week through sessions of the JCOMM Services Coordination Group and the *ad hoc* Task Team on MPERSS. Such follow-up would include, *inter alia*, a restructuring of the JCOMM Electronic Products Bulletin.

The Committee was pleased to see the progress being made by JCOMM in implementing GOOS requirements. It noted that JCOMM documents and invitations did not always reach the appropriate ocean contacts at national levels. The Committee noted that GSC members were assisting in the preparation of documents for JCOMM-II (fall 2005), and that much of the activity of the GPO staff was devoted to organizing JCOMM-II (for which the IOC is responsible). The Committee recognized the need to secure long term funding for JCOMMOPS.

Action 6: The IOC part of the JCOMM Secretariat was asked to ensure that documents on and letters of invitation on JCOMM were sent to appropriate oceanographic locations within national agencies.

Action 7: JCOMM is requested to develop and implement through the OPA and its panels, a pilot project for the real-time transmission, through the GTS, of all metadata relevant to the observational data for SST and subsurface temperature profiles.

4.2 MILAC

Johannes Guddal (co-President of JCOMM) reported on progress in the development of MILAC (Marine Impacts on Lowland Agriculture and Coastal resources), which is a modelling and forecasting programme that is (or is expected to be) endorsed by WMO and IOC to assist tropical coastal nations with their sustainable development. MILAC focuses on prediction of coastal storm surges and waves connected with tropical cyclones and will be a contribution to Natural Disaster Reduction. It is designed so as to fit with GOOS regional implementation, and includes both socio-economic analysis and 'end user interaction' as well as core technical/scientific elements needed for operational forecasting/hind-casting as required. A possible first 'MILAC site' will be the Indian Ocean, and IOGOOS is considering MILAC as one of their pilot projects.

The Committee was pleased to see the development of MILAC as a low-cost mechanism for enabling developing countries to forecast the occurrence of storm surges in coastal regions.

Action 8: The GPO should bring MILAC to the attention of all GRAs, with special attention to SEA-GOOS and NEAR-GOOS.

4.3 REMOTE SENSING

Colin Summerhayes briefed the Committee on the development of the IOC's Strategy for Remote Sensing in support of capacity building, which was approved by the IOC Assembly in June 2003. The intention is to improve access to and training in the use of remotely sensed data on the oceans by developing countries. These efforts are being underpinned by extra funding from UNESCO, as well as through UNESCO's cross-cutting project on remote sensing for water resources and ecosystems. Funds have been made available to improve the UNESCO Bilko programme for learning in remote sensing, which is led by Southampton Oceanography Centre. Considerable efforts have been made to put remote sensing at the heart of the proposal for a Regional Ocean Observing and Forecasting System for Africa (ROOFS-AFRICA).

Dr Summerhayes noted that IOC and GOOS are members of the (IGOS) Partnership, along with the other UN agencies, ICSU, IGBP, WCRP and the space agencies represented by the Committee on Earth Observing Satellites (CEOS). IOC and GOOS are also Associate Members of CEOS. CEOS has been increasing its interests in capacity building, in response to the demands of the Implementation Plan of the World Summit on Sustainable Development (WSSD). CEOS has developed a set of capacity building principles to assist access to and training in the use of remotely sensed data.

The IGOS Partners are building the components of an integrated global observing strategy through the construction of Themes. They are currently in the process of reviewing the Ocean Theme, for which GOOS is responsible. They are developing a Coastal Theme, with the aid of COOP. They recently approved publication of a Carbon Theme, in which GOOS constructed the ocean component. They are now contemplating the development of a Cryosphere Theme that will deal with sea ice. GOOS will be involved in this development.

The Committee was pleased to see the development of a strategy for remote sensing by the IOC, and with the focus of this strategy on support for GOOS. The Committee noted that in Africa one of the key problems was access to broadband communications to facilitate easy access to and exchange of remotely sensed data. It noted that the involvement of African States in ROOFS-AFRICA, through the NEPAD mechanism (New Partnership for African Development), might allow the scientific community to capitalize on efforts being made through NEPAD to improve telecommunications facilities across Africa.

Eric Lindstrom (CEOS representative) briefed the committee on progress with and plans for the Ocean and Coastal Themes of the IGOS Partnership. The Ocean Theme has proved to be a successful strategic planning exercise that has greatly facilitated decision-making and progress in the development of ocean observing systems. The GSC has the responsibility for oversight of the implementation of the Ocean Theme. Plans include a Rolling Review that is now underway, and which will result in the Ocean Theme plan being updated. Among other things, salinity missions are under development, including NASA's AQUARIUS, and ESA's SMOS, which will be launched in the next few years. They will produce monthly maps of one-degree square resolution, which will not be greatly useful for coastal oceans. GRACE was launched in March 2002 and has produced a 100x improvement in the marine geoid. His presentation included examples of simulation outputs from sea-ice models of the polar regions, and global ocean simulations that are contributions to GODAE.

The Coastal Theme is at an early stage of development. Key tools will include the Wide Swath Ocean Altimeter, and a second generation high resolution altimeter. It will be important to link the Coastal and Ocean Themes together.

The Committee congratulated the space agencies on the successful completion of many ocean observing missions that collectively had transformed the view of global ocean processes in recent decades.

The Committee was concerned about the success of the proposed Wide Swath Ocean Altimeter mission, about the JASON-2 follow-on mission, about possible gaps in the microwave SST coverage, and about the continuity of scatterometer missions for ocean vector winds. The Committee agreed that the

Chairman should write a letter to appropriate agencies to raise these concerns, and that a draft of the letter should first be checked by appropriate satellite experts to ensure that all critical issues had bee taken into consideration.

Action 9: GPO and GSC Chair to draft a letter or letters for the Chairman to send to appropriate space agencies with the following recommendations:

(i) Wide Swath Ocean Altimeter (WSOA) – GOOS welcomes news that the WSOA is in development and is on a path to be flown on the Ocean Surface Topography Mission (OSTM) (Jason-1 Follow-on). GOOS commends NASA for its work in finding the ways and means to accommodate the WSOA within the stringent budget for OSTM. This instrument will provide a new high-resolution view of ocean circulation variability.

(ii) OSTM/Jason-2 Follow-on – GOOS was informed that CNES and its partners in ocean altimetry face some key decisions about follow-on missions before the end of 2004. In particular, significant economies may be gained by purchasing copies of Jason-2 sensors for use on its follow-on mission. The GSC, representing a broad section of the oceanographic community, considers the precision altimetry time series to be the cornerstone for global ocean circulation analysis. Foresight to guarantee this key time series by forward planning and procurements by CNES has our full support.

(iii) Microwave Sea Surface Temperatures – Currently microwave SSTs are available from the Tropical Rainfall Measurement Mission (TRMM) Microwave Radiometer (TMR). This capability has been a valuable contribution to oceanographic research by providing SST's unrestricted by cloud-cover. Operational SST analyses are being developed to take advantage of such data. A follow-on to this valuable capability is highly desirable, and would be available as part of the Global Precipitation Mission satellite constellation. However, this mission has now been delayed by two years and there will be a significant gap between TRMM and GPM. The GOOS SC regrets that this gap will exist and hopes that planning for future microwave SST capability will provide gap-free data records.

(iv) Ocean Surface Vector Winds – The QuikScat mission continues to provide extremely valuable data, but no follow-on mission is in prospect. The importance of vector surface winds for marine operations, marine forecasting, climate forecasting and climate science is now well established. Evaluating the effectiveness of the recently flown passive microwave surface wind sensing system is essential for the development of a strategy to provide continuous data in the future.

4.4 DATA AND INFORMATION MANAGEMENT

Mr Peter Pissierssens reported on the way in which data and information management is being handled within the International Ocean Data and Information Exchange (IODE) programme, and the JCOMM Data and Information Programme Area. He also reported on progress with and plans for the Oceans Information Technology Pilot Project (OIT).

The Committee was informed about the history and structure of IODE. In the past the IODE network had a centralized architecture with one data centre per country dealing with mainly physical oceanography data in delayed mode and performing quality control, data archiving and providing user services. Since IODE-XVI this model has been changing gradually to a distributed model whereby multiple organizations in a country assume some data management responsibilities and whereby the IODE NODC plays, in addition to its data management role for certain data types, a coordinating role ensuring that all national data are properly managed and archived. Through this model IODE will be able provide appropriate attention to physical, chemical and biological data types and cope with the rapid increase in data volumes being generated.

The Data and Information Management Strategy and Plan of the GOOS (June 2001) had noted that "The GOOS DIMS will be a highly distributed system based on contributions by operational agencies, data

centres, and research organizations in the oceanographic and meteorological communities". To develop the ten core applications the following weaknesses and requirements had been identified: standards; exchange protocols; existing systems cannot deal with biological and chemical variables; taxonomic information system; environmental indices; fisheries data management system; applicability of satellite data to GOOS; and database interoperability. Many of these requirements are now dealt with by JCOMM and IODE.

IODE is now an active partner in JCOMM within the Data Management Programme Area (DMPA), and more particularly its Data Management Coordination Group (DMCG) and Expert Team on Data Management Practices (ETDMP). As the IODE's GE-TADE (IODE Group of Experts on Technical Aspects of Data Exchange) and the JCOMM EDMP had been seen to have similar terms of reference, it had been agreed by JCOMM and IODE to merge these bodies into the JCOMM/IODE ETDMP. In addition JCOMM had requested the IODE Secretariat to assume Secretariat responsibility for the DMPA.

With regard to the Ocean Information Technology (OIT) Pilot Project, the First Session of the OIT Steering Group had met in November 2002 in Brussels, where it had identified the following core priorities: (i) metadata management; (ii) data circulation and communication; (iii) data assembly, quality control and quality assurance; (iv) archival; and (v) the user interface. Several of these had subsequently been included within the ETDMP-I (September 2003) work plan: (i) metadata management; (ii) data assembly, quality control (QC) and quality assurance (QA); and (iii) end-to-end data management prototype. In order to ensure that concrete results will be available for presentation at JCOMM-II, funds earmarked for the 2nd Session of the ETDMP have been re-allocated to ETDMP-I pilot project implementation.

IODE is also a key player in the development of marine XML through participation in the ICES-IOC Study Group on the Development of Marine Data Exchange Systems using XML [SGXML], and the EU Marine XML project. Marine XML will support tracking of data from collection through to generation of integrated global and regional datasets, and support metadata describing the data collection, quality control and subsequent processing. The generation of data tagged with marine XML at the instrument level can enable automating processes like generation of metadata descriptions.

To provide more attention to biological and chemical data, IODE-XVI (November 2000) had established the IODE Group of Experts on Biological and Chemical Data Management and Exchange Practices (GE-BICH). At its 2nd Session (March 2004) it adopted an ambitious work plan including such issues as (i) prepare a paper that describes the relevance of an integrated and end-to-end approach to physical, chemical and biological data management to be used to create awareness amongst decision makers; (ii) coordination between IODE data centres and OBIS nodes; (iii) collaboration with ITIS; (iv) producing guidelines for data quality assurance of biological data; (v) connect fisheries data and oceanographic data by applying ecology concepts; (vi) implement pilot projects to test the different systems of distributed querying based on XML; (vii) organization of "Ocean Biodiversity Informatics" Conference (Hamburg, December 2004); and (viii) implement a questionnaire to request information about documenting systems, databases and inventories.

An IODE Project Office will be opened in Oostende, Belgium, in April 2005. The Office will establish a creative environment facilitating the further development and maintenance of IODE projects, services and products with emphasis on improving the efficiency and effectiveness of the data and product/service stream between the stage of sampling and the user. It will further assist in strengthening the capacity of Member States to manage oceanographic data and information and to provide ocean data & information products & services required by users.

To further guide IODE towards fully meeting the user needs, a full review of IODE has just started and will be completed for submission to the IOC Assembly in 2005. The review will study the operation and implementation of IODE, with particular attention to its (i) mandate; (ii) mission; (iii) structure; (iv) data centre network(s) and its (their) way(s) of operation; (v) mode of operation; (vi) the activities of its subsidiary groups and projects; and (vii) the national development of IODE activities. It will further review the extent to which IODE activities, including those specifically targeted at capacity-building in support of IODE, benefit Member States. The results of this review will also be used for the development of an "IOC Data Management Strategy" and for the work of the "Inter-sessional working group on the future role of WDCs, RNODCs and NODCs" established at IODE-XVII.

Mr Pissierssens ended with the following questions addressed to GOOS: (i) is the current model that links IODE and GOOS through JCOMM sufficient? (ii) do we need closer linkage between GOOS components and IODE? (iii) how can we make it all work better at the national level? He also invited GOOS to participate actively in the IODE-XVIII Session that will take place between 26 and 30 April 2005 in Oostende, Belgium.

The Committee agreed that the restructuring and refocusing of IODE is a positive response to the development of operational oceanography, and the need to combine data rapidly from many different agencies outside the research community. IODE was established when the main application of data followed archiving. Now, agencies gather and merge data in models BEFORE archiving, and the relationship of IODE to data originators and users has changed.

Action 10: The Committee called on the IODE data centres to implement the distributed model as appropriate, and to strengthen its collaboration with the operational oceanography community at the national and international level.

IODE NODCs can provide a valuable function by coordinating access to data in many different agencies at the national and regional levels, and providing data management expertise so that operational data are not lost after first use. Archived data are important in regional GOOS for providing climatologies and time-series with trends.

Action 11: The Committee called on the operational oceanography community to ensure that data are properly archived at the NODCs.

Action 12: IODE to provide a flow diagram or "wiring diagram" to make it easy for GOOS participants in GRAs to see where data should be submitted and how they can be obtained.

Action 13: GPO to arrange GOOS representation at regular IODE meetings.

4.5 GOSIC REVIEW

Dr Ferris Webster briefed the Committee on progress with and plans for the Global Observing Systems Information Centre (GOSIC). He reminded the committee of the second GOSIC review, held in November 2003, in which representatives of GOOS participated. The conclusion of the review was positive: the Review Team recommended that the development of GOSIC continue and that the system be transferred to an operational agency by 2006. The Review Team provided 27 detailed recommendations, all of which have been or are being implemented by GOSIC personnel.

The Review Team also recommended that closer ties be established with the observing programmes, including programme offices and programme steering committees. F. Webster pointed out that the GTOS and GCOS programme offices have each designated a member of their offices to interact with GOSIC. He expressed the hope that a similar designation could be made by the GOOS Programme Office. F. Webster also welcomed additional advice on the development of GOSIC from the GOOS Steering Committee.

An issue for the GSC over the next couple of years will be the selection of an institution to continue the operation of GOSIC. F. Webster informed the Committee that an expression of interest in continuing GOSIC has been given by the U.S. National Climatic Data Center. The organization that takes over GOSIC should be approved by the GOOS Steering Committee.

The Committee noted that the operational agency should be chosen with assurance that the disciplines involved in the various global observing systems are treated equitably.

The Committee endorsed the concept of an eventual transfer of GOSIC from the University of Delaware to an operational environment. It agreed that some scoping and Terms of Reference were needed regarding what GOSIC should be when it is an operational environment.

Action 14: GPO to work with GOSIC to define the scope and ToRs of the eventual transfer of GOSIC to an operational environment, and to explore possibilities for the relocation.

The Committee also agreed that it was desirable for a member of the GPO IOC staff to be assigned the task of liaison with GOSIC, to act as the GOSIC-GOOS Coordinator, following the models adopted by GCOS and GTOS, and accepted the offer of the IODE Project Office Head, Dr Vladimir Vladymyrov, to assume this responsibility.

During the discussion, Dr Vladymyrov gave his views on GOSIC derived from a review of the Web site. He noted that the user community was not well defined. He felt that groups such as hotel owners, travellers, or scuba divers would not find GOSIC of interest. F. Webster responded that the user groups should be those defined by GOOS and the other observing systems. Those systems have cast a rather wide net in defining users, and GOSIC has attempted to serve those communities.

4.6 PRODUCTS AND SERVICES

Johannes Guddal noted that the GOOS Products and Services Bulletin was now in its 4th issue, and was being managed by Texas A & M University, courtesy of Worth Nowlin.

Peter Dexter noted that the future of the JCOMM Products Bulletin was going to be considered at the Ocean Ops 2004 workshop at Toulouse later in 2004. He pointed out that there was a need to consider how the GOOS and JCOMM efforts to provide outreach on Products and Services could be addressed in future, perhaps with some combination of effort.

The Committee agreed that the GPSB was not sustainable, and that some way should be found to combine the GOOS and JCOMM approaches. The Committee agreed that the mechanisms of outreach, such as Products and Services Bulletins, should be the end result of an agreement on what processes GOOS and JCOMM need to use to identify user requirements and to convert them into products that add value to what individual nations are already doing. These products might be global or regional. They might come from certain designated centres. Once we have agreed on these aspects, then we can consider what means to use (such as a Bulletin) to spread the word about them. It was agreed that a one-stop-shop was required, combining GOOS and JCOMM efforts. An obvious starting point would be to provide an inventory of what is already being done. Ideally the GOOS home page could provide a means of Internet access to national products and services of GOOS type (much as the WMO home page offers access to national products and services).

Action 15: An intersessional group comprising GOOS and JCOMM representatives to consider what constitutes a GOOS product and/or service, and how best to develop and to advertise these [membership: Johannes Guddal (Chair), Worth Nowlin, Ralph Rayner, Nic Flemming, Phil Parker/Peter Dexter, Philippe Dandin, Silvana Vallerga].

4.7 INDICATORS

Dr Mike Sinclair reported on the progress of the inter-sessional working group charged with reviewing the status of indicator development and operational use, developing requirements for indicators, identifying user groups, and developing a plan for identifying and incorporating indicators as "GOOS products". At the 6th GSC meeting, in Cape Town last year, a discussion paper was provided on indicators of interest to COOP. The approach used was to provide examples of indicators for each of the six goals of COOP, using the Gulf of Maine as a representative shelf sea area in which diverse ocean industries were active. In addition, an outline had been provided of a state-of-the-ecosystem report for this pilot (Gulf of Maine Area or GOMA-GOOS).

Dr Sinclair went on to present two approaches for further defining the specific indicators that could be used for a COOP state-of-the-ecosystem report. The approaches were based on examples from the Eastern Scotian Shelf.

The first approach addresses the question of decadal scale changes in ecosystem structure and function, and the question of the explanatory power of the observational system. This approach attempts to describe everything of significance in the ocean, as the basis for determining how the ecosystem has changed. 60 or so indicators were used, comprising 26 metrics of marine life; 12 of human activity; and 23 of oceanographic and meteorological properties. Over the past 3 decades, some things were above average, but are now below; and vice versa, with the principal change at around 1988 from a ground-fish dominated system to a pelagic fish and invertebrate dominated system. Cod disappeared as the bottom water got colder. In this particular case, the species showed the changes faster than the monitoring programme did, because the monitoring programme was not considering the impact of all possible variables (e.g. although bottom temperatures were being measured they were not being considered as ecosystem variables –their relevance only became apparent in retrospect, when the cause of the ecosystem shift was being looked for and the connection between the fish and bottom temperature became apparent).

The second approach defines the indicators required to support ecosystem-based management of the same shelf area. The aim is to determine which national conservation objectives are being affected by which ocean use sectors. That allows an analysis of what sector management plans influence what ecosystem components (or conservation objectives). Indicators may be, for instance, 'by-catch' or 'disturbance of benthos'. This approach leads to an overall state of the ecosystem report. The indicators reflect the decision-making framework for the broad conservation objectives under Integrated Management.

It was concluded that the two approaches are complementary, and both merit consideration in the COOP Implementation Plan.

The Committee agreed that this kind of analysis helps the Committee to think about what kinds of data are needed, and where. Regional ecosystem-based management approaches are becoming widespread, and must be served by the applications of COOP plans. The Committee encouraged COOP Pilot Projects to apply state-of-the-ecosystem reporting. Best practices should emerge from taking diverse approaches. At this stage diversity in reporting of indicators for ecosystem-based management is to be encouraged.

The Committee also noted that substantial change was affecting coral reefs due to nitrification and the over-fishing of large carnivores. The Global Coral Reef Monitoring Programme was analyzing the effects of such impacts on these environments.

5. COOP

5.1 PROGRESS REPORT AND PLANS

Dr Tony Knap (Panel co-Chair) reported on progress with and plans for COOP activities. COOP is developing an Implementation Plan for the coastal component of GOOS, the first draft of which will be delivered in September 2004. The initial Design Plan was published in June 2003 and contains advice on the strategy, the approaches to be taken and the variables to be measured. The objective is to facilitate the routine and rapid detection of change on a wide range of time and space scales. Several of the variables are those currently measured under JCOMM, such as sea-level, temperature, salinity, currents and surface waves, which contribute to marine services and the forecasting of natural hazards and climate change.

Of the 17 core variables, a sizeable number are chemical or biological. Some of these can be measured relatively easily now, including: nutrients, human pathogens, dissolved oxygen, suspended particulate matter, phytoplankton pigments, litter and plastics, and oil. If JCOMM had advice on the measuring instruments, the measurement approach (time and space and accuracy), the standards and the reference materials, and knew what products were required and what national agencies should produce them, then a start could be made to consider how these variables could be handled within JCOMM. Once the Implementation Plan has been agreed then the GSC needs to consider mechanisms for developing appropriate standards and reference materials for measurements proposed by COOP, with a view to making JCOMM responsible for the application of these standards and reference materials in due course.

Dr Knap explained that COOP was searching to develop a range of cheap, rapid and efficient ways for assessing ecosystem health, as opposed to using a number of slow, expensive chemical analyses for that purpose. The new methods come under the RAMP concept (Rapid Assessment of Marine Pollution), and include such things as monitoring crab heartbeats, and simple immunoassay methods (like neutral red retention in which the time for the red stain to emerge from a cell is a taken as a rapid measure of cell health).

The Integrated Design Plan for the Coastal Module of GOOS focused on developing a Global Coastal Network (GCN) with the common variables, combined with the broader activities of the GOOS Regional Alliances (GRAs), with the GCN and GRAs forming a matrix. The Implementation Plan will focus on the development of GRAs to contribute to the GCN. Pilot Projects will be used to establish new approaches before systems are mature enough to consider handing them over to JCOMM. As and when COOP variables evolve into potential product streams, JCOMM's programme area groups should consider how they might best take on the management of the activities.

Measurements of some of the COOP variables (e.g. nutrients) are already being made on a routine basis on coastal buoys by many national agencies, on yachts, cruise ships, and piers by the SeaKeepers Association, and on ferries through the European Ferry-Box project. JCOMM programme areas should consider how to take on board these new measuring programmes. JCOMM, in coordination with IODE, is willing to consider taking on the responsibility for managing the data and product streams suggested by COOP as and when those systems mature. It is expected that JCOMM could consider taking on responsibility for the use of measures like ocean colour as an estimate of chlorophyll distribution, once the IOCCG is satisfied with the algorithms required for that purpose. Taking on other such items will depend on the availability of widely acceptable standards (e.g. for nutrients), and the successful completion of pilot projects (like RAMP).

The Committee was pleased with progress. It was clear that there is scope for close cooperation between COOP, IODE and JCOMM.

The Committee noted that EuroGOOS has carried out a comprehensive survey of the coastal activities in European waters, and the data will be available on the web by year-end 2004. US GOOS has developed a similar inventory.

Action 16: EuroGOOS and US-GOOS to provide information on their inventories of observing stations to COOP for inclusion in the COOP Plan.

The Committee considered what the need for COOP would be following publication of the Implementation Plan later this year – for instance what the role of COOP might be to facilitate implementation of the Plan? The Committee recognized the possible ongoing role of COOP in aiding the GRAs and in aiding capacity building. There is scope for COOP to provide tool kits, to identify and acquire resources, and to carry out its activities through smaller more focused groups. The GRAs need to think about what they want from COOP. The Committee asked COOP to consider at its next meeting, in Tokyo, what the future of COOP should be following publication of the Implementation Plan. GSC's considerations of the future of COOP need to take into account ideas about the strategic development of GOOS.

Action 17: COOP to consider at its next meeting what its possible future role might be following publication of the Implementation Plan, and to inform GPO, Chair GSC, and working group on GOOS Strategy, by year-end 2004.

Action 18: The chair of IODE's Group of Experts on Biological and Chemical Data Management and Exchange Practices and the COOP co-chairs to discuss ways and means of cooperation.

5.2 FERRY-BOX PROJECT

Franciscus Colijn told the Committee about developments in the European commission-funded Ferry-Box Project, in which 11 partners are using instrumented ferries to collect data operationally and routinely around the European coast, to see if this would improve coastal information beyond that provided by coastal monitoring stations and buoys. The Ferries have the disadvantage over buoys that they only collect surface measurements, but have the advantage that they make continuous transects. The system is autonomous, modular, self-cleaning and expandable, and covers basic physical, chemical and biological parameters. It is possible to access the data in real time.

The project has been running for a year and a half. The reliability (availability of data) is higher than with buoy data, and the system is easier and cheaper to maintain and has no bio-fouling problem. In future there are plans to reduce the size of the system and make it more portable. The system can also be fixed to piers. Where blooms are seen the transect data are combined with remotely sensed data to appreciate the spatial dimensions.

The Committee noted that other groups are also making observations from ferries, and that JCOMM (and by inference, GOOS) have accepted that the SeaKeepers programme is carrying out similar activities using yachts, cruise ships and piers.

Action 19: FerryBox and SeaKeepers managers are encouraged to start a dialogue on technologies, strategies, and standards (GPO to provide contact points).

6. REGIONAL COORDINATION

6.1 REGIONAL GOOS ALLIANCES AND COORDINATION

Silvana Vallerga reported on the outcome of the Second session of the Regional GOOS Forum (Fiji, 7-9 February 2004). The Forum participants agreed to form a GOOS Regional Council (see item 2.3 above). The Forum noted progress made in forming a new GRA, SEA-GOOS in South-east Asia. The Forum noted the considerable work done by GOOS-AFRICA in preparing the ROOFS-AFRICA proposal, which has been accepted as a core project of NEPAD. NEAR-GOOS is in the process of revising its strategic plan, with the help of Angus McEwan (former I-GOOS Chair). Pacific Islands GOOS has begun developing pilot projects, for example for pearl fisheries in Manihiki Lagoon. PI GOOS will soon have a Coordinator, sponsored by NOAA and working out of the SOPAC Office in Fiji. This person should be expected to work in close harmony with the GCOS Pacific Coordinator, who is funded by NOAA to work in Apia, Samoa. JAMSTEC has been carrying out a capacity building programme in the Pacific Islands, to assist the development of PI GOOS. Black Sea GOOS has now launched its EC-funded ARENA project. MedGOOS continues with its EC-MAMA project. EuroGOOS and MedGOOS collaborate closely with the EC in the development of MERSEA as part of GMES. Indian Ocean GOOS is developing well. US GOOS is fast developing its plans for the development of a Federation of regional US GOOS alliances. The Forum noted an application by Caspian Sea agencies for GRA status – this will be referred to the next session of I-GOOS.

All GRAs will benefit from the EC funding obtained through the GRAND proposal to facilitate the networking of the GRAs together to strengthen GOOS at the international level. GRAND will share best practices between the regions. It will promote transition of science and technology from R & D to operations. It will enable local benefits to be obtained from the global GOOS. GRAND is funded with 520,000 euros, and will run for 2 years with 11 GRA partners. GRAND Work Programme 1 will assess (i) what is the status of GOOS in each GRA; (ii) who are the major national players in each GRA; what is the coherence between regional and global planning. GRAND will produce an inventory of the national stakeholders. Work Programme 2 will provide 2 high level training workshops for GRA managers. Work programme 3 will contribute a regional strategy for GOOS, and develop a GRA technical publication series. The workshop in September will devise a proposal for Phase II funding.

The Committee was pleased to see the success of the GRAs in attracting funding for GRAND. The Committee noted that, at the 1st GOOS Forum in Athens, it had been recommended that the meteorological agencies should become more involved in the GRAs. This will be addressed through the development by GRAND of the inventory of national stakeholders.

Action 20: GRAs to encourage the involvement of meteorological agencies in GRA activities.

6.2 REGIONAL GOOS OFFICES

Colin Summerhayes reported on progress with and plans for the Perth Office and the Rio Office.

Bill Erb, of the Perth Office, has been very active in supporting the development of IO-GOOS and PI GOOS. Providing aid to WESTPAC as needed is also a part of his job description. Therefore, during the absence of an IOC Officer in the WESTPAC Office between November 2002 and October 2003, he helped WESTPAC to build SEA-GOOS.

Janice Trotte works part-time as Head of the Rio Office. Among other things she has been instrumental in recently bringing together Argentina, Brazil and Uruguay to discuss how to go about forming a SW Atlantic GRA.

The Committee welcomed the efforts of Bill Erb to help the development of IO-GOOS and PI-GOOS (but, note budget discussion under item 11.2 below).

The Committee was pleased to note that the arrival of Dr Miguel Fortes as the IOC Officer for WESTPAC in Bangkok in October 2003 will enable the WESTPAC Office in future to play its full role in servicing SEA-GOOS and NEAR-GOOS, which are WESTPAC projects. The Committee noted with approval that the Perth Office had greatly aided the development of SEA-GOOS at a time when there were no IOC staff in the WESTPAC Office. The new arrangements will relieve the Perth Office of the burden of taking a substantial responsibility for SEA-GOOS coordination.

The Committee welcomed the efforts of Janice Trotte in the Rio Office to bring together representatives of Argentina, Brazil and Uruguay to form a GOOS for the SW Atlantic in due course.

6.3 NATIONAL GOOS DEVELOPMENTS

Bert Thompson reported on progress in and plans for data tracking and assessment, together with documentation of national commitments, that he is carrying out at the University of Delaware on behalf of the GSC. His main focus was on work carried out with operators and data centers to solve data problems. He paid particular attention to data delivery, data trends, and the overall performances of surface drifters, XBTs and the Ocean Circulation (OC) Seal Level data set.

The Indian Ocean XBT network was operating at roughly the 33% level during 2002 and 2003, with all types (HDX, FRX and LDX) well below requirement. This is not a new finding, but with the emergence of the Indian Ocean GOOS programme, renewed efforts should be made to enhance the XBT programme there. Thompson suggested that the newly formed Indian Ocean Observations Panel be requested by GSC to develop an IO/XBT strategy as soon as possible, as the basis for seeking resources for the XBT programme. This "strategy" should be presented to SOT and I-GOOS for implementation. OOPC may wish to address this problem at its meeting in June 2004.

The sea-level ocean circulation data set was defined in 1997, and is intended to provide data across straits, choke points, along polar coast lines and across basin sections for transport variability measurements for use in operational models such as those being tested within GODAE. This requires very fast data delivery. At present only 4-5 of 19 of the identified station pairs are operational. B. Thompson suggested that OOPC should review the requirements for these OC station pairs, and prioritize implementation, and, further, that I-GOOS assist in obtaining commitments/resources (perhaps using some of the new sea-level resources in the GPO budget). It was pointed out that GRA members may be the most appropriate candidates to assist in developing the OC network.

Summaries of national commitments for 22 countries are being upgraded periodically and posted on the GOSIC web site. These summaries, and any others for which sufficient information becomes available, will continue to be maintained. A simplified way of identifying activities and progress through a "bar-code" type of database was proposed.

This activity at the University of Delaware will only continue through 2005. Those involved are fully convinced of the need for data coordinators and urge that arrangements be made to either transfer coordination, tracking, and assessment activities to another organization, or, perhaps, most effectively, to JCOMMOPS. The GOOS Data and Information Management Plan calls for the establishment of data coordinators with activities similar to those that have been conducted at Delaware (see GOOS data management plan, section 5.3).

The Committee was impressed with what Bert Thompson had achieved, and thanked him for his efforts.

The Committee noted that although not all IOC Member States in GOOS were submitting regular reports on their GOOS activities, the main countries involved in GOOS, and therefore the bulk of GOOS activities, were reported upon. Simplified activity identifiers need to be considered.

Action 21: GRAs are asked to request their member agencies to list national GOOS activities; GRAND to provide this information to GPO.

The Committee agreed that the job being done by Bert Thompson was worth doing, following the GOOS Data and Information Management Plan, and that an appropriate mechanism should be found to continue it beyond the end of the present contract (through 2005).

Action 22: GPO to work with Bert Thompson and Worth Nowlin to develop a plan, and identify appropriate people, to continue the work being carried out by Bert Thompson after the end of his contract.

The Committee noted that information about Indian Ocean activities may be obtained from GEF-funded programmes, like the SW Indian Ocean Fisheries Panel centered on Mauritius.

Action 23: IO-GOOS and the Perth Office to find out what GOOS-related data may be obtained from the SW Indian Ocean Fisheries Panel, and to see if that Panel may become involved in IO-GOOS.

7. CAPACITY BUILDING

Prof. Geoff Brundrit (Chair of the GOOS Capacity Building Panel) reported on the GOOS capacity building programme, reviewing recent activities, and setting out future plans. The CB Chair is now part of the Regional GOOS Forum, and attended the 2nd session of the Forum, in Fiji in February 2004. It is clear that the GRAs are responsible for their own CB activities, but recognize the need for a merged GOOS and JCOMM CB Panel to provide them with advice about new developments in operational oceanography. The Forum also benefited from the presence of the new Head of the IOC's CB programme, Dr Ehrlich Desa, who is responsible for writing a new IOC CB Strategy that will address among other things the way in which IOC can support GOOS CB.

Prof. Brundrit noted that the merger of the GOOS and JCOMM CB Panels that was proposed by the GOOS Review has been endorsed by the ISWG on the Follow-up to the GOOS Review, and by the JCOMM Management Committee at is 3rd session. This will enable the development of a coherent and integrated approach. He considered that in the new GOOS structure it will still be necessary for the Chair of the merged panel to report to the GSC on the matters of particular scientific and technical interest.

One focus will be the development of pilot projects, such as WIOMAP, and the promulgation of pilot project concepts from one region to another. The Panel will also focus on aiding implementation of the COOP Plan, and on exploiting for GOOS the existing generic training capabilities and infrastructure

developed by IODE. Resources will be needed to take CB forward, and this should be taken forward through I-GOOS in collaboration with the JCOMM Task Team on Resources.

He went on to note that the merged CB Panel would hold its first meeting at the GOOS/JCOMM/IODE CB Jamboree in Bergen and Oostende in April 2005.

Colin Summerhayes noted developments in capacity building (i) by the Partnership for Observations of the Global Oceans (POGO), which focus on the provision of Fellowships for training in ocean observing techniques; (ii) by the International Ocean Colour Coordinating Group (IOCCG), which provides training workshops in the interpretation of ocean colour data; and (iii) by the CEOS Working Group on Education and Training (WGEdu), which is building a web-based system for accessing remote sensing data sets that can be used for education and training. Dr Desa has replaced Dr Summerhayes as the IOC/GOOS person on the CEOS WGEdu. In due course Dr Summerhayes' successor should also be a member of the WGEdu.

Mr Peter Pissierssens explained that IODE, since 1998, implemented its capacity building activities through ODIN (Ocean Data and Information Network) projects, linking the provision of equipment, training and operational support, and this in a regional context. He noted that the ODINAFRICA-II project, implemented between 2001 and 2003, had been very successful. It had assisted 20 African member states to establish national oceanographic data and information centres. These centres had produced data atlases, metadatabases, national/regional marine library catalogues, and organized national ocean awareness activities and stakeholder meetings, all of which could be considered as contributions to GOOS. Following the success of the ODINAFRICA-II, African member states were now about to embark on ODINAFRICA-III (2004-2007). This project will link data collection, data management and product development through collaboration between GOOS, GLOSS, IODE and ICAM.

Following the successful example of ODINAFRICA, other ODIN networks have started or are being planned in the Caribbean and South America region (ODINCARSA), Indian Ocean region (ODINCINDIO) and Pacific Islands. Mr Pissierssens welcomed close collaboration between IODE and GOOS in the development of these projects.

He then described Ocean Teacher. No extensive standard data and information management training curriculum had existed until 1998 when the IODE ResourceKit (a comprehensive reference and software tool resource on ocean data and information management) was developed, followed by the first version of OceanTeacher in 2001 which combined the ResourceKit with training modules. The ResourceKit contains a range of marine data and information management materials, such as descriptive materials, software tools, documents and links to external sources. The training modules are a collection of outlines, notes, examples, and miscellaneous documents used in conjunction with the ResourceKit to organize training courses in marine data and information training. The training modules link extensively to material in the ResourceKit.

It is planned to implement a new phase of OceanTeacher (ODIMeX) between 2004 and 2007. ODIMeX will constitute "a single integrated e-learning and expert system". It will be an expert and training resource for marine data management and marine information management needed by professional ocean data and information managers and scientists involved in data management. It will furthermore provide ocean researchers and students with the necessary knowledge to interact effectively with their national oceanographic data centres. The new OceanTeacher (ODIMeX) will cover not only the "traditional" IODE, but will also focus on operational oceanography (as requested by GOOS and JCOMM) as well as on biological oceanography.

Mr Pissierssens informed the Committee that the 1st Session of the ODIMeX Editors Meeting had taken place in Cape Town, South Africa between 19 and 23 April 2004. As requested by the JCOMM Management Committee, Ms Regina Folorunsho had represented JCOMM. ODIMeX will have two Chief Editors (Data Management and Information Management) as well as four Managing Editors (Data management general; Data management operational oceanography; Data management biological oceanography; University curriculum; and Marine information management). These will seek authors to provide content, edit/format the content, and enter it into ODIMeX/OceanTeacher. Authors should be knowledgeable and internationally renowned experts in the relevant field.

The Editors' meeting had requested GOOS to help identifying the Managing Editor for data management operational oceanography, as well as to advise on suitable authors for operational oceanography material. The Editors' meeting had also requested guidance from GOOS on possible peer review mechanisms for the operational oceanography content.

Mr Pissierssens concluded with the following questions, addressed to the GSC:

- Do we need a "formal" linkage between ODIN networks and GOOS?
- Should ODIN networks/projects become joint IODE/GOOS initiatives?
- Need advice on draft table of contents for operational oceanography (see Doc. 7B, Annex I);
- Need operational oceanography managing editor (we have funding!);
- Need operational oceanography authors (what's in it for them? Visibility: e-repositories, harvesters);
- Need peer review experts (for Data Management 'general', Data Management biological data and Information Management we can use ETDMP, GE-MIM, GE-BICH);
- How will GOOS participate in ODIMeX/OceanTeacher (through JCOMM CBCG, Managing Editors, "quality-stamped" peer review group)?
- How should IODE CB relate to new Joint GOOS/JCOMM CB panel?

Dr Alan Thomas reported briefly on the significance for GOOS of the outcomes of and plans for the GCOS programme of regional workshops for capacity building. Six out of the 10 proposed regional workshops have been completed, and regional action plans either have been or are being developed. GOOS is involved in each regional workshops. What emerges from the workshops is a picture of the regional infrastructure, and the identification of needs for resources. GCOS then informs the UNFCCC about the regional action plans and tries to gain the support of Parties to the Convention for implementing the plans.

The Committee expressed its appreciation to IODE for taking the lead in developing the ODINAFRICA-III project proposal as an integrated GOOS/IODE/ICAM initiative. It further welcomed the close collaboration between IODE and GOOS in developing similar networks in other regions.

The Committee was pleased to see the merger taking place between the GOOS and JCOMM CB Panels, and the close links that had developed in capacity building between IODE and both JCOMM and GOOS. The Committee further called on the GOOS/JCOMM CB panel to respond to the questions and requests of IODE with regard to (i) a possible membership of IODE in the Joint CB panel and (ii) the required actions for GOOS' participation in OceanTeacher.

Action 24: GOOS/JCOMM CB panel to respond to the questions and requests of IODE with regard to (i) a possible membership of IODE in the Joint CB panel and (ii) the required actions for GOOS' participation in OceanTeacher.

The Committee felt that as well as reporting to JCOMM and I-GOOS, the merged CB Panel should also report to the GSC, reflecting the need for scientific and technical advice on the CB programme.

Action 25: Merged GOOS-JCOMM CB Panel to report to I-GOOS, JCOMM, and GSC.

The Committee noted the existence of a Task Team for Resources as a component of the JCOMM CB Coordinating Group, and felt that such a mechanism ought to exist within the merged GOOS-JCOMM CB Panel, so as to ensure continued efforts to acquire resources for CB. This might require renaming the current JCOMM TTR and broadening its remit to include GOOS.

Action 26: The merged GOOS-JCOMM CB Panel to have a Task Team on Resources, based on the original JCOMM CBCG TTR.

8. RELATED ACTIVITIES

8.1 CENSUS OF MARINE LIFE

Dr Jesse Ausubel (Sloan Foundation) reported on the way in which the Census of Marine Life (CoML) is developing, and on its possible relevance for GOOS. The project aims to assess and explain the diversity distribution and abundance of marine life over the 10 years from 2000-2010. The Census can test or develop technologies that may be later used for GOOS. The Census is also developing an ocean data system (OBIS – Ocean Biogeographic Information System), which, it is hoped, will help GOOS manage biological ocean data in the future. It is estimated that some 2 million species remain to be identified in the oceans.

There will be some 14-15 field programmes, of which 7-8 are operating now. The cost of the field programmes may be US$400-500 million. These include surveys of Drifters, Swimmers, the Deep-Ocean organisms (mid-ocean ridges) and Microbes, as well as regional studies, for instance of the near-shore zone, of continental shelves, of specific regions – such as the Gulf of Maine. One project involves a coastal curtain of listening devices to track migrating creatures along continental shelves. These curtains could become part of the observing system. Another project involves tagging some 5000 animals to determine their foraging pathways across ocean basins. Through attachment of miniaturized devices, the tagged animals can obtain thousands to millions of high-resolution measurements of temperature and salinity (as bioprobes). The continuous plankton recorder programme makes a key contribution; new technology is needed. Sampling water in the Sargasso Sea recently yielded a million or more genes – it may prove possible to monitor the ocean based on automated monitoring of genes in seawater. OBIS will collect all biological data ever collected in the ocean, and enable it to be brought up in maps. It has 3 million records now and will have 6 million in another year.

Agreements on sampling protocols are key elements in each programme.

A history project is likely to cost around $US 50 million. A modelling project is likely also to cost around US$50 million. OBIS is estimated to cost around $US 80-100 million, with subsequent operating costs of $8-10 million/year. Thus the total cost will be around $US1 billion.

The Committee agreed that several of the activities of the CoML might well become parts of GOOS in due course.

The Committee was impressed with Dr Ausubel's presentation and agreed with him that visualisations were vital in conveying information and in attracting attention to CoML projects. Presentation is all important.

8.2 ICES/PICES

Colin Summerhayes reported briefly on the ways in which contacts are developing between ICES and GOOS and PICES and GOOS.

The Committee agreed that links should be developed with PICES as part of developing a North Pacific Observing System, and that the Chairman should attend the forthcoming annual meeting of PICES.

Action 27: Chairman to attend the annual PICES meeting in Hawaii in October 2004, to develop closer links and to emphasize the importance of real time data transmission.

The Committee was pleased to see the continuing development of joint activities between GOOS and ICES, and the interest of ICES in working with GOOS on the development of an Observing System for the North Atlantic.

The Committee agreed that it is essential for the agencies and organizations involved in GOOS to adhere to the GOOS Principles and to follow the new IOC data policy of free and open exchange. GOOS needs to work with ICES and PICES in order to ensure that the benefits of real-time data transmission and operational data processing and modelling can be exploited in ecosystem management and fisheries. The

Committee considered that the large amount of data collected by fisheries agencies could be combined with those obtained by existing IOC and WMO programmes (Argo, VOS, SOOP, DBCP etc) to greatly improve operational forecasts for all users (safety at sea, weather forecasting, pollution control, and so on). At present, large quantities of physical oceanographic data obtained by fisheries agencies are not available in real time, thus undermining the objectives of GOOS, and increasing costs. There are therefore strong reasons for collaboration, with a special view to negotiating a review of data policies in the fisheries community regarding the availability of physical oceanographic data. GOOS should promote the message that rapid turn-around and use of data in models produces socio-economic benefits that at present are being lost, and that these benefits may well be of as much use to the fisheries agencies themselves as they would be to other users.

Action 28: GPO, ICES and PICES to work together (with the aid of IODE as appropriate) to explore how basic oceanographic data (and especially physical oceanographic data) can be made available in real time by fisheries agencies, for use in forecasting models.

8.3 GEO AND EARTH SUMMIT

Colin Summerhayes briefed the Committee on the developments of the Earth Summit process and the associated activities of the Group on Earth Observations (GEO), which are intended to produce a 10-year plan for coordinated Earth observations. GOOS, GCOS and GTOS and the IGOS Partners, along with GOOS sponsors, are directly involved in the GEO process, to ensure that the GOOS requirements are fed into the system and that existing systems and GOOS plans are taken into consideration in developing the plan. The IOC has written to national IOC representatives to explain the GEO process and to suggest that individual countries participate in the process. Some of fast developing programmes, like GMES in Europe, are already considered to be part of the GEO process. This is the highest level of political attention that GOOS and associated earth observations have ever received, and we must ensure that the best advice is given. It is likely that additional money will be made available to implement the plan. The first Earth Summit was held kin Washington in July 2003, and the second in Tokyo in mid April 2004. The final Earth Summit will be held in Brussels in early 2005.

There was a wide-ranging discussion on how GOOS may continue to be involved in and influence the GEO process.

Action 29: GRAs and GPO should prepare a proposal that could go forward to the GEO process through appropriate national representatives.

The Committee also agreed with the suggestion of Jesse Ausubel that GOOS should be drawn to the attention of (i) bi-annual meetings of the "Science Advisors to Heads of State", known as "The Carnegie Group" [items for the agenda can be proposed only by members of the group, so one of the Science Advisors (from Japan, Canada, USA, UK, France, Germany, Italy, Russia and the EU) would have to be persuaded to raise the issue)], and (ii) the "Global Science Forum" organization (formerly the "Mega-Science Forum") which is hosted by the OECD in Paris, but includes non-OECD members [this a place where major science funding agencies meet annually to discuss expensive cooperative initiatives].

Action 30: GPO and Chair GSC to explore how to get GOOS onto the agendas of the "Carnegie Group" and the "Global Science Forum" and IGFA (International Group of Funding Agencies on Global Change Research).

8.4 INTERNATIONAL POLAR YEAR (IPY)

Mr Ed Sarukhanian (WMO) briefed the Committee on the plans for an International Polar Year (IPY) in 2007-2008, which are currently being developed by an ICSU Planning Group. It is highly likely that in November 2004, ICSU and WMO will decide to jointly sponsor the IPY 2007-8. Some 300+ proposals have been received from the scientific community. These are now being used as the basis for drafting a Science Plan for consideration by the wider community over the next few months.

The Committee agreed that it would be desirable for a link to be formed between GOOS and the IPY Planning process. The Committee recommended that IOC should play a full part in planning and oversight of the IPY, so as to facilitate data exchange and data access from Exclusive Economic Zones, and so as to ensure that GOOS interests are taken into consideration.

Action 31: GPO to liaise with WMO (Ed Sarukhanian) on possible GOOS contributions to and involvement in the IPY 2007-2008.

9. OUTREACH AND COMMUNICATION

9.1 COMMUNICATIONS PLAN

Colin Summerhayes explained to the Committee that an inter-sessional working group led by Swamy Narayan had developed Version 2.0 of "A Communication Strategy for GOOS". In addition, Peter Pissierssens gave a brief overview of the IOC draft Communications Strategy that will be submitted to the IOC-EC in June 2004. The Committee was asked if it wished to continue with the development and implementation of the GOOS Plan, or to wait and make the GOOS Plan a component of the IOC Plan when the latter is finalized.

The Committee noted the progress with the development of an IOC Communication Strategy and made a few suggestions for improving the document.

The Committee decided that Version 2.0 of the Communications Plan was a useful guide to what needed to be done, and that it was not necessary to wait further to implement key aspects of the Plan. Clearly a brochure is necessary in the near future. The Committee agreed that visualizations could be useful to explain what can be done based on a global observing system. Regular updates on major oceanic environmental events and catastrophes can be useful for the press, operating through the established press outlets of UNESCO and WMO. A set of Power-Point slides is needed for the GOOS Corporate Image. It needs to focus on benefits.

Action 32: GPO (i) to implement the recommendations of the GOOS Communications Strategy and Plan, version 2.0, drawing on the IOC Communications Strategy as appropriate in due course; (ii) to work with IOC to develop a mechanism for providing regular updates to the press on major oceanic environmental events and catastrophes, operating through the established press outlets of UNESCO and WMO; (iii) to develop a Power-Point presentation to make the case for GOOS, focusing on benefits.

The Committee noted the recent publication of the Operational Oceanography book containing the proceedings of the EuroGOOS Conference in Athens in December 2002. This book is the third in a series that provides many useful examples of operational oceanography.

9.2 CURRENT AND PLANNED GOOS COMMUNICATIONS

Nic Flemming reviewed the activities that he had undertaken against GSC-VI Action 45 to update "The GOOS 1998". He set out the plan for "The GOOS 2005", and gave an analysis of the responses to his questionnaire on this subject. The responses to the questionnaire had strongly supported the need for a substantial publication along the lines of "The GOOS 1998" and exploiting hard copy, CD, web access and associated Executive Summary and Power-Point material. It would be necessary to make at least the Executive Summary available in several languages.

The Committee debated the need for a replacement to "The GOOS 1998", giving consideration to who its audience would be, and who would read it. The Committee agreed that a comprehensive document is needed for those who have to explain GOOS through briefing notes to Ministers. A well-produced summary overview like this helps to make GOOS 'real' to those outside the GOOS Community. In addition a 'National Geographic'-style book on the oceans would be useful to spread the word about how GOOS contributes to the resolution of ocean issues.

Action 33: Nic Flemming was asked (i) to identify members for an Editorial Board to take forward the production of "The GOOS 2005" following the plan approved by the Committee, (ii) to discuss with Peter Dexter the possible choices for an overall Technical Editor, and (iii) to assist the GPO to develop a costing for production (recognizing that the GPO may have to find extra-budgetary resources for the exercise).

Action 34: The GPO should steer the production of "The GOOS 2005", and in addition is encouraged to work with Eric Lindstrom and potential publishers to develop a 'National Geographic'-style book on the oceans that could be used to spread the word about how GOOS contributes to the resolution of ocean issues.

Colin Summerhayes reviewed progress with other GOOS publications and outreach materials.

The Committee agreed that for the most part it accepted the policy of the IOC to publish documents and reports of meetings electronically. The Committee urged the GPO to find a means to publish the biennial status report, using the example of the WWW biennial report, so as to provide a reference point, and to highlight change from previous years. The document should be limited to 20 pages. The Committee did not see a need for a Newsletter, but wished the series of GOOS News Flashes to continue. A GOOS Brochure is needed soon, and it should be produced as soon as the IOC has finalized the follow-up to the GOOS Review (at the IOC Executive Council in June 2004). The web site is informative, but can be difficult to navigate around. The Committee noted that IOC is hiring someone to work on the IODE web site, and recommended that the GPO should consider hiring the same organization to improve the GOOS site.

Action 35: GPO (i) to produce and publish the biennial report and the brochure in 2004; (ii) to consider contracting professional expertise to improve the GOOS web site, following the example of IODE.

9.3 REPORT ON GOOS DEVELOPMENT PLAN

Ralph Rayner outlined ways in which substantial investment in GOOS might be encouraged.

At GSC-VI in Cape Town he had been asked to chair a small working group to looking at ways of developing the funding of the GOOS Project Office. In doing this he drew on his experience of planning other funding initiatives (e.g. Natural History Museum, Earth Centre etc). However, he found that these models could not readily be applied to the GPO. He also found that there appear to be some fundamental flaws in the wider approach to attracting inward investment into GOOS in general. That being the case, and based on discussions with NOAA, IOC, CORE and others on this topic, he had expanded the objective to cover what needs to be done to raise the funding profile of GOOS in general.

The economic case for a global atmospheric observing and forecasting system is obvious and compelling. Being able to forecast the weather has immediate and very visible impact. It is also obvious is that this can only be achieved though a globally co-ordinated effort. Sustained funding for the global observation and forecasting of the atmosphere is therefore well established.

In contrast to the case for weather forecasting, the case for ocean forecasting is much weaker in terms of immediate economic benefits (fewer immediate users, less political and public visibility). The case for a sustained global ocean observing and forecasting system to underpin ocean forecasting is therefore less obvious.

Growing political and public concern over being able to adequately forecast climate, as opposed to weather, should have changed this. Given the pivotal role of the oceans in determining climate, the case for GOOS should have become compelling and urgent. This is intuitively obvious to the GOOS community, but much remains to be done to put the case into a proper economic framework that convinces others. The political importance of such an exercise should be obvious from papers like that recently published by the UK's Chief Scientific Advisor (King, D.A., 2004, Climate Change Science: Adapt, Mitigate, or Ignore. Science 303, 176-177).

In making the case for GOOS, we have an implicit understanding that the public good economic impact is enormous, but we have no sound economically argued case to quantify and support this assumption. Because we cannot promote a well-developed economic argument, we undersell the benefits of what we are seeking to achieve, and we promote the case in a piecemeal way.

Much more work therefore needs to be done on the economics (by economists) to establish a systematic and coherent public good case for GOOS. We need to make the case for the value of GOOS in narrowing economic uncertainties, and show how GOOS can make a major contribution to underpinning, prioritizing and optimizing public good policy and investment decisions. We need to show how a relatively small investment can yield large benefits, and we need to take the case to a much higher level of political advocacy than, say, the IOC or UNESCO governing bodies.

In summary, we need (i) a well-researched economic evaluation of the public good benefits GOOS would bring; (ii) a consistent position of advocacy (avoiding the present piecemeal approach); (iii) expansion of advocacy outside of the scientific community (to economists, planners, politicians, major industries etc).

As next steps, Rayner proposed that we (i) produce a basic scope for an economic study; (ii) identify suitable economists; (iii) acquire funding for the study and hire an appropriate person to do the work; and (iv) organize an advocacy network.

The Committee appreciated the efforts that Dr Rayner had made to present a clear and compelling case for the way forward. Following a wide-ranging debate the Committee agreed that the GPO should work with Dr Rayner to flesh out these ideas and to start the economic study, with a view to revisiting progress at GSC-VIII.

Action 36: GPO to work with Ralph Rayner and Patricio Bernal to scope out the economic study, identify someone to carry it out, fund it, and report the results to GSC-VIII.

10. SESSION ON OPERATIONAL OCEANOGRAPHY

On Wednesday April 28, a half-day session organized and chaired by Ralph Rayner was devoted to practical demonstrations of operational oceanographic equipment and activities, to expose the members of the GSC to recent advances in operational oceanography (see the agenda of the operational session in Annex IV). The presentations will be made available on a CD.

11. REPORTS OF WORKING GROUPS

11.1 IMPLEMENTATION AND LIAISON WITH OTHER PROGRAMMES

11.1.1 Liaison

The Committee noted that the recently published report of ICSU's Environment and Sustainable Development Review Panel had suggested that the linkages between the global observing systems (GOS) - GOOS, GCOS and GTOS - with the marine global environmental change (GEC) projects "have been weak". The Panel went on to note that "To some degree, the sketchy nature of these relationships is due to the fact that the GEC programmes were well underway with considerable momentum, while GCOS, GTOS, and GOOS were developing their missions." The report further noted that "The Panel considers that the value of the GOS to the GEC programmes has not been demonstrated." The Panel recommended that "The relationship between the GOS, the IGOS Themes, and the science community, especially ESSP [Earth System Science Programme], needs to be clarified and strong collaborative ties must be developed." It further noted that " there is a need for a strong bridge to the scientific activities of ICSU in order to fulfil the GOS missions." Finally, The Panel noted that "much good could come of closer interaction among the ICSU GEC programmes and GOOS, GCOS, and GTOS. The onus should be on the observing programmes to work sufficiently closely with the GEC programmes to ensure that GOS plans are on the right track. GOS and

IGOS should set their priorities based on the global requirements of the science community, especially of the GEC programmes."

The Committee took issue with the sweeping nature of the Panel's Report, noting that the links between OOPC (representing GOOS and GCOS) and CLIVAR (a WCRP project) were actually very strong indeed. It is fair to say that CLIVAR influences OOPC (hence the climate component of GOOS) and that OOPC (i.e. GOOS) influences CLIVAR, both in ways that are highly significant. The strength of the links between the ocean research and operational communities involved in climate should have been evident to ICSU's PAA Panel from the success of the OceanObs99 Conference in October 1999 in St Raphael, and the subsequent publication of the conference proceedings by Mr Koblinsky and Mr Smith. That meeting had set the agenda for the ocean climate observing system for the 21st century.

The Committee felt that the links between COOP and LOICZ were also strong, given the participation of the LOICZ Project Office Director (Chris Crossland) on the GSC in recent years, as well as the presence on COOP and on the GSC of one of the LOICZ Officers, Julie Hall. COOP plans strongly reflected LOICZ issues and requirements. However, the wider LOICZ community may not have been much aware of COOP developments prior to publication of the COOP Design Plan in mid-2003. The degree to which COOP (i.e. GOOS) influences LOICZ in future should likely improve further with publication of the COOP Implementation Plan at end 2004.

The Committee recognized that more could be done to promote links between GOOS and GLOBEC, while noting that a past GLOBEC Chair (Roger Harris) had been a regular observer at COOP meetings, with the object of ensuring that COOP plans meet GLOBEC's requirements. As in the case of LOICZ (above) there would be more awareness of COOP (i.e. GOOS) in the GLOBEC community with the publication of the COOP Design (mid 2003) and Implementation Plan (end 2004). The Committee recommended that GOOS form closer links with GLOBEC and the newly developed IMBER (Integrated Marine Biogeochemical Ecosystem Research) programme.

Action 37: GPO in consultation with GSC Chair to invite representatives of GLOBEC, and IMBER to attend GSC-VIII to discuss how closer links between GOOS and these other groups can be established formally.

The Committee noted that GOOS links to relevant SCOR programmes were strong, as in the case of the SCOR-IOC CO_2 Panel, the Technical Secretary for which had in recent years come from the GPO, and which was developing plans for carbon observations for OOPC to consider. The past President of SCOR, Prof John Field, drew the attention of the Committee to a meeting being convened by SCOR in Venice, Italy, from 23-24 September 2004, to bring together representatives of the major ocean research and observation projects to discuss common opportunities, issues and problems. Participants will include representatives of CLIVAR, COML, DIVERSITAS, GEOHAB, GLOBEC, GOOS (COOP and OOPC), IMAGES, IMBER, LOICZ, SOLAS, and SCAR. In addition he suggested that the SCOR Executive Committee can discuss links with GOOS at its next meeting (September 2004).

Action 38: Prof Field will arrange for the GSC Chair to be invited to attend the Venice meeting.

The Committee noted that each GRA has been encouraged to form links with the Large Marine Ecosystem (LME) project in its area. However, LMEs are not at the same stage of development everywhere, and some are hardly developed at all. There are very good links between GRAs and LMEs in Africa, the Caribbean and the Mediterranean. In addition, in a top down way, GOOS representatives meet with the LME management group at its annual meeting in Paris, sponsored by the IOC. It was not obvious that more needs to be done at this time.

The Committee considered that GOOS has a strong ongoing connection to ICES, but that more work needs to be done to develop a similar link with PICES. Joint meetings between PICES and GOOS people would help to decide how we can help each other (see item 8.2, action 27).

There are ongoing strong links to GTOS and GCOS.

In concluding the session the Chairman observed that many researchers know little or nothing about GOOS. That situation was beginning to change as GOOS moves out of the design phase and into the implementation phase. The picture was not in fact bleak because the majority of the experts on the GOOS scientific advisory panels were leading edge researchers. And there were good links to some of ICSU's science committees. Indeed, the picture has improved somewhat with the creation of the Partnership for Observations of the Global Ocean (POGO), which brings together the Directors of the world's major ocean research laboratories to decide on how they can contribute to the development of GOOS. Nevertheless, we do need to work harder to connect to the research community and demonstrate our value to them, as well as to our many other user communities; the science community is only one customer (both a user and a provider). The outreach approaches covered in the Communications Strategy (item 9, above) will help.

11.1.2 Implementation

The Committee agreed that as GOOS moves from design to implementation an Implementation Plan is needed to show what we want to do and how. As it is needed for JCOMM-II in September 2005, it must be drafted in time for review by the JCOMM management committee in February 2005, and by GSC-VIII (early March 2005), and I-GOOS-VII (late March 2005). The Implementation Plan will build on such documents as the Action Plan for GOOS/GCOS, the output of the OceanObs99 Conference, the COOP Design Plan and Implementation Plan, and the Implementation Plans for Argo, GODAE, SOOP, and DBCP. It will also build on the revision of the Strategic Plan for GOOS that is being developed in the same time frame (see agenda item 2.5, above).

As we develop our thoughts on the overall Implementation Plan, they can be fed in to the GEO Process, and the GEO 10-year plan for a global observing system, and into the various Theme documents of the IGOS Partners.

The Plan should show what we can do now, and what we still need to do, along the lines of the maps shown during the OOPC presentation. The Plan should be clear on which bodies should be responsible for what parts of the process of creating and maintaining a GOOS. Consideration should be given to what our case is, what shape the plan will take, who will it go to, and how will we lobby them.

The Committee needs to agree on the point at which the design phase is finished. This is a matter for consideration by the group developing the revision to the Strategic Plan.

Action 39: GPO and JCOMM Secretariat to work with key members of the GOOS and JCOMM community to develop an Implementation Plan for presentation to JCOMM-MAN-IV, GSC-VIII, and I-GOOS-VII, in preparation for consideration by JCOMM-II [Mike Johnson and Peter Dexter for JCOMM, Tom Malone, Worth Nowlin, Ed Harrison, and the GPO for GOOS, and others as appropriate].

Action 40: It will be helpful if the GRAs can establish their global requirements, through GRAND, to be fed in to the Implementation Plan.

11.2 WORK PROGRAMME AND BUDGET

Helen Yap presented the deliberations of the sessional working group on the work programme and budget. The WG noted that a significant proportion of the budget (39%) is devoted to CB, in line with the recommendations of GSC-VI. Nevertheless, under the heading of CB a lot of money is identified for meetings, whereas it would be preferable to spend money on transferring skills and technologies. Only about 10% is being spent on that kind of CB. While it is appropriate to fund COOP development from central funds, the WG thought that actual COOP implementation should leverage funds from external sources. However, it seems likely that some central funds will still be needed in future for oversight of COOP Implementation, at least initially. Science guidance panels and JCOMM are important and their funding should continue. The Perth Office budget from the IOC contribution seems high (US$80,000 out of US$685,000 for all GOOS CB). The WG asked –"Now that IO-GOOS has been established, and PI-GOOS has its Coordinator, what is the task of the Perth Office? If the task of the Perth Office is largely GPO support for CB, would this money be better invested in future in other activities either in Paris or elsewhere

in the field?" The Committee noted that the IOC contribution was part of a tri-partite arrangement in which IOC provides the salary, thereby leveraging office running costs from the Australian Bureau of Meteorology, plus programme implementation funds from the Government of Western Australia. If the IOC money was re-assigned elsewhere (say to activities run out of the Paris Office), the other two contributions would disappear. To aid decision making, a comprehensive analysis of the nature and benefits of the expenditure of the programme implementation funds would be useful, like that provided at the time of the Perth Office review in March 2002.

The Committee appreciated the strenuous efforts made by the GPO to keep meeting costs low, which therefore freed money for other activities (or more meetings).

In response to a question about how priorities were agreed on the budgets allocated to different GRAs, the Committee noted that the work programme and budget were drawn up on the basis of requests from the regions and from I-GOOS, before being submitted to the GSC and I-GOOS for approval. Some GRAs (e.g. EuroGOOS, MedGOOS, US-GOOS) required no support. Others had required more during their early stages and now required much less or nothing at all (e.g. MedGOOS, Black Sea GOOS). Those that were still in a development stage needed more (e.g. SEA-GOOS, IO-GOOS, PI-GOOS, GRASP). NEAR-GOOS was a long established programme of WESTPAC and, being intergovernmental, was supposed to be supported by contributions from its Member States. Experience with other GRAs suggested that the more attractive NEAR-GOOS made its programme to its Member States, the more likely it was to gain extra funds. Writing proposals for additional funds to do new and different (and useful and relevant) things, had been a route to success in Europe, the Mediterranean, the Caribbean, and the Black Sea, and should be tried elsewhere.

Action 41: For GSC-VIII, GPO to review the Perth Office budget in relation to overall GOOS requirements, noting the nature and benefits of the expenditure of the Office's programme implementation funds.

Action 42: GPO to report to GSC-VIII on the historical and possible future balance of the regional spend by the IOC on GRAs.

11.3 APPROVAL OF WORK PROGRAMME AND BUDGET

The Committee approved the Work Programme and Budget.

12. REVIEW OF ACTION ITEMS

The Committee noted that the bulk of the action items from GSC-VI had been discharged.

13. MEMBERSHIP ROTATION

The Committee welcomed the arrival of Dr Philippe Dandin, who replaces Prof Worth Nowlin on the 12-person core committee. The Committee noted Professor Yu's request to stand down, and thanked him for his services over the past 3 years. Apart from seeking a replacement for Professor Yu, the Committee is not seeking to replace other members of the 12-person core committee this year.

Action 43: GPO to ask WESTPAC, SCOR, and IOC Member States (through Circular Letter) to suggest possible replacement candidates from East Asia for the consideration of the IOC Officers.

14. NEXT MEETING

The Committee discussed a number of possible venues for the next meeting, noting offers of Goa and Melbourne. The Committee considered that it would be timely to engage the attention of navies in global observations, since they represent both a major user and a major provider of ocean observations, and are

already active in operational oceanography. The Committee noted the growing involvement of navies in S. America in GOOS (e.g. GRASP, and the proposed MOU on a SW Atlantic GOOS). Bearing in mind the desire to open a dialogue with navies, and the growing interest of navies in GOOS, especially in S. America, the Committee decided that its next meeting should be in S. America and arranged back to back with a (say) 2-day GOOS meeting with navies. One possible venue was Rio, where the meeting could perhaps be arranged by the IOC's Rio GOOS Office, possibly with the aid of the Brazilian Navy's Office of Hydrography and Navigation.

Action 44: GPO and GSC Chair to develop the concept of a GOOS-Navies meeting, and to work with the Rio Office on a venue for GSC-VIII and a possible GOOS-Navies meeting in S. America.

15. ANY OTHER BUSINESS

The Committee agreed that it should consider cosponsoring the proposed International Marine Data and Information Systems Conference (IMDIS) in Brest in May 2005.

Action 45: GPO and IODE to plan GOOS involvement in the IMDIS meeting in Brest, 2005.

16. LIST OF ACTIONS

Action 1	IOC to be asked to invite COOP leadership and Chair of GOOS Regional Council to attend the next meeting of the LME management group in Paris, so as to cement links between Coastal GOOS and the LME process.
Action 2	The inter-sessional working group from GSC-VI Action 44 to begin its work on revising the GOOS Strategic Plan, following the IOC Executive Council's final decisions on the follow-up to the GOOS Review.
Action 3	The GPO to advise the Executive Secretary IOC of the Committee's recommendation that the GSC be renamed the "GOOS Scientific and Technical Steering Committee", with the acronym GSC.
Action 4	IOC Secretariat to discuss with GSC co-sponsors any changes thought necessary to the GSC MoU, following the IOC Executive Council's deliberations in June 2004.
Action 5	Noting that the ninth session of the UNFCCC Conference of Parties in decision 11/CP.9 invited the "Global Climate Observing System secretariat, in conjunction with the Global Ocean Observing System secretariat, to provide information to the Subsidiary Body for Scientific and Technological Advice, at its twenty-second session, on progress made towards implementing the initial ocean climate observing system", SBSTA of the UNFCCC has requested that GCOS provide a report on the status of progress toward implementation of the initial global ocean observing system at its next meeting (need date here) the GSC requests that the IOC, through the I-GOOS and through its own efforts, gather information on national enhancements to the Next Steps recommended last year, and provide this information to the GCOS Secretariat by 31 January 2005. In particular, it is requested the nations provide information on long-term national commitments, and increases, to the following global ocean observing system activities: 1. XBTs made available for coordinated implementation via the JCOMMM SOOP 2. Surface drifting buoys made available for coordinated implementation via the JCOMM DBCP; 3. GLOSS Core tide gauge stations reporting annually to the JCOMM PSMSL and also the number fitted with GPS or Doris receivers; 4. Volunteer Observing Ships participating in the JCOMM VOSClim air-sea observations programme; 5. Surface pCO_2 observing activities being coordinated *via* the IOCCP;

	6. Repeat hydrography/carbon inventory survey lines being supported and coordinated *via* the International CLIVAR&IOCCP repeat survey programme; 7. Ocean Time Series Reference Site moorings supported; 8. Argo profiling floats participating in the Argo programme and coordinated *via* the Argo Science Team; 9. Support for satellite missions for: a. Topex/Poseidon class altimetry, b. TRMM class microwave SST and rainfall, c. SeaWifs class ocean color, d. Ocean surface vector winds; 10. Annual reporting of ocean surface and subsurface observations to the relevant international programme or World Data Center; 11. Participation in GODAE, or other ongoing ocean climate analysis activities.
Action 6	The IOC part of the JCOMM Secretariat was asked to ensure that documents on and letters of invitation on JCOMM were sent to appropriate oceanographic locations within national agencies.
Action 7	JCOMM is requested to develop and implement through the OPA and its panels, a pilot project for the real-time transmission, through the GTS, of all metadata relevant to the observational data for SST and subsurface temperature profiles.
Action 8	The GPO should bring MILAC to the attention of all GRAs, with special attention to SEA-GOOS and NEAR-GOOS.
Action 9	GPO and GSC Chair to draft a letter or letters for the Chairman to send to appropriate space agencies with the following recommendations: (i) Wide Swath Ocean Altimeter (WSOA) – GOOS welcomes news that the WSOA is in development and is on a path to be flown on the Ocean Surface Topography Mission (Jason-1 Follow-on). GOOS commends NASA for its work in finding the ways and means to accommodate the WSOA within the stringent budget for OSTM. This instrument will provide a new high-resolution view of ocean circulation variability. (ii) OSTM/Jason-2 Follow-on – GOOS was informed that CNES and its partners in ocean altimetry face some key decisions about follow-on missions before the end of 2004. In particular, significant economies may be gained by purchasing copies of Jason-2 sensors for use on its follow-on mission. The GOOS SC, representing a broad section of the oceanographic community, considers the precision altimetry time series to be the cornerstone for global ocean circulation analysis. Foresight to guarantee this key time series by forward planning and procurements by CNES has our full support. (iii) Microwave Sea Surface Temperatures – Currently microwave SSTs are available from the Tropical Rainfall Measurement Mission (TRMM) Microwave Radiometer (TMR). This capability has been a valuable contribution to oceanographic research by providing SST's unrestricted by cloud-cover. Operational SST analyses are being developed to take advantage of such data. A follow-on to this valuable capability is highly desirable, and would be available as part of the Global Precipitation Mission satellite constellation. However, this mission has now been delayed by two years and there will be a significant gap between TRMM and GPM. The GOOS SC regrets that this gap will exist and hopes that planning for future microwave SST capability will provide gap-free data records. (iv) Ocean Surface Vector Winds – The QuikScat mission continues to provide extremely valuable data, but no follow-on mission is in prospect. The importance of vector surface winds for marine operations, marine forecasting, climate forecasting and climate science is now well established. Evaluating the effectiveness of the recently flown passive microwave surface wind sensing system is essential for the development of a strategy to provide continuous data in the future.

Action 10	The Committee called on the IODE data centres to implement the distributed model as appropriate, and to strengthen its collaboration with the operational oceanography community at the national and international level.
Action 11	The Committee called on the operational oceanography community to ensure that data are properly archived at the NODCs.
Action 12	IODE to provide a flow diagram or "wiring diagram" to make it easy for GOOS participants in GRAs to see where data should be submitted and how they can be obtained.
Action 13	GPO to arrange GOOS representation at regular IODE meetings.
Action 14	GPO to work with GOSIC to define the scope and ToRs of the eventual transfer of GOSIC to an operational environment, and to explore possibilities for the relocation.
Action 15	An intersessional group comprising GOOS and JCOMM representatives to consider what constitutes a GOOS product and/or service, and how best to develop and to advertise these [membership: Johannes Guddal (Chair), Worth Nowlin, Ralph Rayner, Nic Flemming, Phil Parker/Peter Dexter, Philippe Dandin, Silvana Vallerga].
Action 16	EuroGOOS and US-GOOS to provide information on their inventories of observing stations to COOP for inclusion in the COOP Plan.
Action 17	COOP to consider at its next meeting what its possible future role might be following publication of the Implementation Plan, and to inform GPO, Chair GSC, and working group on GOOS Strategy, by year-end 2004.
Action 18	The chair of IODE's Group of Experts on Biological and Chemical Data Management and Exchange Practices and the COOP co-chairs to discuss ways and means of cooperation.
Action 19	FerryBox and SeaKeepers managers are encouraged to start a dialogue on technologies, strategies, and standards (GPO to provide contact points).
Action 20	GRAs to encourage the involvement of meteorological agencies in GRA activities.
Action 21	GRAs are asked to request their member agencies to list national GOOS activities; GRAND to provide this information to GPO.
Action 22	GPO to work with Bert Thompson and Worth Nowlin to develop a plan, and identify appropriate people, to continue the work being carried out by Bert Thompson after the end of his contract.
Action 23	IO-GOOS and the Perth Office to find out what GOOS-related data may be obtained from the SW Indian Ocean Fisheries Panel, and to see if that Panel may become involved in IO-GOOS.
Action 24	GOOS/JCOMM CB panel to respond to the questions and requests of IODE with regard to (i) a possible membership of IODE in the Joint CB panel and (ii) the required actions for GOOS' participation in OceanTeacher.
Action 25	Merged GOOS-JCOMM CB Panel to report to I-GOOS, JCOMM, and GSC.
Action 26	The merged GOOS-JCOMM CB Panel to have a Task Team on Resources, based on the original JCOMM CBCG TTR.
Action 27	Chairman to attend the annual PICES meeting in Hawaii in October 2004, to develop closer links and to emphasize the importance of real time data transmission.
Action 28	GPO, ICES and PICES to work together (with the aid of IODE as appropriate) to explore how basic oceanographic data (and especially physical oceanographic data) can be made available in real time by fisheries agencies, for use in forecasting models.
Action 29	GRAs and GPO should prepare a proposal that could go forward to the GEO process through appropriate national representatives.
Action 30	GPO and Chair GSC to explore how to get GOOS onto the agendas of the "Carnegie Group" and the "Global Science Forum" and IGFA (International Group of Funding Agencies on Global Change Research).
Action 31	GPO to liaise with WMO (Ed Sarukhanian) on possible GOOS contributions to and involvement in the IPY 2007-2008.

Action 32	GPO (i) to implement the recommendations of the GOOS Communications Strategy and Plan, version 2.0, drawing on the IOC Communications Strategy as appropriate in due course; (ii) to work with IOC to develop a mechanism for providing regular updates to the press on major oceanic environmental events and catastrophes, operating through the established press outlets of UNESCO and WMO; (iii) to develop a Power-Point presentation to make the case for GOOS, focusing on benefits.
Action 33	Nic Flemming was asked (i) to identify members for an Editorial Board to take forward the production of "The GOOS 2005" following the plan approved by the Committee, (ii) to discuss with Peter Dexter the possible choices for an overall Technical Editor, and (iii) to assist the GPO to develop a costing for production (recognizing that the GPO may have to find extra-budgetary resources for the exercise).
Action 34	The GPO should steer the production of "The GOOS 2005", and in addition is encouraged to work with Eric Lindstrom and potential publishers to develop a 'National Geographic'-style book on the oceans that could be used to spread the word about how GOOS contributes to the resolution of ocean issues.
Action 35	GPO (i) to produce and publish the biennial report and the brochure in 2004; (ii) to consider contracting professional expertise to improve the GOOS web site, following the example of IODE.
Action 36	GPO to work with Ralph Rayner and Patricio Bernal to scope out the economic study, identify someone to carry it out, fund it, and report the results to GSC-VIII.
Action 37	GPO in consultation with GSC Chair to invite representatives of GLOBEC, and IMBER to attend GSC-VIII to discuss how closer links between GOOS and these other groups can be established formally.
Action 38	Prof Field will arrange for the GSC Chair to be invited to attend the Venice meeting.
Action 39	GPO and JCOMM Secretariat to work with key members of the GOOS and JCOMM community to develop an Implementation Plan for presentation to JCOMM-MAN-IV, GSC-VIII, and I-GOOS-VII, in preparation for consideration by JCOMM-II [Mike Johnson and Peter Dexter for JCOMM, Tom Malone, Worth Nowlin, Ed Harrison, and the GPO for GOOS, and others as appropriate].
Action 40	It will be helpful if the GRAs can establish their global requirements, through GRAND, to be fed in to the Implementation Plan.
Action 41	For GSC-VIII, GPO to review the Perth Office budget in relation to overall GOOS requirements, noting the nature and benefits of the expenditure of the Office's programme implementation funds.
Action 42	GPO to report to GSC-VIII on the historical and possible future balance of the regional spend by the IOC on GRAs.
Action 43	GPO to ask WESTPAC, SCOR, and IOC Member States (through Circular Letter) to suggest possible replacement candidates from East Asia for the consideration of the IOC Officers.
Action 44	GPO and GSC Chair to develop the concept of a GOOS-Navies meeting, and to work with the Rio Office on a venue for GSC-VIII and a possible GOOS-Navies meeting in S. America.
Action 45	GPO and IODE to plan GOOS involvement in the IMDIS meeting in Brest, 2005

ANNEX I

AGENDA

1. OPENING AND WELCOME

1.1 WELCOME, INTRODUCTIONS, SPONSOR ORGANIZATIONS'S COMMENTS
1.2 LOGISTICS
1.3 FORMATION OF SESSIONAL WORKING GROUPS

2. GOOS DEVELOPMENTS

2.1 GPO REPORT INCLUDING STATUS OF NEW GPO DIRECTOR
2.2 PERSPECTIVES FOR GOOS FROM DIRECTOR GPO
2.3 PERSPECTIVES FOR GOOS FROM CHAIR I-GOOS
2.4 MERSEA/GMES
2.5 VERSION 2.0 OF STRATEDIC PLAN FOR GOOS
2.6 FOLLOW-UP TO REVIEW OF GOOS

3. OOPC

3.1 REPORT ON OOPC
3.2 CARBON OBSERVING SYSTEM
3.3 CLIMATE OBSERVING SYSTEM

4. IMPLEMENTATION

4.1 *IN SITU* IMPLEMENTATION VIA JCOMM
4.2 MILAC
4.1 REMOTE SENSING
4.2 DATA AND INFORMATION MANAGEMENT
4.3 GOSIC REVIEW
4.4 PRODUCTS AND SERVICES
4.5 INDICATORS

5. COOP

5.1 PROGRESS REPORT AND PLANS
5.2 FERRY-BOX PROJECT

6. REGIONAL COORDINATION

6.1 REGIONAL GOOS ALLIANCES AND COORDINATION
6.2 REGIONAL GOOS OFFICES
6.3 NATIONAL GOOS DEVELOPMENTS
6.4 INDICATORS

7. CAPACITY BUILDING

8. RELATED ACTIVITIES

8.1 CENSUS OF MARINE LIFE
8.2 ICES/PICES
8.3 GEO AND EARTH SUMMIT
8.4 INTERNATIONAL POLAR YEAR

9. OUTREACH AND COMMUNICATION

9.1 COMMUNICATIONS PLAN
9.2 CURRENT AND PLANNED GOOS COMMUNICATIONS
9.3 REPORT ON GOOS DEVELOPMENT PLAN

10. SESSION ON OPERATIONAL OCEANOGRAPHY

11. REPORTS ON WORKING GROUPS

11.1 IMPLEMENTATION AND LIAISON WITH OTHER PROGRAMMES
11.1.1 Liaison
11.1.2 Implementation
11.2 WORK PROGRAMME AND BUDGET
11.3 APPROVAL OF WORK PROGRAMME AND BUDGET

12. REVIEW OF ACTION ITEMS

17. MEMBERSHIP ROTATION

18. NEXT MEETING

19. ANY OTHER BUSINESS

16. LIST OF ACTIONS

ANNEX II

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ANNEX III

LIST OF DOCUMENTS*

Document Code	Title	Agenda item	Lang.
WORKING DOCUMENTS			
GSC-VII/1	Provisional Agenda	1.2	E only
GSC-VII/1B rev.	Revised Annotated Provisional Agenda	1.2	E only
GSC-VII/2	Provisional Timetable	1.2	E only
GSC-VII/3	Provisional list of Documents *(this document)*	1.2	E only
GSC-VII/4	Provisional List of Participants	1.2	E only
GSC-VII/5	Progress against the actions of GSC-VI	1.2	E only
GSC-VII/6	Report of the Session *(to be prepared during the meeting)*	1.2	E only
GSC-VII/7A	GPO Director's Report Annex 1 - GOOS Calendar for 2003 Annex 2 - GOOS Calendar for 2004	2.1	E only
GSC-VII/7B	GOOS Annual Report	2.1	E only
GSC-VII/8	GOOS Project Office Work Programme and Budget for 2004 *(vs outcomes)*	2.1	E only
GSC-VII/9	An I-GOOS Perspective on the Future of GOOS *(PowerPoint presentation)*	2.3	E only
GSC-VII/10	Report on Follow-up to the GOOS Review Panel	2.6	E only
GSC-VII/11	Ocean elements and implications of GCOS Adequacy Report	3.1	E only
GSC-VII/12	Report on progress with GODAE and Argo *(included in Document GSC-VII/13)*	3.2	E only
GSC-VII/13	Report of OOPC Activities and Plans *(including web links)*	3.3	E only
GSC-VII/14	The MILAC Proposal	4.2	E only
GSC-VII/15	Ocean Theme Report *(PowerPoint presentation)*	4.3	E only
GSC-VII/16	Data and Information Management	4.4	E only
GSC-VII/17	Ocean Information Technology Project *(included in Document GSC-VII/16)*	4.4	E only
GSC-VII/18A	GOSIC Report	4.5	E only
GSC-VII/18B	GCOS Comments on GOSIC Report	4.5	E only
GSC-VII/19	Indicators	4.7	E only
GSC-VII/20	Report on COOP Progress and Plans	5.1	E only
GSC-VII/21A	IOC Perth Regional Programme Office Report	6.2	E only
GSC-VII/21B	Report on Rio Office	6.2	E only
GSC-VII/22	Report on Status of National GOOS Commitments	6.3	E only
GSC-VII/23	Report of the Outcomes and Plans of the GOOS Capacity Building Programme	7	E only
GSC-VII/24A	Communication Plan	8.4	E only
GSC-VII/24B	IOC Communications Strategy	8.4	E only
GSC-VII/25	List of actions of GSC-VII *(to be prepared during the meeting)*	12	E only
GSC-VII/26	Report on Recent Past Membership of Core Group of GSC	13	E only
GSC-VII/27	Data Flow	4.1	E only
GSC-VII/28	Feasibility of Producing a "GOOS 2005" Document	9.2	E only

* This list is for reference only. No stocks of these documents are maintained.

Document Code	Title	Agenda item	Lang.
BACKGROUND DOCUMENTS			
GSC-VII/B1	Report of GSC-VI	1.2	E only
GSC-VII/B2	Report of I-GOOS-VI	2.3	E only
GSC-VII/B3	JCOMM Progress Report for 2003-4	4.1	E only
GSC-VII/B4	IOC Strategy on Remote Sensing	4.3	E only
GSC-VII/B5	Report of Second Regional GOOS Forum (Feb 2004)	6.1	E only
GSC-VII/B6A	Report on CEOS Working Group on Education & Training	7	E only
GSC-VII/B6B	CEOS Capacity Building Meeting, Stellenbosch	7	E only
GSC-VII/B6C	Report of CEOS Plenary Meeting 2003	7	E only
GSC-VII/B7	Report on IODE Capacity Building Programme	7	E only
GSC-VII/B8A	GCOS Regional Workshop Programme	7	E only
GSC-VII/B8B	GCOS Funding Mechanism	7	E only
GSC-VII/B9	Earth Summit and GEO Process	8.4	E only
GSC-VII/B10	Statement by Patricio Bernal, Executive Secretary IOC, to US Oceans Commission	--	E only
GSC-VII/B11	ICSU's Report on Environment and Its Relation to Sustainable Development	--	E only
GSC-VII/B12	Report of Indian Ocean Panel on Climate Meeting (February 2004)	--	E only
GSC-VII/B13	Preparation for International Polar Year 2007-2008	--	E only

ANNEX IV

GSC-VII SESSION ON OPERATION OCEANOGRAPHY
Wednesday 28 April 2004

1. Introduction to operation oceanography
   Ralph Rayner, Fugros GEOS (10 minutes)

2. Operation oceanography at IFREMER
   Yves Desaubies, IFREMER (10 minutes)

3. Oil and gas industry demands for oceanographic information
   Valerie Quiniou, TOTAL (20 minutes)

4. The EEA/EIONET information system and the development of a wider European Environmental Information System
   Sigfus Bjarnason, European Environment Agency (20 minutes)

5. The SEAWATCH Partnership – an overview
   Frode Berge, Oceanor (10 minutes)

6. SEAWATCH regional experience
   Kostas Nittis, Institute of Oceanography, HCMR, Greece (20 minutes)

7. SEAWATCH regional experience
   Tata Sudhakar, National Institute of Ocean Technology, India (20 minutes)

8. SEAWATCH regional experience
   Enrique A. Fanjul, Puertos del Estado, Spain (20 minutes)

9. Operational products for the fishing industry
   Philippe Gaspar, CLS (20 minutes)

10. Operational hindcast and forecast products for the oil and gas industry
    Robert Stephens, Ocean Numerics (20 minutes)

ANNEX V

LIST OF ACRONYMS

AO	Arctic Oscillation
ARENA	A Regional Capacity Building and Networking Programme to Upgrade Monitoring and Forecasting Activity in the Black Sea Basin
CB	Capacity Building
CBCG	Capacity Building Coordination Group
CEOS	Committee on Earth Observation Satellites
CliC	Climate and Cryosphere programme
CLIMAR	Workshop on Advances in Marine Climatology
CLIVAR	Climate Variability and Predictability
CNES	Centre national d'études spatiales (France)
CoML	Census of Marine Life
COP	Conference of the Parties (of the UNFCCC)
COOP	Coastal Ocean Observations Panel
DBCP	Data Buoy Co-operation Panel
DIC	Dissolved Inorganic Carbon
DIM	Data and Information Management
DMACS	Data Management and Communication System
DMCG	Data Management Coordination Group
DMPA	Data Management Programme Area
DODS/OpenDAP	Distributed Oceanographic Data System
EC	European Commission
ENSO	El Nino and the Southern Oscillation
ETDMP	Expert Team on Data Management Practices
EuroGOOS	European GOOS
FAO	Food and Agriculture Organization of the United Nations
GE-BICH	Group of Experts on Biological and Chemical Data Management and Exchange Practices
GCN	Global Coastal Network
GCOS	Global Climate Observing System
GEF	Global Environment Facility
GEO	Global Eulerian Observatory
GEOHAB	Global Ecology of Harmful Algal Blooms
GE-TADE	Group of Experts on Technical Aspects of Data Exchange
GLOSS	Global Sea-Level Observing System
GLOBEC	Global Ocean Ecosystems Dynamics
GODAE	Global Ocean Data Assimilation Experiment
GOMA-GOOS	GOOS Gulf of Maine Area
GPM	Global Precipitation Mission
GPS	Global Positioning System
GPO	GOOS Project Office
GOOS	Global Ocean Observing System
GOSIC	G3OS Information Centre
GRAs	GOOS Regional Alliances
GRASP	GOOS Regional Alliances for the South Pacific
GRAND	GOOS Regional Alliances Network Development
GRC	GOOS Regional Council
GSC	GOOS Steering Committee
GSOP	Global Synthesis and Observations Project
GTOS	Global Terrestrial Observing System

GTS	Groupe de Travail Scientifique
ICES	International Council for the Exploration of the Sea
ICSU	International Council for Science
IGBP	International Geosphere-Biosphere Programme
IGFA	International Group of Funding Agencies on Global Change Research
IGOS	Integrated Global Observing Strategy
I-GOOS	Intergovernmental Committee for GOOS
IFREMER	Institut français de recherche pour l'exploitation de la mer
IMAGES	Marine component of Past Global Change Programme
IMBER	Integrated Marine Biogeochemical Ecosystem Research
IMDIS	International Marine Data and Information Systems
IOCCP	International Ocean Carbon Coordinating Project
IOC	Intergovernmental Oceanographic Commission (of UNESCO)
IOCCG	International Ocean Colour Coordinating Group
IODE	International Oceanographic Data and Information Exchange
IOGOOS	Indian Ocean GOOS
IPCC	Intergovernmental Panel on Climate Change
IPY	International Polar Year
JAMSTEC	Japan Marine Science and Technology Centre
JCOMM	Joint WMO-IOC Technical Commission for Oceanography and Marine Meteorology
JCOMM-DIM	JCOMM Data and Information Management
JCOMM SCG	JCOMM Services Coordinating Group
JCOMMOPS	JCOMM *in situ* Platform Support Centre
J-GOOS	Joint Scientific and Technical Steering Group for GOOS
LME	Large Marine Ecosystem
LOICZ	Land-Ocean Interaction in the Coastal Zone
MAMA	Mediterranean network to Assess and upgrade the Monitoring and forecasting Activity in the region
MAN	Management Committee (of JCOMM)
MedGOOS	Mediterranean GOOS
MERSEA	Marine Environment and Security for the European Area
MILAC	Marine Impacts on Lowland Agriculture and Coastal resources
MPERSS	*ad hoc* Task Team on the Marine Pollution and Emergency Response Support System
MOU	Memorandum of Understanding
NASA	National Aeronautics and Space Administration (USA)
NEAR-GOOS	N. E. Asian Region GOOS
NEPAD	New Plan for African Development
NOAA	National Oceanic and Atmospheric Administration (USA)
NODC	National Oceanographic Data Centre
OBIS	Ocean Biogeographical information System
OECD	Organization for Economic Co-operation and Development
ODIMeX	Integrated Expert and Training System for Oceanographic Data and Information Management
ODIN	Ocean Data Information Network
ODINCARSA	Ocean Data Information Network in Caribbean and South America region
ODINCINDIO	Ocean Data Information Network in Indian Ocean region
OOPC	Ocean Observations Panel for Climate
OPA	Observations Programme Area (of JCOMM)
OSTM	Ocean Surface Topography Mission
OIT	Ocean Information Technology Project
PICES	North Pacific Marine Science Organization
POGO	Partnership for Observation of the Global Ocean
PSMSL	Permanent Service for Mean Sea-Level
RAMP	Rapid Assessment of Marine Pollution
ROOFS AFRICA	Regional Ocean Observing and Forecasting System for Africa

RNODC	Responsible National Oceanographic Data Centre
SEA GOOS	South-east Asia GOOS
SBSTA	Subsidiary Body for Science and Technology Advice (to UNFCCC)
SCAR	Scientific Committee for Antarctic Research
SCOR	Scientific Committee on Oceanic Research
SIDS	Small Island Developing States
SOLAS	Surface Ocean Lower Atmposphere
SOOP	Ship-of-Opportunity Programme
SST	Sea Surface Temperature
TEMA	Training, Education and Mutual Assistance programme (IOC)
TMR	TRMM Microwave Radiometer
TRMM	Tropical Rainfall Measurement Mission
TTR	Task Team on Resources
UNCED	United Nations Conference on Environment and Development (Rio de Janeiro, 1992)
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNEP	United Nations Environment Programme
UNFCCC	United National Framework Convention on Climate Change
VOS	Voluntary Observing Ship
WCRP	World Climate Research Programme
WDC	World Data Centre
WESTPAC	IOC Sub-Commission for the Western Pacific
WIOMAP	Western Indian Ocean Marine Applications Project
WMO	World Meteorological Organization
WOCE	World Ocean Circulation Experiment
WSOA	Wide Swath Ocean Altimeter
WSSD	World Summit on Sustainable Development
XBT	Expendable Bathythermograph
XML	Extendable Make-up Language