Intergovernmental Oceanographic Commission
Reports of Meetings of Experts and Equivalent Bodies

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

Eleventh Session
8-10 April 2008
Paris, France

GOOS Report No. 170 **UNESCO**

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ABSTRACT

The 11th session of the IOC-WMO-UNEP-ICSU Scientific Steering Committee of the Global Ocean Observing System (GSSC), was held in Paris, France, on 8-10 April, 2008. The meeting was preceded by a successful scientific workshop on developing cooperative programs across the Atlantic between EuroGOOS, EU, OceanUS, IOOS, USA and Canadian GOOS efforts. The GSSC XI reviewed the accomplishments and future of the GODAE modelling programmes. Cooperative activities with GEO/GEOSS were discussed and a commitment to continued participation was endorsed. Outreach and Advocacy accomplishments which were set in motion by the previous GSSC X session were viewed with great satisfaction and will be enhanced in the coming years. Cooperative activities of the JCOMM and OOPC programmes were reported. The breadth of GSSC and GOOS programmes were emphasized in a series of presentations. Breakout groups reported on their discussions of global coast modelling, outreach and advocacy, JCOMM programmes, pilot studies, GRA 4th Forum planning, and OOPC issues. A joint session with the PICO I meeting emphasized development of coastal GOOS programmes.

(SC-2008/……)

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1 OPENING AND WELCOME

1.1 OPENING

The eleventh Meeting of the GOOS Scientific Steering Committee (GSSC-XI) was opened by the Committee chair, John Field, at 09.00 hours on Tuesday, 8 April, 2008 at the headquarters of the Intergovernmental Oceanographic Commission (IOC) of UNESCO. John Field, GSSC chair, thanked the staff of the GOOS Project Office for their hosting generous arrangements. He welcomed both returning and new members of the Committee for attending as well as the participants of the GSSC workshop, which had been held the previous day.

1.2 ADOPTION OF AGENDA

The agenda was presented by John Field and opened to comment. Item 5.1.3 was adjoined to agenda item 3 (Review of the Current Status of GOOS) to accommodate the schedule of François Gerard, I-GOOS chair. The revised agenda was accepted by the Committee.
The agenda is submitted in Annex I.

1.3 WORKING ARRANGEMENT / FORMATION OF IN-SESSION WORKING GROUPS

The arrangement of the meeting, whereby the participants of the PICO-I Meeting would sit with the GSSC members during the sessions on Thursday (GSSC agenda items 7–11) was explained to the Committee. Meeting room arrangements were presented and a request was made to the members to sign up for the working groups to be held in the afternoon. The Committee agreed to break into working groups on:
Breakout Group 1: Scoping future possibilities for global-coastal modelling
Breakout Group 2: Outreach and Advocacy
Breakout Group 3: Process and mechanisms for identifying activities for recognition as part of GOOS
Breakout Group 4: Developing Present Activities into Pilot Studies and Priorities for Doing So
Breakout Group 5: Planning for the 4th GOOS Regional Forum
Breakout Group 6: Discussion of action items raised in OOPC report
Reports by the Breakout Groups would be delivered in session on the third day.

2 REVIEW OF THE PREVIOUS SESSIONS

2.1 REVIEW RECOMMENDATIONS TO THE GSSC AND I-GOOS AND SPONSORING ORGANIZATIONS AND DETERMINE COURSES OF ACTION

Thomas F. Gross, Programme Specialist of the GOOS Program Office, presented a review of action items of I-GOOS and Sponsoring Organizations, which might require action by the GSSC.
A study of the technical aspects of a standard set of routine underway measurements. This study was completed by Detlef Stammer and is part of the GSSC documents. It should serve as a guide to the next steps needed to expand this concept designed for EuroGOOS to the global GOOS needs.
Encourage regional partnerships. The GPO is working within the Assessment of Assessments program with other UN agencies on the Trans-border Water Assessment Programme. A study

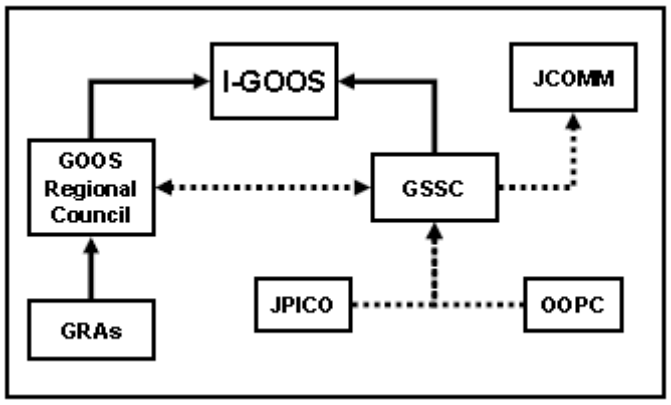
will be commissioned. The LME and Open Ocean GOOS are designated to develop the regional seas issues.
"Summary for Policy Makers" GSSC advice has been solicited through the I-GOOS Board.
The GSSC members noted the decisions of the I-GOOS and IOC Resolution XXIV-7 which concern the creation and ToR for the PICO. The role of the sponsoring organizations in the governance of GSSC was noted. Further communication with the sponsors was encouraged.

2.2 REVIEW RECOMMENDATIONS FROM GSSC-X AND UPDATE AS NEEDED

Thomas F. Gross, Programme Specialist of the GOOS Program Office, presented a review of action items and recommendations from GSSC-X. Progress on all action items met with satisfaction by the Committee. Most completed actions will be reported on in subsequent presentations to the meeting.

3 REVIEW OF THE CURRENT STATUS OF GOOS

Ex 5.1.3 (Moved by agenda change)
GRAs Regional Seas, LMEs and other Regional, GOOS-Relevant Programmes
François Gérard, I-GOOS chair, presented a report on the status and structure of the GOOS Regional Alliances, Regional Seas, Large Marine Ecosystems (LME), and coastal hazards programmes. The I-GOOS VIII emphasized that GOOS sustainability would be based on National commitments and involvement at national levels. The regional development strategy is based on a System of Systems, the GOOS Regional Alliances, GRAs, Regional Ocean Observing Systems, ROOSs and the GOOS Regional Council, GRC. During the past year much has been done toward building this System of Systems, including the establishment of the GRC, the recognition of two more GRAs (OCEATLAN and GRASP) and the creation of PICO by GSSC. The IOC-XXIV decision on Global Ocean related hazards Warning and Mitigation System, GOHWMS, encourages GOOS to implement ocean hazard warning and mitigation systems and advises IOC through the TOWS working groups. Coastal hazard mitigation, warning systems and coastal GOOS will be implemented through coordination of a system of ROOSs, including the Climate GOOS as a specific ROOS. The Intergovernmental GOOS relies on the GRC to interface reporting from the GRAs and ROOSs. Artic ROOS needs and requirements have not been made clear to the GSSC by the IPY. The Polar regions are forming ROOS's, however political issues make a continuation of the IPY legacy difficult. LOS issues, advised on by ABE-LOS, should be linked with international agreements. Observation systems can be given useful legal standing by noting that they are required by international agreements and conventions. A policy document for the GRAs and coastal hazards will be prepared by François Gérard and Dong Young Lee before the next I-GOOS Assembly.



Action 1. *Request report from IPY on status and needs of Arctic GOOS and Southern Ocean GOOS*
Action 2. *Form working group to report on Climate Adaptation as focus for GOOS*
Action 3. *Coastal Hazard Mitigation Report to be prepared*

3.1 GLOBAL GOOS: REPORT BY THE OCEAN OBSERVATION PANEL FOR CLIMATE (OOPC)

Ed Harrison, OOPC chair, presented a report on the state of the GOOS open ocean module, or climate module. The climate observation systems continue to be operated and funded as research programmes. The premise that demonstration programmes would be transitioned from research agencies to operations has not been shown valid. Researchers and research funding agencies are beginning to withdraw their support. Identification of regulatory drivers or international conventions which mandate observation systems maybe a way forward toward sustainable observation systems. The promise made to policy makers of useful forecasts based on environmental observation systems must address the seasonal to decadal time scales. These are the only time scales where political decisions can be made. There remains gaps in our message to policy makers on issues such as coupled ocean/atmosphere modelling, deep ocean sampling requirements, carbon budget, meta data requirements, local variation of sea-level rise and the addition of non-physical variables to observation systems.

3.1.1 Review of Global Ocean Data Assimilation Experiments, GODAE

Pierre–Yves Le Traon (Program Director of Operational Oceanography Systems, IFREMER) reported on the status of the GODAE programme, which is preparing for its final symposium in November 2008. The GODAE programme was a practical demonstration of a global operational oceanography system proving the feasibility and utility of high-resolution, global analyses and short-range forecasts of 3D temperatures, salinities and currents. GODAE developed many of essential elements of GOOS: observation and data processing systems, global scale modelling and data assimilation, standardization of data and products and data and model validation metrics. As GODAE completes its global and climate modelling missions, it is transitioning from demonstration to operational systems through close cooperation with JCOMM, IOC and GOOS. The next GODAE initiatives will target coastal and ecosystem issues. Integrated Marine Biogeochemistry and Ecosystem Research, IMBER, and GODAE have developed a working group to explore use of GODAE systems for ecosystem modelling. The GODAE Coastal and Shelf Seas Working Group, CSSWG, is working to assess how GODAE systems can be used to solve coastal, regional sea scale problems. The group prepared a position paper: “Towards the assessment and demonstration of the value of GODAE results for coastal and shelf seas models and forecasting systems” P. De Mey, ed., 74pp. second edition. Design and assessment of observation systems by simulation of data assimilation into models have been underutilized by GOOS. An OSSE/OSE workshop in November 2008 in Paris, demonstrated the capabilities of the GODAE systems for fulfilling this need. Greater coordination and use of the OSSE/OSEs would be beneficial to GOOS efforts to justify and sustain existing and future observation platforms.

Discussions emphasized that the GODAE expert teams and research teams must link to JCOMM. The goal must be to make the operational systems useful to the research community. Continuous improvement of operational oceanographic systems and state-of-the-art research will advance hand-in-hand. This is very much the theme of the GODAE Final Symposium to be held November 10-15 2008 in Nice, France.

3.1.2 Adaptive Grid Modelling

Following the GODAE presentation Gerard Gorman, Imperial College, UK, demonstrated the capabilities of some of the latest state-of-the-art numerical modelling techniques. Imperial College has developed a new modelling system by migrating technologies and numerical techniques from industrial computational fluid dynamics and engineering fields outside the usual oceanographic domain. Software engineering concepts, such as modularity and concurrent version control, have allowed a wide group of researchers to simultaneously work with the system and stretch the boundaries of oceanographic numerical modelling. Three dimensional, non-hydrostatic, adaptive mesh models are resolving small scale features such as internal waves and convection events. Modelling systems are being validated against laboratory and many other existing ocean models. A sophisticated, but easy to use, validation system has been built to support rapid deployment of model updates from the large development community, an essential element of maintenance for an accepted, operational modelling system. The Imperial College Ocean Model, ICOM, is some years behind other systems, such as ROMS, in being adopted by the ocean community.

3.2 GOOS OUTREACH AND ADVOCACY

Ralph Rayner, IMarEST president, reported on the Outreach and Advocacy achievements of the past year. The previous GSSC-X set forth an ambitious list of outreach tasks and formed the 'Advocacy, Outreach and Role of Industry' Working Group (Colin Grant, Missy Feeley, Jay Pearlman, Ed Harrison, Christina Lief, Jim Baker, Ralph Rayner). Throughout the year communications were achieved by monthly conference calls between the groups. Links were formed with the IMarEST Marine Information Alliance, JCOMM (Worth Nowlin), GOOS Program Office (Tom Gross) and with the POGO (Schubha Sathyendranath) Ocean United advocacy groups. IMarEST organized several workshops and exhibitions that advanced GOOS. As the group has very little internal funding, fund raising has played an important role in the activities. Raising awareness of GOOS needs and goals and soliciting funds to continuing the outreach have moved forward hand-in-hand, expanding our message and funding sources. Proposals in collaboration with the London School of Economics are increasing engagement. IMarEST as a non-profit international organization will be used to handle fiscal administration for the group. Identification of possible sponsors is an important role for the GSSC and the group. The GRAs should be involved as beneficiaries of the outreach activities and sources of interest and possible sponsor involvement.
Breakout Session 1 of this meeting is dedicated to redesigning the working structure of the group, which has grown somewhat unmanageably large for the monthly conference calls, and planning further outreach activities for the coming year.

Action 4. Prioritize Action List for Outreach and Advocacy Working Group

4 BREAKOUT SESSION I

The session met in smaller groups to discuss the breakout topics:

4.1 BREAKOUT GROUP 1: SCOPING FUTURE POSSIBILITIES FOR GLOBAL-COASTAL MODELLING

4.2 BREAKOUT GROUP 2: OUTREACH AND ADVOCACY

4.3 BREAKOUT GROUP 3: PROCESS AND MECHANISMS FOR IDENTIFYING ACTIVITIES FOR RECOGNITION AS PART OF GOOS

4.3.1 Operational data streams for JCOMM to take on

4.3.2 End-to-End Systems for incorporation into GOOS (e.g. the Ocean Tracking Network)

5 GOOS IMPLEMENTATION

5.1 COORDINATION WITH IMPLEMENTING ORGANIZATIONS AND PROGRAMMES

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

The WMO-IOC Joint technical Commission for Oceanography and Marine Meteorology (JCOMM) group gave a series of short reports on aspects of the JCOMM activities of the past year. The group reported on the 6th session of the JCOMM Management Committee, IOC in Paris, 3-6 December 2007. It was a positive report of completion of substantive tasks and significant results. However regular budget support from the WMO Congress and the IOC Assembly was not adequate and continued efforts to acquire extra budgetary programmes is necessary. Outreach programmes are well underway, with a new web site and Newsletter. An almost complete change of the JCOMM senior management is expected, due to retirements and other commitments. It will be a difficult task to replace them. Letters of intent for the Observing Program Support Center, OPSC, have been received, reviewed and the short list will soon be requested to submit full proposals. The Services Programme Area, SPA has a new web site (http://www.jcomm-services.org) focusing on support for Maritime Safety Systems. SPA has organized several maritime safety oriented workshops and is planning the International Maritime Safety Conference at IMarEST, London in March 2009 and a workshop jointly with WCRP and Oil and Gas Producers (OGP) at WMO Headquarters, Geneva, 27-29 May, 2008. The Data Management Programme Area, DMPA has a completed data management and implementation plans. The End-to-End, E2E, technology development has progressed in close cooperation with IODE. The Ocean Data Portal (http://www.oceandataportal.net) is a demonstration of the technology and will become a useful part of GEOSS development and cooperation. Outcomes of the IODE/JCOMM Forum on Oceanographic Data Management and Exchange Standards, January 2008, include: an agreement to further adopt ISO metadata standards and profiles; a plan to develop a catalogue of JCOMM standards and best practices and tailored to different types of users and needs; and to work closely with WMO Integrated Global Observing System (WIGOS) program standards and interoperability plans.

Issues and Actions suggested from JCOMM for GSSC:

Data from Pilots, Research and GRAs

1. Pilot projects, GRAs and other activities should address how and when their observations and information can be made available through JCOMM Programme Areas.
2. GSSC should emphasize to research organizations the importance of releasing their data and information as quickly as possible for wider use and ensure these data get to

international archive systems. This certainly applies to the tagged animal data and looking forward to OTN (Ocean Tracking Network).

Coastal GOOS and New Projects

3. GSSC should encourage Coastal GOOS projects to link to JCOMM Programme Areas to determine when and how coastal observations can be distributed.
4. When setting up regional programmes (or otherwise) there may be opportunities to take advantage of JCOMM capabilities to organize observation components, move data and information and generate products. It may not be necessary for each to create separately these functions internally.

External Data Sources

5. Industry makes a wide range of marine observations. In a number of cases, these data are available for broader use, but not always. GSSC could use its contacts into industry to emphasize the importance of sharing data they collect as well as receiving data from international systems.
6. Paragraph 71 in the GSSC-X report asked IOC to address a question of routine ocean observations not collected under research projects. Did this happen and with what result?
7. CPR (Continuos Plankton Recorder) data are classical observations which have been done for many years. However, the processed results are not freely available since SAHFOS must cost recover from providing the results. Thus one must purchase the data and cannot pass the data on to other researchers. Can GSSC help?
8. GSSC (and JCOMM Data Management Programme Area) should be involved in the GEO Data Sharing Principles.
9. There is a draft paper (http://www.codata.org/GEOSS/) that has been prepared by CODATA and shown at GEO-IV in Cape Town last November, and is due for adoption sometime this year. It is important to make sure that the needs and views of GOOS and JCOMM are properly accounted for in this document, which is being, and will be given, high visibility.

Outreach and Advocacy

10. Agreement that JCOMM – Industry task team and activities will be discontinued in favour of GSSC Outreach and Advocacy group.
11. As a consequence, JCOMM requests that GSSC should include JCOMM, as a major GOOS implementation mechanism, as appropriate in its advocacy and outreach work.

Action 5. *Advise how Pilot Project observations and information must be made available to JCOMM*

5.1.2 IOC International Oceanographic Data and Information Exchange (IODE)

The chairs of the IODE were not able to attend this meeting. Bob Keeley, DMPA Coordinator, pointed out that the IODE and JCOMM data management programmes were working closely together, as reported for the IODE/JCOMM Forum on Oceanographic Data Management and Exchange Standards held in Oostende, Belgium, at the end of January 2008. The IODE standards team will work on the standards process on behalf of JCOMM. The Ocean Portal has become a part of the WIGOS demonstration program. The proposed JCOMM/WMO standards and best practices catalogue will be joined with the IODE documentation. The GSSC interacts with the IODE primarily through IODE's cooperative programmes with JCOMM.

5.2 GOOS-GEO COORDINATION AND COLLABORATION

5.2.1 Matters arising from GEO Plenary

John Field, GSSC chair, reported on the GOOS participation in the GEO Ministerial Summit held in Cape Town, November 28-29, 2008. The involvement of GOOS in the GEO Ministerial proceedings was accompanied by a strong representation of the Ocean community in the exhibition halls and with side events. Ten posters, video screens and active participation by Ocean United, representatives from GOOS, Argo, Jason, POGO, CoML (Census of Marine Life), ChloroGIN (Chlorophyll Globally Integrated Network), and SAHFOS (Sir Alistair Hardy Foundation for Ocean Science) made a very good impression on the GEO community. Aside from the formal meetings there was an afternoon of presentations to local press in Cape Town, and prior to and during the meeting a number of very successful series of media interviews (spear-headed by Terry Collins, media consultant, with much help from Jesse Ausubel of the Sloan Foundation) which resulted in worldwide interest and awareness of ocean activities within GEO.

5.2.2 Other linkages

5.2.3 GEO best practices Wiki

5.2.4 GEOSS Architecture

Jay Pearlman, GSSC member, reported on “GEO Architecture and Operations Development” and the “Best Practices Wiki for GEOSS”. Architecture and Operations are now moving beyond the planning stage to specific programmes. GEO will define programmes around the societal benefit areas, and will not simply rename on-going programmes as GEO. The GOOS and GEO data policies were described as parallel, but with different implementation procedures. The data architecture initial operating capability has been established. This is a system of interoperability standards, procedures and registrations which apply to data exchange and now includes modelling and data assimilation. The GEO Portal is now operating with 75 registered services to date. The system remains flexible by implementing and designing “Special Arrangements” for data services and registration, which are used as templates for future common practices. Seven use scenarios were designed which demonstrated the needs and promise of the interoperable data systems.

Discussion of the interaction of GEO and GSSC had several broad themes. The dominate theme was questioning how GSSC should relate to GEO and why. GOOS and GSSC are well embedded in the GEO planning process. While the oceans are recognized as part of the observing system, they have never been a major thrust of GEOSS. However the ocean presence is slowly affecting that. The political connections of GEO were seen to be of a different quality than the usual GOOS intergovernmental mechanisms. Low level connections between GEOSS and GOOS are not very useful; they are simply the same people attending more meetings. However the access to ministerial level representation should be looked upon as an opportunity by GOOS. GOOS and GEO should not compete for the label of “The” ocean observing system. The GEO thematic goals and the GOOS global coverage goals are complementary. GEO is not a single entity. It is a system of systems, a program of programs and a community of practice. GOOS is one of the programs and remains an important component of GEO and a supporter. GEO has been helpful in the creation of ChloroGIN and has aided coastal coordination.

Jay Pearlman presented the plans and methods of the GEO Best Practices Wiki, http://WIKI.IEEE-EARTH.ORG . This will be an ever evolving, open access repository of accepted best practices for GEOSS. Subject Matter Experts, SMEs, are expected to submit a best practice method and receive feedback from the broader community on its acceptability, applicability and worth. The Wiki should act to create continuous peer review of documents.

Facilitators will be available to keep discussion on track and moving. When the site opens in May 2008, the GSSC members are encouraged to participate. Solicitations of subjects maybe requested if the Wiki does not become utilized as expected.

Action 6. *Consolidate outreach message of GOOS, GSSC, GCOS, and JCOMM in relation to GEO and others.*
Action 7. *Provide coordinated GOOS and GCOS input to GEO 2009-11 workplan*
Action 8. *Submit GOOS input in the GEO process in defining its data policy.*
Action 9. *GOOS use case scenario E2E demonstration*
Action 10. *Request IODE/JCOMM to submit and register relevant services and standards*
Action 11. *Verify and maintain a list of GOOS participation in GEO committees*
Action 12. *Talk to GEO secretariat about how we can raise the whole system awareness.*
Action 13. *Further engage sponsors in supporting GEO advocacy for GOOS*

5.3 INTERACTION WITH INDUSTRY

Colin Grant presented an industry perspective on the needs and development of GOOS. When industry has had a need for environmental data it has collected it. Now many industry groups are finding increased value to themselves and others by making the data available in real time. Collaboration with the National Data Buoy Center, NDBC at NOAA has been very successful for the Gulf of Mexico data. The UK Met Office has interfaced for the North Sea oil rigs. NDBC and UK Met Office work with the Faroe Islands data sources. Oil and Gas Producers, OGP, has worked with GOOS and IMarEST. OGP Metocean Committee will have a workshop on climate change and the offshore industry at WMO in Geneva, May 27-19, 2008. OGP study themes include tropical and extra tropical cyclones, sea level change, Arctic changes, Statistics of forecasts (stationarity assumption violations) and the insurance industry perspective.

GSSC members expressed interest in representing the GRA needs to the industry effort. The industry role has been regional and thus the GRAs may be the most appropriate entry to GOOS. BP funds project by project and must rely upon governments for the core infrastructure. The OGP will work with and feed data to the GOOS, but has no explicit policy on long term data availability. GOOS must work with industry which can advocate the case for ocean observation infrastructure to governments.

Action 14. *Encourage OGP delivery of data to the GTS*

5.4 COORDINATION WITH OTHER ORGANIZATIONS AND PROGRAMMES

5.4.1 Global Observing Systems Information Center (GOSIC)

Christina Lief, NOAA, presented an overview of progress of the GOSIC data access site (http://gosic.org). The GOSIC is funded by NOAA to serve the needs of GCOS, GTOS and GOOS. GOSIC has become part of the GEOSS Data Integration and Analysis System task (DA-07-06). The GOSIC will be in discussion with the development of the new WMO Information System (WIS) as a Global Information System Centers (GISC). The GISCs will be looked to for providing ready access to the WMO Global Observing Systems data which includes the GCOS Networks (atmosphere, ocean, and terrestrial). The GOSIC data matrix development is continuing with input from the user community, NCDC, NOAA Office of Climate Observations, IODE and the GOOS secretariat. GSSC input is also requested. In addition to data services the GOSIC organizes the GOOS National Commitments and

Activities Summaries. The GOSIC programme will work in concert with the GPO on continuing development of this important GOOS task. GOSIC is working with PI-GOOS for their web site development using the adaptable Joomla content management system, the same as the IOC web sites. JOOMLA training will be offered.

Christina Lief will be invited to present this information to the GRA Forum to encourage adaptation by the GRAs of a common data portal methodology. Joomla based bulletin boards may be useful to facilitate information exchange between the GRAs.

Action 15. *Request GSSC members to comment on GOSIC data matrix presentation*
Action 16. *GPO to work with GOSIC presentation of national commitments*
Action 17. *Invite Christina Lief to GRA Forum*
Action 18. *Facilitate informal web based bulletin board for GRA communication*

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5.4.2 International Council for the Exploration of the Sea (ICES)

The ICES, Steering Group for GOOS, held a workshop 21-22 February 2008 at IOC UNESCO, Paris. The SGGOOS is now reorganized under the name ICES GOOS Steering Group (IGSG) to better identify the mission of cooperation between IOC-GOOS and ICES Working Groups. IGSG encourages the formation of a North Atlantic GOOS Regional Alliance, but IGSG will not be a formal member of such a GRA. The ICES community continues to develop strong ecosystem fisheries modelling and monitoring capability. User based evaluations of ICES OOS products will be discussed at the Workshop on ocean products and services, April 8-9th 2008 in Copenhagen.

5.4.3 North Pacific Marine Science Organization (PICES)

Young Jay Ro reported on activities of the North Pacific Marine Science Organization, PICES. PICES has been leading North Pacific marine science since 1992 International Treaty, signed by Canada, People's Republic of China, Japan, Republic of Korea, Russian Federation and United States of America. PICES works through standing technical committees for biological oceanography, Fisheries, Marine Environmental Quality, Physical Oceanography and Climate, ocean data exchange and monitoring. PICES technical committee on monitoring has supported the Continuous Plankton Recording Panel and the North Pacific Ecosystem Status Report. The Circulation Research in East Asian Marginal Seas, CREAMS/PICES programme will oversee a program to study the physical and biological environment of the East Asian Marginal Seas, with a goal to develop permanent observation and data exchange networks in the region. The next major PICES initiative is the Forecasting and Understanding Trends, Uncertainty and Responses of North Pacific Marine Ecosystem, FUTURE. The key elements are understanding how ecosystem and social system forecast models can be made of use by climate variability and global change decision makers, given the difficulty of analyzing forecast uncertainties. FUTURE is now entering the implementation phase after years of planning. PICES is a research organization, but works closely with NEARGOOS and US IOOS activities.

5.4.4 Partnership for Observation of the Global Ocean (POGO)

John Gunn, Deputy Chief CSIRO, presented a review of the POGO mission and how it relates to the GSSC mission. The POGO was established ten years ago to represent major marine laboratories, 35 institutions from 18 countries. It has become a powerful voice made up of action oriented directors of institutions. POGO has organized the inventory of oceanographic cruise into an almost real-time tool. POGO played a very large role in the Ocean United presentations for the GEO Ministerial in Cape Town. We must make it clear to GEO that POGO and GOOS form a partnership to speak for ocean observation programs. The POGO role is to give access to high level institute directors and their connections to high level government representatives, ministers and environmental agencies. Most existing ocean

observation systems are still run by research institutions and therefore their representation is essential in any marine observatory dialogue. The research programs are anxious to turn over these semi-operational systems to GOOS. GOOS needs to support the institutions by giving good feedback on how this will be done. Critical to these efforts are documentation of the cost-benefit analysis for ocean systems. Both POGO and I-GOOS are working on such a document.

Concerns were expressed that the POGO supported carbon projects were not represented within GOOS. A discussion of the need to integrate carbon observations into GOOS revealed that GSSC needs to strengthen its engagement with the carbon community. Maria Hood (IOC secretariat) emphasized that the International Ocean Carbon Coordination Project http://www.ioccp.org/ was well organized and, through entirely research based funding, had achieved substantial recognition as the ocean carbon observation system, and should be considered an asset of GOOS. GSSC chair agreed that carbon observations are a core component of GOOS. Very little of GOOS is fully operational and the carbon programs are no different. The Carbon network reports primarily to the OOPC which reports to GSSC as part of GOOS.

Action 19. *Respond to request from POGO for a cost estimate of GOOS activities*

Action 20. *Request Report from IOCCP on ocean carbon issues and activities*

5.5 PLANS FOR PILOT PROJECTS AND NEW STUDIES

This item was delayed for the report by the Working Group (Section 12.4)

5.6 CENSUS OF MARINE LIFE (COML)

John Gunn, Deputy Chief CSIRO, reported on the Census of Marine Life, a biological component of GOOS. The CoML has had good funding for ten years through the Sloan Foundation, who may be wishing that other sources would take over. The program has been disconnected from real-time observation systems, rather producing assessments of the environment. Tangible goals and purposes must be articulated to fully integrate CoML into an observation network. The Global Ocean Tracking Network provides real-time biological observatory capabilities. The ability to track and assess fisheries stocks on global scales is set to revolutionize the fields of fisheries science. The system has been initiated by Canada, but is moving global. After the infrastructure is in place there could be decades of applications. John Gunn argued for inclusion into GOOS the novel use of instrumented marine mammals as observation platforms for salinity, temperature and maybe more. In the Southern Ocean where Argo floats cannot go, the seals have gathered ten fold more data. Sloan has funded development of large databases to hold the data. GSSC sees this as a strong contributor to GOOS. John Gunn agreed to write a short report on integrating animal oceanography into GOOS. As the CoML comes to an end the young scientists appear ready to spawn the next generation systems. It will and should change.

Action 21. *Interact with JCOMM to facilitate distribution of animal oceanography profiling data on the GTS with monitoring by JCOMM-OPS*

5.7 OTHER RESEARCH INITIATIVES RELEVANT TO GOOS DEVELOPMENT

John Zillman, GCOS chair, reported on Global Climate Observing System, GCOS. The GCOS and GOOS have identical sponsors. GCOS integrates ocean, atmosphere and terrestrial data for climate studies. The agreement on climate change mandates data, prediction and support information which are carried out under GOOS, GTOS, WCRP and World Weather Watch.

6 BREAKOUT SESSION II

The session met in smaller groups to discuss the breakout topics:

6.1 BREAKOUT GROUP 4: DEVELOPING PRESENT ACTIVITIES INTO PILOT STUDIES AND PRIORITIES FOR DOING SO

6.2 BREAKOUT GROUP 5: PLANNING FOR THE 4TH GOOS REGIONAL FORUM

7 STATEMENT BY INCOMING GSSC CHAIR

Patricio Bernal, Executive Secretary of the IOC, welcomed the PICO and GSSC meetings to UNESCO. He expressed his appreciation for the volunteer effort of all the attending participants. Patricio Bernal noted the role GOOS has played in the climate debate and noted that in a sense the Nobel Prize awarded to the IPCCC is shared by the other United Nations programmes. Looking past the climate debate the coastal issues can be anticipated to dominate the coming debate. Much work needs to be done. Very different groups are now involved in climate issues which have been much more numerous. Coastal projects are very local and concern one nation at a time. The proof of concept of a GOOS system in the coastal domain is a high level priority. Coastal priorities will require a repackaging of climate knowledge to manage risk for climate change. Issues of climate change will be pushed to societal goals and away from the science issues.

John Field, outgoing GSSC Chair, congratulated Ralph Rayner on his appointment as GSSC Chair, starting January 1, 2009. Ralph Rayner addressed the GSSC. He joined the GSSC in 1998, as one of the first members with an industry background offering an important and different perspective to GOOS. He noted that industry participation is not a volunteer participation. Ocean observation system payoffs must be identified and communicated to the public. GOOS is a concept and a banner to be used to get resources which we could not get individually. The name, colours and acronyms are not important, the end result of an ocean observing system is important. A vote of thanks was offered to John Field for all of his efforts through the last years.

8 REGIONAL GOOS IMPLEMENTATION

8.1 ROLE AND STATUS OF GRAS IN IMPLEMENTATION OF COASTAL GOOS

Thorkild Aarup, Programme Specialist of IOC at UNESCO, reported on the structure of the Coastal GOOS. “Establishing and improving GOOS is critically dependent on the coordinated development of GOOS Regional Alliances (GRAs) that contribute to and benefit from the global system. GRAs are created to facilitate sustained ocean monitoring to meet regional and national priorities. They require interagency collaboration and an internationally accepted

policy. The activity and cooperation of GRAs is especially important to the development of the coastal module of GOOS." (Preamble to GOOS Regional Policy 2003).

The role of the GRAs for Regional Ocean Observing Systems includes:

- Integration of national efforts around pilot projects or regional observing systems;
- Linking with users (address national requirements, international links, GEOSS Coastal Zone Community of Practice);
- Developing solutions to close "GOOS Gaps";
- Involvement of riparian nations in the GOOS;
- Make GOOS a universal property.

Some GRA issues are:

- Relevance and engagement in development/implementation & for the long term;
- Varying level of activity;
- Focus;
- National visibility;
- Web-presence;
- Secretariat;
- Mobilization of resources.

A discussion on the role of satellite data for Regional Associations pointed out the need for pilot projects emphasizing the use of in-situ data for satellite product calibration. The Regional Seas conventions provide an important opportunity for GOOS.

8.2 ARCTIC ROOS

Keith Alverson, GOOS Program Director at UNESCO/IOC, reported on progress to date on creation of polar ocean observing systems. The polar treaties ratified before 1984 assumed a vast, remote and pristine Arctic. Climate change and new extraction technologies have changed that view completely and now Arctic regions are at the centre of geopolitical decision making. The IOC member states postponed development of a GRA for the Arctic until after the International Polar Year, IPY. As a scientific steering committee the GSSC cannot step beyond the I-GOOS into the politics of establishing an Arctic GRA. The EuroGOOS GRA has formed a group to investigate the creation of the Arctic ROOS with cooperation of many European countries. Canadian and some European governments and institutions have held IPY workshops on Sustaining Arctic Observing Networks, SAON. Both of these efforts will be watched carefully and brought to the attention of the I-GOOS.

8.3 OCEAN CHLOROPHYLL PILOT PROJECT (ChloroGIN)

John Field, GSSC chair, Professor at the University of South Africa, presented an overview of the ChloroGIN programme. ChloroGIN is biological GOOS, the Chlorophyll Globally Integrated Network. ChloroGIN addresses GEO task EC-0607, "Build upon existing initiatives e.g. ANTARES in South America … to develop a global network of organization-networks for ecosystems, and coordinate activities to strengthen observing capacity in developing countries." ChloroGIN's progress is demonstrated in its web site, http://www.chlorogin.org. ChloroGIN has been integrated into the Indian Ocean GOOS GRA. ChloroGIN Africa is delivering chlorophyll imagery live on line, where it is already useful serving regional priorities through harmful algal bloom warnings. ChloroGIN has been selected as one of the demonstration projects in DevCoCast, an European Commission

program, which will utilize the GEOSS GEONETCast satellite imagery distribution system. Built into most ChloroGIN activities is a strong Capacity Building component. A request is made of GOOS and GEO to fund a second ChloroGIN workshop to coordinate activities with new regions in Asia and Africa and set standards and protocols for measurements and web activities.

8.4 SUPPORT FOR COASTAL HAZARD MITIGATION AND COASTAL DEVELOPMENT

Dong-Young Lee, GSSC Vice-chair, was unable to attend the meeting. A paper was prepared on this topic (GSSC-XI/27).

8.5 PREPARATION FOR THE 4TH GOOS REGIONAL FORUM

A breakout session report on the GRA Forum is given in section 12.5. The item was referred to the I-GOOS Board which will meet on Friday, April 11, 2008 to discuss communications with GRASP. GRASP is holding a conference 29-30 April, 2008 at which the GRA Forum will be on the agenda. I-GOOS will expect a report from the meeting about the forum preparations.

9 PICO LINKAGES: IGOS COASTAL THEME AND GEO COASTAL ZONE COMMUNITY OF PRACTICE

The PICO-I meeting was held jointly with the GSSC XI for agenda items 9, 10 and 11. A report of the PICO-I meeting is published separately.

9.1 OVERVIEW AND STATUS OF GEO COASTAL ZONE COMMUNITY OF PRACTICE

9.2 REGIONAL GEO COASTAL ZONE COMMUNITY OF PRACTICE WORKSHOP

10 REVIEW AGENDA FOR PICO-I

11 REPORT ON THE SCIENTIFIC WORKSHOP

12 IN-SESSION BREAKOUT GROUP REPORTS

12.1 BREAKOUT GROUP 1: SCOPING FUTURE POSSIBILITIES FOR GLOBAL-COASTAL MODELLING.

Led by John Gunn. Reported by: Nick D'Adamo.

As context: the group emphasised a number of selected specifics:

- The value of existing Coastal GOOS reference documents (2003-2005) to underpin and support initiatives in coastal GOOS, particularly in providing guidance for parameter selection and monitoring program design and protocols in characterisation studies;
- The importance of remembering that in the coastal sphere, informational needs, capacity building and driving motivations are regionally and locally idiosyncratic in many cases;
- The attractiveness and importance of identifying an opportunity(s) for well defined coastal GOOS project (characterisation and/or modelling) as a demonstration vehicle for Coastal GOOS;
- The high merit in continuing to promote and facilitate the work of the IOC's GRAs (and like minded associations that are not necessarily currently recognised in the formal IOC GOOS framework), and the IOC's regional offices (include commissions/sub-commissions) as important and appropriate coordinating bodies to advance the aspirations (scientific and applied) of Coastal GOOS;
- The need to ensure that Lagrangian imperatives are incorporated in Coastal GOOS initiatives (i.e. the need to be able to 'track' and follow substances and particles, biological and physical-chemical).

In respect of specific potential actions that the GSSC can undertake and/or facilitate:

- Identify one or more opportunities for a well defined coastal GOOS project (characterisation and/or modelling) as a demonstration vehicle for Coastal GOOS, based perhaps on a project that integrates remote sensing, chlorophyll, water quality (modelling and complementary in-situ observations) and in this context note that:
- Undertake an inventory of current and imminent Coastal GOOS studies and initiatives, allowing the GSSC to select and promote the best as generically representative and instructive examples/demonstrations of the type of Coastal GOOS work that integrates the relevant spectrums of spatial and temporal scales as worthy of effort and pursuit;
- Recent advances in ecosystem modelling (e.g. the ATLANTIS model developed by CSIRO in Australia) allow integration of hydrodynamic and biogeochemical dynamics within representations of ecosystem function. Thus, in the development of regional and/or global coastal hydrodynamic/biogeochemical models it may be valuable to consider the interface between these and ecosystem models such as ATLANTIS;
- Encourage and appeal to the GRAs, other IOC relevant associations and IOC regional offices to maintain and increase their focus on Coastal GOOS;
- Promote an effort to inter-compare the wide range of available coastal models in order to assess their relative utility and preparedness for application in regions, bearing in mind the range of capacities to work with coastal models currently available in the regions;
- Motivate an ongoing Coastal GODAE to follow on from current GODAE.

12.2 BREAKOUT GROUP 2: OUTREACH AND ADVOCACY.

Participants in Breakout Group 2: Ralph Rayner, Tom Gross, Mary Altalo, Christina Lief, John Gunn, Colin Grant, Jay Pearlman, Bev Mackenzie.

The Outreach and Advocacy group reviewed the action items set from the previous GSSC-X session. Much progress has been made and the stage set for continuing to even more activities this coming year. The expansion of the group activities now requires a different mode of operation. Instead of monthly conference calls with all participants, the group will be separated into major Work Package Groups.

- GOOS communications package: A communications package consisting of coherent messages, graphic designs and other outreach materials that will be made available to the community. By consolidating and refining central GOOS messages, the impact of all outreach activities can be increased and made more effective;
- Industry Advocacy: Efforts are focused on establishing a high level advocacy group comprising a cross section of major multinational businesses that will benefit from GOOS in optimizing their profitability, ensuring that they operate safely and ensuring that they meet environmental protection obligations. The group will work to entrain industry participation and support of GOOS toward these goals;
- Engagement with foundations and benefactors: The group will actively engage charitable foundations to support outreach efforts and GOOS directly. While little tried by GOOS in the past the possibilities for foundation support are very good;
- Workshops and Conferences: Organizing workshops and conferences is a major activity of GOOS and can be used to expand the GOOS message, entrain greater participation and promote ocean observation and forecasting to industry and government. A special planning group to work across GOOS will coordinate and enhance the value of GOOS related conferences and workshops;
- Special Projects: A number of 'special projects' are underway or in prospect. Google Ocean is an effort to distribute GOOS ocean products via the Google Earth software. White paper studies are underway to compile cost-benefit cases for GOOS as a whole and for key elements of the system. An overlap with similar mandates for I-GOOS, GEO and POGO needs resolution. Oceanunited.net is the web portal provided to the Advocacy and Outreach group to use for sharing information and ideas, and to use to disseminate materials to the wider GOOS audience.

The Outreach and Advocacy group is preparing the ground to receive support from foundations and government organizations for its activities. The IMarEST office in London will be used to control financial actions. As an international, non-affiliated, industry and science support group, it was felt that IMarEST could well serve the GOOS advocacy and outreach group.

12.3 BREAKOUT GROUP 3: IDENTIFYING DATA STREAMS FOR THE JOINT TECHNICAL COMMISSION FOR OCEANOGRAPHY AND MARINE METEOROLOGY (JCOMM) TO TAKE ON.

Participants in Breakout Group 3: Thorkild Aarup, Candyce Clark, Philippe Dandin, Peter Dexter, Paul DiGiacomo, John Field, Jean-Louis Fellous, Bob Keely, Tom Malone

Given that:

- JCOMM monitors and facilitates data exchange as a service to user communities, recognition by JCOMM as a contribution to GOOS is, in effect, recognition that data streams should be sustained;
- JCOMM will coordinate the integration of the common variables to be measured as part of the Global Coastal Network (GCN) as their data streams become sustained according to agreed upon standards and protocols (including QC);
- This should be a step-wise process based on recommendations from the GSSC; and
- All guidance to JCOMM concerning coordinated implementation of GOOS in general, and the GCN in particular, should be transmitted to JCOMM by the GSSC.

Recognizing that there is an immediate need to transition from an ad hoc process of identifying programmes as contributors to GOOS, recommendations from the GSSC to the JCOMM should be based on the following:

- The data are made freely available, according to the GOOS principles and the data policies of IOC and WMO, and are used to achieve one or more of the GOOS goals and GEOSS benefits areas;
- Data are served by a responsible body using agreed upon standards and QC procedures;
- The data are in demand for research and/or applications with identified user groups; and
- Routine, robust and sustainable procedures for the delivery of data in forms, at rates and on timescales required by the users are in place and verified.

The GSSC will inform GRAs of these criteria and include a list of examples of projects/programmes that meet these criteria, e.g., CPR, Ferry Box, ChloroGIN, OTN.

12.4 BREAKOUT GROUP 4: DEVELOPING PRESENT ACTIVITIES INTO PILOT STUDIES AND PRIORITIES FOR DOING SO.

Participants in Breakout Groups 4: Kouadio Affian, Justin Ahanhanzo, Keith Alverson, Nick D'Adamo, Paul DiGiacomo, Shao Hua Lin, Tom Malone, Jose Muelbert, Young Jae Ro.

(1) In addition to recommendations from Breakout Group 3, we recommend the use of criteria used by the GEO/IEEE to establish prototype projects for GEOSS. Thus, prototype projects should be:

- Realizable in the field within a specified period;
- Focused in developing countries;
- Sustainable;
- Repeatable ;
- Scalable;
- Reusable;
- Fundable (engage potential sponsors and donor countries early in the planning process).

(2) Working with participating countries, IOC Regional Offices and GRAs, create and maintain an updated inventory and characterization of current activities that should be considered for endorsement as a contribution to GOOS in areas already identified at the 3rd GOOS Regional Forum and GSSC-X as follows:

- Chlorophyll Global Integrated Network (ChlorOGIN) and HABs in this context;
- Land-based sources of marine pollution and run-off;
- Wind-wave-current interactions;
- Multi-hazard early warning system;
- Ocean Tracking Network.

(3) Use the inventory as a starting point for prioritizing projects and programmes for integration into GOOS.

(4) Develop pilot or prototype projects in these areas (land-based sources of pollution, wind-wave-current interactions, multi-hazard early warning) in the context of the effects of global climate change on socio-economic systems and ecosystems.

(5) Specific prototype projects should be developed by countries, IOC Regional Offices and GRAs (through a bottom up process that reflects local and regional needs for data and information on marine and estuarine systems) that

- Provide products to identified users groups working to achieve one or more of the GOOS/GEOSS societal benefits (including but not limited to research groups);
- Contribute to GOOS/GEOSS and benefit by being incorporated into the GOOS family of systems;
- Build capacity through partnerships among developing and developed countries;
- Build on existing programs/projects as possible and appropriate;
- Engage other regional activities with common interests as needed, e.g., LMEs and Regional Seas Conventions;
- Bring together research and operational groups;
- Facilitate the establishment of common standards; and
- Enable 'end-to-end' test beds that support prototype projects and the development of GOOS.

(6) Related Actions for GSSC/PICO

- Ocean Tracking Network
- Remote sensing of water quality
- Joint GEOHAB-GSSC prototype projects on the detection and prediction of Harmful Algal Blooms
- GEO Coastal Zone Community of Practice, CZCP Workshop on coastal hazards

(7) Review and update the list of programmes that have been identified by COOP and OOPC as contributing to GOOS.

12.5 BREAKOUT GROUP 5: PLANNING FOR THE 4TH GOOS REGIONAL FORUM IN 18-21 NOVEMBER 2008 in Guayaquil, Ecuador.

Participants in Breakout Groups 5: Kouadio Affian, Justin Ahanhanzo, Keith Alverson, Nick D'Adamo, Paul DiGiacomo, Shao Hua Lin, Tom Malone, Jose Muelbert, Young Jae Ro

Recognizing the need for a Local Organizing Committee (GRASP, OCEATLAN, IOCARIBE) and following procedures used to plan and organize the 3rd GOOS Regional Forum, the following recommendations are made:

(1) The GPO should work with representatives from GRASP, OCEATLAN and IOCARIBE to establish a Scientific Steering Committee (SSC) that will work with GRAs to specify goals and products of the forum, draft a provisional agenda to achieve them, and draft background papers for each goal. The SC should be limited to 12 people and consist of experts from GRAs, IOC Regional Offices, the GEO Coastal Zone Community of Practice, OOPC, and PICO.

The recommendations below are intended to be just that – recommendations that are meant to (1) inform the Scientific Steering Committee (SSC) of the results of the last GOOS Regional Forum and (2) provide a starting point for the work of the SSC.

(2) Use "Climate Change" as an organizing theme for technical sessions that address the thematic areas discussed at the 3rd Forum (impacts of land-based sources of pollution on coastal ecosystems and the interaction among wind, waves and currents as relevant to problems such as coastal erosion).

(3) Create and maintain an updated inventory and characterization of current activities that should be considered for endorsement as a contribution to GOOS in areas already identified at the 3rd GOOS Regional Forum and GSSC-X.

- Action 1: Request that participants in the 4th GOOS Regional Forum bring information projects and programmes occurring in their coastal waters that would benefit from being a part of GOOS and will contribute to achieving the GOOS/GEOSS benefits.
- Action 2: In the context of action 1, identify national regulatory drivers and link proposals to them.
- Action 3: Use the resulting inventory to prioritize activities for incorporation into GOOS/GEOSS based on the criteria given above.
- Action 4: Identify potential sponsors of prototype projects.
- Action 5: Agree on a format for proposals that includes specification of applications and user groups, a clear statement of goals and objectives, methods for achieving the goals and objectives, and potential sponsors.
- Action 6: Establish task teams to draft proposals for prototype projects that may be endorsed by the GSSC and submitted to potential sponsors to obtain funding with the help of the GOOS Secretariat, the GSSC, PICO, OOPC and other bodies (e.g., POGO, IOCCG, Joint GSSC-IPHAB Task Team) as appropriate.

12.6 BREAKOUT GROUP 6: DISCUSSION OF ACTION ITEMS RAISED IN OOPC REPORT.

Led by: Ed Harrison,

The group reviewed the items presented by Ed Harrison in the OOPC report. Discussion points and action items were recommended to the GSSC.

1. Given that research programme funding supports most of present global OOS, should GSSC plans and GOOS documents recognize this and should ocean science issues play a larger role in GSSC activities?
2. What can GSSC do to foster support for sustaining a largely research-based and research driven global module?
3. Are there any national regulatory drivers for sustaining global ocean observations? Should I-GOOS be asked to prepare national summaries of such drivers?
4. Would it be fruitful to contemplate regulatory frameworks that might be proposed?
5. Recognizing the strong need for increased R&D for sensors, platforms and science, as well as for data system improvements, are there actions the GSSC wishes to consider in support of these matters?
6. Does the GSSC wish to take up issues associated with performance metrics for its sub panels, for GODAE, for Ocean Reanalysis or for JCOMM activities?
7. Does the GSSC wish to take a role in communicating information about the state of the global ocean as part of its outreach activities? If not, how does it suggest that GOOS draw more attention to the information about ocean conditions that is being produced via the OOS?
8. Does the GSSC wish to take a role in its outreach in explaining the extent to which many societies are going to be affected more in the next decades by seasonal to inter annual to decadal variability, rather than climate change?
9. Predictability of decadal variability is a research area than requires consideration of the coupled system. Are there activities that the GSSC wishes to know more about or to encourage in this area? A briefing request?

10. Present knowledge of low frequency behaviour of Interior Ocean is quite limited. Long-term trends estimation requires multi-decadal records. This message was not carried to society via the AR4. Should GOOS seek to influence direction of AR5 to bring the trend and variability issues forward? Are there other outreach efforts GSSC could take to do so? Symposia?
11. All of these are true of ocean carbon uptake, storage and acidification. Does GSSC wish to know more about state of these issues and activities being undertaken to address them?
12. Does GSSC wish to take a more active role in helping to identify priority ocean data system needs and activities? Would it like to be briefed on the recent challenges identified in ocean heat content estimation?
13. Are present activities associated with trying to increase engagement with the non-physical, non-carbon variable communities adequate?
14. Are present activities associated with water level observations and their implications for societies, region by region, adequate? Local conditions can differ greatly from the picture suggested by global sea level rise values.
15. CLIVAR ends in 2013. A new ocean science framework needs to be developed if the science community is to continue to take the global OOS forward. What role does the GSSC wish to play in the coming discussion?
16. Improvement of ocean models, from basin to coastal scales is essential to meeting all of GOOS's goals. Does the GSSC wish to know more about present issues or to undertake any activities in support of ocean model development?
17. Continuing development of high resolution near real time ocean analysis and forecast systems is essential in the Post-GODAE period. Does GSSC have suggestions for how to take the needed activities forward?
18. "Organizational overhead" in meetings, planning, reports, reporting grows more rapidly than resources to support these activities. Has GSSC suggestions for better matching activities with available resources? Sense is of shrinking national engagement; does this need attention at I-GOOS and/or Assembly?
19. Are GOOS relationships with WMO activities, particularly WIGOS and WIS, appropriate?
20. Request a specific report from GODAE on OSE, OSSE and recommendation for future observing system design.

Action items arising from the Working Group reports:

Action 22. *Engage with UNESCO outreach and education activities with external sponsorships*

Action 23. *The GPO should work with representatives from GRASP, OCEATLAN and IOCARIBE to establish a Scientific Steering Committee (SSC) for the GRA Fourth Forum*

13 INTERSESSIONAL WORK PLAN AND INPUT TO I-GOOS IX

13.1 ACCEPT GSSC-XI ACTION ITEMS TO BE CONSIDERED BY I-GOOS BOARD IV

The GSSC chair led the discussion of the action items accumulated throughout the sessions. Additional items were requested at this time. The finalized list is published in the appendix. Dates for completion of the items were to be reviewed by the chair and submitted for suggestions to the I-GOOS board meeting April 11.

Action 24. *Request IGOOS members to document the national regulatory or statutory information requirements.*

Action 25. *Stimulate co-sponsorship of workshops*
Action 26. *Remind GSSC to act on action items*

14 FORMAL ISSUES

14.1 GSSC, PICO AND OOPC MEMBERSHIP

Tom Gross reported for the GOOS Program Office on the appointment of the GSSC, PICO and OOPC membership. GSSC and PICO members are appointed for up to two terms of three years each. At this time all nine GSSC positions and three PICO positions must be filled for terms starting Jan. 1, 2009. Nominations will be presented to the sponsoring bodies, (IOC, WMO, UNEP, ICSU) by the GOOS Program Office. While direct MOUs with several of the sponsoring bodies and GSSC are not in force, the appointment procedure will continue to be adhered to. ICSU has set the earliest deadline for the nominations of Sept. 2008. GSSC is invited to submit a statement of membership needs concerning scientific background and geographical distribution.
The OOPC panel may nominate and appoint their members as needed to respond to changing agendas. At present, including the CLIVAR representatives, the number of panel members is now 12. No action is required by the GSSC relative to the OOPC membership.

Action 27. *Initiate dialogue to reaffirm MOU's with sponsoring bodies*
Action 28. *Submit membership requirements to GPO for inclusion in recommendations to sponsoring organizations*
Action 29. *The GPO to collate and submit a nomination list to sponsor organizations (ICSU requires this input by Sept. 2008).*

14.2 DATE AND PLACE OF THE NEXT GSSC AND PICO SESSIONS

The next joint GSSC/PICO meeting was discussed. Nick D'Adamo volunteered to host the next meeting through his IOC office in Perth, Australia. The date was loosely set to the end of February, 2008.

15 ANY OTHER BUSINESS

The chair invited motions for other business. No motions were put forward.

16 CLOSURE OF THE SESSION

The chair thanked the secretariat for the facilities and preparation of the documents. All members present thanked the chair for his stewardship of the meeting. The chair adjourned the meeting at 17.00 h

17 LIST OF ACTIONS

ANNEX I

AGENDA

1 OPENING AND WELCOME

1.1 OPENING

1.2 ADOPTION OF AGENDA

1.3 WORKING ARRANGEMENT / FORMATION OF IN-SESSION WORKING GROUPS

2 REVIEW OF THE PREVIOUS SESSIONS

2.1 REVIEW RECOMMENDATIONS TO THE GSSC AND I-GOOS AND SPONSORING ORGANIZATIONS AND DETERMINE COURSES OF ACTION

2.2 REVIEW RECOMMENDATIONS FROM GSSC-X AND UPDATE AS NEEDED

3 REVIEW THE CURRENT STATUS OF GOOS

5.1.3 (Moved by agenda change) GRAs Regional Seas, LMEs and other Regional, GOOS- Relevant Programmes

3.1 GLOBAL GOOS: REPORT BY THE OCEAN OBSERVATION PANEL FOR CLIMATE (OOPC) (E. HARRISON)

3.1.1 Review of Global Ocean Data Assimilation Experiments GODAE *(P-Y. LeTraon)*

3.1.2 Adaptive Grid Modelling *(G. Gorman)*

3.2 GOOS OUTREACH AND ADVOCACY (R. RAYNER)

4 BREAKOUT SESSION I

4.1 BREAKOUT GROUP 1: SCOPING FUTURE POSSIBILITIES FOR GLOBAL-COASTAL MODELLING

4.2 BREAKOUT GROUP 2: OUTREACH AND ADVOCACY

4.3 BREAKOUT GROUP 3 PROCESS AND MECHANISMS FOR IDENTIFYING ACTIVITIES FOR RECOGNITION AS PART OF GOOS

4.3.1 Operational data streams for JCOMM to take on

4.3.2 End-to-End Systems for incorporation into GOOS (e.g. the Ocean Tracking Network)

5 GOOS IMPLEMENTATION

5.1 COORDINATION WITH IMPLEMENTING ORGANIZATIONS AND PROGRAMMES

5.1.1 WMO-IOC Joint technical Commission for Oceanography and Marine Meteorology ..... (JCOMM) *(Peter Eexter, J-L. Fellous, Craig Donlon, Candyce Clark, J. Feeley)*

5.1.2 IOC International Oceanographic Data and Information Exchange (IODE)

5.2 GOOS-GEO COORDINATION AND COLLABORATION (J. FIELD)

5.2.1 Matters arising from GEO Plenary

5.2.2 Other linkages

5.2.3 GEO best practices Wiki (J. Pearlman)

5.2.4 GEOSS Architecture (J. Pearlman)

5.3 INTERACTION WITH INDUSTRY (C. GRANT)

5.4 COORDINATION WITH OTHER ORGANIZATIONS AND PROGRAMMES

5.4.1 Global Observing Systems Information Center (GOSIC) ***(C. Lief)***

5.4.2 International Council for the Exploration of the Sea (ICES) ***(A. Kellerman)***

5.4.3 North Pacific Marine Science Organization (PICES) ***(Y-J. Ro)***

5.4.4 Partnership for Observation of the Global Ocean (POGO) ***(J. Gunn)***

5.5 PLANS FOR PILOT PROJECTS AND NEW STUDIES (WORKING GROUP REPORT)

5.6 CENSUS OF MARINE LIFE (COML) (J. GUNN)

5.7 OTHER RESEARCH INITIATIVES RELEVANT TO GOOS DEVELOPMENT

6 BREAKOUT SESSION II

6.1 BREAKOUT GROUP 4: DEVELOPING PRESENT ACTIVITIES INTO PILOT STUDIES AND PRIORITIES FOR DOING SO

6.2 BREAKOUT GROUP 5: PLANNING FOR THE 4TH GOOS REGIONAL FORUM

7* STATEMENT BY INCOMING GSSC CHAIR *(R. Rayner)

8 REGIONAL GOOS IMPLEMENTATION

8.1 ROLE AND STATUS OF GRAS IN IMPLEMENTATION OF COASTAL GOOS (T. AARUP)

8.2 ARCTIC ROOS (K. ALVERSON)

8.3 OCEAN CHLOROPHYLL PILOT PROJECT (CHLOROGIN) (J. FIELD)

8.4 SUPPORT FOR COASTAL HAZARD MITIGATION AND COASTAL DEVELOPMENT (D.Y. LEE)

8.5 PREPARATION FOR THE 4TH GOOS REGIONAL FORUM (J. MUELBERT)

9 PICO LINKAGES: IGOS COASTAL THEME AND GEO COASTAL ZONE COMMUNITY OF PRACTICE

9.1 OVERVIEW AND STATUS OF GEO COASTAL ZONE COMMUNITY OF PRACTICE (DIGIACOMO)

9.2 REGIONAL GEO COASTAL ZONE COMMUNITY OF PRACTICE WORKSHOP (DIGIACOMO)

10 REVIEW AGENDA FOR PICO-I

11 REPORT ON THE SCIENTIFIC WORKSHOP

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13 INTERSESSIONAL WORK PLAN AND INPUT TO I-GOOS IX

13.1 ACCEPT GSSC-XI ACTION ITEMS TO BE CONSIDERED BY I-GOOS BOARD IV

14 FORMAL ISSUES

14.1 GSSC, PICO AND OOPC MEMBERSHIP

14.2 DATE AND PLACE OF THE NEXT GSSC AND PICO SESSIONS

15 Any Other Business

16 CLOSURE OF THE SESSION

17 LIST OF ACTIONS

ANNEX II

LIST OF PARTICIPANTS

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ANNEX III

LIST OF DOCUMENTS

Document Code	**Title**	Agenda item	Lang
GSSC-XI/01	Provisional Agenda	All	E only
GSSC-XI/02	Provisional Timetable	All	E only
GSSC-XI/03	List of Participants	All	E only
GSSC-XI/04	Provisional list of Documents (this document)	All	E only
GSSC-XI/05	Review of I-GOOS and Sponsoring Organizations' Recommendations to GSSC	2.1	E only
GSSC-XI/06	Review of GSSC-X Actions Recommendations	2.2	E only
GSSC-XI/07	OOPC Report	3.1	E only
GSSC-XI/08	GODAE Report	3.1.1	E only
GSSC-XI/10	Report by GOOS Outreach and Advocacy Group	3.2	E only
GSSC-XI/11	JCOMM report	5.1.1	E only
GSSC-XI/14	Report on GEO/GEOSS	5.2	E only
GSSC-XI/15	Interaction with Industry	5.3	E only
GSSC-XI/16	GOSIC report	5.4.1	E only
GSSC-XI/17	ICES report	5.4.2	E only
GSSC-XI/18	PICES Presentation	5.4.3	E only
GSSC-XI/19	POGO report	5.4.4	E only
GSSC-XI/22	Census of Marine Life (CoML)	5.6	E only
GSSC-XI/24	Arctic ROOS	8.2	E only
GSSC-XI/25	Report on Ocean Chlorophyll Pilot Project	8.3	E only
GSSC-XI/27	Support for Coastal Hazard Mitigation and Coastal Development	8.4	E only
GSSC-XI/28	Preparation for the 4th GOOS Regional Forum	8.5	E only
GSSC-XI/29	Report of GEO Coastal Zone Community of Practice	9.1	E only
GSSC-XI/30	PICO Report	10	E only
GSSC-XI/31	Report on the Scientific Workshop	11	E only
GSSC-XI/32	GSSC-XI Action Items to be considered by I-GOOS Board IV	13.1	E only
GSSC-XI/33	Report on GSSC Membership	14.1	E only
GSSC-XI/34	Report on OOPC and PICO's Membership	14.2	E only
GSSC-XI/P01	Report of Intergovernmental Panel on Harmful Algal Blooms	3.2	E only
GSSC-XI/P02	PICO Terms of reference	All	E only
GSSC-XI/P03	PICO-I Agenda	All	E only
			E only
GOOS-163	3rd Session of the Executive Board of the IOC-WMO-UNEP Intergovernmental Committee for GOOS (I GOOS Board III)	2.1	E only
GOOS-165	Report of I-GOOS-VIII Session	2.1	E only
IOC-XXIV/3	Twenty-fourth Session of the Assembly	2.1	E only

Document Code	**Title**	Agenda item	Lang
GOOS-161	GSSC-X Report		E only
	Report of the ICES/IOC Steering Group on GOOS 2006	5.2.2	E only
GSSC-X/5.7.2	ICES Report	5.4.2	E only
GOOS-166	The Southern Ocean Observing System (SOOS) Interim Report	8.2	E only
GOOS-159	Third GOOS Regional Forum Report	8.5	E only
	Terms of reference for the GOOS Scientific Steering Committee (GSSC)	14	E only
GSSC-XI/P02	Pico Terms of reference		E only
GSSC-XI/B/01	IOC Invitation Letter for GSSC-XI		E only

ANNEX IV

LIST OF ACRONYMS

ABE-LOS	Advisory Body of Experts on the Law of the Sea
BP	Bureau of Programme Planning
ChloroGIN	Chlorophyll Globally Integrated Network
CLIVAR	Climate Variability and Predictability
CODATA	Committee on Data for Science and Technology
CoML	Census of Marine Life
CPR	Continuous Plankton Recorder
CREAMS	Circulation Research East Asian Marginal Seas
CSIRO	Commonwealth Scientific and Industrial Research Organization
CSSWG	Coastal and Shelf Seas Working Group
CZCP	Coastal Zone Community of Practice
DMPA	Data Management Programme Area
FUTURE	Forecasting and Understanding Trends, Uncertainty and Responses of North Pacific Marine Ecosystem
GCOS	Global Climate Observing System
GEO	Group on Earth Observations
GEONETCast	GEO Network broadcast (data information systems)
GEOSS	Global Earth Observation System of Systems
GISC	Global Information System Centers
GODAE	Global Ocean Data Assimilation Experiment
GOHWMS	Global Ocean related Hazards Warning and Mitigation System
GOSIC	Global Observing Systems Information Center
GOOS	Global Ocean Observing System
GPO	GOOS Project Office
GRAs	GOOS Regional Alliances
GRASP	GOOS Regional Alliance for South Pacific
GRC	GOOS Regional Council
GSSC	GOOS Scientific Steering Committee
GTOS	Global Terrestrial Observing System
HABs	Harmful Algal Bloom
ICES	International Council for the Exploration of the Sea
ICOM	Imperial College Ocean Model
ICSU	International Council for Science
IEEE	Institute of Electrical & Electronics Engineers
I-GOOS	Intergovernmental Committee for GOOS
IGSG	ICES GOOS Steering Group
IMarEST	Institute of Marine Engineering, Marine and Technology

IMBER	Integrated Marine Biogeochemistry and Ecosystem Research
IOC	Intergovernmental Oceanographic Commission (of UNESCO)
IOCARIBE	Regional Sub-Commission for the Caribbean and Adjacent Regions
IOCCG	International Ocean Colour Coordinating Group
IOCCP	International Ocean Carbon Coordination Project
IODE	International Oceanographic Data and Information Exchange
IOOS	Integrated Ocean Observing System
IPCC	Intergovernmental Panel on Climate Change
IPHAB	Intergovernmental Panel on Harmful Algal Blooms
IPY	International Polar Year
JCOMM	Joint WMO-IOC Technical Commission for Oceanography and Marine Meteorology
JCOMM-MAN	JCOMM Management Committee
JCOMM-OPS	JCOMM Observing Platform Support Center
LME	Large Marine Ecosystem
MOU	Memorandum of Understanding
NCDC	National Climatic Data Center
NDBC	National Data Buoy Center
NEARGOOS	North-East Regional GOOS
NOAA	National Oceanic and Atmospheric Administration (USA)
OCEATLAN	The Regional Alliance for the Upper Southwest and Tropical Atlantic
OGP	Oil and Gas Producers
OOPC	Ocean Observations Panel for Climate
OOS	Ocean Observing System
OPSC	Observing Program Support Center
OSE	Observing System Experiment
OSSE	Observing System Simulation Experiment
OTN	Ocean Tracking Network
PICES	North Pacific Marine Science Organization
PICO	Panel for Integrated Coastal Observations
PIGOOS	Pacific Islands GOOS
POGO	Partnership for Observation of the Global Ocean
ROOS	Regional Ocean Observing System
SAHFOS	Sir Alister Hardy Foundation for Ocean Science
SAON	Sustaining Arctic Observing Networks
SGGOOS	Steering Group for GOOS
SSC	Scientific Steering Committee
TOWS	Tsunami Operational Warning System
UN	United Nations
UNEP	United Nations Environment Programme
WCRP	World Climate Research Programme

WIGOS	WMO Integrated Global Observing System
WIS	WMO Information System
WMO	World Meteorological Organization