Intergovernmental Oceanographic Commission
Reports of Meeting of Experts and Equivalent Bodies

Regional Forum of the Global Ocean Observing System (GOOS)

First Session
2 - 6 December 2002
Athens, Greece

GOOS Report No. 127 **UNESCO**

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ABSTRACT

The fifth session of the Intergovernmental Committee for GOOS (I-GOOS) (Paris, June 2001) decided that given the rapid growth of GOOS Regional Alliances (GRAs) it was necessary to bring all the regional groups together regularly so as to benefit from each other's achievements, to promulgate "best practice", to create a sense of community between the GRAs, and to ensure an harmonious development of GOOS at the global level. The First Regional GOOS Forum was the mechanism chosen to achieve these goals. In addition it offered an opportunity to establish benchmarks by sharing experience, assessing progress, and identifying gaps.

The venue and timing of the Forum (Athens, Greece, 2 - 6 December 2002) were chosen to capitalize on the fact that from 3-5 December 2002, EuroGOOS was holding its third Conference on Operational Oceanography, which would give all of the other GRAs a chance to see the full extent of EuroGOOS's activities.

To stimulate the interchange of ideas, each GRA provided details about itself and its activities on a standard form (the "Regional Template"). The various needs of the GRAs fell into six main categories: (i) infrastructure; (ii) making observations (monitoring); (iii) data and information access, management, communication and exchange; (iv) data analysis, assimilation, modelling and product development; (v) awareness raising; and (vi) funding. It was agreed that the these needs would be drawn to the attention of the sixth session of I-GOOS (Paris, France, 10-14 March 2003), and that GRAs from the industrial world would draw the needs of the less developed regions to the attention of their supporting agencies, as a means of stimulating technology transfer and capacity building initiatives on a bilateral basis.

Participants agreed to work together towards the development of a proposal to the European Commission's (EC's) sixth Framework Programme (FP6) with the goal of strengthening the network of GRAs as a step towards building a fully operational global system.

* Translated into French and Spanish

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1. OPENING AND WELCOME

The first Regional GOOS Forum took place in the Athenaeum Intercontinental Hotel, Athens, Greece, where premises had been made available as part of the arrangements for the third EuroGOOS Conference on Operational Oceanography. The Forum was opened formally at 0900 on Monday 2 December 2002 by the chairperson of the Intergovernmental Committee for GOOS (I-GOOS), Mme Silvana Vallerga, who was the chairperson for the Forum.

1.1 WELCOME AND INTRODUCTIONS

Mme Vallerga welcomed participants, and invited Patricio Bernal, Executive Secretary of the Intergovernmental Oceanographic Commission (IOC) to address the meeting. Mr. Bernal reminded people how GOOS had been developing in recent years, and noted that as GOOS implementation had begun, since 1998, many Member States of the IOC had begun to develop more of an interest in GOOS particularly through activities at the regional level. Some of these expressions of interest took place through intergovernmental bodies such as the IOC's regional Sub-Commissions for the Western Pacific (WESTPAC) and the wider Caribbean region (IOCARIBE), but others involved groupings of agencies with interests in a common sea area. Both models were acceptable.

He laid out three challenges for the participants to consider:

(i) Institutional: how fast can we develop GOOS, bearing in mind that much of it has developed or is developing through research rather than operational activities? Where will the future funding of operational activities come from?
(ii) Effectiveness: to make GOOS work effectively would require an effective system (or set of subsystems) managed by organizations that were charged with developing and disseminating products.
(iii) Economic: it will require considerable resources to build a comprehensive and integrated global system.

Bearing these challenges in mind, he offered participants a note from the IOC biennial report for 2000-2001, which reads:

"The long term challenge for the IOC is to define a global framework in which the development of GOOS as a single, permanent, global, public-oriented service can be achieved, with the active contribution of different sectors of the society, including the private sector. This requires demonstration of the economic benefits of a common shared strategy between the public and private sector, the identification of the public and private services that can be derived and/or shared through a common observing platform and the appropriate segmentation of public and private products and users. Achieving this new vision will require the development, negotiation and adoption of international norms and agreements, especially in the area of data and information exchange and sharing."

1.2 LOGISTICS

Colin Summerhayes, Director of the GOOS Project Office (GPO) reminded people about the working documents for the meeting, which had been made available through the GOOS web site (http://ioc.unesco.org/goos), explained the plan of the meeting as set out in the revised provisional agenda (Annex I), and reminded participants (listed in Annex II) that they were encouraged to participate in the sessions of the 3rd EuroGOOS Conference on Operational Oceanography that would take place in the Hotel from 3 -5 December 2002, between the two sessions of the Regional GOOS Forum. In effect the EuroGOOS Conference was an integral part of the Forum, through which members of other regional GOOS groups could see at first hand what EuroGOOS is achieving.

2. PRESENTATION OF THE RATIONALE OF THE GOOS REGIONAL FORUM

Silvana Vallerga reminded participants that I-GOOS-V (Paris, France, June 2001) fully supported the development of GOOS Regional Alliances (GRAs), and had decided that, given the rapid growth of GOOS Regional Alliances (GRAs), it was necessary to bring all the regional groups together regularly so as to benefit from each other's achievements, to promulgate "best practice", to create a sense of community between the GRAs, and to ensure an harmonious development of GOOS at the global level. The Forum was the mechanism chosen to achieve these goals. In addition it offered an opportunity to establish benchmarks by sharing experience, assessing progress, and identifying gaps.

The venue and timing of the Forum had been chosen to capitalize on the fact that EuroGOOS was holding its third Conference on Operational Oceanography, which would give all of the other GRAs a chance to see the full extent of EuroGOOS's activities. Dr. Vallerga noted that several of the GRAs had chosen the occasion to present papers on their activities as part of the EuroGOOS Conference, and urged all Forum participants to attend the Conference sessions over the next three days.

Dr. Vallerga reminded participants that to stimulate the interchange of ideas, each GRA had been asked to provide details about itself and its activities on a standard form (the "Regional Template"). Completed Regional Templates had been made available before the meeting for most of the regions and were tabled at the meeting for Pacific Islands GOOS. None was available for EuroGOOS, because the EuroGOOS Office had been fully occupied in preparing the EuroGOOS Conference. She noted that the US national programme had been included as one of the GRAs because the USA comprised such a large geographical region, including three oceans (Atlantic, Pacific and Arctic) and on regional sea area (Gulf of Mexico). In addition one region from within an individual continent (Western Australia GOOS, or WAGOOS) had been included, because it gave an example of how industry could be brought into GOOS as a partner.

3. ROUND-TABLE PRESENTATIONS OF THE ACHIEVEMENTS AND PROBLEMS OF THE REGIONAL GOOS ACTIVITIES

The different GRAs were then invited to make brief presentations based on the Regional Templates and highlighting the progress they had achieved to date, and the chief issues that concerned them – including impediments to progress. The focus was on problems encountered; lessons learned, and successful case examples. Presentations were heard from:

(i) EuroGOOS (Hans Dahlin) (Annex III)
(ii) MedGOOS (Aldo Drago) (Annex IV)
(iii) Black Sea GOOS (Gennady Korotaev) (Annex V)
(iv) GOOS-AFRICA (Justin Ahanhanzo) (Annex VI)
(v) Indian Ocean GOOS (Bill Erb) (Annex VII)
(vi) Pacific Islands GOOS (Alf Simpson) (Annex VIII)
(vii) NEAR-GOOS (Dong-Yong Lee) (Annex IX)
(viii) SEA-GOOS (Anond Snidvongs) (Annex X)
(ix) IOCARIBE-GOOS (Guillermo Garcia) (Annex XI)
(x) US GOOS (Eric Lindstrom) (Annex XII)
(xi) WAGOOS (Ray Steadman) (Annex XIII)

Ms. Janice Trotte of the Rio GOOS Office then told participants about the plans of that Office to assist in the development of regional GOOS activities in the South Atlantic. The idea is to facilitate integration of existing observing system elements, including PIRATA, into a comprehensive regional climate programme. The regional needs and opportunities for this development will be examined at a regional workshop to be held in February 2003 as part of an OOPC workshop on the observing system for climate in the South Atlantic, and in association with the 9th meeting of the PIRATA Steering Committee.

Mr. Rodrigo Nunez and Mr. Rodney Martinez then outlined the possibilities for the development of a GRA for the southeastern Pacific, where several of the countries of western South America have recently enhanced their networks of offshore buoys and coastal tide gauges.

4. ROUND-TABLE DISCUSSION

Many common concerns and needs emerged from the several presentations. These are summarized in section 9, below. The participants noted with interest that the problem of co-ordination between agencies bedevils oceanography everywhere – in industrialised as well as in developing regions. In that context, then, the main blocks to the advancement of operational oceanography and GOOS are organizational rather than matters of resources and knowledge.

The participants noted that much of the development of GOOS to date had been concerned more with the open ocean components related to weather and climate forecasting, rather than with the coastal seas. In that the oceanography of coastal seas is strongly influenced by what happens in the open ocean, the GRAs should benefit from the open ocean developments. In turn the GRAs now had an opportunity to influence the further development of open ocean programmes such as GODAE and Argo, by expressing their needs for open ocean information.

The participants also agreed that publication of the Coastal GOOS Design Plan produced by COOP would help to reinforce the development of operational oceanography and GOOS in coastal seas.

Ray Steadman (WAGOOS) drew the attention of the participants to the requirements placed on industry by legislation to provide environmental information. Laws relating to the safety of the work place, and to the protection of the environment are in effect pushing offshore industries to consider what they must do to support sustainable development. Typical large offshore developments undertaken by the oil and gas industry might have budgets of the order of US$ 10 billion. If only 0.05% of this was made available for investment in compliance with environmental requirements, then quite large sums could be available for making observations. This is already happening in Australia, if not elsewhere, and could be exploited for developing GOOS. It might be advisable to approach high-level industrial associations with a view to aligning our plans with their requirements; this might provide another route to establishing the value of the observing systems in the eyes of government.

Silvana Vallerga noted that the presentations demonstrated a need to work together through a joint activity to develop a comparable level of capacity between the different regions. She drew the attention of the participants to the possibility of doing this through the development of a new initiative under the European Commission's (EC's) sixth Framework Programme (FP6). Through this initiative some 1.2 million Euro might be available for further developing the global network of GRAs in much the same manner as had been achieved under the EC's fifth Framework Programme between individual national agencies within MedGOOS through the MAMA project (Mediterranean network to Assess and upgrade the Monitoring and forecasting Activity in the region). The ultimate goal of the joint activity would be to strengthen the network of GRAs as a step towards building a fully operational global system by around 2020, through incremental improvements, adoption of emergent technology from research and the raising of capacity.

To stimulate discussion, Dr. Vallerga presented a straw-man proposal outlining how such an initiative might be developed to meet the European Commission's need to widen international co-operation to contribute to GOOS. Participants were informed that the call for proposals by the EC for Framework 6 was scheduled for 17 December 2002, and that proposals would have to be submitted by the end of March 2003.

In an extended discussion of Dr. Vallerga's proposal, it became apparent that the different regional groups had different needs and priorities, because they were all at different stages of development. This made it difficult for some GRAs to see how they might participate in or benefit from the proposal. The general view was that the opportunity should not be missed, that there were advantages to be gained from linking the different GRAs, and that the focus should be on building capacity. The proposal would help in assessing what is needed by the different GRAs and start an exchange of personnel to help build capacities.

The acronym GRAND - GOOS Regional Alliances Network Development - was suggested as an appropriate title for the proposed project. In keeping with the EC's models for constructing proposals it would have a number of work packages each representing a specific subset of activities. These might include: overall coordination; stocktaking and identification of the present situation; the interface between regional and global effort; the transfer of expertise through a visiting scientists scheme; and development of an awareness campaign directed at policy makers. A number of individuals were identified as possible developers for some of the proposed work packages.

In addition, Dr. Vallerga told participants about the EC's FP6 Marie Curie Research Training Networks that would fund the training of individuals in the techniques of operational oceanography. Some 1.7 million Euros are available in the Programme.

5. I-GOOS REGIONAL POLICY

Angus McEwan led a discussion on the Regional Policy for GOOS. An initial Regional Policy document had been presented to I-GOOS-V, and received broad support. However the authors had been requested to slim it down and make it more useful for stakeholders and policy makers. The draft presented at the Athens meeting was that revision, and he requested suggestions for improvements, if any, to be made to the document before it is presented for approval to I-GOOS-VI. Several suggestions were made and participants were asked to comment in writing within 10 days.

6. PLANS FOR CLIMATE COMPONENT OF GOOS (OOPC, GODAE, Argo)

Neville Smith made a presentation on the work of the Ocean Observations Panel for Climate (OOPC) of which he had been chair until mid 2002. He included in his presentation progress with and plans for the main OOPC (and GOOS) pilot projects: the Global Ocean Data Assimilation Experiment (GODAE), and the Argo profiling float programme. The GRAs were encouraged to consider how GODAE and Argo might be adapted to meet their needs, and to consider how they might contribute to GODAE and Argo.

7. PLANS FOR COASTAL GOOS

Tom Malone (Co-Chair of the Coastal Ocean Observations Panel – COOP) made a presentation on the work of COOP, summarizing the content of the Design Plan for the coastal component of GOOS. He made the point that the satisfactory implementation of the Plan depends on the co-ordinated activities of coastal laboratories at the local scale, and of the GRAs on a global scale. The GRAs provide one of the most effective potential means of product development for the coastal environment. Recognizing the key role of the GRAs he suggested that they should be encouraged to develop as a Global Federation of GRAs.

One important task of the GRAs, apart from implementing the core element of the COOP Plan (the global coastal network) would be to specify the additional variables that should be measured in their own areas, such as species-specific fish stocks; biologically structured habitats (e.g. reefs); large marine animals and birds, plus invasive species and harmful algae; and chemical contaminants. The GRAs should be encouraged to form partnerships with the Large Marine Ecosystems programmes in their areas, and with appropriate parts of the Regional Seas Programme and regional fisheries bodies. One possible model was given by the North Sea Ecosystem Pilot Project (NORSEPP), which was being developed in a partnership between ICES, EuroGOOS, OSPAR and IOC.

He noted that a coastal GOOS seminar had been held recently as part of the IOGOOS Conference in Mauritius (4-9 November 2002), which was attended by 75 people from 15 countries. At that meeting participants had identified as priorities for coastal observations: coastal erosion and flooding; habitat biodiversity; nutrient pollution; sustainable fisheries; and chemical contamination.

8. JOINT TECHNICAL COMMISSION FOR OCEANOGRAPHY AND MARINE METEOROLOGY (JCOMM) DEVELOPMENTS

Peter Dexter explained how JCOMM was developing, and related these developments to the GRAs. JCOMM is identifying regional needs for capacity building, and many of those needs are likely to be the same as those required by the coastal GOOS and GRA communities. JCOMM is also developing specific regional projects to satisfy regional needs in specific areas. While this could be done in future in close co-operation with COOP, past developments had taken place before COOP was created. The two key projects were the Western Indian Ocean Marine Applications Project (WIOMAP), and the South East Asia Centre for Marine and Atmospheric Prediction (SEACAMP). WMO was working on obtaining funds to launch them.

9. REVIEW OF THE NEEDS OF REGIONAL GOOS BODIES

The various needs highlighted through the regional presentations in agenda item 3 were summarized in Table 1, below, into six main categories of capacity building: (i) infrastructure; (ii) making observations (monitoring); (iii) data and information access, management, communication and exchange; (iv) data analysis, assimilation, modelling and product development; (v) awareness raising; and (vi) funding. The numbers in parentheses show where the need was identified by more than one GRA.

It was agreed that these topics should be considered in the development of the GRAND proposal, and brought to the attention of I-GOOS-VI (10-14 March 2003). In addition, it was agreed that the GRAs from the industrial world would draw the needs of the less developed regions to the attention of their supporting agencies, as a means of stimulating technology transfer and capacity building initiatives on a bilateral basis.

Table 1: FIRST REGIONAL GOOS FORUM: REGIONAL NEEDS

(i) Infrastructure

- Appropriate institutions and infrastructure;
- Supply and employment of skilled personnel (2);
- Appropriate coordinating mechanism (including dedicated Secretariat) (2);
- More enabling research, and research facilities;
- Training facilities;
- Improved communications infrastructure (bandwidth – and even e-mail in some areas);
- Mechanism to transition research to operations.

(ii) Making Observations (Monitoring)

- Much increased monitoring (to eliminate the many data gaps) (3);
- Aid and training in the deployment, operation and maintenance of observing equipment (including ship time and on-board training (3);
- Improvements and increases in technological systems for observations (including, e.g., tide gauge network for Africa) (3);
- Inventories of current situation.

(iii) Data and Information Access, Management, Communication and Exchange

- Integrated data management system for rapid access to diverse data from disparate sources;
- Improved data exchange at national level (full potential is untapped) (4), and between countries (2), including removal of barriers to the exchange of certain data (e.g. bathymetric and pollution);
- The means for accessing, processing, analysis and storage of satellite data (2);
- Timely processing of real-time data, to increase the value of exchange;
- Communication facilities for real-time exchange of data; training in data transmission (3);
- Creation of websites accessible in a common international language;
- Improved archiving, databases and QA/QC, and training in QA/QC (2);
- Common standards of measurement or accuracy;
- Training in data and information management (2).

(iv) Data Analysis, Assimilation, Modelling and Product Development

- Training and increase of personnel in numerical modelling and data assimilation (3);
- Access to appropriate computing facilities for data processing and modelling (2);
- Training in merging, analysing and transforming data into sophisticated data products (2).

(v) Awareness Raising

- Bring together the wide and diverse stakeholder community;
- Raise awareness of and get support from decision makers, managers, scientists and industry, by demonstrations of usefulness of the tools for national development (through products relevant to users' needs) (7);
- Recognize the disparate missions of different national ocean agencies and get them working together to create consensus, co-operation and commitment (from chaos to order) (3);
- Gain special commitment of the scientific community, and of meteorological agencies;
- Capitalize on legal requirement for industry to show its 'green' credentials (environmental compliance) and to demonstrate it is observing a 'duty of care' (which translates into funding) (note usefulness of industry associations);
- Gain commitment by government (national political will) noting governments' obligations under global Conventions (6);
- Gain regional consensus between nations (build on regional instruments, like Regional Seas Conventions and Action Plans etc);
- Address the legal impediments to timely observations in EEZs, and to data exchange (2).

(vi) Funding

- Gain higher levels of investment (4).

10. CLOSURE

The meeting was closed at 1800 on Friday 6 December 2002.

11. LIST OF ACTIONS

(i) GRAs to prepare statements on possible activities that might form part of an eventual FP6 proposal;

(ii) Silvana Vallerga to circulate by e-mail revised version of the GRAND proposal outline;

(iii) FP6 proposal to be developed under the leadership of a European laboratory (S. Vallerga to lead);

(iv) GRA's from industrial areas to consider developing bilateral capacity building assistance for GRAs from developing regions;

(v) Report of Forum to be presented to I-GOOS-VI;

(vi) Comments on Regional Policy document to Angus McEwan by 16 December 2002;

(vii) Final version of Regional Policy document to be made available for I-GOOS-VI.

ANNEX I

AGENDA AND TIMETABLE
FIRST REGIONAL GOOS FORUM AND EuroGOOS CONFERENCE

DAY 1: Monday 2 December 2002: FIRST REGIONAL GOOS FORUM

09.00 - 10.00
1. OPENING AND WELCOME
   - 1.1 WELCOME AND INTRODUCTIONS
   - 1.2 LOGISTICS

10.00 - 10.30
2. PRESENTATION OF THE RATIONALE OF THE GOOS REGIONAL FORUM

10.30-11.15
3. ROUND-TABLE PRESENTATIONS OF THE ACHIEVEMENTS AND PROBLEMS OF THE REGIONAL GOOS ACTIVITIES
   - 3.1 EuroGOOS
   - 3.2 MedGOOS
   - 3.3 Black Sea GOOS
   - 3.4 GOOS-AFRICA

11.15-11.30 Break

11.30-12.30
3. ROUND-TABLE PRESENTATIONS OF THE ACHIEVEMENTS AND PROBLEMS OF THE REGIONAL GOOS ACTIVITIES (cont'd):
   - 3.5 Indian Ocean GOOS
   - 3.6 PacificGOOS
   - 3.7 NEAR-GOOS
   - 3.8 IOCARIBE-GOOS
   - 3.9 US GOOS

12.30- 14.00 Lunch

14.00 -14.40
4. PLANS FOR CLIMATE COMPONENT OF GOOS (OOPC, GODAE, Argo)

14.40 - 16.00
5. ROUND-TABLE DISCUSSION

This session will be based on background papers that will be prepared by the nine active GOOS regional groups (to a template devised by the I-GOOS Chair), and distributed by the GPO in advance. The nine regional groups comprise: (i) EuroGOOS, (ii) MedGOOS, (iii) Black Sea GOOS, (iv) GOOS-AFRICA, (v) Indian Ocean GOOS, (vi) PacificGOOS, (vii) NEAR-GOOS, (viii) IOCARIBE-GOOS, and (ix) US GOOS (which, like EuroGOOS, comprises a number of discrete regional GOOS bodies). The focus will be on problems encountered; lessons learned; and successful case examples.

16.00- Close

DAY 2: Tuesday 3 December 2002: EuroGOOS CONFERENCE
DAY 3: Wednesday 4 December 2002: EuroGOOS CONFERENCE
DAY 4: Thursday 5 December 2002: EuroGOOS CONFERENCE
DAY 5: Friday 6 December 2002 (morning): EuroGOOS CONFERENCE
DAY 5: Friday 6 December 2002 (afternoon): FIRST REGIONAL GOOS FORUM (CONTINUED)

(14.30-18.00)

6. I-GOOS REGIONAL POLICY

This session will involve a discussion of the I-GOOS Regional Policy document that was presented at I-GOOS-V. The focus will be on what changes, if any, need to be made to the document before it is presented for approval to I-GOOS-VI.

7. PLANS FOR COASTAL GOOS

8. JOINT TECHNICAL COMMISSION FOR OCEANOGRAPHY AND MARINE METEOROLOGY (JCOMM) DEVELOPMENTS

9. REVIEW OF THE NEEDS OF REGIONAL GOOS BODIES

10. CLOSURE

ANNEX II

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ANNEX III

**REPORT ON REGIONAL GOOS ACTIVITIES (year 2002):
EuroGOOS**

1. NAME OF REGIONAL GROUP

EuroGOOS (European Global Ocean Observing System)

2. CONTACTS, COORDINATION

2.1. *PRINCIPAL CONTACT POINTS*

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2.2 MECHANISM FOR COORDINATION OF GOOS

The EuroGOOS website (www.eurogoos.org) is kept updated with news and reports from meetings. Information about forthcoming meetings, activities and important events is distributed via e-mail to relevant members.

The Board of Officers meets 3-4 times a year. Decisions are made at the EuroGOOS Annual Meetings.

The EuroGOOS Director participates in a lot of project meetings and ocean-related meetings, providing a natural way to inform others of the work and aims of EuroGOOS and the bottom-up approach to Operational Oceanography.

2.3 CONTACTS WITH GLOBAL, REGIONAL AND NATIONAL ORGANISATIONS

EuroGOOS has identified the key common factors of interest with each organisation, as far as possible, and works with them to achieve specific objectives. This must be done in parallel with concentration on developing operational services, and promoting new operational systems.

IOC and WMO are together with UNEP co-sponsors of GOOS. Close links between these UN bodies and EuroGOOS, acting as a regional GOOS association, are essential. EuroGOOS reports regularly to the GOOS Steering Committee and to the GOOS Project Office, GPO, on its activities, and there are current contacts between the offices. GPO Officers are also invited to attend EuroGOOS meetings. EuroGOOS has a co-ordinating role for the European oceanographic contribution to JCOMM and to the Coastal Module of GOOS, and a dialogue has begun with representatives for JCOMM to consider how JCOMM can contribute to the "building of a European capacity for operational oceanography" and vice versa. EuroGOOS members and the Office have participated in the design of the Coastal Module and a first step has been taken to engage the Task Teams in the implementation. The Third EuroGOOS Conference hosted the first GOOS Regional Forum with participation from most GOOS Regional Associations. An important item at the Forum was how to interact between the global and the regional work in the implementation of GOOS.

ICES has been responsible for a GOOS-like system in the North Atlantic for a century and several of the EuroGOOS members are also active within ICES. EuroGOOS has promoted co-operation between GOOS and ICES for some years and also established direct contacts. EuroGOOS participated in the establishment of and participates in the ICES-IOC Steering Group for GOOS (the task of the group is to steer ICES GOOS

activities, not to steer GOOS). During 2002 this group has created close contact with the Coastal Module of GOOS and Coastal GOOS was also an important theme session at the ICES Annual Science Conference.

European activity has also been busy with plenty of contact with the European Commission as well as newly established working contacts with DG Environment. There has been a lot of GMES activity during the year, both writing and attending meetings, and in particular the EuroGOOS Director gave a keynote talk at GMES Forum 1. The FP6 kick-off in Brussels was another major activity attended by the Director.

Other European activities have included NORSEPP planning and the Baltic Committee with a BOOS presentation and formulation of resolution for a Working Group between the Committee and EuroGOOS.

Regionally the EuroGOOS Director has actively participated in the NWSTT and assisted in the creation of NOOS. Other activities include SeaNet (North Sea), HELCOM Monas to establish operational service from BOOS, HIROMB, and co-ordination between MerSea- ForeSea and EuroGOOS.

2.3 SUMMARY OF 2002

The year 2002 has been a year of major changes for EuroGOOS since we have changed Director, meaning that the Office in Southampton closed at the end of last year. A new Office and some new routines have been established during the year at the SMHI Headquarters, Norrköping in Sweden.

While the Mediterranean Forecasting System, MFS, and the Baltic Operational Oceanographic System, BOOS, have reached a more autonomous level, the Office together with the Northwest Shelf Task Team have finalised the NOOS Agreement that has been signed by most Northwest Shelf Members and entered into force during the autumn.

The members around the semi-enclosed regional seas, the Mediterranean, the Baltic and the Black Sea, have, through funding from the European Commission, gained increased possibilities to co-ordinate the development of operational oceanography in their regions and also to include all coastal states in their region in the work.

A call for project proposals from the programme for Global Monitoring for Environment and Security, GMES, and a call for Expressions of Interest for the Sixth Framework Programme have initiated intensive activities among the EuroGOOS members. This is continued work that will be intensified during 2003, but already during 2002 a first step of the MERSEA concept, Marine Environment and Security for the European Area, has been financed through the GMES/MERSEA-Strand 1 project. This project brings the Global scale into the European operational ocean forecasting and has connections with all EuroGOOS Task Teams.

3. REGIONAL CONTRIBUTIONS TO GOOS IMPLEMENTATION

An important objective for EuroGOOS according to the Agreement is to promote the development of European regional and local operational oceanography. The regional task teams have for several years had the duty to plan and implement operational systems in their regions. Sustained systems have to be built on strong commitments from the participating partners but additional external funding has been shown to be necessary to gather speed in co-ordination and development.

Two new regional projects that have the active participation of the EuroGOOS Office have started during 2002:

- The MAMA-project, Mediterranean network to Assess and upgrade Monitoring and forecasting Activity in the region, had its kick-off meeting in Paris 11-13 March. The EuroGOOS Director participates as a member of the International Advisory Board.

- The PAPA-project, Programme for a BAltic network to assess and upgrade an oPerational observing and forecAsting System in the region, had its kick-off meeting in Korsoer, Denmark, 6-8 November. The EuroGOOS Director is a participant in the project as a member of the Advisory Board.

In March 2003 a third regional project will start, the ARENA-project, A REgional Capacity Building and Networking Programme to Upgrade Monitoring and Forecasting Activity in the Black Sea Basin. Based on the MoU between EuroGOOS and Black Sea GOOS the EuroGOOS Office has participated in the preparation of the project and will together with IOC and MedGOOS act as an international partner in the project.

The EDIOS-project, European Directory of the Initial Ocean-observing System, has been designed by EuroGOOS to support several of the objectives in the Agreement. The project had its kick-off in Hamburg 10-11 September 2001. Three project meetings have been held during 2002 including a workshop with end users. The EuroGOOS Director is a participant in the project as chair of the Steering Committee. Web site: www.edios_project.de.

The ForeSea vision was introduced to EuroGOOS during the autumn 2001 and a “strawman document” was presented and discussed during a day in connection to the Annual Meeting in Copenhagen. The EuroGOOS Director was appointed as the formal link between EuroGOOS and the planning of the Marine Integrated Project, ForeSea. Proposals for GMES Strand 1 and Strand 2 were produced and submitted. The proposals as such were not successful but gave EuroGOOS valuable input to the GMES planning process. The ForeSea vision has created a fundament for Expressions of Interest and planned project proposals for FP6.

MERSEA aims to developing a European capacity for operational monitoring and forecasting of ocean physics, biogeochemistry and ecosystems on global and regional scales. During 2002 the project has developed plans, expressions of interest to FP6, a successful application to GMES Strand 1, and also started the preparation of a project application of the first FP6 Call. EuroGOOS has the role of promoting these kinds of activities and participates in the work. The Director represents EuroGOOS in the MERSEA Steering Committee.

Regional task teams have been set up within EuroGOOS to plan and implement operational systems in their regions. Sustained systems have to be built on strong commitments from the participating partners but additional external funding has been shown to be necessary to gather speed in co-ordination and development.

- The Baltic Regional Task Team has evolved into its own organisation, BOOS (Baltic Operational Oceanographic System), and in 2002 launched the EU-funded PAPA project to assess and upgrade an operational observing forecasting system. Their web site can be found at www.boos.org and displays data for the latest measurements of sea-level, waves and surface temperature.

- The North West Shelf Regional Task Team has followed in the footsteps of its Baltic colleagues and in 2002 NOOS was established. Their web site www.noos.cc shows the latest water level measurements.

There are also regional task teams for the Mediterranean, Arctic and Atlantic oceans.

The longer-term objectives associated with GOOS are being pursued via various projects linked to GODAE ('03 - '05). In particular the ODON proposal (Optimum Design of Observational Networks) will examine the requirements and practicalities of observational networks in shelf seas.

4. CAPACITY BUILDING IN SUPPORT OF GOOS OR GOOS-RELATED RESEARCH

The EuroGOOS Director plays an important part in raising awareness of GOOS and EuroGOOS. When time allows he visits institutes or general meetings to make a presentation of EuroGOOS and answer questions.

The Science Advisory Working Group (SAWG) have held workshops which lead to a number of European Operational Oceanography initiatives that have now been incorporated into EU programmes.

The Technology Plan Working Group (TPWG) has worked on the development of a buoys manual to support the setting up of buoys for monitoring purposes.

5. IMPEDIMENTS TO PROGRESS

Several members institutes are currently experiencing cuts in financing which can lead to serious problems.

Some Institutes are not willing to freely share the data that they have collected.

6. LESSONS LEARNED

7. SUCCESS STORY

8. USEFUL EXAMPLES INDICATING THE BENEFITS OF GOOS AT REGIONAL LEVEL

9. INDICATIONS OF FINANCIAL CONTRIBUTION TO GOOS

9.1 INVESTMENT IN REGIONAL ACTIVITIES
9.2 INVESTMENT IN REGIONAL COORDINATION

ANNEX IV

REPORT ON REGIONAL GOOS ACTIVITIES (year 2002):
MedGOOS

1. NAME OF REGIONAL GROUP

MedGOOS - Mediterranean Global Ocean Observing System

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2.2 MECHANISM FOR COORDINATION OF GOOS

Chair and **Executive Secretary**

Silvana Vallerga from the Consiglio Nazionale delle Ricerche at the International Marine Centre in Sardinia, Italy, presides over MedGOOS, establishes and consolidates links with international organisations, and identifies projects to be developed by the MedGOOS members.

The Executive Secretary, Aldo Drago mans the MedGOOS Secretariat hosted by the IOI-Malta Operational Centre at the University of Malta, supporting the networking of the leading marine institutions in the Mediterranean committed to reach the scope of MedGOOS and the implementation of projects. The Chairperson and the Executive Secretary monitor the development of the projects and make sure that the work proceeds according to schedule. The MedGOOS Secretariat has frequent consultations with the Chairperson concerning the planning and development of projects and initiatives undertaken by MedGOOS. A yearly meeting is held to define the overall policy of MedGOOS, review the progress of ongoing activities and suggest new programmes.

The MedGOOS Secretariat provides administrative support and assists in the co-ordination of MedGOOS activities. It secures the continuous flow of information related to MedGOOS and its project activities, among the members. Important developments, training opportunities, conferences, seminars, etc. related to ocean monitoring and forecasting in the region are circulated to the members by the MedGOOS Secretariat. This strengthens the network and brings its components closer together.

The MedGOOS members play a leading role as a competent entity for the promotion of GOOS in their country and as coherent team in the basin. Each member acts as a national focal point, establishing links with the scientific community and the public authorities, developing awareness activities to enable the implementation of MedGOOS and the future projection into long-term commitments at governmental level. The activity is presently supported by the EC funded MAMA project.

The MedGOOS website provides an avenue for dissemination of information on important activities, promoting awareness on the benefits of operational oceanography in the region, with linkages and coverage to other important related initiatives and their sites. Together with the MAMA website it provides a showcase on ocean forecasting as well as services for the networking of marine institutions in the region. In the near future the MedGOOS website will be more dynamic and interactive, using state-of-the-art technologies for a shared community-based web environment.

2.3 COORDINATION WITH OTHER GOOS BODIES

MedGOOS has a strong cooperation with EuroGOOS, with which it shares the European members. The Mediterranean Task Team of EuroGOOS has provided the science base for the MedGOOS activity. The MedGOOS is building on the strategy, plan and activities of the many EuroGOOS task teams and on the pre-operational projects developed under the EuroGOOS umbrella. The EuroGOOS Director is Advisor to the MedGOOS project MAMA. The MedGOOS chairperson is trustee and officer of the board of EuroGOOS

MedGOOS has links with GOOS-AFRICA, whose Chairman is advisor to the MAMA project. The link between the two regional activities is also through common, active members (e.g. Maria Snoussi).

MedGOOS is cooperating with Black Sea GOOS in the project planning activity. The MAMA project has been used by Black Sea GOOS to prepare a successful proposal to the EC, ARENA, in which both MedGOOS and EuroGOOS are participating. ARENA started in January 2003.

The chairperson of MedGOOS, in agreement with the chairperson of Black Sea GOOS, has submitted a successful Expression of Interest to the European Commission for an integrated project, MAMA-MIP embodying the extended MedGOOS and Black Sea GOOS communities, including all MAMA and ARENA partners. The full proposal will be submitted at the end of 2003. The aims of MAMA-MIP are to set up the initial observing system, strengthen the national capacity in ocean forecasting, incorporate emerging technologies; design effective sampling strategies for the permanent operational forecasting system to benefit tourism, maritime transport, coastal protection, fisheries and to mitigate pollution.

3. REGIONAL CONTRIBUTIONS TO GOOS IMPLEMENTATION

3.1 CONTRIBUTIONS TO CORE ELEMENTS OF THE OBSERVING SYSTEM

Routine marine observations using automated systems in the Mediterranean are conducted on a national scale in several shelf sea areas along the northern perimeter of the basin. Furthermore RTD projects, mainly funded by the EC have also contributed to develop pilot basin-scale monitoring activities. A full assessment on marine observations, and in general on the capability to monitor and forecast in the region is being conducted within the MAMA project. This will serve to identify gaps in infrastructures, to underpin further research and technological developments specific to the region, and to furnish elements to design the initial observing system.

MedGLOSS - The Mediterranean regional subsystem of the Global Sea Level Observing System is a real-time monitoring network for systematic measurements of the sea level in the Mediterranean and Black Sea. It is being developed on the basis of GLOSS requirements and methodology, aiming to provide high-quality standardised sea level data. MedGLOSS is a joint initiative of IOC and CIESM and will contribute to study the worldwide eustatic sea-level rise due to the “greenhouse effect” as well as to provide the ellipsoid to geoid corrections in the sea-level real time satellite elevation measurements. The MedGLOSS network has already installations in Israel, Malta, Croatia, Cyprus, and Romania; other prospective installations will be established in Bulgaria and Morocco.

A pilot **Mediterranean Multisensor Moored Array buoy system (M3A)** for the automatised monitoring of a complete set of physical parameters, including temperature, salinity and currents, together with relevant biogeochemical and optical measurements, has been also designed and sucessfully deployed in the Cretan Sea during MFSPP. The system has proved the feasibility of multiparametric monitoring of the upper thermocline using multi-sensor moored systems. The overall M3A design has fulfilled the requirements of the MFS multidisciplinary observations. The modular system structure used with acoustic links has proved to be a promising one. The experience has shown that 2-3 months maintenance can guarantee high quality data with the exception of turbidity measurements (plus surface optical measurements). Improvements are however necessary for what concerns (1) data transmission technology, both surface and subsurface; (2) use of a smaller surface buoy without an umbilical cord; (3) subsurface transmission from ADCP mooring; (4) addition of optical sensors. The buoy system is currently operated by NCMR (Greece). Two more buoys in the western Mediterranean and Adriatic Sea will be deployed during MFSTEP.

MFSPP-VOS (Voluntary Observing Ship) system – Within the Mediterranean Forecasting System Pilot Project a pilot automatic upper ocean temperature monitoring system covering the whole Mediterranean

has been implemented in the period September 1999 - June 2000 with NRT XBT data delivery from 7 ship tracks. The system has shown the adequacy of XBT sampling at 12 nm and with a repeat time of two weeks for assimilation in forecasting models.

A quality control and data management system handling data in NRT has been established by the centralized data collection centre located in ENEA, La Spezia.

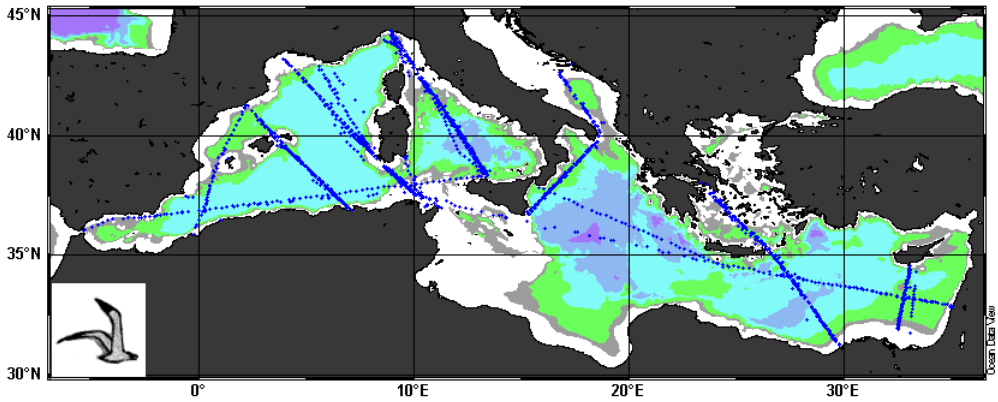

Fig.1 The MFS-VOS tracks working from September 1999 to June 2000

NRT satellite data sets are used by INGV (Italy) for the initialization of weekly forecasts. This is a continuation of the activity initiated within MFSPP. 1) Sea Level Anomalies (SLA) and 2) Sea Surface Temperature (SST) are operationally analysed and mapped on to the numerical model grid and assimilated an Optimal Interpolation scheme (System for Ocean Forecast and Analysis, SOFA) which is multivariate in input and output;

The ***Mediterranean ocean Forecasting System: Toward Environmental Predictions*** **(MFSTEP)** project is a continuation of the *Mediterranean Forecasting System Pilot Project* (MFSPP). One of the goals of MFSTEP is to advance the monitoring technology to achieve maximum reliability of the observing system. In MFSTEP the observing system component will build upon the experience of the initial Observing System for the World Ocean. It consists of: a Voluntary Observing Ship (VOS) system with innovative technology to be real time, cost-effective, multidisciplinary and environmentally safe; a moored buoy system designed to serve real time validation of the basin scale models and the calibration of the ecosystem modelling components; a satellite real time data analysis system using several available and soon to be available satellite observations of the sea surface topography, temperature and colour; a high space-time resolution network of autonomous subsurface profiling floats (Array for Real-Time Geostrophic Oceanography-ARGO); a basin scale glider autonomous vehicle experiment; an Observing System Simulation Experiment (OSSE) activity; and a real time data management and delayed mode archiving system.

POSEIDON is a Greek marine operational monitoring system which covers the need for timely and reliable information with delivery of ocean forecasts in the Greek territorial waters. The system consists of a network of observing buoys to record the physical, biological and chemical parameters of the Greek seas, and of a specialised operational centre for the processing of the data and forecast assembly. The observation buoys are equipped with sensors that monitor: air-pressure, air-temperature, wind speed and direction, wave height, period and direction, sea surface salinity and temperature, surface current speed and direction, sea surface dissolved oxygen, light attenuation with fluorescence, salinity and temperature in depths 0-50m, chlorophyll-A, nutrients and radioactivity. The data is first transferred to the operational centre by means of three telecommunication systems: INMARSAT-C satellite, Radio UHF, Cellular GSM. The POSEIDON operational centre is equipped with a high performance computer system (SGI-ORIGIN 2000) with 8 CPUs on board providing adequate power for the forecasting model's integration, UNIX and MS Windows based workstations for data analysis and presentation, ORACLE data base for storing and managing the field data. The numerical models are designed to forecast: Atmospheric conditions, Offshore wave height and direction, 3-D general circulation, Shallow water wave characteristics, and Buoyant pollutant transport. The POSEIDON system produces a series of data and outputs that targets key users with services and information in the form of: primary data in real time (on-line) transmitted from the observation buoys; historical data and time-series,

statistical analyses and data produced by hindcasting; forecasts for the condition of the Greek seas for the next 1-3 days, and long-term operational forecast.

The **Rayo (Red de Alerta Y Observación − Alert and Observation Network)** project consists of a series of buoy networks deployed to measure and monitor the marine environment in Spanish waters. The main part of the system is the so called "deep water network", consisting of 9 Seawatch (provided by Oceanor) and 3 wavescan buoys measuring waves (Waverider sensors, three of them are directional), currents (UCM−60 sensor), wind (Aanderaa 2740 for speed and Aanderaa 3590 for direction), atmospheric pressure (Vaisala PTB200A(D)) and temperature (Aanderaa 3455), sea surface temperature and salinity (Aanderaa 2994S). Information from the Seawatch buoys is transmitted every hour via Inmarsat to both the harbour authorities and to the main building at Puertos del Estado, Madrid. Additionally, directional wave information is propagated in real time to the mouths of the harbours by means of a wave model. The propagation method is based on the so called "spectral point to point propagation", developed at Puertos del Estado. The deep water network is complemented with three current meter chains, 3 directional Smart buoys for shallow water directional wave measurements and 3 coastal radars. Apart from the 'deep water network', there is also the Coastal Network providing real time data in some specific points located in shallow waters. The main objective of the measurements is to complement those of the Deep Sea Network at those locations of special interest for the port operations or wave modelling validation. The buoys employed are scalar Waverider (REMRO network), and directional.

MedGOOS 1 buoy deployed by MCS-Harris and IMC, Oristano (Italy) in the Sardinian Sea, moored at -2000 m ca., at 42 nautical miles W off the Gulf of Oristano. The surface buoy has a conic structure 10 m high and a 5.2 m in diameter. Its weight (empty) is about 45.5 tons. The buoy is connected to a Kevlar cable 1500 m long, from the surface buoy to a submersed buoy at 1000 m depth. The cable length has 500 supplementary meters in order to avoid traction due to the swinging of the surface buoy. The submersed buoy is connected to a "Junction Box" (23 tons wt) on the sea bottom where an acoustic current profiler and temperature and conductivity sensors are connected. Data transmission is via satellite Intelsat and Argos, the safety control of the buoy (positioning and operating) is performed by Inmarsat-C. Data are broadcast to the MCS-Harris office in Florida (USA), and sent back to Oristano by FTP. The system is powered by an oil generator having over 6 months autonomy.

MedGOOS 2 buoy deployed and operated by IAMC-CNR, Oristano (Italy) in the Sardinian Sea at about 13 nautical miles W off the Gulf of Oristano Gulf, at -870 m. The configuration is: a surface buoy, cable, floating submerged buoys at 800 m depth, anchor (2 tons). The surface buoy, solar powered, is an Oceanor Wavescan, 7 m high (3 m above the sea level), 3 m large and with a weight of about 1.2 tons. Data are transmitted every three hours to the CNR in Oristano via a GSM mobile. The cable is about 1200 m long, and inductive in the first 500 m. Scientific instruments are: meteorological station at +3 m, an RDI ADCP Long Ranger 75kHz with a temperature sensor at -3 m. The buoy moves around the deployment point describing a circle with a range of about 1000 m

MAMBO - (Monitoraggio AMBientale Operativo nel Golfo di Trieste) operated by OGS (Italy) is a real-time meteo-marine system in the Gulf of Trieste, North Adriatic. The system is based upon moored buoys equipped with meteo sensors, a multiparametric profiling probe (pressure, temperature, conductivity, dissolved oxygen, chlorophyll A, pH, turbidity). The data are transmitted to land in real-time and diffused on the Internet. An RT-ADCP has been recently implemented to obtain high resolution profiles of marine currents. A Directional Waverider Buoy has also been deployed to obtain the wave climate of the area and validate wave propagation models. The time series data are used to validate physical and biological models.

ADRICOSM – (ADRIatic sea integrated COastal areaS and river basin Management system pilot project) aims to implement an integrated coastal zone management system in the Adriatic Sea consisting of a predictive circulation module and a river basin and wastewater management module. It will predict coastal currents variability in Near Real Time. This project involves institutions of Italy, Slovenia and Croatia and French Institutions. It is supported by the Italian Ministry for the Environment and Territory.

3.2 CONTRIBUTIONS TO GOOS PILOT PROJECTS

A contribution to the ARGO project – The MFSTEP EC project to start in 2003 will deploy a high space-time resolution network of autonomous subsurface floats for a fully operational test of the ocean forecasting system. Technical developments envisaged in the project: the profilers will be customised to the MFSTEP needs and to the future telemetry systems, a selected sampling design will be adopted and specific software written to take advantage of the future 2-way telemetry for data transmission and for interactive

modifications of the profiler mission characteristics. The MedARGO profilers will be launched from ships-of-opportunity along the VOS-XBT line. The profiler data will be processed and disseminated by the centralised Archiving and Dissemination Data Centre (ADDC) in Brest, France. The data will also be collected and archived at the MedARGO Thematic Expert Data Center (MedARGO/TEDC) in Trieste, Italy. Data summaries will be visualized and distributed in NRT using web servers and ftp sites at the ADDC. Some products will be posted on the MedARGO/TEDC web server. Dissemination via GTS, emails, etc. is also planned. The ADDC will assure data exchange, and general relationships with the international ARGO program. The final quality control and processing of the profiler data will be done at the ADDC.

3.3 CONTRIBUTIONS TO GOOS-RELATED RESEARCH

A number of RTD projects have in the last few years provided a framework for networking the marine scientific community in the region to underpin research in operational oceanography.

The **MEDAR/MEDATLAS II project** has produced a comprehensive data product of multi-disciplinary *in-situ* observations and information covering the Mediterranean and Black Sea, through a wide co-operation of data management centres. The project has compiled and rescued historical data, especially in the Eastern and Southern Mediterranean, and includes data sets from the coastal areas. It has made available comparable and compatible data sets of temperature, salinity, oxygen, nitrate, nitrite, ammonia, total nitrogen, phosphate, total phosphorus, silicate, H_2S, pH, alkalinity, chlorophyll-a profiles by using a common protocol for formatting and quality checking. Qualified value added products using efficient gridding and mapping methodology have been prepared and disseminated. The project has enhanced communication between data managers and scientists to improve the data circulation and contributed to develop a regional capacity for scientific and operational programmes, by enhancing the existing data management structures through training in data qualifying, processing, mapping and archiving.

The **Mediterranean Forecasting System Pilot Project (MFSPP)** closed in 2002, has started to develop the science base for the implementation of a Mediterranean ocean forecasting system. The aim was the prediction of the marine ecosystem variability in the coastal areas up to the primary producers, and from the time scales of days to months.

The project has two components: observing system and numerical modelling/data assimilation able to use the past observational information to optimally initialise the forecast. The basic assumption was that both hydrodynamics and ecosystem fluctuations in the coastal/shelf areas of the Mediterranean are intimately connected to the large-scale general circulation. The second assumption was that, for the physical components of the ecosystem, monitoring and numerical modelling can work almost pre-operationally.
The project has shown that NRT forecasts of the large scale basin currents are possible.

Components developed and implemented:

- automatic temperature monitoring system for the overall Mediterranean Sea (Voluntary Observing Ship-VOS system) with NRT data delivery; a pilot Mediterranean Multisensor Moored Array buoy system (M3A) to monitor temperature, salinity and currents, together with biogeochemical and optical measurements to establish the feasibility of multiparametric monitoring of the upper thermocline in the whole basin;
- NRT satellite data (sea surface height, sea surface temperature and colour) analysis and mapping on the numerical model grid; different data assimilation schemes in order to assimilate multivariate parameters, e.g., XBT from the VOS and satellite sea surface height and sea surface temperature;
- 3, 5 and 10 days forecast experiments at basin scale for three months;
- techniques to downscale the hydrodynamics to different shelf areas of the Mediterranean Sea with nested models of different resolution;
- ecosystem models in shelf areas of the basin and a strategy for validation/calibration with M3A data sets;
- methods for assimilating nutrient, chlorophyll and PAR into predictive ecosystem models;
- an overall NRT data collection and dissemination network which allows the timely release of data for the forecasting exercise.

The ***Mediterranean ocean Forecasting System: Toward Environmental Predictions*** **(MFSTEP)** Starting in 2003 is a continuation of *MFSPP*. The aim is to improve monitoring technology to achieve maximum reliability, to demonstrate the feasibility of regional scale forecasting in several Mediterranean areas, to develop biochemical modelling and data assimilation towards environmental predictions and to start the development of end-user interfaces for the exploitation of the project products. The problems addressed are: technological developments for real time monitoring, the provision of protocols for data dissemination, including telecommunication and quality control; scientific development to improve numerical models, the design and implementation of data assimilation schemes at different spatial scales, the ecosystem modeling validation/calibration at the coastal and basin scales and the development of data assimilation techniques for biochemical data; exploitation developments, consisting of software interfaces between forecast products and oil spill modelling, general contaminant dispersion models, relocatable emergency systems, search and rescue models and fish stock observing systems.

3.4 OTHER CONTRIBUTIONS TO GOOS

The Mediterranean network to Assess and upgrade the Monitoring forecasting Activity in the region - MAMA is a thematic network funded by the EU Programme, *Energy, Environment and Sustainable Development*. The main scope of this project is to bring together and establish a network between major marine research institutions coming from all the Mediterranean countries. The network will identify the needs of the region and provide guidance to the Mediterranean states to shape an integrated effort towards the planning and design of the long term sustained ocean monitoring system in the region.

MAMA is staging a concerted effort between countries in the region to put in place the institutional and scientific linkages to establish the regional platform to implement MedGOOS. MAMA focuses on the trans-national pooling of scientific and technological resources in the basin. The aim is to share experiences and transfer of expertise, to bring capacities in ocean monitoring and forecasting to comparable levels. The joint effort will contribute to the planning and design of the initial ocean observing and forecasting system in the Mediterranean. MAMA is interacting with stakeholders and relevant international organisations to trigger awareness on the benefits of ocean forecasting. Demonstration products and results are disseminated, national awareness campaigns are organised to build momentum towards long-term commitments by governments. Within this effort MAMA is pioneering the implementation of GOOS by an unprecedented endeavour and novel approach that will put the region at the forefront of ocean monitoring and forecasting.

The scientific objectives of MAMA are:

- Build the basin-wide network for ocean monitoring and forecasting, linking all the Mediterranean countries;
- Identify the gaps in the monitoring systems in the region and in the capability to measure, model and forecast the ecosystem;
- Integrate the knowledge base derived by relevant national and international RTD projects and programmes;
- Build capacities in ocean monitoring and forecasting;
- Design the initial observing and forecasting system, on the basis of a co-ordinated upgrading of capabilities in all Mediterranean countries;
- Raise awareness on the benefits of MedGOOS at local, regional and global scales;
- Bring together all stakeholders to harmonise strategies for operational oceanography at the service of sustainable development;

4. CAPACITY BUILDING IN SUPPORT OF GOOS OR GOOS-RELATED RESEARCH

Workpackage 3 of the MAMA project targets the capacity building and the upgrading of the scientific/technological expertise in operational oceanography. This WP is developed through a scheme of visiting personnel of MAMA participants at specialised centres in the MAMA consortium. The hosting centres provide training-on-the-job and hands-on-experience for ocean observations, modeling and forecasting.

Specific training issues are: technical know-how for the deployment, running, calibration and maintenance of an operational observing system; transmission of data; numerical modeling and data assimilation; management of operational data/meta-data, access to data including satellite data, merging, analysis and transformation into added value products; and data handling, management and reporting.

The visits last on average one month, during which the visiting fellow participates in the day-to-day activities of the hosting center, under the tutorship of experienced personnel. The trainees are expected to disseminate the acquired expertise to their national scientific community, through seminars, small workshops/training courses, short internships, direct applications of the acquired experience. In all MAMA WP3 funds thirty visits.

5. IMPEDIMENTS TO PROGRESS

Solve the legal issue for timely observations related to EEZ.

6. LESSONS LEARNED

The experience made so far made us aware of the importance of building consensus for a concerted approach involving partners in all the coastal States, going step by step and considering the specific needs and priorities of each country.

7. SUCCESS STORY

The EC funded MAMA project is a success story of a simple idea developed in concertation.

8. USEFUL EXAMPLES INDICATING THE BENEFITS OF GOOS AT REGIONAL LEVEL

GOOS is not yet developed at regional level. MedGOOS will contribute to this end.

9. INDICATIONS OF FINANCIAL CONTRIBUTION TO GOOS

9.1 INVESTMENT IN REGIONAL ACTIVITIES

A rough estimate based on ongoing RTD pre-operational projects (MFSTED, MerSea), pilot projects (Adricosm) and national monitoring programmes lead to 15 million euros per year.

9.2 INVESTMENT IN REGIONAL COORDINATION

The investment for regional coordination is presently about 2 million euros per year.

ANNEX V

REPORT ON REGIONAL GOOS ACTIVITIES (year 2002): BLACK SEA GOOS

1. NAME OF REGIONAL GROUP

Black Sea GOOS

2. CONTACTS, COORDINATION

2.1. PRINCIPAL CONTACT POINTS

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E-mail: natali@ims.metu.edu.tr

2.2 MECHANISM FOR COORDINATION OF GOOS

Co-ordination of Black Sea GOOS mainly is via Internet correspondence. Chairmen and the Executive Secretary utilize the Internet too, but whenever possible the opportunity to meet on other occasions, *i.e*. IOC-General assembly meetings, NATO SfP Project meetings, regional international organizations such as Black Sea Environmental Programme and IOC Black Sea Regional Committee, etc., are used to meet and discuss relevant issues. The "Annual Steering Committee" meeting forms the core of coordination and evaluation of the Black Sea GOOS.

Dissemination and co-ordination through the web is regularly used. The web address of the Black Sea GOOS is: http://www.ims.metu.edu.tr/black_sea_goos/.

2.3 COORDINATION WITH OTHER GOOS BODIES

Black Sea GOOS participates to the MedGOOS, EuroGOOS and I-GOOS activities. The co-ordination is via several means, such as correspondence via Internet, direct contact by participation to the meetings, having access to these organizations Web Sites, collaborating through EU funded and other projects such as MAMA, SeaSearch, ARENA etc.

3. REGIONAL CONTRIBUTIONS TO GOOS IMPLEMENTATION

Black Sea GOOS is a recent set up, however the pre-existing regional capacity is utilized to contribute to GOOS.

A Black Sea GOOS Strategic Action and Implementation Plan has been prepared and finalized. The document is available on Internet (http://www.ims.metu.edu.tr/black_sea_goos) and will be printed by IOC GOOS Office.

3.1 CONTRIBUTIONS TO CORE ELEMENTS OF THE OBSERVING SYSTEM

The capacity and human resources of the Black sea riparian countries differ from each other. This is reflected in their contribution to the GOOS implementation. Therefore the measurements carried out by countries are given individually.

Bulgaria: Standard oceanographic parameters are measured from research vessel as seasonal time series. The parameters are T, S, nutrients, dissolved oxygen (DO), H_2S, light penetration. These measurements are carried out both in coastal stations and for the open sea. Hydro-meteorological parameters are measured on a regular basis from coastal meteorological stations.

Georgia: Hydro-meteorological parameters and sea level measurements are carried out at five stations on a regular basis.

Romania: Sea level (near-real time transmission), Temperature (surface), Salinity, pH (occasionally), DO, Nutrients, Organic matter, Phytoplankton (twice a week), Zooplankton (twice a week) and hydrometeorological parameters are measured as time series on the Contanza coast of Romania.

Russian Federation: Coastal observations include five hydro-meteorological stations (4-times-a-day observations of standard, meteorological parameters, sea level, water temperature, waves, salinity); a waverider buoy off the coast of Gelendzhik measures the wave parameters, including propagation direction and temperature and transmits the data to the coastal reception station every three hours (or every hour if the wave height exceeds 1.5 m/s); the buoy is insensitive to sea currents of a speed less than 2.5 m/s; automated systems for measuring meteorological parameters, sea level, water temperature, waves in the coastal area, current speed and direction, temperature at depth; measurements are made every 3 hours and transmitted to the collecting centre via satellite. For the open ocean, Satellite observations involve OkeanOl, Sich, Meteor-3 and Resurs-01 satellites. Remotely measured are surface temperature, ocean colour, and ice coverage. Operational services products include analysis and forecast of wind and waves, water and air temperature, ship-icing warnings, recommended routes and time of departure.

Turkey: Turkey is carrying out biweekly time series measurements at three coastal stations off Sinop. The parameters measured are T, S, nutrients, DO, phyto and zooplankton biomass and species composition. Sea level measurements are carried out at one mareograf station. There are three operational hydro-meteorological stations on the Turkish coast.

Ukraine: Observations include physical, chemical or biological observations from fixed buoys; 30 drifting buoys allow determination of water mass trajectories; air temperature and pressure are observed in the entire Black Sea and transmitted to a collecting centre via satellite channels. There are 2 (Ukraine-Russia-USA) drifting buoys. Sea level measurements are made at Katsively (Med GLOSS); Hydrometeorological stations (36) measure SL, T(s), Sal, wave, ice, and meteorology; off-Shore stations (4) Katsively and 3 gas platforms measure: T(a), Wind, humidity, AP, T(s), waves, SL and currents.

With the exception of the Turkish time series data and hydro-meteorological data of all countries, exchange of the above mentioned data is very limited. This is mainly due to the absence of regional data exchange facilities (protocol, strategy, etc.).

3.2 CONTRIBUTIONS TO GOOS PILOT PROJECTS

Three profiling floats built by the University of Washington and provided to Turkey/Ukraine. The floats were deployed by a Turkish team on September 2, 2002. The First float 587 deployed on the rim current at 41°50`N 29°50E, 1550m parking depth. The float 631 is at 750m, and the float 634 at 200m parking depths at 42°15`N 30°20E, which is within the western gyre of Black Sea. All floats provide vertical profiling T-S from 1550m depth. The floats transmit data weekly and spend 7 to 8 hours transmitting on the surface with 1 message per 46 to 54 seconds. The data is recovered from the floats via the Argos system. The T-S vertical profiles (as pressure versus T-S), together with float trajectories are displayed in near-real time on the web site http://flux.ocean.washington.edu/metu. The web site is developed and maintained by Dana Swift (email:swift@ocean.washington.edu) of the University of Washington, Seattle, USA. Automatic PALACE Profile E-mail Distribution Unity transfers data to METU Institute of Marine Sciences (IMS) and Marine Hydrophysical Institute (MHI). Two additional floats are envisaged for 2003. Assuming the average lifetime

of a float is four years, about 400 profiles are expected from each float and this comprises a set of reliable time series measurements for the Black Sea.

3.3 CONTRIBUTIONS TO GOOS-RELATED RESEARCH

NATO Science for Peace programme is funding a project entitled Black Sea Ecosystem Processes and Forecasting/Operational Database Management System. Eight institutions from all Black Sea countries are participating in this project. The Project is a GOOS relevant activity with the following main objectives:

- To explore, quantify and predict the ecosystem variability of the Black Sea through process studies and development of coupled interdisciplinary models with data assimilation;
- To develop further the NATO Black Sea Data Base and Management System for management oriented operational marine forecasting and research, requiring transmission to a wide variety of users quality controlled data received from observation systems with DBMS-to-USER transmission in delayed and/or near-real-time modes.

3.4 OTHER CONTRIBUTIONS TO GOOS

Within the framework of the above-mentioned NATO project a **data management system** has been developed. Innovations of processing and analysis of biological, physical and chemical data including those from satellites and time series have been utilized. More than eight million measurements of physical, chemical and biological data obtained from about 20,000 Black Sea stations have been analyzed, quality controlled and loaded to the data base management system, which is open to the scientific community. The contact address of the data base management system is:

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Institute of Marine Sciences
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TURKEY
Tel: (+90) 324 521 2150 (Ofice)
Fax: (+90) 324 521 2327
e-mail: vmir@ims.metu.edu.tr

Further information can be obtained from http://sfp1.ims.metu.edu.tr.

4. CAPACITY BUILDING IN SUPPORT OF GOOS OR GOOS-RELATED RESEARCH

Capacity building is facilitated through regional projects such as the NATO SfP and EU ARENA. Throughout the implementation of the NATO-funded GOOS oriented project, several summer schools were carried out to train young scientists from the region. In order to provide regional institutions with proper and modern research equipment, funding was provided to the interested parties.

Among the other main objectives of ARENA, capacity building is outstanding.

5. IMPEDIMENTS TO PROGRESS

The main issues causing obstacles for the GOOS implementation are:

- The national and governmental awareness are not at the desired level;
- Capacities, both in human resources and technical facilities, of the riparian countries are not at the same level, and sometimes are missing;
- There is insufficient information regarding the open sea hydro-meteorological data;
- Data analyses and data sets are not accessible to the majority of potential users;
- National and regional communication facilities do not suffice for real time dissemination;
- Real time or near real time data exchange is not facilitated yet. In some cases this is valid for the historical data exchange too. This is mainly due to the laws, rules and procedures of the countries.

6. LESSONS LEARNED

Collaborative work is leading to a higher quality of ocean knowledge and better management and use of resources.

7. USEFUL EXAMPLES INDICATING THE BENEFITS OF GOOS AT REGIONAL LEVEL

The Black Sea GOOS activities lead to the further regional collaboration ended up with a joint EU funded project entitled “A Regional Capacity Building and Networking Programme to Upgrade Monitoring and Forecasting Activity in the Black Sea Basin” (ARENA).

ANNEX VI

**REPORT ON REGIONAL GOOS ACTIVITIES (year 2002):
GOOS-AFRICA**

1. NAME OF REGIONAL GROUP

Global Ocean Observing System for Africa: GOOS-AFRICA

2. CONTACTS, COORDINATION

2.1. PRINCIPAL CONTACT POINTS

Chairman:
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Coordinator and Technical Secretary:
Justin Ahanhanzo
GOOS-AFRICA Coordinator
Intergovernmental Oceanographic Commission of UNESCO
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Fax: 33-1 45 68 58 10/12/13
E-mail: j.ahanhanzo@unesco.org

2.2 MECHANISM FOR COORDINATION OF GOOS

GOOS-AFRICA Structure

- The GOOS-AFRICA Coordinating Committee is a Pan-African organizational structure decided by the participating countries to take forward the development of the GOOS in Africa. The membership is based on scientific capacity of the members taking into consideration the geographical balance within Africa. The Committee has a rotation system for its members. The latest Membership of the GOOS-AFRICA Co-ordinating Committee is:

GSC:	Kwame Koranteng, Chair	(kwamek@africaonline.com.gh)
COOP:	Birame SAMB	(bsambe@yahoo.fr) or (bsamb@crodt.izra.zn)
MedGOOS:	Cherif Sammari	(cherif.sammari@instm.rnrt.tn
MedGOOS:	Maria Snoussi	(snoussi@fsr.ac.ma)
WIOMAP:	Sachooda Ragoonadan	(meteo@intnet.mu)
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IOCEA:	Kouadio Affian	(k_affian@yahoo.fr)
GTOS:	Chris Magadza	(profmagadza@baobab.cszim.co.zw)
ACMAD	Mohammed Boulahya	(msboulahya@acmad.net)
AARSE	Peter Adeniyi	(peter.adeniyi@futa.edu.ng)
Co-ordinator:	Justin Ahanhanzo	(j.ahanhanzo@unesco.org)

- GOOS-AFRICA National Coordinating Committees: The Coordinating Committee, in collaboration with the GOOS Project Office (GPO), is encouraging establishment of National GOOS-AFRICA Committees and will provide Member States with advice to this end. Linkages should be made with the national meteorological offices and administrations.
  The Coordination with the Members of the Committee as well as with the participating countries is mainly through e-mails, letters and tel/fax.

Depending on the issues, the following *fora* have been organised:

1- Regional meetings with all participating countries:
   - 18-25 July 1998, Maputo- Mozambique: Formal establishment of GOOS-AFRICA;
   - 19-23 November 2001, Nairobi- Kenya: GOOS-AFRICA Project Identification Meeting.

2- GOOS-AFRICA Review Meeting, 06-14 May 2002, Abidjan, Côte d'Ivoire:
GOOS-AFRICA Group of Experts Meeting with a participation of the Team Leaders of the main Working Groups of the GOOS-AFRICA.

3- GOOS-AFRICA Coordinating Committee Meeting, 22 November 2001, Nairobi- Kenya: Aimed at discussing the strategy of implementation of the GOOS-AFRICA and proceeded with the rotation of memberships.

2.3 COORDINATION WITH OTHER GOOS BODIES

- Some of the members of GOOS-AFRICA are also members of some of the GOOS Panels.
- The GOOS-AFRICA Coordinator also served as the Technical Secretary for the MedGOOS Programme, ensuring the links between GOOS-AFRICA and MedGOOS.
- In the context of the GOOS-AFRICA Project Identification Meeting, the Chairs of the other regional GOOS Bodies as well as the Chair of the GSC have been co-opted to participate in and contribute to the International Organizing and Advisory Committee for GOOS-AFRICA.
- The Coordinator of the GOOS-AFRICA had been participating in and contributing to the EuroGOOS Conferences so as to raise awareness of the GOOS-AFRICA and to share information and experiences with EuroGOOS.

3. REGIONAL CONTRIBUTIONS TO GOOS IMPLEMENTATION

3.1 CONTRIBUTIONS TO CORE ELEMENTS OF THE OBSERVING SYSTEM

- Ongoing marine and coastal projects in Africa are of interest to GOOS, i.e. the Gulf of Guinea and the Benguela LMEs projects with focus on physical, chemical, biological, fisheries and pollution observations.
- The First GOOS-AFRICA project entitled the Regional Ocean Observing and Forecasting System for Africa (ROOFS-AFRICA) is a potential strong contribution to the GOOS because integrating many inter-related working packages including: (i) The African network of *in situ* ocean observing systems including sea level records for monitoring coastal zones and global change, (ii) Application of Remote Sensing (satellite data) to Marine and Coastal Environment; (iii) Modelling and Forecasting based on *in situ* and Satellite Data; (iv) Effective Involvement of Different Stakeholders at different stage of project implementation; (v) End-User interactive Communication and Information Delivery System; (vi) Industry and Business Partnerships towards reinforcing a Regional Ocean and Forecasting System for Africa.

3.2 CONTRIBUTIONS TO GOOS PILOT PROJECTS

Potential for establishing North and South East Extensions of PIRATA have been suggested with a participation of African countries. Proposals to investigate their feasibility and usefulness are being formulated within the regional Large Marine Ecosystem projects. Mechanisms are still to be established to ensure the implementation. PIRATA is currently funded by USA, France and Brazil.

3.3 CONTRIBUTIONS TO GOOS-RELATED RESEARCH

- The African Centre of Meteorological Application for Development is a key partner in the GOOS-AFRICA development and is bringing the meteorological dimension into the GOOS-AFRICA.
- The African Association of Remote Sensing of the Environment is also a key partner supporting the development of the application of remote sensing (satellite data) to the ocean observing system in Africa.
- Clear linkages have been established between the GOOS-AFRICA and the UNESCO Cross-cutting project on the Application of Remote Sensing to Ecosystems and Water Resources in Africa.

3.4 OTHER CONTRIBUTIONS TO GOOS

The reinforcement of the African Network of Sea Level is a key component of GOOS-AFRICA and will significantly contribute to the GOOS.

4. CAPACITY BUILDING IN SUPPORT OF GOOS OR GOOS-RELATED RESEARCH

GOOS-AFRICA had been linked with major programmes and brought to the attention of various stakeholders and at the level of major international meetings including (i) World Summit on the Sustainable Development (WSSD) in Johannesburg in the context of the Ministerial and the Heads of States Conferences of the Partnership Conference of the African Process on Cooperation for Development and Protection of the Marine and Coastal Environment of the Sub-Saharan Africa, (ii) Meeting with the President of Senegal on his capacity of the Coordinator of the Environment Initiative of the New Partnership of the Africa's Development; (iii) the Ministerial and technical sessions of the Contracting Parties of the African regional Conventions, (iv) the Super preparatory meetings of the African Process towards the World Summit, (v) the UNESCO Cross-Cutting Project on the Application of Remote Sensing for Integrated Management of Ecosystems and Water Resources in Africa, (vi) UNOOSA/ESA/South Africa International Initiative and Symposium on "Space Technology Provides Solution for Sustainable Development; (vii) African Monsoon and its Components, (viii) CLIVAR-AFRICA Committee; (ix) African Centre for Meteorological Applications for Development (ACMAD); (x) Fifth Session of the IOC Committee for the Eastern and Central Atlantic; (xi) Fifth Session of the Intergovernmental Committee for the Cooperative Investigations in the North and Central Western Indian Ocean; (xii) African Association of Remote Sensing of the Environment (AARSE) and its Fourth International Conference on Geoinformation for Sustainable Development in Africa, (xiii) First GOOS Regional Forum and 3rd EuroGOOS Conference.

- The End-User interactive Communication and Information Delivery System of GOOS-AFRICA known as the GOOS-AFRICA/RANET (Radio and Internet) had been offered to various partners so as to demonstrate the importance of timely and high quality environmental and business-forecasting information to the local communities via the World Space Satellite-based digital radio.

- It is expected that through the implementation of the ROOFS-AFRICA/GOOS-AFRICA, infrastructures of operational oceanography including equipment and research facilities in African countries will be gradually improved since the development of GOOS-AFRICA started with limited infrastructures for operational oceanography.

  Some of the needs are:

(i) Installations of tide gauges around Africa
(ii) Computer facilities for data processing, analysis and modelling
(iii) Ship time: onboard training
(iv) Infrastructure and equipment for processing, analysis and storage of satellite data
(v) Infrastructures for Operational Oceanography

5. IMPEDIMENTS TO PROGRESS

(i) Lack of infrastructure for observations
(ii) Lack of critical mass for modelling expertise
(iii) Lack of funds to implement the ROOFS-AFRICA proposal.

6. LESSONS LEARNED

Regional cooperation is a key to enhance international cooperation. Regional support and commitment are the prerequisite for the development of the GOOS Regional Alliances. The GOOS as a global program would become a reality when the regional components will be become operational. Regional GOOS Alliances are a key element to boost the development of operational oceanography at basin level.

7. SUCCESS STORY

Starting with very limited resources, GOOS-AFRICA was able to grow up as a unique Pan-African framework for building up a Regional Ocean Observing and Forecasting System entirely driven by the region. The African coastal countries and regional institutions are very supportive of that initiative. Strong collaboration had been established among the oceanographic and meteorological communities within Africa. Collaboration with the African and international remote sensing communities through the UNESCO Cross-cutting project is reinforced. The Programme is now brought to the level of the Heads of States of the African countries as well as to the level of the Heads of International Organizations.

8. USEFUL EXAMPLES INDICATING THE BENEFITS OF GOOS AT REGIONAL LEVEL

There have been few examples of benefits of GOOS at regional level in Africa, as yet. Nevertheless, there is a hope for future success:

- Development of an integrated approach and strategy to marine and coastal management.
- Development of remote sensing and satellite based applications.
- Regional cooperation in marine sciences is reinforced.

9. INDICATIONS OF FINANCIAL CONTRIBUTION TO GOOS

- Successful fund raising strategy with bilateral and multilateral partners: About $US 100,000.
- Links to the UNESCO Cross-cutting Project on the Application of Remote Sensing for Integrated Management of Ecosystems and Water Resources in Africa sharing the costs of joint activities.
- Links to the African LME projects, particularly in respect of the establishment of regional early warning systems for the marine environment.
- ROOFS-AFRICA/GOOS-AFRICA proposal developed for funding.

9.1 INVESTMENT IN REGIONAL ACTIVITIES

The total of the funds raised are to date invested in promoting the GOOS-AFRICA activities. Support has been provided to regional experts to participate in international meetings and seminars related to the development of GOOS.

9.2 INVESTMENT IN REGIONAL COORDINATION

Limited resources have been invested in the coordination mechanisms.

ANNEX VII

**REPORT ON REGIONAL GOOS ACTIVITIES (year 2002):
IOGOOS**

1. NAME OF REGIONAL GROUP

Indian Ocean Global Ocean Observing System (IOGOOS) established on 5 November 2002.

- Member-Organizations (presently):

(i) Australian Bureau of Meteorology, Australia
(ii) CSIRO-Marine Research, Australia
(iii) Curtin University, Australia
(iv) Indian National centre for Ocean Information Services (INCOIS), India
(v) National Institute of Oceanography, India
(vi) National Institute of Ocean Technology, India
(vii) Iranian National Centre for Oceanography, Islamic Republic of Iran
(viii) Kenya Marine and Fisheries Research Institute, Kenya
(ix) University of La Réunion, La Réunion
(x) Institut Halieutique & des Sciences Marine, University of Toliara, Madagascar
(xi) Mauritius Oceanography Institute, Republic of Mauritius
(xii) INAHINA, Mozambique
(xiii) Interim National Committee for IOGOOS, South Africa
(xiv) Institute for Aquatic Biodiversity, South Africa
(xv) University of Port Elizabeth, South Africa
(xvi) University of Natal, South Africa
(xvii) National Aquatic Resources Research and Development Agency, Sri Lanka

- Associate Member-Organizations (presently)

(i) IOC Perth Regional Programme Office, Australia
(ii) NOAA, Office of Global Programmes, USA

- A few more organizations (from Bangladesh, India and Seychelles) as well as SACEP are expected to become Members shortly.
- Active interactions are underway with organizations from Comoros Malaysia, Indonesia, Pakistan, Tanzania, Thailand, Myanmar, Maldives, Qatar, Oman and Yemen. Contacts in Singapore and Somalia are yet to be established.

2. CONTACTS, COORDINATION

2.1. PRINCIPAL CONTACT POINTS

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2.2 MECHANISM FOR COORDINATION OF GOOS

2.2.1 Indian Ocean Conference 4-9 November 2002

The Indian Ocean Conference was held at Mauritius during November 4-9, 2002. 165 participants from 24 countries (Australia, Bangladesh, Comoros, France, India, Iran, Japan, Kenya, Madagascar, Malaysia, Mauritius, Mozambique, Netherlands, New Zealand, Norway, Qatar, Reunion, Seychelles, Sri Lanka, South Africa, Thailand, Tanzania, USA and UK) and 8 organizations (IOC, WMO, GCOS, POGO, JICA, Indian Ocean Commission, SACEP and ONR-IFO) participated in the Conference.

The Conference addressed issues of common concern for the Indian Ocean Region and recommended taking up of specific projects and capacity building in the areas of:

(i) Ocean & Climate [e.g. (a) Risk Analysis for Climate Variability such as Monsoons, (b) Storm Surge Disaster Management, and (c) Observational needs for basin-wide structure of temperature, salinity, and currents]; and
(ii) Coastal Ocean [e.g. increased and coordinated study and monitoring of (a) coastal erosion, (b) habitat and biodiversity, and (c) fisheries, with the aim of forecasting changes and of providing the best possible data products to the national authorities, managers and scientific communities].

Further, the requirements for Data Management and Capacity building were addressed.

2.2.2 IOGOOS

Nineteen organizations of 10 Indian Ocean countries signed a Memorandum of Understanding to create and actively participate in a Regional Alliance for IOGOOS, signed on 5 November 2002. This Memorandum of Understanding is one of the strongest instruments of cooperation and collaboration in the context of the oceanographic development of the region. IOGOOS is intended to elevate the Indian Ocean from one of the least studied to one of the most studied of the world's major oceans, with a real emphasis on the link between societal and scientific issues.

- IOGOOS will hold Annual Meetings. The Chairperson and four Officers, providing a balanced representation of the region, have the responsibility for all IOGOOS activities between annual meetings of IOGOOS. The Head of the IOC Regional Programme Office in Perth, as well as the Chairpersons of IOCINCWIO and IOCINDIO, will be invited to attend the IOGOOS Officers' Meetings. Subsidiary bodies such as working groups will be created as necessary by IOGOOS.
- Secretariat is hosted by a Member-Organization and will be rotated after six years. Secretary, IOGOOS has the responsibility for ensuring satisfactory implementation of all decisions by the Annual Meetings and between the annual meetings by the Officers, for the IOGOOS Office and for the management of IOGOOS Funds.
- The First Annual Meeting of IOGOOS was held on November 08, 2002 at Mauritius, during the Indian Ocean Conference.

  - For the first term of two years, the following were elected/ unanimously:
    - Chairman: Dr. K. Radhakrishnan (India)
    - Officers:
      Dr. Neville Smith (Australia) for Eastern Indian Ocean
      Dr. Johnson Kazungu (Kenya) for East Africa
      Mr. Harry Ganoo (Mauritius) for Indian Ocean Islands
      Prof. A. T. Forbes (South Africa) for Southern Africa
  - INCOIS was chosen to host the Secretariat of IOGOOS for a period of six years and Mr. Tummala Srinivasa Kumar of INCOIS was chosen as the Secretary of IOGOOS for the same period.
  - A strategy paper for IOGOOS was adopted.

- The main mode of communication is through e-mail and IOGOOS Website. (www.incois.gov.in/iogoos)

2.3 COORDINATION WITH OTHER GOOS BODIES

During the Indian Ocean Conference, the representatives of WAGOOS, IOGOOS, SEA-GOOS and GOOS Africa had interactions and reiterated the need for a mechanism for continued interactions.

3. REGIONAL CONTRIBUTIONS TO GOOS IMPLEMENTATION

3.1 CONTRIBUTIONS TO CORE ELEMENTS OF THE OBSERVING SYSTEM

Several countries in this region have their programmes for satellite based and *in situ* observation systems. An inventory of such systems and the regional contribution to GOOS has to be made by the recently established IOGOOS.

3.2 CONTRIBUTIONS TO GOOS PILOT PROJECTS

Several Countries in this region are contributing to the GOOS pilot projects including Argo and GODAE. An inventory of such systems and the regional contribution to GOOS has to be made by the recently established IOGOOS.

3.3 CONTRIBUTIONS TO GOOS-RELATED RESEARCH

An inventory of the research activities is to be made by the newly established IOGOOS.

3.4 OTHER CONTRIBUTIONS TO GOOS

4. CAPACITY BUILDING IN SUPPORT OF GOOS OR GOOS-RELATED RESEARCH

5. IMPEDIMENTS TO PROGRESS

6. LESSONS LEARNED

7. SUCCESS STORY

8. USEFUL EXAMPLES INDICATING THE BENEFITS OF GOOS AT REGIONAL LEVEL

9. INDICATIONS OF FINANCIAL CONTRIBUTION TO GOOS

9.1 INVESTMENT IN REGIONAL ACTIVITIES
9.2 INVESTMENT IN REGIONAL COORDINATION

ANNEX VIII

**REPORT ON REGIONAL GOOS ACTIVITIES (year 2002):
PI-GOOS**

1. NAME OF REGIONAL GROUP

Pacific Islands Global Ocean Observing System (PI-GOOS).

Member Countries: Cook Islands, Federated States of Micronesia, Fiji, Kiribati, Marshall Islands, Nauru, Niue, Papua New Guinea, Republic of Palau, Samoa, Solomon Islands, Tonga, Tuvalu, Vanuatu

2. CONTACTS, COORDINATION

2.1. PRINCIPAL CONTACT POINTS

Chairperson – PI-GOOS
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Ms. Cristelle Pratt
Acting Manager – Ocean and Islands Programme
South Pacific Applied Geoscience Commission [SOPAC]
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E-mail: cristelle@sopac.org

2.2 MECHANISM FOR COORDINATION OF GOOS

The coordination mechanism for PI-GOOS is mainly via Internet/Email correspondence and through GOOS related meetings such as IOC General Assembly Meetings, WESTPAC meetings/workshops, Marine Sector Working Group Meetings and PI-GOOS workshops and meetings. Each member country is represented by at least two representatives to the various PI-GOOS related meetings, invariably from different agencies/institutions in the country. The Annual PI-GOOS Steering Committee Meeting forms the core of coordination and evaluation of relevant issues of the PI-GOOS.

2.3 COORDINATION WITH OTHER GOOS BODIES

The SOPAC Technical Secretariat is recognized as the interim PI-GOOS Secretariat. The PI-GOOS Chair coordinates PI-GOOS activities with other GOOS bodies together with respective PI-GOOS members from the various member countries. Collaboration is carried out via the Internet/Email or direct participation to various GOOS meetings and workshops.

3. REGIONAL CONTRIBUTIONS TO GOOS IMPLEMENTATION

Pacific Islands GOOS was established in 1998 to enable the potential twenty-three member countries to review their ongoing ocean research and monitoring activities, as well as to assess their priority demands and needs of GOOS through the utilization of regional capacity.

3.1 CONTRIBUTIONS TO CORE ELEMENTS OF THE OBSERVING SYSTEM

The primary issues of importance to local users in the Pacific include fisheries, climate change, sea-level rise, El Nino phenomenon, coastal management and conflicts for sharing the marine spaces in the coastal zone, marine pollution and water quality, coral reef and mangrove health, pearl and seaweed mariculture development and the availability and use of science data. The basic parameters for water quality data are normally surveyed and these include current, temperature, depth, wind, wave and salinity. Bathymetric and tidal data surveys are also carried out.

Significant volumes of natural resources observational data already exist in regional databases. These include the SOPAC cruise management database

[http://www.sopac.org.fj/Data/ResearchCruises/cruiseslist.html]

and the MMAJ/SOPAC Deep-sea Minerals database, which is housed at the SOPAC Secretariat.

3.2 CONTRIBUTIONS TO GOOS PILOT PROJECTS

PI-GOOS is also an active participant in The International Argo Project, which advances Pacific Island Countries understanding of the ocean in climate.

ARGO notifications can be accessed by subscribing to pmsr@list.sopac.fj
ARGO data can be downloaded from: http://www-argo.ucsd.edu/; http://argo.jcommops.org/

PI-GOOS also participates in the GODAE pilot projects and TAO/TRITON (Japan). This is a part of PI-GOOS.

In addition to this, the list of GOOS elements that exist in the Pacific Islands which PI-GOOS is part of include:

- Voluntary Observing Ships of World Meteorological Organization (VOS of WMO)
- Ships of Opportunity
- Data Buoy Co-operation Panel (DBCP)
- Tropical Atmosphere Ocean array in the equatorial Pacific (TAO)
- Global Sea-Level Observing System (GLOSS)
- Global Temperature-Salinity Pilot Project (GTSPP)
- Global Coral Reef Monitoring Network (GCRMN)
- Global Telecommunications System (GTS) of WWW for data transmission and communication

3.3 CONTRIBUTIONS TO GOOS-RELATED RESEARCH

All the member countries of PI-GOOS have their own independent research programmes that indirectly contribute to PI-GOOS.

3.4 OTHER CONTRIBUTIONS TO GOOS

A Cruise Management Database has been developed and is being managed and housed at the SOPAC Secretariat, which holds information on R/V surveys in member country waters. In addition to this, SOPAC also holds the Deep-sea Minerals Database and other databases such as the Water Quality Database, Pacific Cities Database and Coastal-related databases. The contact address for access to the above-mentioned databases is:

Cristelle Pratt
SOPAC Secretariat
Private Mail Bag
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FIJI
Tel: (679) 3381 377
Fax: (679) 3370 040
Email: cristelle@sopac.org

4. CAPACITY BUILDING IN SUPPORT OF GOOS OR GOOS-RELATED RESEARCH

To promote the idea and philosophy of GOOS, activities of the PI-GOOS include:

- *Pacific Regional GOOS Capacity Building Workshop* convened in Suva, Fiji in February 1998. The Workshop considered organizational arrangements and the development issues for a Pacific Islands GOOS Alliance (then regarded as PacificGOOS). The meeting also agreed that SOPAC be the Interim Pacific Islands GOOS Secretariat.

- *Pacific Regional Coastal-GOOS Workshop* held in Apia, Samoa in August 2000, was convened to develop concept papers for Coastal-COOP pilot projects in the Pacific Region. The International Argo Float Programme was introduced and blanket consent/clearance to deploy Argo floats within the EEZs of PICs sought. The concept of SEREAD was also tabled. Fourteen of the potential twenty-three Pacific Islands GOOS Members attended.

- *Oceanographic Data Handling Workshop* held by JAMSTEC in late 2000, 2001 and 2002 in Yokosuka, Japan, attended by 6, 4, and 4 PI-GOOS member countries, respectively.

- *Developing a Strategy for Ocean Observing in the Pacific* presented by SOPAC to the PI-GOOS Steering Committee Meeting held at IRD in Noumea, New Caledonia in February 2001.

- PI-GOOS represented at the *5th Session of the Intergovernmental Committee for GOOS (I-GOOS-V*) in Paris France in May 2001. Status report presented on PI-GOOS activities and offered to hold the 7th Session of the I-GOOS in the Pacific Islands Region.

- *PI-GOOS Strategy Plan* drafted by Michel Gautier [ex-IFREMER and EuroGOOS] and circulated for comment in August 2001. Endorsed by the SOPAC Governing Council at their 30th Annual Session in Majuro, Marshall Islands in October 2001. Finalised in October 2002.

- PI-GOOS member countries (Fiji, Kiribati and Papua New Guinea) represented at the Fifth IOC/WESTPAC International Scientific Symposium, 9-13 September 2002 in Fremantle, Australia.

- *Regional Workshop on Potential Applications of Ocean Observations for the Pacific Islands Region [PAOOP*] convened from 4 to 7 October 2002 in Nadi, Fiji. Thirteen member countries of PI-GOOS attended this workshop.

- PI-GOOS Steering Committee Meeting held on 6 October 2002 in Nadi, Fiji. The meeting reviewed the PI-GOOS Strategy and activities; discussed issues concerning PI-GOOS Secretariat support, and were briefed on the progress of Argo, PI-GCOS, SEREAD Pilot Project, PI-GOOS Coastal Project Initiatives. The Meeting agreed that, given the size of the Pacific Ocean, the PacificGOOS Regional Alliance be re-named Pacific Islands GOOS [PI-GOOS] as this would dispel uncertainty in terms of the geographic coverage of the membership of the alliance.

- Presented PI-GOOS activities paper at the *NEAR-GOOS Data Management* Training Course in Tokyo, Japan, in October 2002.

- Attended the *First Regional Forum of the Global Ocean Observing System* and *EuroGOOS Conference* in Athens, Greece, from 2nd to 6th December 2002.

- Draft *Pacific Islands Regional Ocean Information System* Project design developed and funds being sought for project implementation.

5. IMPEDIMENTS TO PROGRESS

Lack of Pacific Islands Advocacy among Membership

Increased advocacy and awareness of the (GOOS data and product) needs of PICs amongst the wider global GOOS community, to engender interest and widen support and assistance to the PI-GOOS is required. A brochure needs to be developed that outlines the links between PIC offerings and GOOS offerings and needs. This will seek to raise the global interest of potential contributors and partnerships to the PI-GOOS. Development of a user friendly website would also raise awareness of the importance of GOOS for Pacific Islands countries.

Data exchange Issues at National, Regional and International levels

The exchange of data within agencies in the same country and between different countries (both regionally and internationally) is often less than adequate. As well, data is stored in formats that are often non-user friendly or stored in a language that PICs have difficulty to understand and/or interpret. The general perception amongst PICs is the existence of unwillingness amongst participants to freely share and disseminate data, information and products.

Lack of Regional Capacity to Effectively Implement PI-GOOS Activities

Due to national and regional resources (such as human and financial) and infrastructural capacity (such as information communication and technology) limitations in the Pacific Islands region, the ability to establish a robust PI-GOOS and ensure the effective implementation of PI-GOOS activities will only be achieved through external assistance and support to develop the regional capacity that will eventually result in a sustainable regional GOOS alliance.

6. LESSONS LEARNED

7. SUCCESS STORY

Potential Applications of Ocean Observations for the Pacific: A workshop on *Potential Applications of Ocean Observations for the Pacific* was held in Nadi, Fiji from 4-7 October 2002. Seventy-four participants from seventeen countries and twenty-three regional and international organizations attended the meeting. The workshop developed a regional strategy for establishing a Pacific Islands Regional Ocean Information System.

The primary objective being to provide ocean data, products and services (at regional and local levels); and enhance the capacity of Pacific Island Countries and States to address important environmental, resource, coastal management and public use issues. A concept proposal has been developed based on the proposed strategy and funds are currently being sought to enable its implementation.

Pacific Islands Regional Ocean Policy: Knowledge of the ocean and better management and use of resources is increasing in PICs due to collaborative work amongst the members of PI-GOOS and of the Council of Regional Organizations of the Pacific (CROP).

The endorsement of the *Pacific Islands Regional Ocean Policy* by the Pacific Island Forum Leaders in May 2002 embraces the guiding principle of *Improving Our Understanding of the Ocean*. This principle will be a key theme of the *Pacific Islands Regional Ocean Forum,* scheduled to be convened by the Pacific Regional Organizations of the CROP in late 2003, and provides the basis for the development of medium to long-term regional initiatives for long-term ocean observing and monitoring systems.

8. USEFUL EXAMPLES INDICATING THE BENEFITS OF GOOS AT REGIONAL LEVEL

9. INDICATIONS OF FINANCIAL CONTRIBUTION TO GOOS

9.1 INVESTMENT IN REGIONAL ACTIVITIES AND REGIONAL COORDINATION

The workshop on *Potential Applications of Ocean Observations for the Pacific (PAOOP*), Nadi, Fiji, was supported by the following developments partners:

Partners	**USD**
UNESCO-IOC GOOS Office	10 000
National Oceanic and Atmospheric Administration, USA	40 000
Taiwan-ROC	40 000
IRD	4 000
PI-GOOS Secretariat, SOPAC	In-kind

ANNEX IX

REPORT ON REGIONAL GOOS ACTIVITIES (year 2002): NEAR-GOOS

1. NAME OF REGIONAL GROUP

North East Asian Regional – Global Ocean Observing System (NEAR-GOOS)

Member countries:
Present members: People's Republic of China, Japan, Republic of Korea, and Russian Federation.
Democratic People's Republic of Korea has been invited to join.

2. CONTACTS, COORDINATION

2.1. PRINCIPAL CONTACT POINTS

Acting Chairperson:
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(on behalf of the nominal chairman, Prof. Victor Akulichev, Director of the same institute)

Technical Secretary:
Pending recruitment of new Head of Office,
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c/o National Research Council Thailand
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2.2 MECHANISM FOR COORDINATION OF GOOS

The coordinating mechanism for NEAR-GOOS consists of a Coordinating Committee that meets annually. Each member country is represented by two representatives on the committee, invariably from different agencies/institutions in the country. Observers are welcome to participate in the meetings of the Committee. Each country has its own mechanism for the coordination of activities at the national level operating with different degrees of autonomy either through the respective National Oceanographic Committees or their equivalent, or through some ad hoc coordination among interested institutions and agencies.

NEAR-GOOS essentially operates as a virtual platform of interlinked national data servers (near-real time and delayed mode database) established in each of the countries, whereby the Japanese databases carry out the aggregation at the regional level. Main concept of NEAR-GOOS is free of charge data exchange. Each data server has its own website set up, mostly in the national language.

Japan:
NEAR-GOOS Regional Real-Time Data Base (RRTDB): http://goos.kishou.go.jp
NEAR-GOOS Regional Delayed Mode Data Base (RDMDB): http://near-goos1.jodc.go.jp/

People's Republic of China:
Real Time Data Base: http://dell1500sc.nmefc.gov.cn/NEAR-GOOS/near-goos.html
Delayed Mode Data Base: http://near-goos.coi.gov.cn

Republic of Korea:
Real Time Data Base: http://near-goos.kordi.re.kr
Delayed Mode Data Base: http://www.nfrda.re.kr/kodc/english/index.html

Russian Federation:
Real Time Data Base: http://hydromet.com/project/near-goos/
Delayed Mode Data Base: http://www.pacificinfo.ru/en/near-goos/

Intergovernmental Oceanographic Commission:
NEAR-GOOS Homepage: http://ioc.unesco.org/goos/NearGoos/neargoos.htm

2.3 COORDINATION WITH OTHER GOOS BODIES

Coordination with the wider GOOS organization occurs via the Technical Secretary and through representation of respective CC-members or their respective countries in the GOOS Steering Committee or in the meetings of the I-GOOS.

3. REGIONAL CONTRIBUTIONS TO GOOS IMPLEMENTATION

3.1 CONTRIBUTIONS TO CORE ELEMENTS OF THE OBSERVING SYSTEM

All four NEAR-GOOS member states participate in GLOSS independently. Additional tide gauge data from Japan are available on the websites of the JODC.

NEAR-GOOS records many observations from regular fixed line R/V and SOOP and station data (fixed buoys, moorings, coastal stations, ocean towers) time series observations (meteorological, fisheries and academic/research agencies in Republic of Korea and Japan and Russia; State Oceanic Administration vessels in China), most of which are reported through the GTS. The parameters are limited to physical, notably wind, wave, currents, temperature and salinity.

Occasional non-physical data sets as well as bathymetric and tidal data are added to the delayed mode databases in the respective countries. Biological and chemical data are added on an *ad hoc* basis. NEAR-GOOS Regional DMDB holds around 7GB of data.

3.2 CONTRIBUTIONS TO GOOS PILOT PROJECTS

Each of the member states participates independently in the Argo and GODAE Pilot Projects (Japan, Republic of Korea, Russian Federation, China), TAO/TRITON (Japan). This is not considered a part of NEAR-GOOS, and different institutions/agencies may be involved.

3.3 CONTRIBUTIONS TO GOOS-RELATED RESEARCH

All of the countries have their own independent research programmes that indirectly contribute to NEAR-GOOS, e.g. Russian Federal Programme on the World Ocean, the Japanese ORI research project on "physical, chemical and biological studies on monitoring of marginal seas for ocean forecasting – a fundamental research project for NEAR-GOOS", selected research carried out by Korean and Chinese institutions or in regional networks (CREAMS, JECCS). These and other programmes are not coordinated through NEAR-GOOS.

3.4 OTHER CONTRIBUTIONS TO GOOS

The Japanese JMA provides data from the GTS to the NEAR-GOOS community. Other products from the various member states include oceanographic atlases, temperature/salinity-depth graphs for selected stations and ship routes.

Many of the partner institutions in NEAR-GOOS perform additional functions within the context of the IODE.

Under GODAE, JMA works with Meteorological Research Institute to develop and utilise comprehensive ocean modelling, prediction and analysis system capable to assimilate various types of

available data. JMA will also work with Tohoku University in the provision of high-resolution satellite based merged SST maps of the NEAR-GOOS area. These will indirectly become available to NEAR-GOOS.

4. CAPACITY BUILDING IN SUPPORT OF GOOS OR GOOS-RELATED RESEARCH

Every year, with support from the Japanese Funds in Trust to UNESCO, the IOC and the Japan Oceanographic Data Centre (JODC) organize a training course on NEAR-GOOS Data Management that is open to 7 people from all IOC/WESTPAC Member states, but with preference to the NEAR-GOOS member states. The remaining seats are taken by the other countries. The course covers subjects of data processing, data quality control, data archive, and basic database skills at data centers.

Capacity Building needs are varied, ranging from the deployment and operation and technical maintenance of observational equipments, QA/QC procedures, database skills, to the development of mathematical models and data assimilation, and sophisticated data products. All countries seem to be able to provide the necessary tertiary and technical training that ensures skilled labour, but the specifics of NEAR-GOOS data management have to be learnt on the job and come through experience.

NEAR-GOOS is conceived as an umbrella under which national and international data collection and dissemination activities are coordinated. All the member states are in principle responsible for the purchase, development, deployment and maintenance of their own equipment. NEAR-GOOS encourages collaborative frameworks under which two or more countries share the responsibility of maintaining an ocean observing programme. Efforts are currently underway to establish such a scheme with respect to an ocean observing platform to be built in the Yellow Sea.

In terms of awareness building and promotion of NEAR-GOOS much more needs to be done. A brochure and website were developed some years ago, but are in need of updating. The Technical Secretary and Chairperson as well as other CC-members often speak about NEAR-GOOS at scientific meetings, and this also helps to spread the message around.

5. IMPEDIMENTS TO PROGRESS

Lack of coordinating mechanism and commitment of participation: Not many experts are involved in the development of NEAR-GOOS. The effort of CC member only is limited in persuading government agencies to initiate a regional cooperation program for the effective development of NEAR-GOOS. The present coordinating mechanism in which CC members meet once a year can not drive the active participation of marine experts of different agencies and proper coordination to implement specific planning and implementation.

Data gaps appear in terms of the parameters considered, technologies used and the area under observation: A concerted effort is needed to fill those gaps, taking into consideration the needs of the users, however:

- In view of the long history of some of the time series, it will be difficult for many of the countries to re-assess or optimise their observation strategy from a regional perspective including the type of parameters considered.
- Data from different countries or different agencies are gathered with various degrees of accuracy using different methods and analysis techniques at widely varying intervals in time or space.
- In some cases, for instance, bathymetry and marine environmental pollution data are considered sensitive from a security or economic point of view.
- Data are not always available in a central location, or are maintained by a completely different host of agencies that so far have not been involved in NEAR-GOOS, nor is it in their immediate interest or mandate to do so, i.e. remote sensing agencies.

Data exchange is not working well at the national level and international level. Different agencies within a single country do not exchange data on an operational level. URLs are changed without notifying other parties, websites are set up in the national language only. Real-time data exchange is a relatively new concept to the oceanographic community and this leads to a less than timely processing and distribution of data in the system via the respective national databases for those data that are not reported through the GTS. International data exchange both in a real-time and delayed mode is limited by restrictions effective in China and Russia that should be solved on some higher level like at the I-GOOS meetings or through national IOC committees.

NEAR-GOOS is perceived as of little value to the user community. The potential user community, if there is any has yet to learn about the real potential of NEAR-GOOS and GOOS, but since NEAR-GOOS is a development process, immediate results, benefits and return on investment cannot be expected, rendering it unattractive to the potential users. NEAR-GOOS does not appeal to users in its current form because of a lack of intermediate products that can be readily used and interpreted by a user community.

Lack of financial support. Not all countries support even the travel of their members to the annual sessions of the Coordinating Committee or important conferences and meetings that would benefit NEAR-GOOS. All member countries do put up the minimum of resources required to sustain the national databases, making it difficult for the system to grow and expand. NEAR-GOOS did benefit though from the initial capital investment made by JMA and the other agencies for the establishment of dedicated servers with corresponding manpower, and indirectly from the establishment or upgrading of adequate infrastructure to improve monitoring at the national level.

Lack of support base. Many research groupings, institutions and agencies could benefit from NEAR-GOOS but only few of them are aware of involved in NEAR-GOOS. The country's contribution to NEAR-GOOS could increase substantially if more people would lend their support to NEAR-GOOS by providing financial and human resources, conducting enabling research, exchanging data, etc. NEAR-GOOS depends too much on a few good people and institutions that try to make it work. If these people and institutions loose their interest, NEAR-GOOS would collapse.

6. LESSONS LEARNED

NEAR-GOOS and the associated open data policy was initially welcomed by everyone, but once it became clear that real operational data exchange of critical data in real-time was much farther away, the interest in NEAR-GOOS soon subsided.

To make the program more active to be able to produce more information useful to the end-users, each of the participating countries needs to realize the importance of the regional cooperation and benefit from it.

It is difficult to initiate a funding cooperation program through the loose coordinating mechanism of a CC meeting, without active participation of marine experts from leading agencies in the region, who can actually prepare a proposal to persuade the participating government to invest. A strategic planning exercise was initiated in late 2000 with a view to revitalising NEAR-GOOS, but it is very difficult to draw up a widely supported Strategy Document with the few people who currently volunteer their time.

We also learned that it is difficult to initiate a regional corporation program, especially in this region with not much previous experiences in regional cooperation and problem of communication, to cover all the region of NEAR-GOOS together, since the marine environment and scientific issues and countries involved are different for three different marginal seas in the region. It would be much easier to initiate the specific action program to improve ocean observing and prediction system for sub-regional seas rather independently under the umbrella of NEAR-GOOS.

7. SUCCESS STORY

The initial establishment of NEAR-GOOS was driven by a desire to start international cooperation on a limited scale. The agreement on an open data exchange policy early on in the process cannot be underestimated as an achievement in that respect, particularly in view of the disparity between the political and economic settings of the participating countries. Moreover, the capabilities and opportunities that are present or foreseen in the NEAR-GOOS system depend fundamentally on a willingness to share and distribute information. The NEAR-GOOS concept to provide the data and oceanographic products free of charge is very important for development of oceanographic research in the area.

8. USEFUL EXAMPLES INDICATING THE BENEFITS OF GOOS AT REGIONAL LEVEL

NEAR-GOOS led to an active interest among Korean and Chinese agencies to establish an operational observing system in the Yellow Sea through bi-lateral cooperation program. When such bi-lateral program is successfully established, it could be extended to include the East China Sea by inviting Japan to participate action implementation plan.

The contribution of JMA in providing GTS data is of enormous value to the oceanographic community who previously would have little or no access to such data.

NEAR-GOOS constitutes a good model/platform for the establishment of a collaborative regional marine environmental assessment and information management programme under the UNEP Northwest Pacific Action Plan, one of the Regional Seas Bodies.

NEAR-GOOS and GOOS are important drivers of the new trend toward operational oceanography which only years ago constituted an elusive concept.

9. INDICATIONS OF FINANCIAL CONTRIBUTION TO GOOS

9.1 INVESTMENT IN REGIONAL ACTIVITIES

Investment in regional activities directly under the NEAR-GOOS umbrella is limited to the support of experts and CC-members to meetings and the removal of restrictions on data exchange. Indirectly though some large investments are involved, for instance in promoting enabling research and the building of an ocean observation tower by Korea in the NEAR-GOOS region, which will operate from early 2003.

9.2 INVESTMENT IN REGIONAL COORDINATION

As mentioned, there are neither adequate arrangements in place to ensure the participation of the CC-members to the annual meetings, nor do governments provide enough time to each of the CC-members to work on NEAR-GOOS and to promote it at the national level intersessionally. The Technical Secretary and the Chairperson are largely responsible for the organization of the annual meetings and the overall guidance of NEAR-GOOS development.

ANNEX X

**REPORT ON REGIONAL GOOS ACTIVITIES (year 2002):
SEA-GOOS**

1. NAME OF REGIONAL GROUP

South-East Asian GOOS (SEA-GOOS)

Member countries: not determined yet (all WESTPAC member states will be invited to join).

Countries that have expressed a preliminary interest in membership: Australia, PR China, Indonesia, Malaysia, Philippines, Singapore, Thailand, and Viet Nam.

Other countries or economies in Southeast Asia, like Cambodia, Brunei-Darussalam, East Timor, Lao PDR, Myanmar and China-Taipei and Hong-Kong SAR have not been contacted yet concerning possible affiliation.

Some of these countries/economies are not IOC members and some may be located in the Indian Ocean Region of IOC.

2. CONTACTS, COORDINATION

2.1. PRINCIPAL CONTACT POINTS

Chairperson not selected yet.

Technical Secretary
Pending recruitment of new Head of Office,
IOC/WESTPAC Secretariat
c/o National Research Council Thailand
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Technical Secretary operates with the assistance of the IOC Perth Regional Programme Office
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2.2 MECHANISM FOR COORDINATION OF GOOS

The suggested coordinating mechanism for SEA-GOOS constitutes a Coordinating Committee that would meet annually at the expense of the participating countries as far as possible. Each member country would be represented by two representatives on the committee, preferably one from the operational meteorological/oceanographic community and one from the marine scientific community. The committee shall elect a chairperson and vice-chairperson among its members. The chairperson will act as SEA-GOOS coordinator. Other countries and appropriately affiliated organizations can attend the sessions as observers.

There are as yet no national GOOS committees established in the region that could pursue the development of SEA-GOOS and related data exchange and management at the national level.

There are no dedicated web servers set up.

2.3 COORDINATION WITH OTHER GOOS BODIES

Coordination with the wider GOOS organization would occur via the Technical Secretary and through representation of respective CC-members or their respective countries in the GOOS Steering Committee or in the meetings of the I-GOOS.

3. REGIONAL CONTRIBUTIONS TO GOOS IMPLEMENTATION

3.1 CONTRIBUTIONS TO CORE ELEMENTS OF THE OBSERVING SYSTEM

All SEA-GOOS member states participate to some degree in GLOSS, independent from SEA-GOOS. Many of the countries have buoy and other operational monitoring programmes (e.g., OCEANOR), but the countries often have imposed restrictions on the release of the data, be it for cost-recovery or security reasons, or lack an inadequate infrastructure for data exchange at the national level.

3.2 CONTRIBUTIONS TO GOOS PILOT PROJECTS

China and Australia have participated in Argo.

3.3 CONTRIBUTIONS TO GOOS-RELATED RESEARCH

Apart from China and Australia, there is only limited self-financed enabling research in the region. Occasionally, the countries in the region do participate in international research that is relevant to GOOS, for instance in the study of the Indonesian Through Flow, and the Gulf of Thailand Project.

3.4 OTHER CONTRIBUTIONS TO GOOS

China participates in NEAR-GOOS and Australia participates in Indian Ocean GOOS and has a special programme on the Western Australian GOOS (WA GOOS).

4. CAPACITY BUILDING IN SUPPORT OF GOOS OR GOOS-RELATED RESEARCH

Several countries in the region regularly benefit from the training course on NEAR-GOOS Data Management that is annually organized with the support from the Japanese Funds in Trust to UNESCO, the IOC and the Japan Oceanographic Data Centre (JODC).

IOC/WESTPAC, through its International Cooperative Study on the Gulf of Thailand, has conducted 4 Training Workshops since 1999 on oceanographic data collection, processing, and management for Gulf of Thailand countries.

JCOMM and the WMO TCP programme are planning a hands-on training workshop on storm surge modelling and wave forecasting in Kuantan, Malaysia, July 2003 which is considered as a contribution to SEA-GOOS.

Capacity Building needs are enormous, ranging from the deployment and operation and technical maintenance of observational equipments, QA/QC procedures, database skills, to the development of mathematical models and data assimilation, and sophisticated data products.

The limited resources available in some of the countries implies that the countries could well benefit from the pooling of both financial, technological and human resources. SEACAMP, an initiative established with support of the IOC and WMO, and currently furthered under the auspices of ASEAN, intends to provide a centre of excellence in atmospheric and marine prediction, but the concentration of a single centre in Singapore meets with scepticism from some of the neighbouring countries.

There is very little knowledge of SEA-GOOS in the region, and a lot more needs to be done to involve the industry and maritime sectors – which might reap benefits from SEA-GOOS – as well as the various institutions at the national level.

5. IMPEDIMENTS TO PROGRESS

Few data are regularly monitored and archiving and QA/QC is often inadequate.

Data exchange is very difficult to achieve at the national level, let alone the international level. Some initial steps have been undertaken through the IOC/WESTPAC Gulf of Thailand Co-operative Study.

Countries lack the institutions and infrastructure to support regional GOOS.

Few skilled personnel are available.

6. LESSONS LEARNED

SEA-GOOS initially established an *ad hoc* steering committee that showed little progress. A government commitment is needed. SEA-GOOS cannot progress if it can depend only on a few committed people.

7. SUCCESS STORY

None available yet.

8. USEFUL EXAMPLES INDICATING THE BENEFITS OF GOOS AT REGIONAL LEVEL

The oil and gas sector might potentially benefit from SEA-GOOS, but the possible merit still has to be made explicit.

9. INDICATIONS OF FINANCIAL CONTRIBUTION TO GOOS

9.1 INVESTMENT IN REGIONAL ACTIVITIES

Data not available yet, but likely to be limited.

9.2 INVESTMENT IN REGIONAL COORDINATION

Data not available yet, but likely to be limited.

ANNEX XI

REPORT ON REGIONAL GOOS ACTIVITIES (year 2002): IOCARIBE-GOOS

1. NAME OF REGIONAL GROUP

IOCARIBE-GOOS

2. CONTACTS, COORDINATION

2.1. PRINCIPAL CONTACT POINTS

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Cesar Toro
Acting Technical Secretary
IOCARIBE Executive Secretary
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2.2 MECHANISM FOR COORDINATION OF GOOS

IOCARIBE-GOOS planning began in 1999 with the formation of an *ad hoc* group of experts. The group completed planning activities in 2002 with the completion of a Strategic Plan (GOOS Pub. No. 115). The strategic plan is to be implemented under the direction of a Steering Committee, whose selection will be completed by 1 March 2003. The Steering Committee will use electronic forum for discussion of the Strategic Plan and Implementation, and planning for first meeting in June 2003. A Web site is being developed at www.iocaribegoos.com; presently documents are available at:

http://ioc.unesco.org/goos/IOCARIBE/carigoos.htm.

2.3 COORDINATION WITH OTHER GOOS BODIES

Coordination presently takes place through interactions (meetings, etc.) of co-chairmen and IOCARIBE Secretariat with the GPO, and other national and regional GOOS offices.

3. REGIONAL CONTRIBUTIONS TO GOOS IMPLEMENTATION

All activities listed are ongoing (actual) activities; as yet they are only planned contributions to IOCARIBE-GOOS.

3.1 CONTRIBUTIONS TO CORE ELEMENTS OF THE OBSERVING SYSTEM

Sea Level:
- The US operates tide gauges in the US and territories; http://www.co-ops.nos.noaa.gov
- The Caribbean Planning for Adaptation to Climate Change (CPACC) program, funded by GEF; www.cpacc.org
- RONMAC, funded by NOAA, USAID, OAS; http://www.oas.org/ronmac
- GLOSS reporting stations in the Bahamas, Colombia, Cuba, Martinique, Jamaica, Mexico, Panama, Bermuda, Venezuela

Time Series:
- CATS University of Puerto Rico
- CARIACO Edimar, Venezuela and University of South Florida, USA

Coral Reef Monitoring:
- CARICOMP
- GCRMN

VOS:
- US
- SeaKeepers
- Cuban Met Office Program

Buoys:
- US NDBC
- MeteoFrance

Met Stations: many
Cable Transports: Florida Straits, Grenada Passage
Regional and National Observing Systems: several
Satellite Remote Sensing Centres: in USA, MX, CO, VEN

3.2 CONTRIBUTIONS TO GOOS PILOT PROJECTS

GODAE: Assimilative models of the Atlantic and Caribbean run by USA, UK, FR
PIRATA: Tropical Atlantic buoys supported by FR, USA, BRA

3.3 CONTRIBUTIONS TO GOOS-RELATED RESEARCH

3.4 OTHER CONTRIBUTIONS TO GOOS

4. CAPACITY BUILDING IN SUPPORT OF GOOS OR GOOS-RELATED RESEARCH

5. IMPEDIMENTS TO PROGRESS

- Insufficient capacity in marine and coastal science and services in many member states.
- Lack of confidence on the usefulness of the system as a tool for sustainable environmental and economic development.
- Severe budget limitations due to economic crises in most countries.
- Lack of commitment by larger states to initial organization.
- Lack of political will.

6. LESSONS LEARNED

7. SUCCESS STORY

8. USEFUL EXAMPLES INDICATING THE BENEFITS OF GOOS AT REGIONAL LEVEL

9. INDICATIONS OF FINANCIAL CONTRIBUTION TO GOOS

9.1 INVESTMENT IN REGIONAL ACTIVITIES
9.2 INVESTMENT IN REGIONAL COORDINATION

ANNEX XII

REPORT ON REGIONAL GOOS ACTIVITIES (year 2002): US GOOS

1. NAME OF REGIONAL GROUP

U.S. GOOS

2. CONTACTS, COORDINATION

2.1. PRINCIPAL CONTACT POINTS

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2.2 MECHANISM FOR COORDINATION OF GOOS

U.S. GOOS is coordinated by the Ocean.US Office, which is charged with developing an integrated and sustained ocean observing system (IOOS) (www.ocean.us.net). The Office is supported by nine Federal agencies. A U.S. GOOS Steering Committee is composed of representatives from academia, industry, government, and environmental organizations providing advice for the planning, implementing, and coordination of U.S. GOOS. Annex 1 contains a summary of the Ocean.US initiative, which is still in the formative stages.

U.S. GOOS is to be a single integrated system consisting of two components:

(i) an open ocean component that includes the U.S. contribution to the climate module of GOOS, and
(ii) a coastal component for U.S. coastal waters that links changes in the global ocean-climate system and land-based changes in the nation's watersheds to events in the U.S. exclusive economic zone and the nation's estuaries and bays.

A National Observing Network of measurements, data management, and analysis will function as a national "backbone" that provides data and information required by all regional systems for U.S. coastal waters and by the open ocean component. The coastal component will evolve into a National Federation of regional observing systems that both contribute to and benefit from the National Network. A total of 8-10 regions within the U.S. is envisioned, with boundaries overlapping due to oceanographic, biological, and political factors. It is expected that each regional observing system will be developed and operated by regional associations or consortia that represent both data providers and users. Regions will establish their own governing and coordinating mechanisms. These regions now vary significantly with regard to the extent of observing activities.

2.3 COORDINATION WITH OTHER GOOS BODIES

The Ocean.US Office is the national focal point for coordination with intergovernmental activities. There is a recognized need to establish closer collaboration with neighbouring countries. While close ongoing cooperation has taken place with Canada for many years on fisheries and Great Lakes issues, links with areas south of the U.S. are not as strong. At the Johannesburg Summit in September 2002, the U.S. introduced the "White Water to Blue Water" initiative to cooperate with the governments of the wider Caribbean on improving regional ocean and coastal ecosystem management. Efforts are being made to link the planning for this effort with the identified needs of IOCARIBE-GOOS.

3. REGIONAL CONTRIBUTIONS TO GOOS IMPLEMENTATION

3.1 CONTRIBUTIONS TO CORE ELEMENTS OF THE OBSERVING SYSTEM

Many activities are ongoing that contribute to GOOS. These web sites describe programs that are some *examples* of these activities.

- U.S. GOOS – General Description: http://ocean.tamu.edu/GOOS
- Regional Coastal Observing Systems: http://www.csc.noaa.gov/coos/
- Tropical Atmosphere Ocean (TAO) Array of Buoys: http://www.pmel.noaa.gov/tao/proj_over/tour/tao_tour.html
- Voluntary Observing Ship (VOS) Network: http://www.vos.noaa.gov/vos.html
- Data Buoy Cooperation Panel (DBCP): http://www.dbcp.noaa.gov/dbcp/
- National Environmental Monitoring Initiative: http://www.epa.gov/cludygxb/
- Global Coral Reef Monitoring Network: http://coris.noaa.gov
- US PORTS: http://www.co-ops.nos.noaa.gov/d_ports.html
- Oceanography Space Missions : http://airsea-www.jpl.nasa.gov/missions.html
- NASA Satellite Ocean Remote Sensing: http://oceans.nasa.gov/
- NOAA Satellite Ocean Remote Sensing: http://orbit-net.nesdis.noaa.gov/orad/ors_index.html
- Fisheries Assessments: http://www.noaa.gov/nmfs/
- Harmful Algal Blooms Observing System (HABSOS) pilot project: http://www.ncddc.noaa.gov/habsos

3.2 CONTRIBUTIONS TO GOOS PILOT PROJECTS

The U.S. presently contributes substantially to global pilot projects such as Argo (www.argo.ucsd.edu), PIRATA, and GODAE. Approximately one-third of the Argo profiling float network is funded, on a long-term basis, by the U.S. Plans are to increase the resources invested in pilot activities. In FY03, for example, several agencies are jointly sponsoring a U.S. GODAE pilot project to demonstrate the use of real-time ocean data assimilation in forecast models and systems. The first year investment is $1.5M, increasing to $4.5M in two years.

The U.S. has also begun several regional pilot projects, the first of which is the Gulf of Maine Ocean Observing System (GoMOOS) (http://www.gomoos.org/). GoMOOS is a prototype pilot project designed to bring hourly oceanographic data from the Gulf of Maine to all those who need it, and has been organized by a regional public-private consortium.

3.3 CONTRIBUTIONS TO GOOS-RELATED RESEARCH

The research community is a major stakeholder in U.S. GOOS and is a core creator and advocate for it. There is increased recognition that research will benefit enormously from a sustained observing system. The U.S. supports extensive research that directly or indirectly contributes to U.S. GOOS and plans to increase this investment. An example of a present research projects is the Coastal Ocean Observations Laboratory (http://marine.rutgers.edu/coolroom/), a dense system of coastal weather and sea observations available in near-real time via the web. A proposed project, the Ocean Observatories Initiative (http://www.geo-prose.com/projects/ooi.html), will construct the initial infrastructure for an observatory network linked to the Internet via seafloor cables. A challenge will be to convert successful research and technology projects to sustained efforts, while maintaining research funding for further work. Annex II describes the stages of transition envisioned for U.S. GOOS activities.

3.4 OTHER CONTRIBUTIONS TO GOOS

Data Management and Communications (DMAC) - the establishment of an integrated data management and communications infrastructure is a high priority for the implementation of the IOOS. A preliminary design for the Data Management and Communications (DMAC) subsystem is now being expanded to a formal implementation plan. A DMAC Steering Committee is supported by six teams: Data Transports, Metadata and Data Discovery, Data Archive, Data Applications and Products, Data Facilities Management, and User Outreach. The teams are responsible for evaluating available technologies, making technical recommendations, and developing user community issues lists. The plan will include a detailed discussion of the activities, phasing, and costs required to develop and implement the DMAC subsystem. The final draft will be completed by the end of 2002.

Economic Studies - A set of regional studies had been funded to assess the expected economic benefits of regional systems (See also Section 8 below). An inventory of user categories will be compiled that reflect the physical and economic scope of their activities. Using common economic methodologies, the studies will provide estimates of the value of more effective decision-making (more timely, more accurate, etc.) afforded by integrated and sustained observations and data analysis. Sectors projecting significant expected benefits will then be analyzed in more detail.

Business partners are also being solicited in order to demonstrate the value of environmental information resulting from the IOOS. For decision-making, industries use business forecast models, which incorporate environmental data and can thus improve greatly in accuracy with better environmental data. Examples of industries particularly dependent on environmental conditions include tourism and recreation, energy management, agriculture, forestry, and fishing.

4. CAPACITY BUILDING IN SUPPORT OF GOOS OR GOOS-RELATED RESEARCH

The U.S. provides ongoing support to developing countries in programs such as Argo and PIRATA. For example, scientists from India, Korea, and China have been trained in the U.S. on the operation and deployment of Argo floats. Data management training is also provided regularly. The National Oceanographic Data Center operates World Data Center A for Oceanography under which data exchange agreements are in place with over 40 countries engaged in marine research.

5. IMPEDIMENTS TO PROGRESS

The overarching difficulty is the national consensus on the need for a much greater Federal investment in homeland security, which results in less time and attention available for environmental and natural resource issues.

A serious impediment is the challenge to clearly and repeatedly articulate the benefits of the observing system to society, and thus to obtain the core funding necessary for full and rapid evolution of a comprehensive system. The breadth and lack of cohesion of stakeholders, the competition among research interests, and the disparate missions of the sponsoring agencies are other challenges. In the context of this last challenge, the lack of a mechanism to fund the transition of successful research projects to operational status is a barrier.

6. LESSONS LEARNED

(i) The support of the scientific community and other user groups must be secured as early as possible in the design and implementation stages.

(ii) An unprecedented level of cooperation among agencies and with other countries is necessary.

(iii) A prerequisite to an effective observing system is the availability of an integrated data management system for rapid access to diverse data from disparate sources.

7. SUCCESS STORY

The El Niño/Southern Oscillation Observing System made the transition from research to an operational capability in 1997, in order to facilitate the long-term, systematic collection of ocean data in the tropical Pacific. Because of the availability of this data for numerical ocean/atmosphere models, the El Niño event of 1998 was predicted. Economists estimate that improved El Niño forecasts in the U.S. are worth nearly $300M annually. World wide, a lower bound estimate of annual economic benefits of improved forecasts is $450-$500M per year.

The Gulf of Maine Observing System (GoMOOS) is a national pilot program designed to bring hourly oceanographic data from the Gulf of Maine to all those who need it, including:

- Commercial Mariners making everyday decisions that impact their safety and livelihood.
- Coastal Managers seeking to maintain economically and environmentally vital resources.
- Scientists trying to understand complex ecosystems and predict climate change.
- Educators conveying the complexity and urgency of ocean science.
- Search and Rescue Teams trying to find people and save lives.
- Emergency Response Teams mitigating damage from environmental disasters.
- Public Health Officials concerned about outbreaks of harmful algal blooms (such as red tides).

8. USEFUL EXAMPLES INDICATING THE BENEFITS OF GOOS AT REGIONAL LEVEL

A study titled the “Potential Economic Benefits of Coastal Ocean Observing Systems: The Gulf of Maine” (http://ioc.unesco.org/goos/pdf%20maine%20econ.pdf) may be a useful template for analyzing the economic benefits and costs of proposed systems. A thorough understanding of the benefits and costs is essential for allocating the costs of such systems between the public and private sectors, and, within the public sector, among federal, state, and local governments.

GoMOOS (www.gomoos.org) was established in 2001 as a multi-purpose activity to collect and provide data for a variety of users. The economic *value* of GoMOOS is the sum, across all organizations, of the difference between economic outcomes (i.e., net benefits) of decisions with and without GoMOOS data. Five activities were examined: maritime transportation, commercial fishing, recreational fishing and boating, search and rescue operations, and pollution management (e.g., oil spill response). It was determined that seasonal restrictions on allowable fish catches may be adjusted if better data are available. The average value added per day in New England finfish and shellfish fisheries is $4.1M. If more accurate weather information were available, recreational fishing trips might increase; a 1% increase in the number of angler trips in the Gulf of Maine is valued at $4.2M. The U.S. Coast Guard conducts 6000 search-and-rescue missions per year in the Gulf of Maine. An average of 28 lives are lost per year in the region after the Coast Guard has been notified. Understanding currents and winds is critical- only 4% of all lives are saved after two hours at risk. A 1% improvement (from 90% to 91% lives-at-risk saved) in the Gulf of Maine would result in an additional 6 lives saved per year. Economists estimated the potential annual benefits of GoMOOS to be over $33M per year.

9. INDICATIONS OF FINANCIAL CONTRIBUTION TO GOOS

9.1 INVESTMENT ON REGIONAL ACTIVITIES

The federal agencies are now compiling the investments presently being made in FY03 and FY04. The additional cost for the first year of IOOS implementation is $138M, increasing to $500M in new funds for a mature system.

9.2 INVESTMENT IN REGIONAL COORDINATION

The annual cost of the Ocean.US Office is $1M.

Annex I

What is Ocean.US

Ocean.US is a Federal initiative under the auspices of the National Oceanographic Partnership Program. Ocean.US promotes and facilitates implementation of **a sustained and integrated ocean observing system** to meet national needs for:

- improving the safety and efficiency of marine operations
- detecting and forecasting oceanic components of climate variability and effects on coastal populations
- ensuring national security
- managing resources for sustainable use
- protecting and restoring healthy marine ecosystems
- mitigating the effects of natural hazards
- reducing public health risks

The system will be a virtual one--- a federation of existing and new elements, providing full and open access to ocean data. Both *in situ* and satellite observations are included.

A coastal component and a global oceanic component are being designed simultaneously. The coastal component is to be a federation of regional observing systems, each of which is administered by a regional association, and will consist of a national "backbone" of observations and data management protocols. Regions may supplement their data collection activities to respond to region-specific data needs.

The initiative is the U.S. contribution to the Global Ocean Observing System (GOOS) and reflects the increasing interest of both the Executive Branch and the Legislative Branch to move oceanography into an operational endeavor. An advisory Panel chaired by Dr. John Knauss of the University of Rhode Island recommended that an interagency office be established as a focal point for such a system. In October 2000 the Ocean.US Office was established under the auspices of the National Oceanographic Partnership Program (www.nopp.org), with eight agencies, to date, having signed the memorandum of agreement to support this effort. To date, nine agencies have agreed to participate in the Ocean.US endeavor. Representatives of these agencies comprise an Executive Committee that provides oversight and guidance to the Office.

National Oceanic and Atmospheric Administration
Department of the Navy
National Aeronautics and Space Administration
National Science Foundation
Minerals Management Service
U.S. Geological Survey
Department of Energy
U.S. Coast Guard
U.S. Army Corps of Engineers

A full-time staff of personnel is now assigned to this office, with oversight provided by an Executive Committee chaired by NOAA and committee of users, the U.S. GOOS Steering Committee. The office is initially charged with documenting a set of integrated requirements and capabilities and for preparing a phased implementation plan for consideration by the agencies.

Annex II

Development of an Operational System

Successful development of the IOOS will depend upon advances in the state of the art in many areas of ocean science and engineering. Research projects intended to test hypotheses and develop new measurement and analysis capabilities will be finite in duration. It cannot be assumed that every successful technique developed will or should be incorporated into a sustained observing system. Thus, a process is needed to select and incorporate candidate observing system elements into the sustained observing system. Candidate technologies and capabilities will pass through a series of stages (Figure 1) as follows:

(1) Research Projects: The development of observational (platforms, sensors, measurement protocols, data telemetry) and analytical (e.g., models and algorithms) techniques for research purposes (performed by research groups).

(2) Proof-of-Concept Pilot Projects: Subjecting techniques developed through research to repeated or sustained testing over a range of conditions that will help to illuminate weaknesses and provide opportunities to address those weaknesses and to understand the range of applicability of the techniques.

(3) Pre-Operational Projects: Use of techniques and data by the research and operational communities to ensure that incorporation into the observing system leads to a value added product (is more cost-effective than functioning in isolation) and to ensure that incorporation does not compromise the integrity and continuity of existing data streams and product delivery (primary performers are operational groups with involvement of researchers).

(4) Operational System: Incorporation of techniques and data into a routine, sustained, integrated system of observations, data management and data analysis (performed by operational groups with researchers functioning as advisors, consultants, and users).

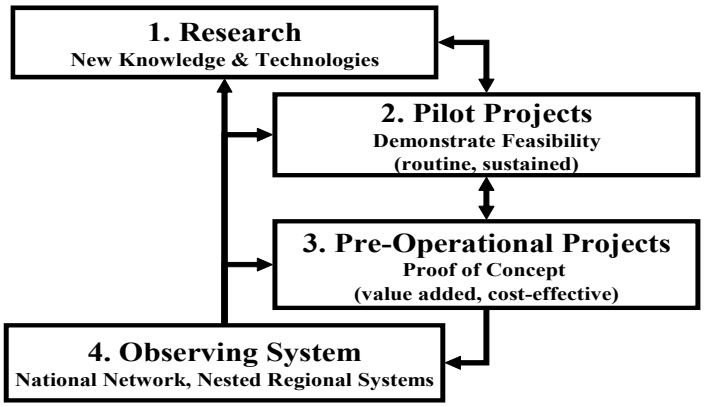

Figure 1. Candidate technologies and capabilities pass through stages to be considered for incorporation into an operational system

Existing programs, elements, and systems may enter the sequence at any stage if they meet requirements, and, although presented as a linear sequence, in practice all four stages will be in play simultaneously with feedback among all stages. Projects in stages 1-3 may focus on elements of the system (a particular sensing technology, development of sampling protocols, model development, data management and communications protocols, etc.) or on the development of an integrated system (e.g., a regional OOS). Research may be mission-driven with funding earmarked for IOOS, or hypothesis-driven with funding from other sources. Pilot and pre-operational projects will be supported by IOOS funding.

The development of the IOOS must ensure more cost-effective use of existing data, expertise and infrastructure than is currently realized. The IOOS will become a comprehensive system of observations through shared use of infrastructure from measurement systems and platforms to communication networks, data management systems, assimilation techniques, and modelling. National, regional and global coordination will be required to minimize duplication and costs, optimize the temporal-spatial scales of observation, and maximize the availability of data and information to participating nations.

The IOOS must include mechanisms that allow its managers and users to (i) evaluate the performance, reliability, and effectiveness of the system, (ii) assess the value of the information produced, and (iii) improve the system as new capabilities become available and user requirements evolve. Products must provide social and economic benefits that justify the operational costs of the observation system. If the IOOS is to evolve as patterns of use change and as the capacity to observe and analyze environmental changes improves, there must be an ongoing feedback among those groups that make measurements, those that provide analysis services, and those that use the resulting data and information.

ANNEX XIII

REPORT ON REGIONAL GOOS ACTIVITIES (year 2002): WAGOOS

1. NAME OF REGIONAL GROUP

Western Australian Global Ocean Observing System (WAGOOS)

2. CONTACTS, COORDINATION

2.1. PRINCIPAL CONTACT POINTS

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Australia

2.2 MECHANISM FOR COORDINATION OF GOOS

Web: www.bom.gov.au/wagoos
Regular meetings of members; 8 meetings since December 2000.
Seminars and workshops on topics of interest.

2.3 COORDINATION WITH OTHER GOOS BODIES

None to date.

3. REGIONAL CONTRIBUTIONS TO GOOS IMPLEMENTATION

3.1 CONTRIBUTIONS TO CORE ELEMENTS OF THE OBSERVING SYSTEM

Members currently operate instrumented arrays of current meters, thermistor chains, ADCP, tide gauges, Argo floats and ships taking observations CTD profiles and the like. These projects are in place as separate projects. Coordination is planned.

3.2 CONTRIBUTIONS TO GOOS PILOT PROJECTS

Members are planning a significant pilot project to measure the Indonesian Through-Flow (ITF) as it passes through the Timor Sea. This project shall compliment existing oil/gas company measurements, INSTANT, GOODAE and Argo float and satellite observation programmes.

3.3 CONTRIBUTIONS TO GOOS-RELATED RESEARCH

Satellite research and training programmes such as WARESAT are being carried out by members, but at this stage are not coordinated.

3.4 OTHER CONTRIBUTIONS TO GOOS

Members have data, product and information management systems in place. Coordination and access is being developed.

4. CAPACITY BUILDING IN SUPPORT OF GOOS OR GOOS-RELATED RESEARCH

Members undertake capacity building programmes. Further capacity building is under consideration.

5. IMPEDIMENTS TO PROGRESS

WAGOOS has made a significant way forward with strong member interest, a preliminary development strategy in place, and is about to implement legal incorporation and development of effective ocean measurement programmes. However development of WAGOOS as an effective organization is taking time, particularly as members have time constraints, and a limited amount of executive funding constrains development.

6. LESSONS LEARNED

Nothing significant. Development of WAGOOS needs an improved awareness programme.

7. SUCCESS STORY

Timor Sea proposal to better understand the ITF as it affects small-scale phenomena such as internal waves, buoyancy and local currents. Such a study links climate and local scales. If it proceeds this project may prove successful.

8. USEFUL EXAMPLES INDICATING THE BENEFITS OF GOOS AT REGIONAL LEVEL

Inclusion of the oil and gas companies in the programmes has been significant. All offshore operators, government and private, are driven primarily but the legal obligations of duty of care, safety, sustainable development, and environmental protection. WAGOOS can significantly contribute to the compliance of offshore operators.

9. INDICATIONS OF FINANCIAL CONTRIBUTION TO GOOS

9.1 INVESTMENT IN REGIONAL ACTIVITIES

No estimate

9.2 INVESTMENT IN REGIONAL COORDINATION

WAGOOS members' programmes shall make a significant contribution; estimated budgets of at least $20,000,000 over the period 2003 to 2006.

ANNEX XIV

LIST OF ACRONYMS*

COOP	Coastal Ocean Observations Panel
EC	European Commission
EEZ	Exclusive Economic Zone
EuroGOOS	European GOOS
FP6	Sixth Framework Programme (of the European Commission)
GODAE	Global Ocean Data Assimilation Experiment
GODAR	Global Ocean Data Archaeology and Rescue
GOOS	Global Ocean Observing System
GPO	GOOS Project Office
GRAs	GOOS Regional Alliances
GRAND	GOOS Regional Alliances Network Development
ICES	International Council for the Exploration of the Sea
I-GOOS	Intergovernmental Committee for GOOS
IOGOOS	Indian Ocean GOOS
IOC	Intergovernmental Oceanographic Commission (of UNESCO)
IOCARIBE	IOC Sub-Commission for the Caribbean and Adjacent Regions
JCOMM	Joint WMO/IOC Technical Commission for Oceanography and Marine Meteorology
MAMA	Mediterranean network to Assess and upgrade the Monitoring and forecasting Activity in the region
MedGOOS	Mediterranean GOOS
NORSEPP	North Sea Ecosystem Pilot Project
OOPC	Ocean Observations Panel for Climate
OSPAR	Olso-Paris (Convention)
PI-GOOS	Pacific Islands GOOS
PIRATA	Pilot Research Array in the Tropical Atlantic
SEACAMP	South East Asia Centre for Marine and Atmospheric Prediction
SEA-GOOS	Southeast Asia GOOS
WA GOOS	Western Australia GOOS
WESTPAC	IOC's regional Sub-Commission for the Western Pacific
WIOMAP	Western Indian Ocean Marine Applications Project
WMO	World Meteorological Organization (of the United Nations)

* This list refers to acronyms of the main report only.