**Intergovernmental Oceanographic Commission**
*Reports of Meetings of Experts and Equivalent Bodies*

# Joint Scientific and Technical Committee for Global Ocean Observing System (J-GOOS)

## First Session

Nantes, France, 26-27 May 1994

**UNESCO**

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## 1. WELCOMING REMARKS AND OPENING

1 The first session of the Joint Scientific and Technical Committee for GOOS (J-GOOS) was hosted by IFREMER/France in Nantes, 26-27 May 1994. Angus McEwan was invited to chair this initial J-GOOS meeting.

2 McEwan welcomed the participants and asked that they introduce themselves. Then, to set the stage for later discussion, he provided some background comments and offered his view of what lay ahead of the Committee. He emphasized that GOOS was not another global science experiment; GOOS was the creation of a new global system with diverse uses that would be built by the Member States, not some central organization. It has the promise of great strategic, economic and social benefit and science is needed to deliver this benefit.

3 It was recognized from the start that GOOS had to be created from national efforts, by building on existing systems, but it would not be only an assembly of national contributions. Instead GOOS was intended to provide an integrating framework based on a scientific plan for developing common methods of observation, standards and procedures, a means for the rationalization of existing observation systems, and the coordinated usage and development of global observing systems such as satellites. The plan would encourage the introduction of new observing and data handling technologies, the generation of products such as models and facilitate training and capacity building.

4 McEwan stated that governments need convincing that benefits will justify the cost of an ongoing commitment, and this underscored the need to focus on practical outcomes and demonstrably useable products at an early stage.

5 McEwan outlined the proposed organizational framework for GOOS and briefly discussed the advisory scientific responsibility of J-GOOS. He drew attention to important distinctions from GCOS, particularly the need for a wider range of disciplinary coverage in view of the breadth of purpose of the observing modules of GOOS. In his view J-GOOS will be a separate voice advising sponsoring agencies about GOOS. He concluded by emphasizing the need for GOOS to demonstrate its value without delay.

## 2. REVIEW AND ADOPTION OF THE AGENDA

6 McEwan opened a discussion of the agenda. Several members voiced concern about the arrangements for the meeting and believed they were ill-prepared to comment on the agenda in a meaningful way. After an exchange of views regarding the kind of questions needing answers by J-GOOS, the Committee adopted the agenda in Annex I. The list of participants is provided in Annex II.

## 3. INTRODUCTION TO THE SCIENTIFIC CHALLENGES FOR GOOS

7 Four Committee members were invited to give presentations that served to introduce varying aspects of the breadth of scientific challenges that the development of GOOS presents.

### 3.1 PRESENTATION BY JOHN WOODS: "GOOS CONCEPT AND STRATEGY"

8 In his talk, Woods presented an overview of GOOS and identified a number of scientific issues that needed to be addressed. Woods expressed the view that GOOS provided a global perspective upon local problems and needs. Excepting global climate issues, however, the interests of the potential users of GOOS were mainly upon local or regional problems. He offered an overriding concept: that GOOS provided the "Boundary Conditions" (interpreted in the broadest sense) for local or regional operational services.

9 Woods suggested that J-GOOS scientific attention should be addressed to the following aspects of GOOS:

(i) METHODS including observations, assimilation, simulation experiments to address the problems of undersampling.

(ii) MODELS to provide rapid improvement in representation of eddies, regional currents, topography, and atmospheric coupling and to address complex ecological dynamics (embracing physics, chemistry and biology).

(iii) BOUNDARY CONDITIONS including bottom topography such as continental shelves and seas, sea ice and atmospheric coupling.

(iv) TECHNOLOGY including computing, observation methods, communications and data management.

0 Woods concluded by drawing an analogy with TOGA and WOCE, to suggest that GOOS needed a uniting "keystone" theme and stressed the need for a "Strategic Goals" statement. Woods later provided a draft "Strategic Goals" statement, which Dr. McEwan undertook to redraft later for consideration at J-GOOS II. The modified draft of this statement is included along with the J-GOOS terms of reference in Annex III.

1 In discussion, the central role of modelling was explored. Models will be needed for assimilation of data and in design of the observing system itself through Observing System Simulation Experiments (OSSE's).

2 Some examples were raised showing the utility of OSSE's, especially in special situation studies based on particular models with particular observations. One success cited was the improvement of local wave forecasts by adding ocean swell information (from ECMWF). It was noted, however, that models would have to become much more realistic before they can be broadly used reliably for OSSE's. Though progress is being made, existing academic groups are under-resourced for addressing this important task. Moreover, at present, there are several stages of difficulty, depending on how limited the application, as well as internal model errors in the operational application of models.

3 The "Boundary Condition" concept was regarded as potentially important in the longer term for regional problems. At present, however, and probably for years to come local models may be more sensitive to other factors (e.g., atmospheric forcing, local observations) than to the open-ocean boundary condition. It was also recognized that J-GOOS should focus upon what products would most immediately serve the needs of local operational services, through interaction with I-GOOS and directly with these services.

3.2 PRESENTATION BY NEVILLE SMITH: "MODELLING AND GOOS"

4 Dr. Smith began by discussing the role of models in the context of data processing. Four levels or grades of information may be defined:

Level 1 - raw data, including associated algorithms, ground truthing for satellites, etc., to derive higher level information such as colour for fluorescence, or doppler shift for current, etc.

Level 2 - variables such as temperature, velocity, nutrients, etc.

Level 3 - scientific analyses, e.g., a gridded data field.

Level 4 - user products.

5 Models are essential for moving information through these levels.

6 Smith added that models provide the means to interpolate data and extrapolate information in space and time, to infer related fields from observed fields, to blend disparate types of information and to filter and quality control data streams. He emphasized the point that observations are the only source of new information; models are simply processing tools, though they may be quite sophisticated.

7 Smith described the interconnection between the various stages of observation and processing: measurement, assimilation, analysis and "production" (a practical and useful outcome), noting

that a substitute for frequent observations (if logistics were a constraint) was a good model: remote information in time or space could be "carried" to the observation location. In this way the strength of the GOOS modelling directly impacts on the observational design.

18 In discussion, the need for more consideration of useful modelling products and applied "deliverable results" was emphasized. The concept of an agency equivalent to a "Met Office" i.e., a "Wet Office" to provide a public interface was raised. This further focussed discussion on "public good" deliverables and the need for benefit-cost analyses.

### 3.3 PRESENTATION BY ALLYN CLARKE: "THE WOCE EXAMPLE AND FISHERIES"

19 Clarke informed the Committee that the planning of WOCE was ten years and that this matched the planning lead times required for new satellite systems. In spite of this match of planning time scales, an important satellite system desired by WOCE, the NSCAT scatterometer for surface winds, is only now scheduled for launch, during the final year of the field phase of WOCE. The lesson here is that, while large international ocean science programmes are an important mechanism to define the requirements for satellite observing systems, the planners of those programmes must also build redundancy into their plans so that a programme does not fail should a satellite fail to be launched or a new instrument fail to be delivered. Clarke emphasized that GOOS will need to play a role in lobbying for marine satellite observation systems and new instrument developments.

20 WOCE’s goal 1 was the development of ocean models that would be useful for climate prediction. The WOCE field programme was designed in order to collect a new global oceanographic data set of known and high quality which could be used to test and validate global and regional models. In designing this field programme, WOCE wished to describe the 3-D circulation of the global ocean, the month-by-month changes of the atmospheric forcing of the ocean, the seasonal response of the upper ocean to that forcing and the year-to-year changes in the newly formed water masses. WOCE’s second goal was to assess how representative the 7-year WOCE period was of the five-or-more decades of modern instrumental records of the ocean, and to recommend a long-term climate observing system for the ocean based on the WOCE modelling and observational results.

21 WOCE has been struggling to effect a cultural change on the oceanographic community. It has been successful in establishing a number of data assembly and data analysis centres where data from a number of different investigators, institutions and nations are brought together, quality controlled, distributed and analyzed in terms of data products. WOCE planners look at this as a first step towards considering the data collection and the data analysis/synthesis as two different activities which might be pursued by two different organizations.

22 WOCE, along with its sister programme TOGA, have provided the oceanographic community with significantly improved surface-drifter technology as well as the ALACE float, which, coupled with a temperature and conductivity sensor, may truly revolutionize the way we collect temperature and salinity profiles from remote parts of the ocean in the future.

23 Clarke noted that oceanographers working within the climate research community often encounter narrow views of the role of the ocean in climate. Climate research is driven by meteorologists who have a tendency to only think of atmospheric variables when thinking of climate variability or change. Large-scale changes in ocean temperatures are dismissed by these climatologists if such changes cannot be demonstrated to effect large-scale changes in atmospheric conditions. Such demonstrations are generally done either through statistical analysis of weather records or through simulations using atmospheric models driven by anomalies of SST fields. Clarke explained that being an employee of a fisheries department made him sensitive to contrasting climate perspectives. He could attest to large economic impacts of changes in the distribution and abundance of various fish populations which can be attributed in part to changes in ocean temperatures and salinities. In the Northwest Atlantic, these changes are part of a large-scale oceanic variability, not simply a local shelf response to atmospheric conditions.

24 In discussion, further examples in fish population dynamics were cited, encouraging a departure from the "black box" approach. This raised questions of whether GOOS should concern itself with living resources directly as well as defining their environment. Fisheries are primarily a coastal issue and the "global boundary condition" concept for GOOS may not address their needs. The fishing industry is one kind of end user that will seek a service from GOOS, but is probably not interested in the primary variables.

GOOS might consider offering a "menu" of products, an example being environmental trends.

3.4 PRESENTATION BY MICHEL LEFEBVRE: "DATA FROM SPACE"

5 Lefebvre pointed out that satellite observations have demonstrated their utility in relation to global experiments. As called for by WOCE requirements, TOPEX/POSEIDON has been able to resolve sea level with a precision of 2-3 mm over two years for the mean. However, to make a decisive contribution to models, at least two altimeters and two scatterometers will be needed in a future operational system. Lefebvre believes that an operational system requires that further attention should be directed not only to refinement of the system in terms of accuracy, data analysis and data assimilation, but to assure continuity of the orbiting platforms, i.e., planning for a series of follow-on replacement satellites and spares in case of breakdown before the end of their design lifetimes.

6 Solutions to the problems concerning data processing and access are well in hand, but achieving real efficiency requires that some centres/institutes be charged with end-to-end responsibility from data acquisition to product generation. Scientists must be involved at all stages in the loop to assure scientific quality control of the data. Lefebvre noted that assimilation is at present a crucial problem that requires greater involvement of modelers.

7 Lefebvre provided a helpful listing of the satellite missions active or planned through the next decade (see Annex IV). He emphasized however, that based upon past experience such lists may be misleading since satellites appearing on these lists often do not eventuate. For GOOS purposes, long-term programming requires that clear commitments to a series of operational ocean satellites be obtained from space agencies. While research applications satellites provide valuable proof of concept for GOOS purposes, GOOS can only base its long-term plans on real commitments, otherwise the plans carry no credibility. Lefebvre closed by noting that the delay time between proposals for satellites and actual launch dates when they do occur has varied typically from 4 to 10 years.

## 4. ORGANIZATIONAL STRUCTURE AND THE RESPONSIBILITIES OF J-GOOS

8 The proposed organizational structure for GOOS developed at I-GOOS-I was presented for discussion (see Annex V). Some members expressed concern that this structure indicated I-GOOS would be communicating "policy" rather than "proposals" (as the MOU states) to J-GOOS. Others questioned the implications of the different levels between I-GOOS and J-GOOS in the structure diagram. (At a later meeting of the sponsors, the structure diagram was changed as shown in Annex V to reflect these concerns.)

9 McEwan agreed to prepare a "J-GOOS Issues Paper" during the intersessional period in which he would undertake to address these and other science-related issues of GOOS with the aim of assisting in developing a common understanding of the relationships between GOOS, J-GOOS and subsidiary groups.

## 5. DISCUSSION OF THE GOOS MODULES

5.1 HEALTH OF THE OCEAN (HOTO)

0 The Committee reviewed briefly the Report of the *Ad Hoc* Health of the Oceans (HOTO) panel (Doc IOC-WMO-UNEP/I-GOOS-PS-I/8, March 1994). The report was deemed to be a creditable introductory view of the elements required in the module, but it raised some unresolved questions relating to the interface with the Coastal Zone module. Since the document had not been seen beforehand by several participants, Drs. Su and McCarthy were asked to examine the report intercessionally and report at the next meeting with recommendations for the development of a scientific planning process.

5.2 LIVING MARINE RESOURCES (LMR)

1 The Committee discussed the Report of the *Ad Hoc* Panel on Living Marine Resources (Doc IOC-WMO-UNEP/I-GOOS-PS-I/9, 9 March 1994). The report was seen to contain some useful ideas on the responsibilities of the module and priorities for implementation, but it also revealed that the scale of the task demanded a more rigorous analysis and justification. The Committee concluded it would be premature to proceed with the activities proposed for discussion in Mexico in July 1994 and considered the terms of

reference, as presently posed, to be too ambitious. To address the practical scope of this module with a prioritized sequence of development, a new panel would need to be constituted. With the guidance of the report the terms of reference would be re-drafted and membership of such a panel would be considered for presentation at J-GOOS II.

*32* The terms of reference of the initial *ad hoc* Panel are included in Annex VI.

5.3 THE CLIMATE MODULE

*33* The OOSDP Interim Report on the design of the Joint GOOS-GCOS Ocean Climate Module was not available at J-GOOS-I. Smith was asked to outline its content.

*34* Smith noted that the goals extended from ocean observations to oceanic prediction, and also addressed technology. In view of the approaching end of the TOGA observing period it was important for implementation of some elements to proceed without delay and urged J-GOOS to endorse its "ENSO recommendations", the priorities being:

(i) Sea surface temperatures and surface winds.
(ii) Upper ocean measurements.
(iii) Ocean currents, sea level and salinity.

*35* The comprehensiveness of the OOSDP report and the importance of implementing these recommendations were acknowledged but the view was expressed that J-GOOS should not be endorsing the report before its formal presentation.

*36* Accordingly, it was agreed that a statement would be drafted by Michael Bewers, Gerbrand Komen, Wolfgang Scherer and Smith expressing the importance of the continuation of the TOGA network and its promise of operational value in the prediction of ENSO events. The initial draft statement is included as Annex VII.

*37* Ichio Asanuma, Komen and Lefebvre agreed to undertake a review of the final draft OOSDP report and prepare recommendations for consideration at J-GOOS II.

5.4 THE COASTAL ZONE (CZ) MODULES AND OCEAN SERVICES MODULE

*38* No documentation was available but there was extensive discussion of GOOS responsibilities in these two modules, which were seen to be most important in terms of "deliverables" for human benefit. Although the CZ contains many scientific challenges many of the issues have substantial implementational content. GOOS should be seen as drawing upon common interests rather than imposing upon territorial matters. On the other hand, to be environmentally successful in the global context, it would need specific and sometimes sensitive local data, such as terrigenous inputs. The task is to make the CZ module attractive to nations and to encourage their participation through emphasis on common benefits or products. These might include:

(i) Demonstration case studies.
(ii) Development of common observational methodology including use of satellite colour, validation methods and sensors.
(iii) The implementation of "best practice" guidelines.
(iv) Generic high-resolution numerical models for "service" purposes.
(v) Delineation or perhaps combination with the LMR and HOTO models according to technical commonalities.
(vi) Region- or zone-specific products.
(vii) "Commissioned" observations coordinated on behalf of international or intergovernmental agencies.

*39* It was agreed that David Prandle, Su and Bewers would draft a proposal for an *ad hoc* J-GOOS group on the scientific components of a coastal zone module for further consideration at J-GOOS-II. Their draft statement is included as Annex VIII.

## 6. ACTION ITEMS SUMMARY

0 The actions summarized below were agreed to be carried out during the intersessional period.

(i) McEwan to draft and circulate a J-GOOS Scientific Strategy Statement.
(ii) McEwan to draft a J-GOOS Issues Paper for consideration at J-GOOS-II.
(iii) Su and McCarthy to review the HOTO *ad hoc* panel report and prepare recommendations on the development of a scientific planning process for HOTO.
(iv) Lefebvre, Komen and Asanuma to review final report of the OOSDP and prepare recommendations for consideration at J-GOOS-II.
(v) Bewers, Komen, Smith and Scherer to develop a draft statement expressing the importance of the continuation of the TOGA network and its promise of operational value in the prediction of ENSO events (for presentation at next I-GOOS, IOC and GCOS meetings).

ANNEX I

**AGENDA**

**1. WELCOMING REMARKS AND OPENING**

**2. REVIEW AND ADOPTION OF THE AGENDA**

**3. INTRODUCTION TO THE SCIENTIFIC CHALLENGES FOR GOOS**

3.1 PRESENTATION BY JOHN WOODS: "GOOS CONCEPT AND STRATEGY"

3.2 PRESENTATION BY NEVILLE SMITH: "MODELLING AND GOOS"

3.3 PRESENTATION BY ALLYN CLARKE: "THE WOCE EXAMPLE AND FISHERIES"

3.4 PRESENTATION BY MICHEL LEFEBVRE: "DATA FROM SPACE"

**4. ORGANIZATIONAL STRUCTURE AND THE RESPONSIBILITIES OF J-GOOS**

**5. DISCUSSION OF THE GOOS MODULES**

5.1 HEALTH OF THE OCEAN (HOTO)

5.2 LIVING MARINE RESOURCES (LMR)

5.3 THE CLIMATE MODULE

5.4 THE COASTAL ZONE (CZ) MODULES AND OCEAN SERVICES MODULE

**6. ACTION ITEMS SUMMARY**

ANNEX II

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ANNEX III

## GOOS SCIENTIFIC STRATEGY STATEMENT

1. The identification of the best scientific practice for operational ocean observations including technology, standards, sampling design, data management and numerical modelling, suitable for implementation in the present and foreseeable future by regional and national ocean service organizations.

2. The definition of the scientific framework within which national services can be developed to contribute to a coordinated and fully integrated global ocean observing system.

3. The promotion of the development and application of those scientific products of a global ocean observing system which will maximize social, environmental and economic benefit for the nations of the world.

## TERMS OF REFERENCE FOR THE JOINT SCIENTIFIC AND TECHNICAL COMMITTEE FOR GOOS

1. The Joint GOOS Scientific and Technical Committee (J-GOOS) shall:

(a) be responsible for all the scientific and technical aspects of GOOS design, and undertake appropriate activities to support the design process,

(b) instruct the Director of J-GOOS support staff in the duties to be performed by the J-GOOS support staff,

(c) report to the sponsoring organizations at least once a year.

2. Specifically, the J-GOOS will:

(a) establish, after consultation with its sponsoring organizations, required subordinate bodies,

(b) identify observational requirements ("user needs") and products in co-operation with I-GOOS; define design objectives; and recommend co-ordinated actions by the sponsoring organizations and other relevant organizations and agencies,

(c) advise the Intergovernmental Committee for GOOS (I-GOOS) on all scientific and technical aspects of GOOS, and take into account the proposals of I-GOOS as they have implications for scientific and technical planning for GOOS,

(d) collaborate with the Joint WMO-IOC-ICSU-UNEP Scientific and Technical Committee for GCOS, and its Joint Planning Office, and other appropriate bodies,

(e) review and assess the progressive development and implementation of components of GOOS,

(f) identify and encourage research efforts, in close co-operation with the on-going research programmes (IGBP and WCRP) in order to promote studies of importance for the development of GOOS,

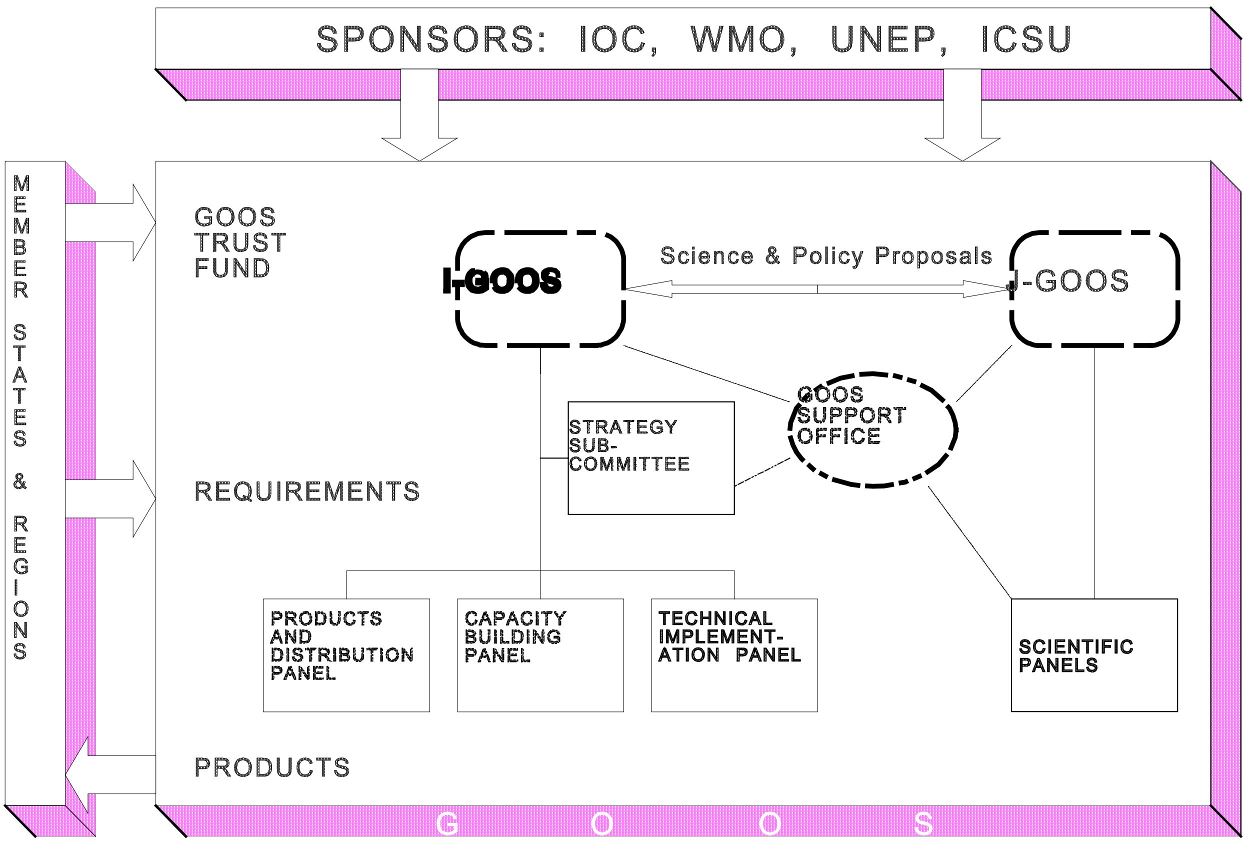
(g) encourage the development of new technologies needed for GOOS.

ANNEX IV

## LISTING OF SATELLITE MISSIONS

ANNEX V

**GOOS STRUCTURAL DIAGRAM**



ANNEX VI

## TERMS OF REFERENCE
## FOR GOOS *AD HOC* PANEL ON LIVING MARINE RESOURCES

(i) Provide advice to the Global Ocean Observing System Scientific and Technical Committee on the development of a Module for Monitoring and Assessment of Living Marine Resources.

(ii) Specify the deliverables and products for user needs.

(iii) Identify present and potential users of existing data of GOOS Living Marine Resources information and relate Module design and operations to their needs.

(iv) Define the sampling requirements and observations necessary for Living Marine Resources with particular reference to: 1. global focus 2. routine collection 3. cost effectiveness 4. existing programmes 5. data management.

(v) Develop a written plan for the design and implementation of an operational collection and monitoring system of Living Marine Resource parameters relevant to climate change, ecosystem-biodiversity change and fluctuations in renewable resources. The plan should be based on the best scientific knowledge.

(vi) Incorporate, in so far as possible, elements of training, mutual assistance and capacity building for developing countries into planning and implementation.

(vii) Effectively integrate developing coastal states, within the range of their capabilities, into the System and its operations and include regions where appropriate data have not been previously collected.

(viii) Be cognizant of and coordinate with appropriate Living Marine Resource research programmes and organizations to ensure that Module recommendations and activities are up to date and relevant.

(ix) Be fully responsive and cooperative to all other panels and committees within GOOS as well as all coordinating bodies and cooperating Agencies. Mechanisms for coordinations should be specified.

(x) Produce the final draft plan by the end of March 1994.

ANNEX VII

## DRAFT J-GOOS STATEMENT FOR POST-TOGA OBSERVING SYSTEM

(prepared by Bewers, Komen, Smith and Scherer)

The J-GOOS considered the recommendations of GCOS and the OOSDP in relation to the maintenance of the ocean component of the TOGA observing system.

J-GOOS **recognized** the importance of retaining continuity of the basic observing system for monitoring and prediction of ENSO. While J-GOOS is not in a position yet to provide a comprehensive assessment of these recommendations in the broad context of GOOS, it does recognize the importance of proceeding with implementation as soon as possible. It therefore **recommends** that the I-GOOS Implementation Task Group proceed with this implementation according to the plans provided by GCOS and the OOSDP.

ANNEX VIII

**DRAFT TERMS OF REFERENCE FOR COASTAL ZONES (CZ) MODULE**
(Prandle et al.)

Assuming that the I-GOOS *Ad Hoc* Group will request that a Coastal Zone Module be created to provide infrastructure for living resource questions (e.g., recruitment of fish stocks), health of the ocean questions (e.g., fluxes of land-derived contaminants, their transport, distribution, fate and effects) and service module functions such as storm surge and wave prediction, J-GOOS establishes an *ad hoc* group to define the scientific components of a coastal zone module.

Accordingly, recognizing the coastal module will likely encompass:

- measurement and prediction of circulation in boundary currents;
- measurement, monitoring and prediction of the circulation of regional seas;
- consideration of the interface between the shelf and regional seas and the land, the atmosphere, sea floor, the deep sea and that this consideration will be multidimensional and multivariate;
- practical forecasting and simulation for waves, extreme events, etc., of global observing systems;
- global validation and context for assessment of regional systems; and
- provision of the global perspective for separate regional systems.

1. To review scientific issues important to dealing with these questions and services.

2. To assess the capacity of global observing systems (e.g., satellite and other systems) to deliver appropriate data.

3. To review and evaluate relevant science plans and models of other groups and programmes (e.g., LOICZ) that might provide a basis for the development of a Coastal Zone Module.

4. To propose scientific initiatives that advance the scientific goals of GOOS.

5. To report to the next meeting with Terms of Reference for consideration.