

Responses to Questionnaire for Project Coordination Meeting  
(boldface type indicates comments from the meeting)

## Interactions Among Projects

### Comments from Meeting

1. Identify individuals that are on more than one Steering Committee  
 Make clear responsibilities for communication between groups  
 Identify new people as liaison people between projects  
 Make clear responsibilities for communication between groups
2. List server system/email aliases set up that can be used for communication between projects either IPO's and/or Chairs, SCOR to investigate this.
3. Where regional nodes/structures there are channels of communication between projects at regional level. Projects to take this forward, potential to have project coordination meeting at regional level where appropriate.
4. Projects co ordination meeting on annual basis with agenda set by the projects. Potential topics for future meetings: standardisation of web sites, data management.

Summerhayes—GOOS and projects should cross-reference their activities on each others' Web sites.

Parslow—It would be useful for projects to keep a list of their activities on their Web sites.

Malone—It would be helpful if these lists were map-based.

Field—GLOBEC does this already.

Ryan—This is similar to the cruise database idea.

Grassle—Regarding #4, I think a meeting of project Web masters would be useful.

Hall—The EU project “GRAND” will be pulling together GOOS information worldwide.

Grassle—A “carrot” for getting together database people could be access to each others' data. Geo-referenced fields are the most important.

O'Dor—Metadata on cruises could be input before the cruise.

Harrison—One of the keys to success will be to make things automated.

Parslow—The benefit to PIs is in knowing what other people are working on, related to your own work, and to set the context.

## **Data Management**

### CLIVAR

The CLIVAR Scientific Steering Group has not explicitly discussed the recommendations of the SCOR Data Management Meeting. It has, however, as part of an overall self assessment of progress with CLIVAR over the past 5 years, considered a critical review of CLIVAR data management, carried out by Neville Smith. CLIVAR has also recently instituted a new Panel – the CLIVAR Global Observations and Synthesis Panel (GSOP), the terms of reference for which are to:

1. Develop, promote and seek to implement strategies for a synthesis of global ocean, atmosphere and coupled climate information through analysis and reanalysis efforts and through the use of other techniques where appropriate. Initial emphasis will be on global ocean synthesis efforts, building on previous experiences and developments.
2. Be responsible for the definition and fulfilment of CLIVAR's global needs for sustained observations (in collaboration with relevant WMO and IOC bodies, including GCOS, GTOS, GOOS, AOPC and OOPC, and JCOMM), and for the development of a strategy for their evolution/optimization based on new science and reanalysis insights, and fostering the use of resulting data sets in global synthesis efforts.
3. Promote activities to develop the surface flux data sets required by CLIVAR in liaison with the WGNE, global atmospheric reanalysis efforts and the WCRP Working Group on Surface Fluxes.
4. Provide an overview of and directions to CLIVAR data management and information activities in collaboration with other WCRP projects and in liaison with CLIVAR-relevant data centres and DACS and the ICPO.
5. Liaise and collaborate with CLIVAR Panels and Working Groups in identifying the requirements for and coordinating the development of an observing system for CLIVAR. ToR 4 tasks GSOP with oversight of CLIVAR data management. This will be a topic for the first GSOP meeting, which will take place in November this year. GSOP will consider the outcomes of the review of CLIVAR data management referred to above.

The ICPO will ensure that the outputs from the SCOR data management meeting are fed into these discussions.

For information, the 1st CLIVAR Data Planning Meeting on Ocean Observations was held from 24-26 March 2004 at Scripps Institution of Oceanography, La Jolla, California, USA as a first activity of GSOP in this area. A primary objective of the meeting was to: engage and build links between the CLIVAR DACs and the CLIVAR user community (as represented by its basin panels). The outcomes of the meeting were fed into the CLIVAR review of its data management activities and will further inform the first GSOP meeting

A report of the Data Planning Meeting will be available shortly.

### CoML

1. All of the Census of Marine Life (CoML) projects make their data readily available through OBIS and it will serve as CoML's legacy. OBIS enables interoperability of many

heterogeneous sources of data including those of taxonomic authorities as well as academic and government data centers. OBIS is growing rapidly and provides open access to over 5 million records either through species names (common or scientific) or geographic designation. OBIS is an Associate Member of the Global Biodiversity Information Facility and adheres to its data policies. **OBIS has just set up regional nodes.**

2. A Member of the OBIS International Committee (Geoff Boxshall, The Natural History Museum, London) represented OBIS at the SCOR/IGBP Meeting on Data Management in Liverpool 8- 10 November 2003 and provided an OBIS summary. OBIS is also referred to in the Data Management and Communications Plan for Research and Operational Integrated Ocean Observing Systems ([http://dmac.ocean.us/dacsc/imp\\_plan.jsp](http://dmac.ocean.us/dacsc/imp_plan.jsp)). Special issues associated with species-referenced data are discussed in Appendix 7 of that Report.

3. OBIS would like to encourage all international programs to contribute their species-referenced, geo-referenced data to OBIS. The best way to do this is through an on-going partnership and web-based interoperability with the data provider.

**OBIS uses GBIF standards for species-level geo-referenced data and welcomes such data from all marine projects, preferably from project-maintained databases.**

#### DIVERSITAS

I have read the document prepared in Liverpool and do see the validity of the recommendations. There is a huge difference between traditional ecological projects and the way the oceanographic community deals with data. The DIVERSITAS SSC will certainly need some education on this point. We will discuss the document during the task force meeting. It will be mainly relevant if and when DIVERSITAS will co-sponsor projects with the CoML and IMBER. Whether help from SCOR on this issue is needed remains to be seen. **DIVERSITAS participates in GBIF.**

#### GEOHAB

GEOHAB was represented at the meeting on Data Management for International Marine Research Projects by Wolfgang Fennel. A report on data types and management within GEOHAB was presented by Wolfgang at this meeting. A decentralized data management and distribution system with a centralized index is proposed for GEOHAB. The components, centralized under the supervision of an IPO, will include a comprehensive inventory of databases relevant to GEOHAB, as well as meta-data, with links to their locations and contact persons.

The GEOHAB SSC has not had the opportunity to discuss or implement the recommendations of the data management meeting. The recommendations will, however, be considered at our SSC meeting in November in Cape Town, **and the SSC plans to set up a data management committee at that time.**

### GEOTRACES

During its inaugural meeting in June, 2004 the GEOTRACES SCOR Planning Group discussed the importance of data management, both in terms of a policy and of a system to archive and disseminate the data. However, GEOTRACES Planning Group members had not been informed previously about the recommendations of the SCOR data management meeting, so there was not an opportunity to discuss these recommendations in detail. Nevertheless, it is anticipated that GEOTRACES will be generally compliant with the SCOR recommendations, and GEOTRACES will certainly comply with the data submission requirements of participating funding agencies. **GEOTRACES would like to form a single international system to manage GEOTRACES data.**

### GLOBEC

The SCOR/IGBP Data Management meeting was mentioned at the last GLOBEC SSC meeting but not discussed in detail due to time constraints. The GLOBEC IPO continues to maintain a metadata catalogue using the DIF format held in the Global Change Master Directory. **GLOBEC has a data management task team.** GLOBEC uses a decentralised data management system where individual projects are responsible for quality control and archiving of their data. At present there are no plans to change this. **There are no time requirements on data submissions.**

### iAnZone

The iAnZone SSC has not considered the recommendations of the SCOR data management meeting. iAnZone oceanographic data are submitted to data banks in accordance with the funding regulations of each participating nation. There are standard data centres for CTD and mooring data. The primary repository is usually the CLIVAR data centre. This situation is less clear with new instruments such as the lowered acoustic Doppler current profiler where an international data centre is not yet announced.

### IMAGES

IMAGES is actively involved in the discussion of ongoing and future data management. At the data management meeting, the IMAGES concept of data management has been taken as one example for a potential way of making progress in terms of data management in such projects. **One person is paid from IMAGES funds to have contact with both researchers and the World Data Center into which IMAGES data are placed (WDC-MARE).**

**IMAGES needs better access to data sets from communities investigating the physical, chemical, and biological conditions of the modern ocean, especially historical data and records.**

### IMBER

IMBER will form a small Data Management working group, potentially in collaboration with SOLAS. Their first task would be the development of a data management policy and plan for the project based on the recommendations by the SCOR/IOC Meeting on Data Management for International Marine Research Projects held in Liverpool in December 2003.

There is the potential as suggested at the Liverpool meeting to bring data managers for marine projects together on a regular basis. This would improve the flow of information between the projects.

#### InterRidge

Our SSC has not discussed and considered the recommendations of the data management meeting. **There is no attempt presently to manage data internationally from national projects, but InterRidge will consider establishing an international system. InterRidge is trying to get cruise reports from all InterRidge-related cruises.**

#### LOICZ

**LOICZ I created the coastal typology database.** The need for data management was recognized as a priority at the LOICZ SSC Meeting, Singapore, June 2004. The meeting resolved that a dedicated workshop on data management should be convened as soon as possible. That workshop will consider the recommendations of the SCOR/IGBP Meeting on Data Management. The development of global databases and typologies for coastal systems will play a major role in LOICZ II implementation and synthesis across all themes. To succeed, LOICZ II must have a strategy to deal not only with management and delivery of “new” data acquired through

LOICZ core and associated coastal projects, but with collation, quality control and analysis of large and diverse existing coastal data sets. Because of its location at the interface of ocean, terrestrial and atmospheric domains, LOICZ will need to draw on datasets covering all these domains, some of which may be produced by other IGBP/SCOR projects. In order that this be done efficiently and effectively, it is important that arrangements are set in place to facilitate exchange of data between projects, as well as management of data within projects.

#### SOLAS

The SOLAS SSC discussed and approved the recommendations of the Liverpool data management meeting. These are, however, unlikely to be implemented in full in the near future. Although we do have a data management task team, which will meet and write the SOLAS data management policy this year, implementation of this will have to wait until we have funding for a data manager. **National SOLAS projects include data management resources.**

#### Other Comments

**Bernal—Major institutions lose 60% of their own data.**

**Labeyrie—Electronic journals such as Geochemistry, Geophysics, Geosystems (G<sup>3</sup>) review data as publications (see [www.agu.org/journals/gc/](http://www.agu.org/journals/gc/)) and also consider model output as data.**

**Summerhayes—SCAR has a Joint Committee on Antarctic Data Management to work with National Antarctic Data Committees (NADCs). They are trying to get the NADCs to interact with the National Oceanographic Data Centers (NODCs). The SCAR committee is updating its data and information management strategy.**

In terms of IPY, the planners are attempting to be proactive about preparing for the new data that will be gathered.

Neville Smith is leading an Ocean Information Technology project (see <http://ioc.unesco.org/oit/>).

Data archeology was left out of the Liverpool report. The Global Oceanographic Data Archaeology and Rescue (GODAR) and the World Ocean Database Project, for example (see <http://www.nodc.noaa.gov/General/NODC-dataexch/NODC-godar.html>).

Bernal—IOC's data policy was reviewed and revised last year and requires open access data for all IOC-sponsored projects. IOC is trying to expand beyond the IODE system, which now encompasses two World Data Centers and more than 60 NODCs, primarily including physical oceanography data. IOC is ready to help in any way it can with data management; governments can sometimes sustain data management more easily than can institutions. IOC is working with NASA ocean XMLs.

Harrison—There is a huge opportunity for science projects to recognize that PI culture needs to be changed to create a different spirit about data. We tend to think that data is only ours. We don't have statements in our program documents about the importance of project data for global needs.

O'Dor—Data loss sometimes occurs because older scientists lose their funding and can't afford to put their data together.

Labeyrie—Software should be available from the Web to help with data access. We need to make it easy for people who are not computer experts.

Summerhayes—Mentioned the Open Geospatial Consortium, Inc. (<http://www.opengeospatial.org/>)

Parslow—It is not easy to put data into databases, so we need to help the projects do this.

Alverson—Databases should be a tool to get insights and understand the data in a larger context. Operational oceanography concerns real-time data.

Grassle—We should think about starting to create an integrated ocean data system, in which variables are presented in similar way across projects, within a minimum set of variables. UN agencies can do the international standard setting.

Malone—It is important to get users and providers of data to set the standards.

Hall—Databases should also include model results.

### **From Break-out Group**

**Data management : draft bases for a set of recommendations**

**Actions to be started immediately :**

**1/ Write a short EOS type paper to be published in programs newsletters, EOS, Challenger Society, TOR... giving the main recommendations from existing "up to date" group reports on data management (SCOR, ICSU, IOC etc.) including common sets of policies with web links to the reports**

**2/ same or other paper : lessons learned from previous programs successes/ failures**

**Proposed task leaders : Leslie Rickard and Ferris Webster**

**3/ initiate a project for IOC to support multi-national retrieval programs on predigital period cruise reports (translation and scanning of reports after local expertise of scientific value)**

**4/ letter (?) to project managers and agencies to insist on preparing and budgeting data management and inter-operability as a top priority**  
**- implementing ways to guaranty long term archiving/data management , not depending on individual agencies/ national policies (POGO/IOC/UN?)**

**Longer term recommendations**

**1/ OCEAN DATA ACCESS**

- **-data collection is a major problem for individual/small projects without data management facilities. Data will be collected only if net profit : easy data access Web+ training + free easy to use (downloaded/web) software opening possibilities for easy intercomparison between own data and what is available. (maps, sections, graphs..) you put your data in to compare, and its there for ever!**
- **Data base as research tool.**
- **Transfer should be easy (text/excel files formats).**
- **-standardization of formats should not be an issue if each file carries its meta data (feet/cm!)**

**inter-operability should become a black box automatic system, with catalogue sets of “overall” formats and “minimum common” formats, standard search engines, .XML like files..**

- **2/ Increase lay person access to programs data base (each program should have a front page with easy to understand results and nice figures/maps)**
- **3/ A SCOR (?) web portal to all available quality controlled ocean data bases, with**

**Immediate—#1 and #2 could abstract from the Liverpool report, rather than starting from scratch.**

**Add a new #4: “Get species-specific geo-referenced data into OBIS.**

**Longer term--#3: SCOR could recommend this to some other organization. Keith Alverson noted that IODE maintains a Web portal (see <http://oceanportal.org/>). Fred Grassle added that a single portal should provide access to the data from all projects. Julie Hall asked that there be explicit mention of GOOS data exchange, for example, through GODAE.**

## GOOS

### CLIVAR

Sustained ocean observations are key to many of CLIVAR's interests. CLIVAR's main interaction with GOOS comes through collaborative activities and involvement with OOPC. The OceanObs'99 Conference was perhaps the key event so far as ocean sustained observations is concerned. The Conference was jointly supported by OOPC and the CLIVAR Upper Ocean Panel (UOP) and from the outset had objectives that encompassed both CLIVAR and operational applications. The UOP and GODAE also endorsed a project we now know as Argo.

The UOP later evolved into the CLIVAR Ocean Observations Panel, COOP, (as distinct from the GOOS COOP which focuses on coastal) and this more recently into the wider remit of GSOP. There was intentioned cross-membership between the UOP/CLIVAR OOP and OOPC. More recently, and for the past two meetings, CLIVAR has been represented at OOPC by representatives of its Atlantic, Pacific, Southern and Indian Ocean Panels. The chair of OOPC also attends the CLIVAR SSG. As will be seen from its ToR 2 above, GSOP will provide the route through which CLIVAR links to GOOS and related activities in the future.

As for data management, CLIVAR has recently carried out a critical review (again by Neville Smith) of its activity in sustained observations over the past 5 years. The attached pdf (globocean.pdf) provides a short summary of CLIVAR interests in and requirements for global ocean observations.

### CoML

1. James Baker is a member of the CoML SSC and provides an ongoing link to GOOS.
2. CoML co-sponsored with POGO a workshop, Biological Observations of the Global Ocean: Requirements and how to meet them, at Dartington, UK, 28-30 June 2001.
3. Jesse Ausubel gave a powerpoint presentation on the potential contributions CoML can make to GOOS at the Seventh Session of the Global Ocean Observing System Steering Committee (GSC-VII) Brest, France, 26 – 29 April 2004. The focus was on sensor systems and protocols that could provide operational or near-operational biological data that are being tested in CoML. (Available on Request)
4. Ron O'Dor, working with Shubha Sathyendranath at POGO, provided text for the current draft of the Biodiversity 'Social Benefit Topic' for the GEOSS 10-Year Implementation Plan and a table of biodiversity relevant observations (Available on Request).

**CoML considers GOOS will add a critical dimension to understanding its data and looks forward to developing “operational” biological sensors and techniques, such as coded animal tracking and DBA barcodes, to rapidly analyze samples for biodiversity.**

### DIVERSITAS

Again, there has been no interaction yet between DIVERSITAS and GOOS and again this should be discussed at the task force's first meeting. The idea of biodiversity observatories is lingering around, for instance in the CoML project NAGISA and in EU-sponsored projects such as BIOMARE, but the links with GOOS and GEO have not yet been established.

### GEOHAB

LOICZ, GLOBEC and GOOS have clearly been identified as international programmes with scientific interests that overlap with those of GEOHAB. It is acknowledged that GOOS will encourage the implementation and development of observing systems required to document HAB trends, evaluate the efficacy of management actions and define those areas that require additional research. In turn the knowledge and tools generated by GEOHAB will benefit the coastal component of GOOS in the form of more effective operational monitoring systems, data-based risk assessment, and improved forecasts of the timing, magnitude and effects of HABs.

Marcel Babin has represented GEOHAB as a member of COOP and contributed to writing the Science and Implementation Plans of the coastal module of GOOS [attended 3 meetings: Oct 2003, Jan 2004 and June 2004]. Marcel contributed to the preparation of the Implementation Plan as an expert on marine optics and ocean colour remote sensing. The GEOHAB SSC has not discussed in any detail, observations by GOOS, to which GEOHAB scientists would like access. The SSC has not had a presentation detailing GOOS. The last GEOHAB SSC meeting, in December 2002, focused on finalizing the GEOHAB Implementation Plan. The COOP Science Plan was only published in 2003, and the COOP Implementation plan will be published in 2005. The next GEOHAB SSC meeting in November 2004 will therefore offer an appropriate opportunity to further explore the benefits that may be derived from GOOS. The proceedings of the Workshop on Real-time Coastal Observing Systems for Ecosystem Dynamics and HABs, held in Villefranche sur Mer in 2003 [available at: <http://www.HABWATCH.org>], will serve to indicate the operational observation systems from which GEOHAB will benefit.

### GEOTRACES

GEOTRACES has had no interactions with GOOS to date. However, the development of new sensors to monitor the time-varying concentrations of trace elements is of high priority to GEOTRACES, as is establishing the relationships between the time-varying concentrations of trace elements and basic hydrographic and chemical parameters.

### GLOBEC

Active links between GLOBEC and GOOS exist through overlapping membership of committees. The past GLOBEC chair (Roger Harris) was a regular observer at GOOS Coastal Ocean Observations Panel (COOP) meetings to help ensure that COOP plans met GLOBEC's requirements. Dr Coleen Moloney, who is a member of the GLOBEC Focus 3 Working Group, and Dr Mike Fogarty, the past president of U.S. GLOBEC, are also members of the GOOS COOP panel.

Members of the GLOBEC Focus 1 Working Group, Dr Andy Bakun and Dr Takashige Sugimoto, were members of the GOOS Living Marine Resources (LMR) group. Tom Malone, the chair of the COOP implementation panel, has attended meetings of the GLOBEC Focus 3 Working Group to discuss GOOS activities in relation to GLOBEC.

Members of the GLOBEC SSC who are involved in GOOS activities report to the SSC on progress; however, there have been no formal presentations from GOOS members to the GLOBEC SSC.

Other GOOS-related activities include the Continuous Plankton Recorder survey (CPR), operated by the Sir Alister Hardy Foundation for Ocean Science (SAHFOS), which is a contribution towards UK GLOBEC and has also been incorporated into the initial Observing System of GOOS; and the GLOBEC/PICES Climate Change and Carrying Capacity programme intend to conduct a one day workshop on ‘North Pacific GOOS: Needs and Activities’.

On-going communication between GLOBEC and GOOS is important to help ensure that information collected by the observations system is useful to researchers, especially in the context of long ecological time series. Also, the modelling studies that are being carried out under the auspices of GLOBEC should enhance the ability to use the observations system to understand (and predict) changes in ecosystems. It was felt by the GLOBEC SSC that monitoring of biological parameters under GOOS are not well defined and that continuous involvement with GLOBEC would be useful in defining those parameters.

#### iAnZone

iAnZone has had no interactions with GOOS to date. **But, GOOS could provide the following for iAnZone:**

- **Data in the Antarctic Zone (one of the “white areas” on the map), in terms of CTDs, moorings, tracers, etc., as well as good swath bathymetry.**
- **Improved atmospheric re-analysis to provide better air-sea fluxes (heat, freshwater, and momentum) for forcing models of the ocean-ice system.**
- **Endorsement of iAnZone plans for IPY. The proposed SASSI project includes a network of climate-observing sites on the Antarctic continental shelf. A legacy of the IPY would be a subset of this network as a GCN.**
- **Encouragement for development of Argo floats under ice. Winter data under the sea ice are crucial. The Germans plan to track Argo floats with sound sources in the Weddell Sea. GOOS could encourage extension of this to the rest of the Antarctic Zone.**

#### IMAGES

There has been no official interaction between IMAGES SC and GOOS so far. Observations from GOOS are needed, physical and chemical as well as biological conditions monitored in long-term surveys for better paleoproxy calibration.

**GOOS could help IMAGES to foster interaction with other communities involved in GOOS. IMAGES would like to be involved in joint interpretation of satellite images in respect to riverine and eolian transport, ocean circulation, temperatures, and biology of the surface ocean.**

### IMBER

IMBER SSC members have attended meetings of both the GOOS Steering Committee and COOP. There has not been a representative at OOPC meetings but there has been discussions regarding the need for a biogeochemist to be added to the OOPC.

The GOOS Steering Committee and COOP meetings have been attended by Julie Hall in her role as a member of each committee.

IMBER has identified that future interaction with GOOS will be important, both as an end user of data collected by GOOS and as a partner with GOOS in identifying the variables to be measured and the research and development needed to improve observing systems.

The IMBER SSC has not discussed any specific GOOS observations. At the first IMBER SSC meeting in August 2004 a presentation on GOOS was given. The IMBER SSC has not discussed what research observation systems it would like to see become operational.

### InterRidge

InterRidge has up to present not interacted with GOOS, and there are currently no plans to interact with GOOS, although this is probably a result of ignorance about what GOOS might be able to produce which would be of interest to InterRidge. InterRidge has not had a presentation about GOOS at a steering committee meeting.

### LOICZ

Since the late 1990s, through Jozef Pacyna (current vice Chair) and the IPO Executive, LOICZ has been represented extensively at Coastal GOOS SSC meetings and vice versa, as well as in certain workshops, e.g., IOC-WMO-UNEP-ICSU Coastal Panel of the Global Ocean Observing System (GOOS) Third Session, Accra, Ghana, 13 – 15 April 1999 – GOOS report 76). There the issue of collaboration between C-GOOS and LOICZ was explicitly addressed and reported. In practical terms LOICZ has participated in the preparation of a major document, the Strategic Design Plan for the Coastal Component of the Global Ocean Observing System (GOOS), edited in October 2000 (IOC/INF-1146 and GOOS report No. 90) which identifies LOICZ as an enabling research project calling for a high level of integration into the C-GOOS development.

This concept of cooperation between GOOS and LOICZ was developed based on the assumption that GOOS should provide long-term monitoring data, while LOICZ should be able to provide the results from short-term research projects in order to interpret the meaning of the coastal ecosystem changes as monitored within GOOS. Major exchange and relevance was seen to derive from the LOICZ I biogeochemical budgeting activities and in particular the typology development. ICAM, in its role as pilot project contributing to the implementation of C-GOOS identified the LOICZ-Basins assessment as an activity that is mutually beneficial to the two.

However, while LOICZ I was entering its synthesis phase, and in parallel started to develop a plan for the next decade of LOICZ research following the mandate given by the IGBP SC in Cuernavaca and Chiang Mai (2000/2001), contacts with the current GOOS slowed down. It is expected, however, that this will switch back to a more operational involvement in the future based on the concept of collaboration outlined before and recognizing that the draft LOICZ II SPIS identifies interaction and collaboration with GOOS as a critical part of LOICZ II implementation in multiple themes. The LOICZ Chair is co-chair of the IGOS Coastal Theme. Further points of contact and interaction with GOOS are expected to develop as the Implementation Plan is rolled out. We expect strong interaction between LOICZ researchers at national and regional scales, and the development and implementation of coastal ocean observing strategies at these scales. The new LOICZ regional IPO nodes are well-positioned to facilitate this integration. Among other specific instances, there has been discussion of LOICZ – GOOS collaboration at the recent CZAP meeting in Brisbane in September 2004 likely to be followed up in 2005, and participation by the LOICZ Theme 4 Coordinator in the GODAE Symposium in Miami in November.

As mentioned before, LOICZ I identified certain core observations required for coastal biogeochemical budgets. The LOICZ II SPIS has identified among its priority activities the further development of coastal budget and modelling methodologies, and this is expected to lead to revised recommendations on coastal observations. The typology is expected to receive increased LOICZ II attention and this can obviously be a major area of cooperation where indicator development, testing and application will be supported by a coastal classification that needs to be issue based. Over all mutual benefit is expected to be in the fact that LOICZ II with its mandate to be truly interdisciplinary between natural and social sciences can design and carry out enabling research that anchors the human dimensions appropriately in the implementation of long-term observation efforts such as C-GOOS, whereas GOOS in return provides a global platform for the application, testing and review of these scientific results and concepts.

#### SOLAS

The SOLAS SSC has had very little contact with GOOS. One key area where we will need to work with GOOS is in atmospheric and seawater pCO<sub>2</sub> measurements. Plans for a global pCO<sub>2</sub> observing system are developing outside of SOLAS, but the more process-orientated research that SOLAS is interested in is vital to the effective design and implementation of such a system.

#### Other Comments

**Summerhayes—The GOOS system is quasi-operational and is dual use between operations and research. “Sustained system” is a better term than “operational”, although operational agencies need to use the term “operational”. Time-series sites need to avoid commercial applications because of Law of the Sea implications.**  
**Malone—GOOS is trying to work with NGOs to show that scientists can help them.**  
**Devey—InterRidge has developed a Code of Conduct for research in hydrothermal areas, which has allowed science to be a stakeholder in decision processes.**

**Alverson**—The re-analysis products for atmospheric data are a good example of operational data being used for research.

**Bernal**—We must eventually instrument all intensively used systems on Earth. POGO is trying to deal with the issue of instrumenting institutions' ships.

**Anderson**—Continuing satellite measurements and spinning up new measurements are important.

**Bernal**—This can be accomplished working through the GEOSS process.

**Harrison**—The broader the number of users that talk with satellite and observing system providers, the more likely they will be continued.

**Summerhayes**—Regarding the IGOS Partnership, GOOS is a leader of the coastal theme, with NASA. SCOR should try to be represented.

Echosounders should be turned on the full time of cruises to solve global ocean bathymetry issues.

### **What Projects Need from GOOS**

**Summerhayes**—Southern Ocean GOOS components are needed, which will be started as part of IPY.

**Schneider**—IMAGES needs measurements that will help with proxy calibration, to build better “transfer functions.” Labeyrie noted that including forams in the Southern Ocean CoML project would help.

**Labeyrie**—IMAGES could use sediment traps with CTD data, to detect short-term variations in high-resolution areas.

**Ryan**—UK and Canadian SOLAS are putting in time-series stations that could be linked into GOOS. SOLAS is also interested in having CO<sub>2</sub> measurements included in GOOS, as well as DMS and organohalides. Harrison responded that it is mainly a technological issue to develop appropriate sensors.

**Pitcher**—Strong links between GEOHAB and GOOS are possible. GEOHAB aspires to predict harmful algal blooms; to do so, GOOS measurements will be necessary. Species-specific measurements from GOOS, or in combination with GOOS data, are needed.

**Parslow**—LOICZ is working on regionalizing itself, which could have better connections with regional GOOS activities. LOICZ needs better data on nutrient and sediment inputs, as well as sea level rise. LOICZ could also use downscaled climate predictions for planning and to address integrated coastal zone management. Julie Hall added that the IGOS Coastal Theme is also relevant here.

**Grassle/O’Dor**—CoML can use all types of GOOS data. It specifically needs geo-referenced biological information. CoML is interested in three-dimensional displays of organismal abundance and diversity as a function of chemical and physical parameters. CoML is also interested in data on microbial DNA.

**Heywood**—iAnZone is interested in more data from GOOS in the Antarctic Zone. The project needs good data on forcing parameters—heat, fresh water, momentum—to the ocean. iAnZone also needs endorsement of its plans. It needs Argo measurements under sea ice. Summerhayes added that processes occurring under the ice in winter are important for water formation.

**Hall**—IMBER needs long-term sustained time series, imbedded in process study areas. The project needs more biological and biogeochemical measurements. It

would be useful for IMBER and the GOOS Coastal Ocean Panel to co-endorse activities.

**Devey**—InterRidge could use information about dispersal of hydrothermal plumes and what is happening a couple of hundred meters above the seafloor. Power is not necessary an issue, since InterRidge studies often take place in areas with 30 watts of power from the seafloor. The project is planning a long-term monitoring station on the Mid-Atlantic Ridge. InterRidge often conducts its studies in areas where there are data gaps and thus could help other projects in these areas. Colin Summerhayes noted that the NEPTUNE project could help both InterRidge and GOOS.

**Boscolo**—CLIVAR has interacted a lot with GOOS. Representatives of the CLIVAR ocean basin panels are involved in OOPC. CLIVAR and GOOS may conduct an ocean re-analysis project together.

**Ashby**—GLOBEC is interested in long-term ecosystem data, particularly if biological parameters are added to GOOS.

**Anderson**—GEOTRACES will conduct a one-time global survey of trace elements and isotopes in the ocean. It would be useful to have data from GOOS of sources and sinks of trace elements in hydrothermal plumes, as well as the supply, sources, sinks, and cycling of trace elements from aerosols and in coastal margins. Trace element sensors are at very early stages of development.

**Adler**—The Millennium Ecosystem Assessment (MA) hopes to be a repeated exercise, and it needs good time-series data, particularly on habitat, changes in biodiversity and biomass, and the results of marine ecosystem models, particularly for coastal ecosystems. Tom Malone responded that it would be very helpful to have information about what information gaps the MA faced and what indicators it uses.

### What Does GOOS Need From the Projects?

**Harrison**—OOPC needs new sensors for biogeochemical parameters. GOOS can help projects make the case for new sensors and could work with the projects to develop priorities for new sensors, test the sensors, and develop standards and best practices. It takes about 10 years to move a sensor from initial development to routine operations. GOOS could possibly provide platforms for testing sensors. GOOS needs help in identifying indicators of the environmental processes in which the projects are interested. Colin Summerhayes inquired whether there should be a SCOR WG on the research and development needs for specific GOOS needs, sensor development, and/or ecosystem modeling.

GOOS needs help deploying equipment in ocean areas of the Southern Hemisphere. They need to know whether the GODAE server is helpful (see

<http://www.bom.gov.au/bmrc/ocean/GODAE/Projects/ServerWS/index.html>).

Every ocean observation has value for GOOS, particularly if available in real time.

**Malone**—COOP is improving communication with SCOR projects already. COOP needs help with systematic planning of pilot projects. It needs inter-operable data management, particularly related to GOOS. Modeling and data assimilation will be very important for GOOS. COOP needs to figure out how to make GODAE coastally relevant. In the short term, projects can probably help GOOS more (in

**determining what parameters to measure) than GOOS will help the projects. The payoff for the projects will be available later.**

## **Southern Ocean Research**

### CLIVAR

CLIVAR has a panel devoted to the Southern Ocean region. The panel is jointly sponsored by CLIVAR and WCRP's Climate and Cryosphere (CliC) Project and, more recently, by SCAR. A summary of the Panel's objectives and activities is given on the attached pdf (so.pdf).

The CLIVAR/CliC Southern Ocean Panel has, through its Co-Chair, Steve Rintoul, been active in the development of an strategy for the IPY, the Title Page and Executive Summary of which are given in Annex A to this document.

### **Annex A**

## **The Role of Antarctica and the Southern Ocean in Past, Present and Future Climate: A Strategy for the International Polar Year**

The strategy has been prepared by Steve Rintoul on behalf of the CLIVAR/CliC/SCAR Southern Ocean Implementation Panel. The panel recognised a number of common threads and opportunities for synergy in the submissions to the ICSU IPY Planning Group. The panel volunteered to draft a strategy for integration of individual IPY proposals in order to stimulate development of a coherent and coordinated IPY program in the southern hemisphere. The strategy is based on input from a wide cross-section of the community who submitted ideas to the IPY planning group and provided direct input to the panel (contributors are listed in the appendix).

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### **Executive Summary**

The purpose of this document is to outline a strategy for an integrated and interdisciplinary approach to understand the role of Antarctica and the Southern Ocean in past, present and future climate during the International Polar Year (IPY) 2007-2008. Climate research proposed for the IPY can be organized into five themes:

1. Antarctica and the Southern Ocean in the global water cycle
2. Southern hemisphere teleconnections
3. Climate processes at the Antarctic continental margin
4. Climate – ecosystem – biogeochemistry interactions in the Southern Ocean

## 5. Records of past Antarctic climate variability and change

To address these themes, an integrated IPY Southern Ocean observing system is needed that includes synoptic, multidisciplinary transects; time series measurements; enhanced atmospheric measurements; and new paleoclimate data sets. Extensive use of new technologies such as autonomous floats, gliders and aircraft will be required to sample regions, seasons and variables that have eluded us in the past.

The IPY observing system will tackle a number of key unknowns. The IPY will:

- Obtain the first circumpolar snapshot of the Southern Ocean environment, including physical, ecological and biogeochemical properties.
- Measure the circumpolar volume (extent and thickness) of Antarctic sea ice through an annual cycle for the first time.
- Observe the sub-ice ocean circulation, water mass properties and biological distributions

The strategy directly addresses four of the science themes identified by the ICSU IPY 2007-2008 Planning Group: to determine the present environmental status of the polar regions; to understand past and present change in the polar regions; to advance our understanding of polar-global teleconnections; and to investigate the unknowns at the frontiers of science in the polar regions.

The Southern Ocean strategy and the AOSB/CliC initiative “The Northern Seas at a time of Global Change” together form the integrated bi-polar program required to address the goals of the IPY.

The Southern Ocean IPY will leave a legacy of a targeted, affordable, sustained observing system; a circumpolar snap-shot to serve as a benchmark for the assessment of past and future change; models capable of simulating interactions between climate, ecosystems and biogeochemical cycles, providing vastly improved projections of future change; a well-integrated interdisciplinary polar research community; and inspire a new generation of polar researchers.

### CoML

1. The CoML biohistory, History of Marine Populations (HMAP), element is conducting case studies on historical records from the Benguela region, New Zealand, SE Australia and Global Whaling.
2. Four Ocean Realm Field Projects are operational in the Southern Ocean (SO):
  - A. The Nearshore, NaGISA, project has plans to run biodiversity dive transects from shore to 10m depth in Australia, New Zealand, Antarctica and likely South America and South Africa.
  - B. Coastal Tracking, POST, project has an Australian collaboration concentrated in Tasmania, but a recently formed consortium extends it across the entire south coast.
  - C. The Chemosynthetic Ecosystems, ChEss, and Abyssal, CeDAMar, projects have affiliated cruises scheduled (Available on Request). The soon to be launched Plankton, CMarZ, also has several cruises committed in the SO.
3. The CoML also has a National Implementation Committee in Australia and Regional Implementation Committees in South America, Southern Africa and the Indian Ocean. These committees organized after ‘Known, Unknown, Unknowable’ Workshops that documented what was known about marine biodiversity in their regions in preparation for

consolidating their data in regional OBIS Nodes.

4. An Australian Antarctic Division proposal for a Circum-Antarctic CoML project for IPY was recently approved by SCAR as part of its Evolution and Biodiversity of Antarctic Organisms program. Negotiations continue, but several countries have made ship-time commitments. There are also strong links between the Oceanic Tracking, TOPP, project and Southern Ocean animal trackers. CoML and OBIS-SEAMAP are supporting John Croxall's project to assemble all the SO albatross tracking data, and we hope that the Antarctic project will form the basis for assembling and focusing the entire SO animal tracking enterprise on the data sharing, multi-species approach used so successfully by TOPP in the North Pacific. SCAR has also begun development of Marine Biodiversity Information Network that would be compatible with OBIS.

**CoML is working with SCAR and the Australian Antarctic Division to develop Antarctic biodiversity activities for IPY. CoML is coordinating its own Southern and Northern Hemisphere IPY activities. CoML would like to work with iAnZone to provide a biodiversity element to its proposed synoptic project and encourage fully interdisciplinary IPY activities. CoML also looks forward to contributing cruise data schedules to any database developed.**

#### DIVERSITAS

Projects will probably be developed in co-operation with IMBER.

#### GEOHAB

No response.

#### GEOTRACES

The Southern Ocean is of particular interest to GEOTRACES because of the widely held view that biological productivity, nutrient utilization and, consequently, the natural sequestration of CO<sub>2</sub> in the deep ocean is regulated, in part, by the supply of iron (and possibly other trace elements) to phytoplankton in the Southern Ocean. GEOTRACES seeks to better constrain the sources of iron and other trace element micronutrients to Southern Ocean ecosystems, and to better understand the processes removing these trace elements from the water column, thereby limiting the biological availability of these essential micronutrients.

GEOTRACES has submitted a statement of interest to the international IPY office. We have also participated in the broader planning activity for Southern Ocean Research under the leadership of Steve Rintoul (CSIRO, Australia). The document describing these plans is posted on the SCOR web site: <http://www.jhu.edu/scor/PC-SO.pdf>. GEOTRACES sees a mutually beneficial opportunity for collaborating with CLIVAR studies worldwide, and this is particularly true in the Southern Ocean.

## GLOBEC

Southern Ocean GLOBEC is an international programme designed to study the year-round life cycle of Antarctic zooplankton. The primary objective is to understand the physical and biological factors that contribute to enhanced Antarctic krill growth, reproduction, recruitment and survivorship throughout the year. The focus also includes the predators and competitors of Antarctic krill, such as seal, penguins, whales, fish, seabirds and other zooplankton. Southern Ocean GLOBEC programmes operate from the UK, Germany, Korea, Australia, the USA and the International Whaling Commission. Field studies have consisted of around 20 multinational cruises to different parts of the Antarctic to provide an approach for regional comparisons.

Southern Ocean GLOBEC includes studies of:

- Regional differences in over-wintering strategies of Antarctic krill in relation to the physical environment;
- Population dynamics of selected zooplankton species, both sea-ice related and pelagic species;
- Population dynamics of major krill predators, both ice-based and pelagic species;
- Hydrographic, circulation and sea ice distributions; and
- Modelling of circulation, sea ice, and biological processes.

Further information on the GLOBEC Southern Ocean programme can be found from <http://www.pml.ac.uk/globec/structure/regional/so/so.htm> and [http://www.ccpo.odu.edu/Research/globec\\_menu.html](http://www.ccpo.odu.edu/Research/globec_menu.html). Also see the attached extract from the Report on the GLOBEC National, Multinational and Regional Programme Activities, 2004 on Southern Ocean GLOBEC [contained in the full GLOBEC report on the meeting Web site].

International Polar Year—A new initiative ICCED (Integrated analyses of Circumpolar Climate interactions and Ecosystem Dynamics in the Southern Ocean) is being developed as a joint venture between GLOBEC and IMBER as part of the International Polar Year initiative and is due to start in 2007. ICCED aims to bring together climatologists, oceanographers, biogeochemists and ecosystem scientists to generate unique circumpolar datasets and models and to address two globally important questions:

- How do climate processes affect the dynamics of circumpolar ocean ecosystems?
- How does ecosystem structure affect circumpolar ocean biogeochemical cycles?

## iAnZone

All of iAnZone's research is in the Southern Ocean, and in particular the region between the Antarctic Circumpolar Current and the continent. Our Southern Ocean plans are coordinated with the CLIVAR/CLiC/SCAR Southern Ocean Panel. We also maintain communications with FRISP, IPAB and ASPECT. There is cross-membership with each of these groups. Our plans for IPY are to implement the SASSI project. This centres around a series of 'hedgehog' sections radiating outward from Antarctica across the

continental shelf and slope, to be occupied simultaneously during the period January-March 2008. It also includes moored arrays on these sections, where possible, to obtain winter data. The second primary part of SASSI is to deploy in the sea-ice zone around Antarctica under-ice floats (analogous to Argo floats) and the associated sound sources needed to track them.

### IMAGES

Southern Ocean Research will be the IMAGES topic in the next 2 years. The IMAGES working group "Southern Ocean" has identified and proposed several core transects across the frontal systems in the Atlantic, Indian and Pacific parts of the Southern Ocean for CALYPSO (giant piston corer) coring at high sedimentation sites. Attempts have been made to coordinate with the IODP program and the IMAGES scientists involved in this IMAGES Southern Ocean campaign have intimate collaboration with the international JGOFS and WOCE community. IMAGES, of course, can contribute to the 3rd International Polar Year, pending on successful cruises in 2005 and 2006 and their financial support.

### IMBER

There are initial plans for a regional IMBER study in the Southern Ocean. IMBER has given support to the further development of the planned ICCED project that is being initiated by a group of scientist with extensive experience in the Southern Ocean. There will be a planning meeting for the ICCED project in May 2005.

The ICCED project is likely to be launched in 2007 to coincide with IPY. It is too early in the development of IMBER for it to have coordinated research with other projects.

### InterRidge

InterRidge had two main focuses in the Southern Ocean: (1) a South-West Indian Ridge working group which completed its work last year, and (2) the Australian-Antarctic Discordance (AAD) which was drilled together with ODP a few years ago. As the Southern Ocean contains long sections of spreading axes, it is a natural place for InterRidge to be working now and in the future. InterRidge has coordinated drilling of the AAD with ODP.

The new InterRidge working group Ultra-slow Spreading Ridges is planning to be heavily involved in the 2007 Polar Year in order to bring mid-ocean ridges into the focus of the polar community. They will put together a proposal as soon as the 6 "core programs" and topics for these for the Polar Year are announced. The criteria for submitting a proposal are (1) Internationality, (2) Multidisciplinarity and (3) Bipolarity, and InterRidge has all these.

The InterRidge Working Group "Ultraslow Spreading Ridges" will be taking the lead on IPY activities for IR as the slowest-spreading ridge on Earth crosses the Arctic Ocean. Contact person is the chair of this WG Jon Snow, Max-Planck-Inst für Chemie, Mainz, Germany (jesnow@mpch-mainz.mpg.de).

### LOICZ

LOICZ has had little involvement in Southern Ocean research, and this is not expected to be a priority in LOICZ II.

### SCAR

SCAR has an Expert Group on Oceanography that is designed:

- to encourage an inter-disciplinary approach to Southern Ocean observations, modelling and research, recognizing the inter-dependence of physical, chemical and biological processes in the ocean at present and in the past;
- initially to facilitate coordination between the physical oceanographic research groups currently active and those planning research in the Southern Ocean;
- to identify historical and reference data set of value to researchers, focusing initially on physical oceanography data
- to encourage the exchange of information with operational agencies
- to be complementary to, and not duplicate, the activities of other groups active in the Southern Ocean
- to develop initiatives for education and training.

There is high potential for cross linkages between this group and other research groups, particularly global groups with regional interests in the Southern ocean. Already iAnZone is affiliated with this group.

Independently, SCAR is co-sponsor with WCRP of the CLIVAR/CliC/SCAR Southern Ocean Implementation Panel; of CliC; and of IPAB. SCAR is working with GLOBEC on co-sponsorship of SO GLOBEC. SCAR is a sponsor of the Circum-Antarctic Census of Marine Life. SCAR and WCRP are leading the development of a Cryosphere Theme for the IGOS Partners. SCAR is keen to have SCOR co-sponsor the Expert Group on Oceanography and to work closely with IMBER.

### SOLAS

SOLAS has done little on this topic to date. We would however like to make several contributions to the IPY (see below). SOLAS (The Surface Ocean - Lower Atmosphere Study, of IGBP, SCOR, WCRP and CACGP) strongly supports OASIS (The Ocean-Atmosphere-Sea Ice-Snowpack Interactions Program) and AICI (Air-Ice Chemical Interactions Task) as part of IPY activities. They are both component parts of SOLAS and would be important contributions to the IPY. They have already been submitted as potential activities for the IPY.

We would also like to propose that plans are made for an “armada” of ships to collect pCO<sub>2</sub> data in the Southern Ocean during the IPY, both above and below the air-sea interface. The many ships that will be transiting to and from Antarctica during this period provide a rare opportunity to take a snapshot of the state of the carbon cycle in the Southern Ocean. A small investment in measurement equipment and alteration of cruise

tracks could have a disproportionately large payoff in terms of a valuable and rare data set. We note several similar suggestions in the appendix to the IPY Outline Science Plan. The Southern Ocean is shown as a large sink region for atmospheric CO<sub>2</sub> in the most comprehensive climatology of net air-sea CO<sub>2</sub> fluxes (Takahashi, 2002). However little is known about the interannual variability of this flux, mainly due to the paucity of data in the Austral winter. Longitudinal variation are also not well resolved. These factors combine to produce large uncertainty in the magnitude and even direction of the flux in current ocean carbon cycle models (see OCMIP-2). Without more data to constrain present day models, we can have little confidence in our ability to predict the effects of global change on this crucial component of the carbon cycle.

SOLAS, specifically its Implementation Group 3, has a strong interest in this issue and would be an enthusiastic partner in this effort.

### **Other Comments**

**Schneider—IMAGES has a Southern Ocean group and would like to cooperate with SCAR.**

**Anderson—GEOTRACES has put in planning letters for both polar regions. Iron in the Southern Ocean is important to GEOTRACES, so there is planned to have one or two Southern Ocean transects. It is impossible to extrapolate from JGOFS. GEOTRACES is interacting with the CLIVAR Southern Ocean Panel, so they might work with CLIVAR on their “hedgehog” model for research in IPY.**

**Ashby—GLOBEC has established activities related to the Southern Ocean through 2007, into IPY.**

**Boscolo—CLIVAR has a Southern Ocean implementation panel, co-sponsored by CliC and SCAR. They are addressing new physical measurements at the “chokepoints” between Antarctica and the southern continents (e.g., the GOODHOPE project).**

**Devey—Both polar areas are of interest to InterRidge. The Arctic Ocean has the slowest-moving ridge. InterRidge has plans for observations there during IPY.**

**Dickey—OceanSITES plans on development of platforms to work in the Southern Ocean or Arctic. The NSF Observatories initiative (see [http://www.geo.nsf.gov/oce/pubs/ooi\\_broch\\_6.30.03.pdf](http://www.geo.nsf.gov/oce/pubs/ooi_broch_6.30.03.pdf) and <http://www.orionprogram.org/>) might help, but not by the time of IPY.**

**Pitcher—GEOHAB has a fairly tenuous relation to IPY.**

**Harrison/Malone—If there are new measurements initiated during IPY, they might be incorporated into GOOS.**

**Grassle/O’Dor—MarBIN is focused on bringing together CCAMLR with benthic data. CoML has already been involved in some Southern Ocean measurements made from autonomous pinnipeds tags, as well as on albatrosses and petrels. There will be a Southern Ocean CoML and probably an Arctic CoML. The latter will bring in Russian data sets and they will run NAGISA-type transects.**

**Hall—IMBER research is already being planned for the Southern Ocean. ICCED would start during IPY. It will look at ecosystem controls on biogeochemical cycles. There will be a workshop in May 2005.**

**Heip—Marine efforts in DIVERSITAS have just started. It is probably too late to develop something for IPY. DIVERSITAS is developing links with IMBER and CoML.**

**Heywood— The Synoptic Antarctic Shelf-Slope Interactions (SASSI) project will be undertaken in 2007-2008 and will be circumpolar. SASSI is being developed by iAnZone, with a series of “hedgehog” sections from the ice edge to the bottom of the shelf. These are planned as semi-synoptic surveys in Jan.-March 2008. They are currently coordinated with CLIVAR, but links with IMBER and GEOTRACES are welcome, such as providing berths on iAnZone cruises. They especially need under-ice Argo measurements.**

**Ryan—SOLAS will try to collect as many pCO<sub>2</sub> measurements in the Southern Ocean during IPY as possible.**

**Schneider—IMAGES has a Southern Ocean working group and two cruises are planned.**

**Parslow/Kremer—LOICZ is running an Arctic Coastal Dynamics project.**

## **Time-Series Stations**

### CLIVAR

CLIVAR has clear requirements for these and has been active in planning for these. Further information will be provided at the meeting.

### CoML

1. BATS – A funded OBIS contributor.
2. HOTS – A focal site for the soon to be launched Microbes, ICOMM, project.
3. CPR (Continuous Plankton Recorder) international surveys (Sir Alister Hardy Foundation for Ocean Science) – These data are served by OBIS and SAHFOS.
4. POST - The acoustic modem and cabled hydrophone curtains going from the shore to the continental margin can also collect and transmit shelf-bottom physical and chemical data in the coastal zone not served by Argo floats. POST has funding to create curtains, but the business plan assumes that many users will pay for data and support the costs of data collection.

### DIVERSITAS

Projects will probably be developed in co-operation with IMBER.

### GEOHAB

No response.

### GEOTRACES

GEOTRACES anticipates making use of data and samples collected from time-series stations. However, GEOTRACES does not anticipate establishing any new time-series stations. At most, we might augment existing stations or new stations (e.g. within SOLAS).

### GLOBEC

There are several time-series stations used for GLOBEC research, including L4 in the English Channel, SAHFOS Continuous Plankton Recorder lines and grids and US GLOBEC Georges Bank. Each of these stations are funded by the individual projects.

### iAnZone

Some time-series stations have been maintained in the Antarctic Zone by iAnZone projects, but none of these has had indefinite funding. Moored arrays were maintained in the Weddell-Scotia Confluence region as part of DOVETAIL for ~3 years. Moored arrays are currently on the continental shelf and slope in the Ross Sea for ~3 years. We would welcome support for longer-term time-series stations around Antarctica.

### IMAGES

The implementation of the new IMAGES SCOR Working group 124 LINKS (Present Oceanic Processes and Paleorecords) will require intimate collaboration with new monitoring and time-series station programs in coastal and open ocean settings; However, the IMAGES program itself will not attempt to run such programs.

**IMAGES is interested in close collaboration with respect to time-series stations, particularly in relation to sediment traps, water sampling (nutrients, isotopes), and planktonic and benthic organisms that have the potential to become fossilized in the sediments. Some samples would be useful for paleo-proxy calibrations.**

### IMBER

IMBER will require long-term observations as a foundation for developing predictive capability of IMBER. Development of new, additional sustained observation are envisaged for areas such as the continental margins, high-latitude and polar ocean areas, and within the mesopelagic layer. Geographical locations for these have not been discussed and are at least partially going to be dependent on funding from specific countries or a group of countries. As IMBER has no funds for research these stations will need to be supported by research funds from specific countries. It will be important to ensure that there is good coordination between research projects and GOOS.

### InterRidge

Observations from time-series stations is part of the plan, and implementation will be discussed at the meeting in Spring 2005. Also MOMAR is a possible node of ESONET, and if implemented, it would include a dedicated seafloor observatory and associated instrumentation. The site of focus to initiate work will be the Lucky Strike hydrothermal vent at 37.5N (the "MoMAR" region). This may be extended to the Rainbow site, in the event of an IODP project taking place (proposal active but needs to be re-submitted - it is in the works). As of now there is no direct financial support. Both European and American (Ridge2000) scientists are working on a collaborative project at the MoMAR region. Support may come from the European (Framework 6) ESONET project.

### LOICZ

The need for long-term sustained coastal time series has been identified in LOICZ II.

However, given the diversity and spatial complexity of coastal systems, this is likely to require a different strategy to that adopted for open-ocean time-series sites.

### SOLAS

The SOLAS Implementation Plans that are currently being prepared call for several time-series stations. These include:

- Flux measurements (probably from towers) in high windspeed locations.
- Direct flux measurements (of physical fluxes, CO<sub>2</sub>) in coastal seas.
- Biogeochemical observations in high latitudes.

The UK SOLAS project is developing plans for a monitoring station on the Cape Verde Islands, to complement ongoing German research there. It would be funded by UK SOLAS (a 5-year NERC directed programme) and would include atmospheric trace gas and particle measurements from a station on the island and possibly, the deployment of air-sea flux buoys upwind of the island (ASIS-type buoy).

Canadian SOLAS has a long term mooring at Station P, measuring biogeochemical and physical parameters including pCO<sub>2</sub>, O<sub>2</sub>, N<sub>2</sub>, rain, windspeed and bubble spectra. This is funded for 3 years.

### Other Comments

**Devey—InterRidge is interested in deep-sea sensors.**

**Dickey—Some of sensors just need sensor housings that can withstand high pressures (see <http://sensors.marine.usf.edu/> for Ocean Sensor Gateway and sensor bibliography at <http://www.jhu.edu/scor/DickeyRefs.txt>). Many people are interested in putting biological and chemical sensors on Argo floats and gliders, but smaller sensors are needed. Jim Bishop is experimenting with carbon sensors for such platforms. OceanSITES does not include benthic stations as of now, or sediment traps. Most of the OceanSITES sites are in the open ocean.**

**Bernal—Other GOOS assets should be considered for time-series needs. Also, strong support from individual scientists and institutions is needed. POGO institutions see one of their roles as developing new sensors for Argo.**

**Harrison—It is necessary to plan ahead to put new sensors on buoys**

**Malone—A workshop on “sentinel sites” for coastal measurements is needed.**

**Parslow—It is better for projects to specify criteria for selecting sites, rather than specifying the sites.**

**O’Dor—OBIS is beginning to allow identification of ocean “hot spots” of high biodiversity.**

**Harrison—In coastal areas, it is good to think not only of autonomous systems, but also manned systems, VOS, Ferry Box systems, etc. The research community could help think of instrument packages. At an IMO meeting, I found out that the commercial shipping community is willing to put a wet lab on new ships, but they need to know the specifications.**

## **Environmental Assessments**

### CLIVAR

The key CLIVAR activity here is input to IPCC. It does this in particular through the activities of the joint JSC for WCRP/CLIVAR Working Group on Coupled Modelling (WGCM), though a considerable number of scientists involved with CLIVAR (and WCRP more widely) are also involved in a personal capacity in the IPCC assessments. WGCM has been involved in the past helping to plan, coordinate and run scenario experiments for input to IPCC. It has also informed IPCC through its Coupled Model Intercomparison Project (CMIP). CMIP subprojects, of which some 28 are currently active, have produced a large number of peer-reviewed publications, contributed significantly to the IPCC Third Assessment Report and will play a key role in the upcoming Fourth Assessment Report (AR4). A CMIP-related activity will involve collection and analysis of the most recent standard CMIP simulations as well as 20<sup>th</sup>, 21<sup>st</sup>, and 22<sup>nd</sup> century simulations for AR4. A specific call has gone out through CLIVAR Exchanges and elsewhere announcing the opportunity for the community to participate in climate model analyses leading towards input to AR4.

Input to AR4 will also come through the joint Commission for Climatology/CLIVAR Expert Team on Climate Change Detection.

### CoML

CoML recognized the need for and feasibility of a global accounting of ocean life in 1997 and began working actively towards such a census with the formation of its independent international Scientific Steering Committee in 2000. Since that time it has worked to make its census an element of global ocean assessment. During the Thirty-third Session of the Executive Council, Paris, 20-30 June 2000 (IOC/EC-XXXIII/3), "the Executive Council expressed support for the Census, and instructed the IOC Secretariat to develop an appropriate mechanism for IOC involvement in the Census." It further "recognized the potential implications of the information arising from the Census for the conservation and management of fish stocks within national EEZs, and the particular need therefore to coordinate Census activities on a national basis." CoML participated in the First Meeting for a Feasibility Study for Establishing a Regular Process for the Assessment of the State of the Marine Environment, Reykjavik, 12-14 September 2001 (Proceedings, UNEP GC Decision 21/13), as well as the Technical Consultation on Improving Information on the Status and Trends of Capture Fisheries, Rome, 25-28 March 2002 (FAO Fisheries Report No. 680, FIDI/R 680-Tri). CoML is the Biology Editor for the UN Atlas of the Oceans and was discussed in *One Planet, One Ocean – Sustainable Development of Oceans and Coasts: a Commitment of 129 States at Johannesburg 2002* (IOC Information documents series No. 1172, UNESCO 2002). In response to a UN invitation to be a modality "for a regular process for the global reporting and assessment of the marine environment", RADM West, President of the Consortium for Oceanographic Research and Education organized a CoML side-event for the General Assembly at UN Headquarters in New York for UNICPOLOS on 4 June 2003. CoML considers that its program and OBIS are a crucial baseline for future Global Marine Assessments and continues to work to ensure that biodiversity is a recognized component.

### DIVERSITAS

DIVERSITAS is involved in the Millennium Ecosystem Assessment.

GEOHAB

No response.

GEOTRACES

GEOTRACES has not participated in any environmental assessments.

GLOBEC

Expert advice has been provided for the Millennium Ecosystem Assessment.

iAnZone

iAnZone has not been asked by any global assessment organisations for data, model results or advice.

IMAGES

The IMAGES program serves with paleoenvironmental data and paleoclimatic reconstructions to projects like MOTIF or PMIP for data model comparison studies which are involved in the next IPCC reporting process.

IMBER

IMBER has not been asked by any of the global assessment organizations for data, model results, and/or expert advice, as the project is still in the early organisational stages and there is no data or modelling results available.

InterRidge

InterRidge was asked for expert advice from the International Seabed Authority on the current 'code of conduct' that InterRidge is working on for research at ocean ridges. The InterRidge chair, Colin Devey, attended a meeting at ISA in Jamaica 6-9 Sept 04 to discuss this.

LOICZ

No response.

SOLAS

SOLAS has contributed to global assessments only tangentially. We have been asked for emission data for some of the compounds covered by the Montreal protocol (and further agreements) and climate relevant compounds. We will work with GEIA in developing these.

Other Comments

**Alder—The MA is focused on human well-being and the services that ecosystems can provide. The findings will be released in Jan.-Feb. 2005. Representatives of the major international environmental conventions participated. The MA includes a global assessment and sub-global assessments at different scales. IPCC output was used as input to MA and the MA did not duplicate IPCC work. Not all data used in the assessments are archived, because some are proprietary.**

**Bernal—If a Global Marine Assessment is developed, it is planned to do assessments on a regional basis.**

**Malone—MA has done a lot of work and has been useful for quantitative assessments on ecosystems. We need to (1) develop and standardize indicators and (2) identify what data are needed for better assessments.**

**Parslow—All our focus should be on the next assessment. A workshop of projects with MA representatives to fill the data gaps for the next assessment could be useful.**

**Harrison—IPCC participants say offline that there is not enough ocean data, but their reports don't communicate this lack of data well. They have been too diplomatic. Jackie Alder responded that they are trying to keep in some of the negative comments in the MA to reach policymakers.**

**Heip—The MA document seems to only focus on fisheries. Alder responded that this issue was debated several times. It was felt that this was a major issue for which data are available.**

**Labeyrie—IMAGES has created a working group to contribute to the next IPCC assessment. Perhaps other projects should do the same.**

**Field—We found from a recent SCOR/IOC project that indicators need to be specific. Fishery managers want indicators that respond quickly, not with a long lag time. Malone responded that regime shifts can be very rapid.**

**Kremer—There is a European effort to develop sustainable ecosystem indicators.**

**Malone—It is important that we have consensus on indicators—a focused set—worldwide.**

**Field—There needs to be a sequence: (1) questions, (2) indicators, then (3) measurements.**

**Alder—The Convention on Biological Diversity is looking at indicators for marine biodiversity.**

**Field—It would be useful for the MA to ask the questions for the next assessment now, so projects could work on providing the answers.**

**Malone—We should also state that we feel these assessments are important.**