

**Minutes of the Second IMBER SSC Meeting
East China Normal University, P.R China
April 18 – 20, 2005**

Present:

SSC Members:

Julie Hall, Dennis Hansell, Patrick Monfray, Arne Körtzinger, Carol Turley, Coleen Moloney, Jack Middelburg, Jing Zhang, Jay Cullen, Hiroaki Saito, Wilco Hazeleger, Claire Hamilton, Sylvie Roy.

Invited participants:

Kathy Hubbard (AIMES), John Parslow (LOICZ), Francisco Werner (GLOBEC), Ed Urban (SCOR), Wendy Broadgate (IGBP)

Apologies:

From IMBER SSC members:

Raymond Pollard, Carina Lange, Dave Hutchins, Ann Bucklin, Wajih Naqvi,

From invited participants:

Eugene Murphy (ICCED),

Carlo Heip (DIVERSITAS)

Bob Anderson/Gideon Henderson (GEOTRACES), Christoph Heinz (CARBO-OCEANS)

Liana McManus (LOICZ),

Scot Doney (US SSC)

Monday 18TH April

Welcome to East China Normal University and the State Key Laboratory of Estuarine and Coastal Research – by our host Professor Jing Zhang.

Welcome from the IMBER Chair – Julie Hall

Julie welcomed the SSC to the second SSC meeting and introduced Jay Cullen, and Sylvie Roy along with our invited guests. Julie also gave an overview of the aims of the meeting, which follow:

1. Update on IMBER SP/IS.
2. Review Implementation Strategy – Develop a plan to take IMBER forward
3. Promotion of IMBER
4. Work plan for the IPO

IMBER Science Plan & Implementation Strategy

A large thank you was extended to the SSC for all the hard work, which has been put into the development of IMBER since the last meeting. The response to reviewers was discussed at the Executive meeting in Miami (RASMAS, December 2004), with the draft further refined by addition and removal of some questions from the SP/IS. Following further input from the SSC the draft underwent editing in early January and the final IMBER SP/IS was submitted to the sponsors in late January. The SP/IS was approved by IGBP at their SC meeting in Beijing, and by SCOR a little later. The feedback received from the IGBP SC in Beijing was extremely positive, related both to the science and the standard of the overall document. The finalised SP/IS is now with the IGBP editor, and the printed version is expected to be available in late May.

The issue of the mailing list for distribution of the IMBER SP/IS was raised. In the last IMBER bulletin that went out Claire asked that those on the mailing who wished to receive a Hardcopy of the SP/IS provide the IPO with their postal address, and to pass this message on to colleagues who are likely to be interested in receiving a hard copy. Julie asked that the SSC think about who should receive copies, i.e. program/project managers, key people in funding bodies etc.

Dennis suggested that a Brochure like booklet be used as an accompaniment to a CD version of the IMBER SP/IS. John Parslow suggested that IMBER could use a different slant in a brochure, providing a short synthesis of the project and perhaps pitch the type of information included depending on audience. Possible translation into different languages.

Action/Recommendation: Action on **all SSC** to provide Julie with lists of names and addresses of programme managers, key people at funding agencies, institutions, and colleagues and other relevant people etc. for distributed of the IMBER SP/IS.

Wendy to provide Claire with a copy of the International JGOFS mailing list.

IPO Update

One of the exciting developments in IMBER has been securing funding for the International Project Office by a French consortium. The IPO will be based at the Institut Universitaire Europeen de la Mer, Brest, France. The IMBER IPO is being supported by Centre National de la Recherche Scientifique (CNRS), Institut de Recherche pour le Développement (IRD), the Université de Bretagne Occidentale and the Brittany Region. A big thank you must go to Patrick Monfray and Paul Treguer for all their hard work in securing this funding.

Executive Officer position was advertised in early January, from a large number of applicants four candidates were interviewed in early March and Sylvie Roy was offered the position. Sylvie has accepted the position and will

start in Brest in mid August. Thanks was extended to Sylvie for coming to the SSC meeting.

Thanks also goes to Plymouth Marine Laboratory for supporting the Interim IMBER IPO, and Claire for the past nine months.

Action/Recommendation: Action **Julie** to write letter of thanks to PML for supporting the interim IPO.

Feed Back on the Theme 2 Foci Diagram

The idea for this diagram evolved out of the Executive meeting held in Miami last December. It was decided that a diagram that illustrated the IMBER science focus was needed, but not the usual box diagram that is produced by most projects. Theme 2 was identified as being the heart of IMBER and it was felt that a diagram identifying the four main foci of the Theme would be a useful tool for IMBER. The development of the diagram was flagged as an option for use on the front cover of the SPI/IS. Julie took back ideas that came out of the meeting such as the use of aspects of the logo, such as the circle and arrows, to a graphic artist who developed the draft using images to represent the four key foci in the theme. The draft diagram that had been produced was circulated and it was decided that another draft be worked on using a few different images to illustrate the main foci in the centre.

Action/Recommendation: **Julie** to take the comments from the SSC back to the Graphic designer and make amendments discussed to the diagram. This diagram will be used on the front cover of the SP/IS.

SPONSOR UPDATES

SCOR - Ed Urban

Ed gave an overview of SCOR, and outlined two SCOR working groups, which are relevant to IMBER. The SCOR working group 125, is about bringing data from global studies together so that all zooplankton time series data is in a single location for analysis. SCOR working group 126 could be important for input into IMBER.

IGBP - Wendy Broadgate

On behalf of the IGBP Wendy thanked the IMBER SSC for the refined IMBER SP/IS that was received and for the quality of the document and the science contained in it. Wendy gave an update of recent IGBP developments, such as the approval of the Science Plans of the IMBER, IGAC, LOICZ II, ILEAPS and LAND projects. This was followed by an insight into the new fast track initiatives, a quick discussion on the development of the AIMES project. IGBP are presently trying to complete their Science Plan.

UPDATE ON COUNTRY ACTIVITIES FOR IMBER PROJECT

Canada – Jay Cullen

The IMBER initiative in Canada will be addressed at the Canadian SOLAS Open Science Conference in early June. Given limited financial and human resources available it is likely that IMBER science goals will be reached in the

observatories can be found online. Venus will operate as a NEPTUNE testbed for instrumentation and will be in the water later this year. NEPTUNE has had its first call for proposals to outfit the network with instrumentation with results of the competition to be known later this summer. There exists an upper ocean dynamics group (biology, physics and chemistry) interested in water column processes that has submitted a proposal to NEPTUNE. The group plans to install profiling instrument packages to study shelf-slope process on the west coast of British Columbia. Many IMBER specific science goals could potentially be addressed with the network. It is important to note that no money is available in the NEPTUNE Canada budget to maintain the network explicitly. It is unlikely that Canadian funding agencies will not allocate significant resources to support science programs that utilize the network. IMBER should position itself in Canada to take advantage of the NEPTUNE and Venus observatories.

Action/Recommendations: Julie to Provide a letter of support for the proposed BIOPRON mesopelagic research project. Jay to contact E. Pahkomov (UBC) re links between IMBER and BIOPRON.

China – Jing Zhang

After the OCEANS OSC meeting in Paris, January 2003, a joint working group of IMBER and GLOBEC was set up in China, this was later approved by the national committee of IGBP in August, 2003. A national top-level forum, the Xiangshan Forum, was organised at Xiangshan Park in Beijing in May 26-28, 2004. Julie Hall, Cisco Werner and Sven Sundby were invited to give lectures at this meeting. The aim of this meeting was to promote biogeochemical and foodweb type studies in China and to find a way to implement the GLOBEC and IMBER projects in China. A meeting report in Chinese was published later and circulated to the Chinese scientific community. The National Chinese GLOBEC project ended in October 2004, and was evaluated by the Chinese Ministry of Science and Technology.

A new proposal for the Chinese National research project (2005-2009) was submitted to the Ministry of Science and Technology in March 2005. An oral presentation will be given in Beijing on April 24, 2005.

The new proposal of National research is focused on the biogeochemistry and food web interaction supported by the physical forcing over the china seas (e.g. East China Sea) aiming for sustainable food production and ecosystem based management in the coastal ocean. This is considered as the Chinese combined contribution to GLOBEC and IMBER, with a ratio of 3:1(GLOBEC 3:IMBER 1).

Action/Recommendations: Julie to provide letter of support for the proposal that has been submitted.

France – Patrick Monfray

The full French Country report can be found in the Appendices (Appendix 1).

In France IMBER will be implemented through the French PROOF program, jointly with SOLAS. The three research areas /Themes to be undertaken are:

- Theme 1: Interaction between climatic changes and marine biogeochemical cycles at the ocean-atmosphere interface
- Theme 2: The respective effect of climatic change and of natural variability on the functional structure of marine ecosystems and on biogeochemical cycles.
- Theme 3: The paleo-oceanographic proxies in the present ocean.

The tools needed to carry out this research can be grouped into three main categories:

- In situ observation
- Laboratory experiments
- Modeling

Update on oceanographic campaigns

Two major campaigns have been successful recently:

- BIOSOPE (November-December 2004), dedicated on Biogeochemistry and Optics in South Pacific across eutrophic, mesotrophic and oligotrophic area in a poorly known area.
- KEOPS (January-February 2005), dedicated to the natural iron fertilization of the ocean by the Kerguelen plateau (52°S, 73°W) on the biological pump of CO₂ and on the cycles of the other chemical compounds relevant to climate.

Major campaign in development:

- PRIMO (2007 or 2008?), a multi-national project dedicated to researching the formation and dynamics of the Oxygen Minimum Zone in the Peru-Chile Current system, and its impacts on biogeochemistry and ecosystems. The SPIS is under development through the partners.

Action/Recommendations: Endorsement by IMBER-SSC of the BIOSOPE programme is requested, this programme is relevant to IMBER Theme1, Issues 1 and 2. Endorsement is also requested for the KEOPS program (which is relevant to IMBER Theme1, Issues 1 and 2, Theme 3 Issue 1), and the PRIMO campaign to provide support when approaching funding agencies (this campaign has high relevance to Theme1, Issues 1,2&3, Theme2 Issues 1&3 and Theme3, Issue2). **Patrick** to make sure the relevant project leaders submit forms for endorsement by IMBER.

Finland

Julie spoke with a scientist from Finland (Jorma Kuparinen, University of Helsinki) who indicated that the focus of research within the Finnish Scientific community will be in the Baltic, in conjunction with other Scandinavian countries. Finland is looking outward for links to international projects and

Jorma has undertaken to highlight possible links to IMBER at an upcoming funding proposal meeting.

Germany – Arne Koertzinger

So far IMBER is not funded as such in Germany. Also a formal German IMBER committee has not yet been formed. However, the following three meetings of a wide range of representatives from the marine science community in Germany have taken place to discuss and develop a German IMBER project which is currently called G-IMBER:

- 1st German IMBER (OCEANS) Workshop: June 13, 2003; Hamburg
lead by Mike St. John/Hamburg & Bodo v. Bodungen/Warnemünde
- 2nd German IMBER Workshop: spring 2004; Hamburg
lead by Mike St. John/Hamburg
- 3rd German IMBER Workshop: Dec. 10, 2004; Hamburg
lead by Mike St. John/Hamburg & Kay Emeis/Warnemünde

From these two major study systems/regions have emerged:

- Shelf pump system: North Sea. There was some discussion on whether the Baltic Sea (which like the North Sea is currently studied by the German GLOBEC) will be included or not. Currently this seems unlikely but that may still change.
- Coastal upwelling system: Two regions – upwelling off Namibia and upwelling off northwest Africa – were proposed and discussed vigorously. A final decision has not been made yet. Since the Namibian upwelling system is far better studied by the German community and good collaboration with African partners has been established in this region, the Namibian upwelling system gained more momentum in the discussions. Again, there is no final decision yet and the focus may still shift.

The scientific interest and the suite of questions asked are closely aligned with the international IMBER SP/IS. Largest interest came from the ecosystem (i.e. GLOBEC) and biogeochemistry communities but other disciplines (oceanographers, marine geologists etc.) also expressed their interest.

Several funding opportunities were discussed. Representatives of the German Research Ministry (BMBF) indicated their interest in a German IMBER project. However, with SOLAS currently making way with the BMBF the earliest slot for G-IMBER would be 2007 (possibly even 2008). Due to the fairly tight financial constraints (especially since the new German research vessel Maria S. Merian is currently being built) the funds available for G-IMBER (after approval) will according to the BMBF most likely not exceed 1 Million EUR per year for a total of 4 years in the first run.

In order to further develop the German IMBER project, a two-day workshop titled "Marine biogeochemical cycles and ecosystems and their interactions with climate: The role of ocean margins" will take place on May 2-3 at the RCOM – Research Center Ocean Margins in Bremen (organizers: D. Hebbeln & A. Paul, Univ. of Bremen).

In addition to these formal IMBER plans, many ongoing or planned research projects are working in the IMBER realm. These span a wide range from small individual-PI projects to rather research initiatives. An example of the latter are plans for a new special research unit of the German Research Foundation (typical lifetime 10-12 years) at the University of Kiel which will be primarily run by the IFM-GEOMAR. The focus of this large project with the working title "Climate - Biogeochemistry Interactions in the Tropical Oceans" is:

- Theme A: Variability and the Physical Supply of O₂ to Tropical O₂-Minimum Zones
- Thema B: Oxygen Dependent Nutrient Controls in the Tropical Oceans
- Theme C: Whole System Analysis of Quaternary and Cretaceous Variability

The project will be discussed immediately after the G-IMBER workshop on May 4 in Bremen. A pre-proposal will be submitted this year. If successful the full proposal is due in 2006 for an expected project start in Jan. 2007.

Action/Recommendations: Arne to talk to people in Germany to see if various programmes will fly the IMBER flag.

Japan – Hiroaki Saito

The Japanese IMBER National Committee was set up under the Global Environmental Research Liaison Committee of the Science Council of Japan (SCJ). The IMBER NC members are 6 from biology and ecology, 7 from biogeochemistry, and 3 from physics and model, chaired by HS. A few additional members will join, one of them from data management. Six members are also SOLAS NC members and two GLOBEC. The first NC meeting was held in February. In addition to 15 NC members, 25 scientists including GLOBEC, GEOTRACES, SOLAS, LOICZ NC members, attended. Discussions were on 1) present status of IMBER and IGBP core projects, 2) hot topics and questions to be solved in the next 10 years, 3) future funding proposal. Next NC meeting will be held in this summer for proposals of funding and ship-time (FY2007-2009). Japanese proposal systems for research fund and for ship-time are independent each other (not always but most). Several cruises for IMBER study are probably proposed collaborated with SOLAS and/or GEOTRACES, or with GLOBEC. The relationships with SOLAS and GLOBEC are smooth, NC chairs of IMBER, SOLAS (Dr. Mitsuo Uematsu, ORI), GLOBEC (Dr. Yasunori Sakurai, Hokkaido Univ.) frequently exchange information.

Although IMBER-JAPAN has not yet got a “big” fund, IMBER-related programmes are on-going or will start.

Biological pump in the Northwestern North Pacific

On-going JAMSTEC programme to understand the role of biological pump in the NW North Pacific by means of sediment trap moorings, which maybe useful platform for IMBER studies. It is expected to continue for more several years. Closely linked to US VERTIGO (Vertical transport in the Global Ocean) project. PI: Dr. Makio Honda, JAMSTEC.

A-line monitoring

In order to monitor the Oyashio ecosystem, multiple cruises (6-8 per year) has been carried out from 1990 by Fisheries Research Agency using various funding sources. It is expected to continue the programme throughout the IMBER-period and the A-line may be a useful platform for IMBER studies.

http://www.mirc.jha.or.jp/HNF/a-line/index_e.html

DEEP (Deep-Sea Ecosystem and Exploitation Programme, on-going)

A part of the MER (Marine Ecosystem Study for Sustainable Utilization of Biological Resources) project focusing on the interaction between epipelagic and mesopelagic ecosystems funded from the Agriculture, Forests and Fisheries Research Council. Closely linked to Japan-GLOBEC programme.

http://www.myg.affrc.go.jp/personal/HP_E/index_e.html

PI: Hiroaki Saito, FRA.

Carbon sequestration

There was a research programme on carbon sequestration to the deep-sea (Study of Environmental Assessment for Carbon Dioxide Ocean Sequestration for Mitigation of Climate Change, FY1997-2001) funded from the National Institute of Advanced Industrial Science and Technology (AIST). Scientists in AIST are interested in collaboration study with IMBER scientists to asses the effect of sequestered carbon on deep-sea biota and the ecosystem.

SNIFFS (Subtropical Nitrogen Fixation Flux Study) cruise

As mentioned above, Japanese proposal systems for research fund and for ship-time are independent each other. A scientist group related SOLAS and IMBER got 2-monthes ship time of RV Hakuho-Maru to subtropical NW Pacific (summer 2006). Some scientist subgroups got fund (or are sending funding proposal) for research of N₂ fixation, iron chemistry, role of trace metals for biological processes. etc. PI: Mitsuo Uematsu, ORI, Univ. Tokyo.

India – Wajih Naqvi

National Programmes: Activities of the IGBP core projects in India are coordinated and monitored by a national committee constituted by the Indian National Science Academy (INSA). During the annual meeting of INSA held at Pune, a brain storming session was organized on 28-29 December 2003 to discuss the requirements of SOLAS and IMBER. A number of presentations were made by researchers representing various universities and research

institutions engaged in marine scientific research on aspects of work related to these projects. It was generally felt that for the optimal utilization of available resources SOLAS and IMBER should be implemented together under a single national programme. A Task Force was constituted to invite formal proposals from potential investigators and to seek funding from government agencies such as the Department of Ocean Development (DOD) and the Department of Science and Technology (DST). A number of proposals have since been received and are currently in review.

In the meantime, the Council of Scientific & Industrial Research (CSIR) has approved a project entitled, "Impact of anthropogenic perturbations on oceanographic – atmospheric processes in and around India in the context of Global Change". This project, being coordinated by the National Institute of Oceanography (NIO), Goa, comprises three activities of interest to IMBER:

- Transport and transformations of nitrogenous fertilizers from agricultural field to the ocean: Impact on coastal ecosystem and exchanges with atmosphere
- Reconstruction of upwelling intensity/anoxia on seasonal to centennial time scales from coral and sedimentary records
- Long-term time-series measurements including calibration of critical atmospheric and oceanographic parameters

For the time series work, the coastal section off Goa (consisting of five stations to a depth of 28 m), repeatedly occupied by NIO since 1997, is now being extended offshore. In addition, two open ocean stations will be sampled on cruises to be conducted once every two months. At the time-series stations including the shallow one off Goa [the Candolim Time Series (CATS), 15°31'N, 73°39'E], moored instruments including automated sampling devices and current meters will be deployed in near future to record high frequency changes. The work plan also includes deployment of sediment traps at the two open ocean time-series locations (15°N, 72°E and 17°N, 68°E). While the data collected under this programme include most routine biological parameters, the project also has strong links with another in house project of NIO (viz. Marine biodiversity and ecosystem functioning).

The Centre for Marine Living Resources and Ecology (CMLRE), Cochin, under DOD, has also initiated a major multi-institutional project on Marine Living Resources. Under this programme, dedicated cruises are being conducted throughout the year focusing on biogeochemical processes and fisheries resources of the Indian exclusive economic zone (EEZ) using the Fisheries and Oceanographic Research Vessel (FORV) Sagar Sampada. The project is implemented with the Regional Centre of NIO at Cochin serving as the nodal agency; the other participating organizations are Central Institute of Fisheries Education (CIFE), Mumbai, Fishery Survey of India, School of Marine Sciences, Cochin University of Science and Technology, and Department of Zoology, Andhra University, Waltair. In addition to the fisheries survey, the project also involves extensive data collection on hydrography, nutrients, and various biological parameters of relevance to IMBER that will provide insights into transformations of biogenic elements, food web structure and their interactions in various biogeochemical provinces of the Arabian Sea

and the Bay of Bengal. This includes studies of the Arabian Sea suboxic zone which supports an amazingly large biomass (~100 million tonnes) of mesopelagic fish (myctophids) that probably contributes significantly to biogeochemical fluxes in the region.

Regional/International Initiatives

A cruise of the Oceanographic Research Vessel (ORV) Sagar Kanya was organized in the Arabian Sea during 4-25 September 2004 in which besides the Indian researchers three scientists from Oman (two from Sultan Qaboos University and one from the Marine Science & Fisheries Centre) and six scientists from USA (three from Princeton University, two from Woods Hole Oceanographic Institution and one from University of Washington) took part. The cruise involved observations within the upwelling zones off India and Oman during the same monsoon season and along a transect extending from the Omani coast to the Indian coast. Interactions between the trace metals and nitrogen cycles was the main focus of the cruise; the other important issues sought to be addressed were sedimentary respiration (denitrification and sulphate reduction) and the role of anaerobic ammonium oxidation (ANAMMOX) in N₂ production within the suboxic zone.

New Zealand – Julie Hall

As a small country New Zealand will not have a distinct IMBER project, instead as has happened in the past research carried out in a number of projects will contribute to IMBER. In February 2005 a cruise to investigate nitrogen cycling was held north-west of New Zealand in the permanently oligotrophic region north of the Tasman Front. A follow up cruise is planned for 2006. The New Zealand research team will be seeking IMBER endorsement for this research.

United States – Dennis Hansell

Ann Bucklin, Dave Hutchins and Dennis Hansell organized an evening informational session at the 2005 annual meeting of the American Society of Limnology and Oceanography (ASLO), held on Feb. 22 in Salt Lake City, Utah. The session was intended to highlight IMBER in the context of other international ocean projects that the US was developing or involved with, such as GLOBEC, SOLAS, and the US Ocean Carbon and Climate Change (OCCC) project.

The title and abstract for the session were:

US National and International Projects on Carbon, Ecosystems, and Global Change: Status and Discussion.

Where will U.S. and international marine science research efforts linking carbon, ecosystems, and global change be directed over the next decade? This interactive informational session will explore the status of new and ongoing research initiatives. Short presentations describing the status of OCCC (U.S. Ocean Carbon and Climate Change Project), U.S. GLOBEC (Global Ocean Ecosystem Dynamics), and the relevant international projects

(such as the IGBP/SCOR projects IMBER, the Integrated Marine Biogeochemistry and Ecosystems Research, and SOLAS, Surface Ocean-Lower Atmosphere Study) will be followed by an open community forum on the future directions of marine carbon science and ecosystem research efforts. We encourage everyone with an interest in global change, biogeochemical cycles, and food web interactions in the ocean to attend this workshop and participate in an informal exchange of ideas and future research strategies.

Dr. David Hutchins (Univ. of Delaware) chaired the session, providing rationale and goals for the evening, and introducing the speakers. Following these introductions, the session continued with a presentation by Craig Carlson (UC Santa Barbara) on OCCC, a project that the US is developing. Dr. Carlson outlined the science plans presented in the publication Ocean Carbon and Climate Change: An Implementation Strategy for U.S. Ocean Carbon Research, a document prepared for the U.S. Carbon Cycle Science Scientific Steering Group and Interagency Working Group by the Carbon Cycle Science Ocean Interim Implementation Group. Dr. Carlson served as a member of the Interim Implementation Group.

The OCCC presentation was followed by an update on both international and US GLOBEC activities by Dr. Roger Harris (Plymouth Marine Laboratory), former Chair of the GLOBEC SSC. GLOBEC is in its synthesis phase in the US, and these synthesis activities were presented.

Ann Bucklin (Univ. of New Hampshire) presented the scientific themes, issues and questions developed by IMBER, and Dennis Hansell (Univ. of Miami) followed this with implementation strategies and an update on IMBER/SOLAS agreements and status for joint carbon research activities.

Wade McGillis (Columbia University) and Bill Miller (Univ. of Georgia) presented SOLAS, particularly the status and plans for SOLAS activities in the US.

In attendance were approximately 100 scientists, and 3 Program Managers from the US National Science Foundation (Drs. Dave Garrison, Phil Taylor, Fred Lipschultz). Many of the scientists were young, apparently in attendance to learn more about opportunities that may develop for advancement of their careers. It is the interests and needs of these young scientists that may be key to the success of IMBER in the US. The session seems to have been successful in raising interest in and awareness of the IMBER science plan in the US marine science community. Numerous encouraging comments were received from individual scientists and NSF program managers in the days following the session.

South Africa – Coleen Maloney

South African contributions to IMBER will be made through existing nationally funded research projects. The Benguela Ecology Programme focuses on the shelf ecosystem of the southern Benguela upwelling region, with research that

underpins the ecosystem approach to fisheries management. The contributions to IMBER research will thus be at the level of integrated food webs, and impacts of fishing. Satellite remote sensing and spatial variability are also important topics of research, with a strong biophysical modelling element that falls under the South African-French IDYLE research project.

Regionally, South Africa, Namibia and Angola co-operate in two regional programs. BENEFIT is a partnership between the three countries, Germany and Norway. The BCLME programme has been underway for a few years, and has a focus on observing systems, among other activities.

The Netherlands – Jack Middelburg

Dutch science is bottom-up organised, i.e. program managers are not important. Separate budgets for international programmes are usually not allocated, however, CLIVER and LOICZ I received limited budgets; JGOFS, GLOBEC and others did not receive special budgets. Given the launch of biodiversity programmes, LOICZ II, SOLAS and IMBER all about at the same time I doubt whether there will be a budget allocated for IMBER.

On April 12th, 2005 there was a national meeting on the future of oceanography in The Netherlands with 140 people attending. IMBER was presented at the meeting and IMBER issues covered by Dutch marine biogeochemists were identified:

- Carbon storage in ocean
- Ocean in a high pCO₂ world
- Trace nutrients and GEOTRACES
- Mesopelagic research
- Low oxygen conditions in the ocean
- Diversity and ecosystem functions

These are not yet consolidated, however, there are firm plans for a national oceanographic expedition in the Indian Ocean including SOLAS and IMBER programmes. The program is lead by the strong dominating palaeoceanography community.

United Kingdom – Carol Turley

Many of the NERC centres/collaborative laboratories already carry out IMBER like research. All laboratories in the UK are in the process of writing the research programmes for the next 5 years.

- The National Centre for Ocean Forecasting (NCOF) has just been formed pulling all marine modelling together in one place.
- UK scientists contribute to the EU NoE EUROCEANS.
- PML is organising the AMEMR modelling workshop, and already has IMBER endorsement.
- CASIX is a virtual centre on carbon and its Headquarters are at PML.

- Atlantic Meridian Transect (AMT) is a UK consortium studying BGC processes bi-annually. Now in its 7th year, and some thought of trying to keep it going as a time series.
- Environmental Genomics is a UK consortium studying BGC processes using genomics. Just starting.
- QUEST (Quantify Earth System) is a big £20 million programme mainly modelling, with some marine input into their oceans model. It has a human-dimension theme.
- UK-SOLAS is a UK consortium, with first funding round underway. No carbon being funded!
- MARINE BIORESOURCES is under development by NERC for potential future funding.
- The Royal Society – working group on ocean acidification, with a report due June 2005.
- Ocean Observatories – several longish time series and new ones too are being repackaged as observations.
- SAHFOS – long time series of plankton on ships of opportunity.
- UK Government produced ‘State-of-our-Seas’ report and recognised sensitivity of marine ecosystems and the need for an ecosystem approach. The Climate Change Stabilisation Conference, Exeter, February 2005, recognised ocean acidification as a major issue of CO₂ emissions.

Australia – John Parslow

To my knowledge, there is no formal IMBER initiative (e.g. national committee or program) in Australia to date. I’m aware of a number of existing projects and proposals, which have potential relevance to the IMBER SPIS. (The following list should be taken as indicative rather than exhaustive. I’ve indicated where activities in the continental margins have potential relevance to both IMBER and LOICZ.)

The Antarctic Climate Ecosystem Cooperative Research Centre (ACE CRC) is a major multi-institutional program looking at interactions among climate, biogeochemistry and ecosystems in the Southern Ocean.

CSIRO conducts research into ecosystem-based management of pelagic fisheries, and is increasingly addressing climate impacts on pelagic ecosystems and fisheries (already linked into CLIOTOP).

The SRFME partnership in WA is studying climate and large-scale changes in East Indian Ocean circulation, and their effects on biogeochemistry and lower trophic levels across the continental shelf in SW Australia (IMBER & LOICZ).

A major new multi-institutional research initiative is being developed to support sustainable management of the Ningaloo reefs in WA, and associated pelagic ecosystems. This will address links from climate through circulation,

biogeochemistry, benthic habitats and pelagic food webs up to whale sharks, including coral bleaching and impacts of pH. (IMBER & LOICZ).

New collaborative research initiatives on the Great Barrier Reef in NE Australia are being developed to address concerns about impacts of catchment runoff & loads, climate change including bleaching and pH, and marine resource use, within a spatial management framework. There is strong interest in adopting a systems approach, integrating physics, biogeochemistry and ecosystems, and establishing a pilot regional coastal / ocean observing system to support both research and management. (IMBER & LOICZ)

UPDATE ON REGIONAL ACTIVITIES

ICCED

A report was received from Eileen Hoffman (Appendix 2). The ICCED initiative proposes a coordinated circumpolar approach to understanding climate interactions in the Southern Ocean and implications for ecosystems and the impacts on biogeochemical cycles. A number of issues ICCED will investigate link directly to IMBER questions.

Detailed objectives of the ICCED initiative:

- Develop a circumpolar, interdisciplinary approach which will provide a framework for understanding climate interactions in the Southern Ocean, and its implications for ecosystem functioning and impacts on biogeochemical cycles
- Implement circumpolar (remote) instrumentation that will include large-scale surveys and monitoring, internationally coordinated field efforts, enhanced CLIVAR transects, and focused process studies in key regions
- Extend and further develop existing circulation and biological models and facilitate the development of integrated circumpolar coupled biogeochemistry-ecosystem models
- Stimulate capacity building through focused training courses, workshops, and personal exchange
- Collaborate with international programmes and organizations, such as CLIVAR, IMAGES, GLOBEC, GOOS, CCAMLR, IWC, and SCAR

ICCED's way forward:

- Drafted an initial science document for circulation to act as discussion document for planning meeting.
- Prepared and submitted IPY proposal.
- Hold a full international workshop in May 2005 to develop the science plan. This will link to developing IPY plans

Action/Recommendations: IMBER needs to make sure that there are strong connections between IMBER and ICCED. **Julie** will attend the ICCED planning workshop in May.

BASINS

Cisco Werner

An international discussion-based workshop was held 11-15 March, 2005 in Reykjavik to consider and plan the next steps in North Atlantic ocean-basin scale analysis, integration, synthesis, and modeling of biological, chemical, and physical oceanographic data sets. Approximately 50 invited researchers and ecosystem managers attended. The workshop began the formal process of integration and synthesis of data resulting from major oceanographic research programs, including GLOBEC programs in the USA, Canada, UK, and EU-funded programs, including TASC, ICOS, and others. The workshop report (targeted for completion by June 2005 and published jointly between GLOBEC and US GLOBEC) will be an action plan describing steps leading to new knowledge of the processes controlling dynamics of ocean-basin populations of zooplankton and fish and the input needed to improve management of fisheries resources. A key element of BASIN will be the development of conceptual and quantitative models capable of elucidating ecosystem dynamics and responses on a broad range of space and time scales. The hope is that funding from US, Canada and Europe will be available to initiate studies in 2007/2008.

Action/Recommendations: Eur-Oceans is a direct partner with BASIN's so IMBER will be able to have input into the project via Eur-Oceans.

Eur-OCEANS – Patrick Monfray

The European Network of Excellence (NoE) EUR-OCEANS aims to achieve lasting integration of European research organisations on global change and pelagic marine ecosystems, and to develop models for assessing and forecasting the impacts of climate and anthropogenic forcing on food-web dynamics (structure, functioning, diversity and stability) of pelagic ecosystems in the open ocean.

For the full Eur-Oceans report see Appendix 3.

Action/Recommendations: Sylvie is to prepare an M.O.U between Eur-OCEANS and IMBER. It is important that Eur-OCEANS and IMBER have good communication to ensure that opportunities for collaborative initiatives are explored.

LINKS TO OTHER PROJECTS

AIMES- Kathy Hubbard

Kathy provided both a report which was included in the meeting minutes (Appendix 4) and a short presentation on AIMES and it's perceived interactions with IMBER.

AIMES perceived interactions with IMBER

1. Biogeochemistry:

- interactions, transfers, change in community structure
- Fe, N, N₂, P, trace metals
- Improve parameterization, initialization and evaluation of modeled bgc fluxes, budgets and interactions

Possible cross-cutting venues: PML AMEMR (Advances in marine ecosystem modeling research); Carbo-Oceans sensitivity/uncertainty analyses; GODAE

2. Sensitivity to global change:

- Climate and physical forcings/variability
- High latitude integrated regional study:
- Carbon storage and sequestration (OM, CH₄, clathrates, CO₂)
- Hydrology: ppt/et ratios: runoff, sediment transport, salinity gradients, permafrost, etc
- Changes in THC; warming, altered CO₂ uptake
- Changes in high latitude albedo

Additionally: SOLAS, LOICZ, iLEAPS, GLP, PAGES, GLOBEC (ESSAS), GCP

3. Feedbacks to the Earth System

Storage, ecosystem feedbacks, N₂O (3.2)

AIMES next steps are to:

- Seek core project and ESSP partnerships
- Confirm AIMES SSC;
- 1ST AIMES SSC Meeting: Oct/Nov 2005
- Finalize AIMES Science Plan:
- "GAIM" activities
- New activities
- Open Science Conference ~2008
- Develop institutional & postdoc networks
- Website under development (www.aimes.ucar.edu)

Action/Recommendations: That IMBER participate in the AIMES SSC meeting later this year when the AIMES Science Plan is being developed to ensure effective linkages between the projects.

CARBO-OCEAN

A report was received from Christoph Heinz on the development of CARBO-OCEAN. "The Annex1 (description of work) of CARBO-OCEAN is available at <http://www.carboocean.org/> under 'documents'. To receive login information, please, contact the CARBO-OCEAN scientific project manager Andrea Volbers (email: andrea.volbers@bjerknes.uib.no).

The CARBO-OCEAN project is carbon based and includes several aspects of IMBER/SOLAS carbon research. CARBO-OCEAN is linked to SOLAS and OCCO, and would like to interact with IMBER, how do we develop a relationship here? There is a strong link with IMBER's Theme 2 and in places CARBO-OCEAN is clearly aligned to Theme 1 also. Biogeochemical and mesocosm experiments are included and are very much IMBER type experiments. IMBER SSC members Jack, Patrick and Arne are also members of CARBO-OCEAN

Action/Recommendations: Julie to Approach CARBO-OCEAN and explore how to formalise the links between IMBER and CARBO-OCEAN.

CLIVAR

A report from the CLIVAR IPO was received (Appendix 5). Wilco gave a quick update on CLIVAR and the new WCRP development, which is a framework that overarches CLIVAR, GEWEX, SPARC, CLIC: Coordinated Observation and Prediction of the Earth System (COPEs). The aim of COPEs is to facilitate analysis and prediction of Earth system variability and change for use in an increasing range of practical applications of direct relevance, benefit and value to society.

CLIVAR see IMBER-CLIVAR collaboration as being “ **...prospects for collaboration on how climate variability influences/impacts marine ecosystems, i.e. forcings and feedbacks between the modes of climate variability and marine ecosystems...**”

CLIVAR Basin Panel activities - process studies

CLIVAR have identified 4 ocean Basins for research, the representatives for each basin are:

- Atlantic Arne Körtzinger
- Pacific Dick Feely
- Indian Bronte Tilbrook
- Southern Ocean Chris Sabine

CLIVAR/IMBER Implementation:

- Maintenance of hydrographic/carbon sections (joint lead between CLIVAR/IOCCP)
- Modelling the carbon cycle (IMBER/SOLAS leads)
- Development of Earth System Models (WCRP/IGBP partnership, AIMES?)
- Development of earth system data assimilation (WCRP/IGBP partnership)
- Climate variability influences/impacts on marine ecosystems and feedbacks (CLIVAR/IMBER partnership)
 - Example of joint PICES/CLIVAR Workshop “Scale interactions of climate and marine ecosystems”, Honolulu, 23-24 October 2004

Action/Recommendations: **Sylvie** to ensure that all representatives on the CLIVAR basin panel have an understanding of IMBER. Need to confirm that Carbon sampling will be carried out and follows WOCE lines. **Wilco** will deal with links between IMBER Theme 3 activities and CLIVAR.

CoML

A report was received from Ann Bucklin (Appendix 6). Two recently approved CoML projects ocean that are closely relate to IMBER's programmatic goals were mentioned:

1. The International Census of Marine Microbes (ICOMM) will document the genetic and metabolic diversity of microbial life. ICOMM is planning an Open Ocean and Coastal Systems meeting for 10-11 May with the help of the David Karl who is chairing this working group.
2. The Census of Marine Zooplankton (CMarZ) is a global biodiversity survey of holozooplankton. CMarZ is carrying out a number of cooperating projects during 2005, involving collection of zooplankton samples during oceanographic research cruises in Antarctic, Arctic, southeast Asia, Mediterranean, and N. Atlantic regions. The first CMarZ Steering Group meeting is planned for June 29 – July 1 in Bremerhaven, Germany. Ann Bucklin is leading this project.

Action/Recommendations: To gain a broad view of CoML activities, interested IMBER SSC members and researchers may consider attending the CoML All Program Meeting, in Frankfurt, Germany, scheduled for 4-5 November 2005. We have good linkages with CoML through Ann, **Julie** to write a letter to open lines of communication with CoML and its projects. The ICOMM SSC meeting will be held prior to the SCOR Meeting, August/September 2005 in Cairns, Australia. **Julie** to explore possibility that an IMBER rep could attend this meeting.

DIVERSITAS

A draft report from Carlo Heip on the recent DIVERSITAS Marine Task Force was presented. This report outlined the way forward for the marine component of the DIVERSITAS programme. The report clearly identifies the need for DIVERSITAS to work with IMBER in developing the Science and Implementation Plan for the Marine area.

Action/Recommendations: **Ann** will receive the report and will be the link person between DIVERSITAS and IMBER, and will work with DIVERSITAS in the development of the Marine Science and Implementation Plan.

GEOHAB

Ed Urban reported on behalf of GEOHAB.

The Global Ecology and Oceanography of Harmful Algal Blooms (GEOHAB) program is a joint activity of the Scientific Committee on Oceanic Research (SCOR) and the Intergovernmental Oceanographic Commission (IOC). The GEOHAB mission is “to foster international cooperative research on HABs in ecosystem types sharing common features, comparing the key species involved and the oceanographic processes that influence their population dynamics.” The GEOHAB scientific goal is to “improve prediction of HABs by determining the ecological and oceanographic mechanisms underlying their population dynamics, integrating biological, chemical, and physical studies supported by enhanced observation and modelling systems.”

The GEOHAB Scientific Steering Committee (SSC) was formed in 1999. It completed its Science Plan in 2001 and its Implementation Plan in 2003. Since late 2003, GEOHAB has convened three small open science meetings, with an additional meeting planned for December 2005:

HABs in Upwelling Systems	17-20 Nov 2003	Cascais, Portugal
HABs in Fjords & Coastal Embayments	26-29 April 2004	Viña del Mar, Chile
HABs and Eutrophication	7-10 March 2005	Baltimore, USA
HABs and Stratification	5-8 Dec 2005	Paris, France

Each open science meeting will result in a research plan for the associated GEOHAB Core Research Project and a subcommittee of the SSC will be formed to implement each Core Research Project. In 2006, GEOHAB will convene a HAB modeling workshop, to bring together modelers to compare their models and make recommendations about improvements needed in future predictive models of HAB events.

The Research Plan for the GEOHAB Core Research Project recently has been published and is available from SCOR and IOC in hard copy and on their Web sites. The plan describes what is known about HABs in the upwelling systems of the Benguela Current, the Iberian Peninsula, and the west coast of the United States. The Core Research Project contains eight research questions:

1. Are there definable adaptive strategies that characterize HAB species in upwelling systems?
2. What seeding strategies persist within upwelling regions and are they consistent among regions?
3. How do small-scale physical processes affect HAB growth and dispersion in upwelling systems?
4. How do nutrient supply type and ratios determine HAB population dynamics in upwelling systems?
5. What is the role of genetic predisposition versus environmental conditions in toxin production in different upwelling systems within a given genus or species?
6. How does coastal morphology and bathymetry affect HAB dynamics in upwelling systems?
7. What is the relative importance of cross-shelf and along-shore advection in different upwelling systems for HABs?

8. Are climate indicators predictive of HAB events in upwelling systems?

GEOTRACES

A report was received from Gideon Henderson of GEOTRACES (Appendix 7). Ed also provided a quick presentation on GEOTRACES. The data from GEOTRACES transects will be important for IMBER. Process studies are an area for IMBER to investigate, some process studies will likely begin in 3-4 years time. Julie, Dave and Jay have read the Science Plan and provided feedback to GEOTRACES. Dave is the link person to GEOTRACES in terms of biology; Jay is a secondary link person in terms of the Chemistry. Raymond is a joint member of both IMBER and GEOTRACES.

Action/Recommendations: Julie to forward a compilation of comments on the GEOTRACES from IMBER (prepared by Jay, Dave & Julie) to GEOTRACES for consideration at their next meeting.

GLOBEC

Cisco Werner gave a quick update on GLOBEC activities and presented a series of suggestions from the GLOBEC SSC as a way forward for IMBER and GLOBEC to work together in the next five years. These included:

- end-to-end foodweb studies,
- joint regional studies (e.g. Southern Ocean)
- joint modelling activities
- plans for integration into earth system studies
- investigate human dimensions issues
- write addendum for IMBER SP/IS at GLOBEC's 'Sunset'

Action/Recommendations: Proposed formation of a Working Group on End-to-end foodwebs with GLOBEC goes ahead as soon as possible. Julie to discuss formation of this group with GLOBES SSC at their meeting in Rome in early June.

GCP

A report was received from the GCP IPO (Appendix 8). Kathy Hubbard gave a quick review of GCP. GCP is interested in thinking about how to deal with Ocean fluxes and budgets.

Action/Recommendations: There is a GCP meeting 12 June 2005, Paris, and they would like an IMBER representative to attend.

IOCCP

A report was received from Maria Hood of IOCCP (Appendix 9). Dennis also gave a short report at the meeting which follows:

Some History –

January of 2003 - the SCOR-IOC Advisory Panel on Ocean CO₂ and the IGBP-IHDP-WCRP Global Carbon Project initiated a collaborative pilot project:

1. to gather information about on-going and planned ocean carbon research and observation activities,
2. to identify gaps and duplications in ocean carbon observations,
3. to produce recommendations that optimise resources for international ocean carbon observations and the potential scientific benefits of a coordinated observation program,
4. to promote the integration of ocean carbon observations with appropriate atmospheric and/or terrestrial carbon activities.

Activities through first two years:

- the IOCCP undertook a number of projects to aid communication and coordination among research and observation programs, with a particular emphasis on carbon measurements on the repeat hydrography cruises of CLIVAR and on underway pCO₂ measurements and systems.
- The IOCCP hosted several major international workshops on CO₂, including measurement issues and “the ocean in a high CO₂ world”.

Recent Changes to IOCCP

From mid-2004 to early 2005, in response to the development of several new global and national research programs dealing with various aspects of ocean carbon:

- the IOCCP hosted 2 international ocean carbon stakeholders' meetings to bring together representatives from major research or observational programs to determine the needs for communication and coordination among them.
- The sponsors of the IOCCP agreed to broaden its mandate to deal with all aspects of ocean carbon (not just CO₂ issues) and to provide communication and coordination assistance as needed to the research programs.
- *The sponsors also agreed that the IOCCP should be formalized with new terms of reference and the establishment of a Scientific Steering Group to provide guidance on coordination activities for this expanded range of topics and activities.*

Specific Terms of Reference

- I. To develop an international communication center on ocean carbon activities through the development and maintenance of Web-based compilations and syntheses of ocean carbon observation and research

activities, and through e-mail and/or Web-based newsletters and other publications;

II. Provide an international forum for initiatives to promote high-quality observations to understand the ocean component of the global carbon cycle, through international agreements on standards, including:

- a. Methods / Best Practices
- b. Quality Control and Quality Assurance Procedures
- c. Data and Meta-data Formats
- d. Use of Certified Reference Materials

III. To facilitate data collection, management, data product development, and archival of ocean carbon and related data by:

- a. Aiding regional and global data syntheses being developed through ocean carbon research programs, as requested;
- b. Facilitating and aiding the development of historical data bases for ocean carbon, including data recovery activities, as necessary;
- c. Ensuring long term data availability by working with data management groups and World Data Centers to archive data sets beyond the lifetime of the individual projects.

IV. To work with global research and observation programs to promote and document the development and status of a sustained ocean carbon observing system;

V. To liaise with integrated programs (IGCO, GCP) to promote the integration of ocean carbon into earth system studies.

Meeting Update –

Meeting of IOCCP scheduled for September 2005. The SOLAS/IMBER joint implementation group will meet prior to IOCCP. The SOLAS/IMBER joint team will be responsible for “process studies” while IOCCP will lean toward coverage of “observing systems”.

IOCCP Scientific Steering Group

Chair: Christopher Sabine, NOAA / PMEL (USA)
Repeat Hydrography: Masao Fukasawa, JAMSTEC (Japan)
Underway pCO₂: Bronte Tilbrook, CSIRO (Australia)
Time Series: Nick Bates, BBSR (Bermuda)
Remote Sensing / Ocean Colour: Cyril Moulin, LSCE (France)
Process Studies: Cindy Lee, SUNY-Stonybrook (USA)
Data set development: Dorothee Bakker, UEA (UK)
Coastal Observations: Helmuth Thomas, Dalhousie Uni. (Canada)
IMBER representative: Dennis Hansell (USA)
SOLAS representative: Truls Johannessen, Uni. Bergen (Norway)

LOICZ

John gave an overview of LOICZ II and also discussed the science approach of LOICZ II. LOICZ II will focus more attention on not just the

Bio-physical but Human Dimensions and will be jointly developed with IHDP and IGBP.

LOICZ Themes:

Theme 1: Vulnerability of coastal systems

Theme 2: Implications of global change and land and sea use on coastal development

Theme 3: Anthropogenic influences on the river basin and coastal zone interactions

Theme 4: Fate and transformation of materials in coastal and shelf waters

Theme 5: Towards coastal system sustainability by managing land ocean interactions

LOICZ Implementation priorities:

- Coastal Modelling Workshop / Working Group
- Global database and typology
- LOICZ input / exchange with IGOS Coastal Theme, GOOS Coastal Panel, CODAE?
- Development of regional, national projects through regional IPOs.

IMBER-LOICZ Communication and Collaboration

- Many regional and national projects will be deliberately designed to meet both LOICZ and IMBER goals.
- Both IMBER and LOICZ have committed to joint endorsement of projects which meet guidelines of both projects.
- Suggest commitment by IPOs to keep each other informed at early stage of projects and proposals in continental margins.
- Proposed IGBP/SCOR sponsored joint LOICZ-IMBER workshop on continental margins.
- Welcome other suggestions

How we can achieve IMBER-LOICZ Collaboration:

- Had proposed joint Continental Margins Working Group. No longer in IMBER plan.
- Areas of overlap span several IMBER WGs.
- LOICZ to date is not using WGs as a principal mechanism for implementation, but will likely have ad hoc WGs, workshops, etc.
- Encourage cross-participation in WGs, workshops

Joint LOICZ-IMBER activities at LOICZ OSM:

- Workshop on coastal modelling approaches (Jack Middelburg, John Parslow)
- Session on shelf biogeochemistry and carbon (Helmuth Thomas, Dileep Kumar, Jack Middelburg)

JOINT LOICZ-IMBER (AIMES-GOOS/CODAE?) Coastal Ocean Modelling Workshop:

- Prognostic and diagnostic coastal models for assessment, scenarios and projections, which:
- address responses of coastal systems to global and local pressures
- exploit new observation technologies and data assimilation techniques
- exploit advances in physical ocean forecasting and hindcasting
- address ecological feedbacks and indicators
- Can contribute to observing system design.

Action/Recommendations: We propose that the GEOHAB approach (of a small Open Science conference be held) by IMBER and LOICZ jointly to look at both Science Plans and to come up with a implementation joint plan for continental margins.

John will take the suggestion back to LOICZ SC for discussion and approval.

OECOS

A letter was received from Charlie Miller to inform IMBER of the development of the OECOS project (Appendix 10). OECOS has evolved out of the discussions within a subgroup at the PICES meeting in Honolulu 2004, which Julie Hall attended.

Action/Recommendations: **Jay** to talk with Charlie Miller and indicate that IMBER is interested in the OECOS project and ask how we can build a link between the two projects. **Jay** to give an overview of IMBER at the next OECOS meeting.

A brief report was received from PAGES which identified some areas of common interest. These will need to be explored more fully in future.

SOLAS

A report was received from the SOLAS IPO (Appendix 11). Dennis also gave an update on the joint SOLAS/IMBER Carbon plan, which is included below.

Joint IMBER/SOLAS Carbon Research Implementation plan
(D. Hansell)

A group of about 20 scientists met in November 2004 in Miami to advance the groups task of seamlessly merging SOLAS and IMBER carbon implementation plans. The work done in Miami built on the planning document established by SOLAS at the Bergen meeting in early 2004. The plan is currently in draft form.

The outline of the plan as it stands today is included in the Appendices (Appendix 12)

Action: Recommendation: **Dennis** to continue moving this initiative forward and will contact the SSC when it is ready for review by the SSC.

GOOS

Julie presented an overview of GOOS. GOOS is a sustained, coordinated international system for gathering and processing data about the oceans, generating useful products and services including accurate descriptions of present conditions and forecasts of future conditions and creating long term consistent data sets. Sustained observations are a key to the success of IMBER; therefore IMBER must develop appropriate interactions with GOOS, including the Coastal Ocean Observations Panel (COOP) and the Ocean Observations Panel for Climate (OOPC).

OOPC has been thinking about Biogeochemical measurements, and a Biogeochemist has been added to the OOPC group – important to have IMBER involvement.

Global Coastal Network Provisional Common Variables:

- **PHYSICAL:** Sea level, Temperature, Salinity, Currents, Surface waves, Bathymetry, Shoreline position
- **CHEMICAL:** Sediment grain size/organic content, Dissolved inorganic N-P-Si, Dissolved O₂
- **BIOLOGICAL:** Benthic biomass, Phytoplankton biomass, Attenuation of solar radiation, Fecal Indicators

Action/Recommendation: **Julie** to discuss inclusion of a biogeochemist as a member of OOPC with the chair Ed Harrison.

IGOS

The IGOS Partnership has three themes relevant to IMBER: Coastal, Carbon and Ocean. Early themes focused on remote sensing, this has changed slightly due to the inclusion of the coastal theme and a broader focus to include remote sensing and in-situ sampling. IGOS focuses on interaction between the land and coastal ocean. The IGOS Coastal Theme Plan was approved last year and the Implementation plan is being developed and Julie is involved with this. Patrick Monfray was involved in the early stages of the carbon section of the draft IGOS Plan. In terms of the Ocean theme IMBER should ask to have input to the Ocean theme.

Action/Recommendations:

Patrick to check on status of the present draft of the Carbon section and make sure that there are strong links in place between this and IMBER.

Julie to discuss with Paul DiGiacomo the relationship between IMBER and input into the IGOS Coastal theme and implementation and the review of the ocean theme.

REPORTS ON MEETINGS ATTENDED ON BEHALF OF IMBER

GODAE

The main goal of GODAE is short term forecasting. There is a feeling that GODAE should move more actively towards ecosystem modelling and include this within its mandate. GODAE should develop models with living marine resources (thus providing products for users) and form partnerships with others (e.g. IMBER, LOICZ, GLOBEC, GEOHAB) to develop and apply assimilation techniques for ecosystem models. GODAE will produce a number of relevant Product Lines which will be useful for IMBER. The challenge for IMBER is to produce models which can use the GODAE products, a partnership with GODAE must be proactively encouraged by IMBER-SSC in order for this to be successful. (See Appendix 13)

IMBER's message to GODAE is to interact with the IMBER user group in the following areas:

- Assimilation matching - Need to ensure that the data collected and specific assimilation schemes represent the right aspects of ecosystem dynamics to make the model most useful for the users (special attention needed for vertical transport and turbulence).
- Specific verification - Each 'product' must be tested (locally) against the requirement of its defined user need. It is not simply possible to test the 'generic' model but is necessary to know what 'type' of output is required by the user and in what form. Benchmarks and verification are important to ensure data quality and gain trust of users.
- Translation – GODAE should help to make the products understandable to the users, making vast amounts of information useful and more easily understandable. Ease of access is also important. Communications with new users may be difficult.
- Dialogue - Some simple results of data already in use would require relatively little discussion for development but in general development of useful products will require many local and regional bi-lateral and multi-lateral discussions between developers and users. General strategic support could probably be provided by GODAE but perhaps only at strategic level.

Action/Recommendations: Patrick and Wilco to draft a letter from IMBER to GODAE, recommending that GODAE take into account biology and biogeochemistry systems in their models, and the points above.

PICES

Julie gave a report on the 13th Annual PICES Meeting held October 14-24, 2004, Honolulu, which she was invited to and at which she gave three presentations – one which was an overview of themes and issues, one on IMBER science and the third of the PICES Board on the IMBER project. There was strong interest IMBER from the PICES community.

Action/Recommendations: Julie to follow up on possible PICES initiative related to IMBER with Alex Bychkov.

DEVELOPMENT OF IMBER COMMUNICATIONS TOOLS

Web page

The web page is a priority as it is a communication tool. IMBER needs a good and extensive web site. Good use needs to be made of the visual identity of IMBER.

Action/Recommendations: Sylvie is to instigate the redevelopment of the new IMBER web page once the IPO is up and running. This should be based on the outline developed at the SSC meeting.

Visual Identity

Wendy presented the idea of the development of a Glyn Gorrick image for IMBER. This had been broached at the Executive Meeting in Miami and there had been a negative response to the idea. The total cost of the development of a Gorrick image is 2500 Euro's. This cost will be split between IMBER and IGBP.

Claire presented the draft visual identity that she has been working on with John Bellamy, IGBP's graphic artist. This included design ideas for PowerPoint templates, Newsletters, brochures, stationary and a web page.

Action/Recommendations: It was decided to go ahead with the development of a Gorrick image for IMBER. **Sylvia** is to start working with Glyn Garrick on the development of the image when she starts at the IPO. Claire to complete.

The visual identity developed fro IMBER by John Bellamy was accepted and will be used in presentations, the web page and newsletter. **Julie** to update IMBER presentation using new identity and make available to the SSC.

Newsletter

At present updates on IMBER are sent out every 3-4 months as an electronic bulletin via the present email list. People can subscribe to this list from a link on the IMBER website. It was proposed that a rolling

web newsletter and associated electronic bulletin are used, with the bulletin able to be printed out as a broadsheet/flyer.

Action/Recommendations: Sylvie to develop.

Publicity/Poster Brochure

The development of a brochure for IMBER was discussed.

Action/Recommendation: It was decided that the brochure will wait until the web page is set up, and the art work/graphics by Glynn Garrick have been developed so that aspects of the visual identity can be carried through in the design of the brochure.

Summer School

An initial approach was made by Prof. Temel Oguz to IMBER in 2004, for an IMBER Summer school to be held in Turkey in 2005. It was felt that this kind of activity was not possible at the time given that the IMBER Science Plan and Implementation Strategy was still in development/review. Prof Oguz was asked to prepare a proposal for 2006 (Appendix 14) to be tabled at this meeting for discussion.

Action/Recommendations: After discussion it was decided that due to limited funding available for all IMBER activities the priorities for IMBER at this point is the development of Working Groups to get the implementation of IMBER underway.

Action: **Julie** to discuss decision with Prof Oguz and thank him for his proposal, but unfortunately decline his Summer school proposal at this point.

Implementation of IMBER

There was extensive discussion on the key priorities, issues and approaches for the implementation of IMBER. The following was identified as a way forward in the implementation of IMBER.

1. A working group on carbon research would be formed jointly with SOLAS. An implementation plan for carbon research within IMBER and SOLAS is being prepared and the working group will be charged with the implementation of this plan. The working group will meet jointly with the IOCCP in September this year.
2. A working group focussed on End to end food webs will be formed jointly with GLOBEC. This working group will meet as soon as possible to plan a way forward for end to end food web research. The results of an initial brain-storming session on this working group are outlined below:

What?

A joint IMBER/GLOBEC working group should be formed. The number of members needs to be clarified. Two options were discussed with respect to the necessary size. A large group (10-12 people) will be necessary if a range of co-ordinating activities are to be carried out. Smaller groups can tackle specific tasks, but would probably have difficulty in reaching out to the IMBER “community”.

Who?

The working group should consist of persons with a good mix of the following attributes/ characteristics.

Field observationist/ experimentalist/ modeller

IMBER/ GLOBEC

Geographical spread

Shelf vs open ocean

Young – established – wise and experienced

How many?

Two options were considered in terms of size. Either an appointed working group of 10-12 people, which can split into sub-groups as required by tasks in the workplan, or appoint a small steering group which co-opts others as necessary. The first option probably requires quite well-refined terms of reference, so that the correct people are chosen.

When?

Suggest a date at the end of September/ beginning of October 2005. The GLOBEC modelling working group is meeting in Aberdeen, Scotland at that time.

Where?

Aberdeen, Scotland

How?

- Using GLOBEC/ IMBER core funds
- For EurOceans symposium, extra funds are required to bring IMBER / GLOBEC people to the meeting .
- Also require funds from elsewhere (IOC, NSF?? don't put in minutes!!) for the EurOceans symposium, and/or working groups??
- The Working Group should develop a work plan at its first meeting,, working within the guidelines and terms of reference for the first phase
- Terms of reference
- The Working Group should probably exist for the lifetime of IMBER, but we suggest it could be constituted in three evolving phases.
- The first phase from 2005 to 2008 should focus on the link from microplankton to meso/macrozooplankton, and vice versa.

- In following phases of approximately three years duration, the focus should expand to incorporate additional trophic links.
 - As the focus shifts, so the working group should be re-constituted, to include the appropriate persons as the focus shifts up the trophic levels
 - The zooplankton to fish link is planned to be addressed by the GLOBEC Modelling Working Group. Their products could be built on in preparation of the Addendum to IMBER II in 2008/9.
 - What are the deliverables? original papers? co-ordination? synthesis papers? reaching out to the community, providing guidance for field research in terms of end to end food webs? Some guidance on this should be provided by the SSCs as the Working Group is formed/ constituted.
3. A capacity building working group will be formed and will by email develop a capacity building strategy for IMBER. This strategy will be the basis of capacity building efforts for IMBER and will provide. Initial thoughts on the development of this strategy are outlined below:
- Include developing country, gender, young scientists, cross-disciplinary interactions.
 - Track and follow-up on capacity-building activities, to see how effective they have been. Are people staying in the field? Are they involved in environmental policy making?
 - Promote “training through research”
 - Mentor young people as working group members as a pair of young/established scientist from the developing country
 - Bring practicing scientists, including students, to meetings
 - Use DISCO/DIALOG-type meeting for recent Ph.D. recipients or with at least one peer-reviewed publication. Would include both developed and developing country students. Contact START about this, as they do this kind of conference already. Raise the expectations for this kind of conference, e.g., writing proposals
 - Promote regional training courses in regions, in an appropriate language
 - Raise the capacity-building issue in relation to other IMBER activities
 - Explore other ideas from SPIS: “To fulfill the aim of IMBER in developing scientific capacity, a range of approaches will be required. IMBER will seek financial support for specific training workshops and Web-based training initiatives, and will encourage activities such as the exchange of scientists and university students between institutions, the development of summer schools and the provision of berths on cruises for developing country scientists, university students and teachers.”
 - Consider existing documents on capacity building.

Action/Recommendations: Julie to ask Wajih if he will lead this group, also contact Carina and ask if she is prepared to be involved in this.

4. There needs to be further discussion and thought on the development of a data management working group. This will be taken forward once the IPO is established. It is critical that data management not be considered in isolation. We should be discussing this issue with SOLAS, LOIC2, GEOHAB and GOOS to ensure common approaches and interoperability. The working group needs to build on the results of the SCOR data management workshop held in Liverpool December 2003.
5. IMBER convene a series of small Open Science Conferences to promote IMBER research. Topics for these were identified as:
 - Continental margins research.
 - 4 Conferences based around the issues of theme 2. The highest priorities were identified as Issues 1 and 3.
 - Mesopelagic research.

The initial thoughts on the first 3 proposed OSC's are outlined below.

Continental Margins OCS

WHAT?

Global Change Impacts on Biogeochemistry and Ecosystem Interactions on Continental Shelves/Slopes (focus on middle to outer shelf, but include inner shelf as needed, depending on the process; have the IMBER/LOICZ issues/questions as a foundation)

WHO?

- Coastal observatories – Tom Malone (USA), CODAE person
- /Benthic microalgae/coral reefs, seagrasses – Jean-Pierre Gattuso (France), AIMS person
- Remote sensing – PML person, Paul DiGiacomo (USA)
- Sediment dynamics – Eric Wolanski (Australia)
- Sediment biogeochemistry: oxygen, nitrogen, redox, exchanges – Rick Jahnke (USA), Jing Zhang (China), Nancy Rabalais (USA),
- Benthic-pelagic coupling – Steve Whitticum (UK), Jack Middelburg (Netherlands)
- Open ocean-shelf coupling: physics, chemistry (inc. DOC and trace metals, especially iron), biology – Carlos Duarte (Spain), Peter Franks (USA), Maurilare Gregoire (Belgium), Francisco Chavez (USA), GEOTRACES
- Coupled Ecosystem Models – Andreas Moll (German), MacDonald (Australia), GLOBEC

- Fate of terrestrial inputs on biogeochemistry of the continental shelf - LOICZ, Silvio Pantoja (Chile), Su Mei Liu (China)
- Biodiversity – Steve Whitticum (UK), Carlo Heip (The Netherlands)
- Impact of fisheries on shelf ecosystems – UK, Australia, Jeremy Collie (USA)
- Human dimensions: oil and gas development; ballast water and introduced species – LOICZ
- Atmospheric deposition to the shelf – ask SOLAS. Climate-active gases from the shelf, Jing Zhang (China)

WHERE?

Shanghai or Qingdao, China
 United States – Coastal GOOS, CoOP connections

WHY?

Develop a more detailed implementation plan for joint research between IMBER and LOICZ

WHEN?

Sept./Oct. 2006 or sometime in early 2007

HOW?

Appoint an IMBER/LOICZ planning committee of 6-8 people to develop draft agenda, invitation list, funding. Would include at least one IMBER SSC member and one LOICZ SSC member, filled out with other people
 The planners would be instructed to start with LOICZ and IMBER SPIS's.
 Plenary speaker, break-out group, posters organized around key questions. Planning committee member involved in each break-out group.

WHAT?

The T2I3 OSC needs to cover the following aspects (in arbitrary order):

- Trace metals, micro nutrients
- Nitrogen cycling, denitrification, Anamox etc.
- Sediment-water-interface, benthic systems
- Ecological stoichiometry
- Lower end food web
- Coastal margin interface
- Circulation, oxygen supply, modeling

WHEN?

Ideal time window: late summer to early fall 2006

WHERE?

To be decided by organization committee on the basis of the available of national funding opportunities.

HOW?

- 3-4 days duration
- plenary sessions around key questions/issues (with keynote talks), no parallel session possibly poster sessions around key questions/issues
- working group sections on future project developments

Theme 2 Issue 1 OSC

Wilco I need your notes from the discussion group on this one for inclusion here.

6. Development of Theme 4.
This needs to be moved forward in the next 12 months.

Action/Recommendations: Julie will work with Ed, Wendy and Sylvie to identify a team of people to take this forward and plan a workshop and raise funding for the workshop.

7. First IMBER Open Science Conference should be planned for 2008.

Timeline for Activities

2005	2006	2007	2008
Carbon Wg Meeting (Sept)	Continental Margins OCS	Theme 2	IMBER OSC
End to end food webs Wg	SSC meeting	Issue 3	
IMBER Executive meeting (Sept/Oct)	(March/May)	OSC	

Promotion of IMBER

Communication Policy

Carol had had a brief looked at what was written and decided that this related mainly to internal communication and did not overlap with publicity and promotion of IMBER. What is less evident is the external communication or outreach of IMBER to the wider community not just scientific. Scientists need to provide information to engage the wider community.

- IGBP do a lot of out reach and have a science communications team who deal with this. It was suggested that IMBER work with this team to use some IGBP ideas and their experience i.e. Build a media network for press releases for joint IMBER and institute press releases. At a national level work with reference user groups on Hot topics and keep the community posted on what's 'Hot' or 'New'.
- Education: Work with schools get children involved to broaden the understanding in the public domain, collaborate with teachers, identify what material might be interesting for them to use i.e. run workshops etc. The public learn a lot through media coverage. Julie is involved in a education scheme 'SEREAD' which teaches children from Pacific Island Nations about the Ocean, weather and Sea level rise, some thing similar could be run from an IMBER point of view.
- Carol suggested more interactive approach with development of a film for youngsters "Finding Nemo 2100" exploring what has happened to the ocean and Nemo 100 years down the track with ocean acidification and virus's!

Action/Recommendations: Write a policy/document regarding public outreach – at the moment it is buried in the capacity building section.

Carol to co-ordinate the development of a communications policy, document, **all SSC** are asked to participate in this. This should be completed in time for the IMBER executive meeting late this year.

Special Sessions

Dennis raised the issue of proposing special sessions related to IMBER at international conferences and meetings – such as the US town hall meeting at the ASLO meeting and upcoming Ocean Science Meeting. Special sessions are a prime opportunity to put IMBER in the spot light, and in the process exposing more of the community to IMBER - especially young up and coming scientists and PI's.

Action/Recommendations: **All SSC** members are asked to suggest IMBER as a topic when suggestions for Special sessions are called for.

Identification of National Contacts list

The list of 5 national contacts forwarded by SSC members was tabled.

Action/Recommendations: All SSC members will be initial points of contact in their own countries and have been asked to provide names of colleagues to be a point of contact in countries other than those represented by IMBER SSC members.

Identify key actions for IMBER International Project Office

- Establish the office (copret: hiE)JTJ4.447 0 TD-0.0002 Tc0.0161 Tw(re aDeputy, Executive)
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It was suggested that the next SSC meeting be held in Brest, France so that the SSC meet the IPO staff and create stronger links with Euro-OCEANS. The date for this meeting must be set early to for the maximum number of SSC members to attend, proposed March-May 2006.

Action/Recommendations: Sylvie to organise for dates for this meeting.

THANK YOU.

Thank you to Jing and his team for providing a great venue for our meeting and being excellent hosts.

APPENDICES

Appendix 1

PROOF: French Contribution to IMBER

Provisional report to IMBER-SSC

(by P.Monfray, Shanghai, 18-20 April 2005)s

Context

Within French PROOF program, joint IMBER and SOLAS, three research areas are undertaken:

Theme 1: Interaction between climatic changes and marine biogeochemical cycles at the ocean-atmosphere interface

Theme 2: The respective effect of climatic change and of natural variability on the functional structure of marine ecosystems and on biogeochemical cycles.

Theme 3: The paleo-oceanographic proxies in the present ocean.

The tools can be regrouped into three main categories.

In situ observation

Laboratory experiments

Modeling

For more details see : http://www.obs-vlfr.fr/proof/index_vt.htm

Update on oceanographic campaigns

Two major campaigns have been realized with success just recently:

- **BIOSOPE** (November-December 2004), dedicated on Biogeochemistry and Optics in South Pacific across eutrophic, mesotrophic and oligotrophic area in a poorly known area (for more details see <http://www.obs-vlfr.fr/proof/vt/op/ec/biosope/bio.htm>)

Endorsement by IMBER-SSC is asked for recognition (relevant to Theme1/Issue1&2).

- **KEOPS** (January-February 2005), dedicated to the natural iron fertilization of the ocean by the Kerguelen plateau (52°S, 73°W) on the biological pump of CO₂ and on the cycles of the other chemical compounds relevant to climate (for more details see <http://www.obs-vlfr.fr/proof/vt/op/ec/keops/keo.htm>).

Endorsement by IMBER-SSC is asked for recognition (relevant to Theme1/Issue1&2, and Theme3/Issue1).

One major campaign is in project :

- **PRIMO** (2007 or 2008?), multi-national project dedicated to Formation and dynamics of the Oxygen Minimum Zone in the Peru-Chile Current system, and its impacts on biogeochemistry and ecosystems (for more details see Annex below). The SPIS is under development through the partners.

Endorsement by IMBER-SSC is asked for support towards funding agencies (high relevance to Theme1/Issue1,2&3, Theme2/Issue1&3 and Theme3/Issue2).

Letter of Intent to IMBER Steering Committee

*“Formation and dynamics of the Oxygen Minimum Zone
in the Peru-Chile Current system”*

PRIMO Project

« Programa Regional Integrado de la Minima de Oxígeno »
« Programme Regional Intégré du Minimum d'Oxygène »
« Oxygen Minimum Integrated Regional Program »

A project proposed by Chile, Peru and France
O. Ulloa (COPAS, U.of Concepcion, Chile), D. Gutierrez (IMARPE, Peru)
and Y. du Penhoat (LEGOS, Toulouse, France)

MOTIVATIONS

In the South-eastern Pacific, the Peru-Chile current system (PCCS) is one of the most productive systems in the world ocean with permanent or seasonal upwelling cells along the coasts of Peru and Chile. However, it is very sensitive to ENSO events (El Niño Southern Oscillation) which cause significant changes of the physical, chemical and biogeochemical environment. In the PCCS, there are significant exchanges of heat and CO₂ between the ocean and the atmosphere because of the upwelled cold water, rich in nutrients and saturated in CO₂. Associated with this current system, a zone of very shallow oxygen minimum (OMZ) is present and extends far offshore. In this region, the oxygen content ranges from saturated values at the surface to values lower than 0.25ml.l⁻¹ at 20 meters, and reaching less than 0.02 ml/l at its core. On average, this OMZ is located between 30-70 m and 300-400 m.

Through previous sedimentary studies and modelling efforts, we know that the OMZs of the global ocean varied in response to climate fluctuations. The OMZ would contract for cold periods and would increase during warm periods at interannual to interdecadal time scale.

These fluctuations of the OMZ, associated with processes of denitrification and the oceanic circulation, feedback on the concentration of two main greenhouse gases -CO₂ and N₂O- and thus on climate, it was shown that natural effects or artificial fertilizations (e.g. enrichment in iron) by increasing exportation of organic carbon and CO₂ sequestration could increase the OMZ and the release of N₂O. This OMZ expansion could then counterbalance the supposed "positive" effects of the fertilization connected to the global climatic change.

Moreover, in the SE Pacific, the upper oxycline may occur within the euphotic layer. It allows the existence of specific phytoplanktonic communities, an abnormal nitrogen/phosphorus molar ratio and a particular bacterial consortium. These, modify not only the traditional mechanisms of production/consumption of N₂O and CO₂, but also fluxes of other trace elements - silica and metals (eg Fe, Zn, Co). In spite of a strong total productivity, the net community production remains 2 to 4 times weaker than that of upwellings of the African coast. The upwellings of the PCCS show HNLC (High Nutrient Low Chlorophyll) characteristics with a slow growth rate of the phytoplanktonic biomass. The reasons of this moderate use of nutrients by photosynthesis in the area can be numerous: dynamic instabilities, iron limitation, grazing pressure, etc. However, despite this weak efficiency to use nutrients, this system is able to support a huge production of small pelagic fishes, and constitute its paradigm.

*It is recognized that the presence of a major OMZ determines the characteristics of most pelagic as well as benthic populations in this area. Many studies have illustrated the influence of the presence of deoxygenized water on the vertical distribution of the pelagic communities and this, 'from plankton to tuna'. **The***

dissolved oxygen concentration is thus a key factor in structuring the ecosystems and the presence of a shallow OMZ is a typical feature of the PCCS. To date, there were however only a few studies that studied in detail the processes related to the formation and dynamics of the OMZ in the PCCS.

We propose to study this complex system. Our approach will be process-oriented and multidisciplinary, which implies that we intend to investigate the whole spectrum of the OMZ variability, from daily to interannual or decadal timescales. Main objectives will be to understand what physical, biological and biochemical processes are involved in the formation and variability of the OMZ of the SE Pacific, on time scales of a few days to the interannual time scales for the present ocean and assess the impact of its extension (or contraction) on productivity, on biological processes in the water column and on sedimentation. Such international study fit directly to main objectives of IMBER as Theme 1 (Issues 1,2 &3), Theme 2 (Issue 1&3), and Theme 3 (Issue 2). This is why this letter of intent is send for consideration by the IMBER SSC.

The international group had met 4 times since 2003 and is refining actually its Science Plan and Implementation Strategy (SPIS). The SPIS will integrate different actions based on in situ observations at different time scale and in different reservoirs (water column – particular and dissolved phases – sediments), laboratory experiments and numerical modelling. Strategy will include: i) oceanographic cruises for snapshot studies, ii) a long term component using moorings and sediment cores, iii) a modelling component based on state of the art physics and biogeochemistry schemes.

It is also worth to note that the project constitutes also a pertinent framework to improve proxies useful for paleoceanographic reconstructions in productive margins. Moreover, paleoceanographic projects in the framework of IMAGE program have been proposed with some paired study sites off Peru, with the aim to reconstruct OMZ extension and denitrification over longer timescales (Glacial-Interglacial periods)..

Appendix 2

ICCED

ICCED: Integrated Analyses of Circumpolar Climate and Ecosystem Dynamics

Report on the development of the ICCED initiative for the IMBER Steering Committee.

Submitted by E. Murphy and E. Hofmann, Friday, 08 April 2005

Since the last IMBER science steering committee meeting the ICCED Interim Steering Group has been expanded to include more biogeochemical expertise. The full group now involves:

- U. Bathmann, Alfred-Wegener-Institut, Bremerhaven, Germany. Alfred Wegener Institut , Am Handelshafen 12, D-27570, Bremerhaven, Germany, ubathmann@awi-bremerhaven.de
- E. Hofmann, Center for Coastal and Physical Oceanography, Old Dominion University, Norfolk, Virginia, USA, hofmann@palmer.ccpo.odu.edu
- C. Lancelot, Ecologie des Systèmes Aquatiques, Université Libre de Bruxelles, Campus Plaine CP221, Boulevard du Triomphe, B-1050 Brussels/Belgium, lancelot@ulb.ac.be
- E.J. Murphy, British Antarctic Survey, NERC, High Cross, Madingley Road, Cambridge, CB3 0PU, UK, e.murphy@bas.ac.uk
- S. Nicol, Australian Antarctic Division and ACE CRC, Hobart, Tasmania, Australia Steve.Nicol@aad.gov.au
- E. Pakhomov, Department of Earth and Ocean Sciences, University of British Columbia, Canada, epakhomov@eos.ubc.ca
- W. O. Smith, Virginia Institute of Marine Science, Greate Road, Box 1346, Gloucester Point, VA 23062, wos@vims.edu
- D. Thiele, IWC, Marine and Migratory Wildlife Ecology Group, School of Ecology and Environment, Deakin University, GPO Box 423, Warrnambool, Victoria, Australia 3280, dthiele@deakin.edu.au
- P. Treguer, European Institute for Marine Studies (IUEM) Université de Bretagne Occidentale (UBO), Technopôle Brest-Iroise, Place Copernic, 29280, Plouzané, France, Paul.Treguer@univ-brest.fr

This also strengthens the partnership with the European EUR-OCEANS network of Excellence. Paul Treguer with Louis Legendre leads the network.

The first Science Planning Workshop for ICCED will be held 24-26 May 2005 at the British Antarctic Survey, Cambridge, UK. The objective of the Workshop is to develop a science plan that will form the basis for internationally coordinated scientific analyses of Southern Ocean ecosystems over the next decade. To develop a plan that links analyses of climate, biogeochemical and ecosystem processes we are bringing together a group with a wide range of expertise in ecosystem science, biogeochemistry, plankton and predator biology, climate processes and oceanography. We also want to ensure that the major Southern Ocean science operators and relevant international science programmes are represented to help develop a coordinated approach.

To support the meeting we have obtained funding from a range of groups including SCOR, SCAR, Southern Ocean GLOBEC, EUR-OCEANS and the British Antarctic Survey. The meeting will involve about 30 people and the major focus will be on developing data synthesis and modelling plans for the initial phase of ICCED. The meeting will also consider the integration and coordination of field plans over the next

few years with a view to developing specific field plans for the second phase of ICCED. The meeting report will be the basis for the development of the ICCED science plan for the first phase of ICCED.

We have also submitted an outline proposal to the International Polar Year (IPY) organising committee entitled ICCED-IPY to link the developing ICCED initiative to other circumpolar science initiatives developing under IPY. This will be particularly important in linking the data synthesis and modelling phase of ICCED to planned and developing field programmes.

Appendix 3

EUR-OCEANS report to IMBER-SSC

Scientific Director: **Paul Tréguer** (UBO, CNRS, Brest-F)
Deputy Sci. Director: **Louis Legendre** (CNRS, Villefranche-F)

1-Objectives of EUR-OCEANS

Explicitly referring to IMBER and to GLOBEC EUR-OCEANS *overall scientific objective* is to develop models for assessing and forecasting the impacts of climate and anthropogenic forcing on food-web dynamics (structure, functioning, diversity and stability) of pelagic ecosystems in the open ocean.

EUR-OCEANS is a Network of Excellence (NoE), which is one of the New Instruments created and financially supported by the European Commission to build-up the European Research Area.

The *overall networking objective* of EUR-OCEANS is to achieve lasting integration of European research organisations on *global change and pelagic marine ecosystems* and the relevant scientific disciplines (pelagic ecosystems, biogeochemistry and ecosystem approach to marine resources).

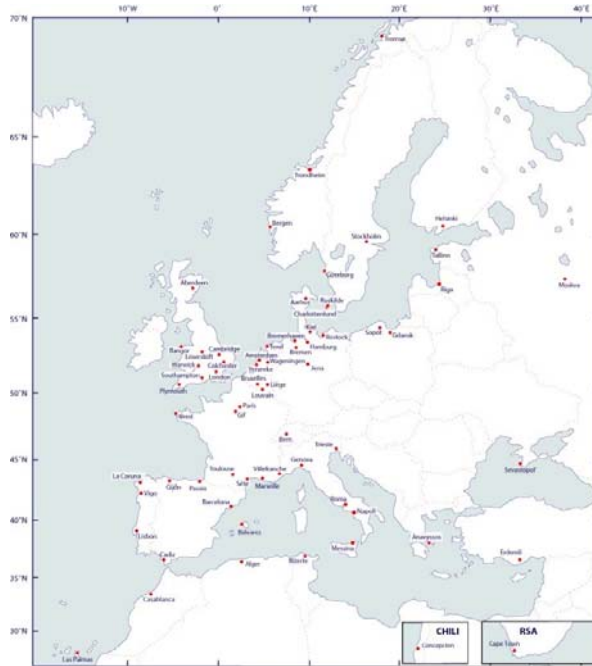


Figure 1 : EUR-OCEANS networks 160 Pls and 66 Institutes (incl. UCT/Capetown COAS/Concepcion)

The NoE will be a step forwards a multi-site Institute for EUropean Research on OCean Ecosystems under Anthropogenic and Natural forcings (EUR-OCEANS Institute) to be created in 2009.

2-Science themes

To develop coupled models to simulate the interactions between climate, ocean, and ecosystems with the view of improving the current understanding of the functioning of ocean in the past (50 years), present and future (50 years).

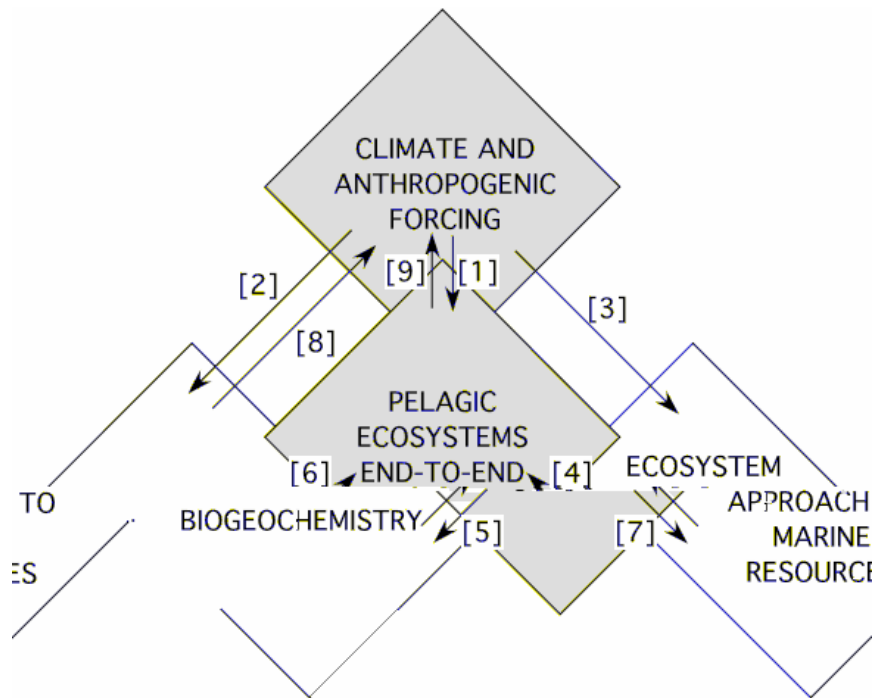


Figure 2 : EUR-OCEANS: Interrelationships among the four components of EUR-OCEANS.

3-Organisation of the Network

3a- Integrating Activities (IA)

WP1 Networking:

- 1.1 Sharing facilities (K. Lochte , IFM-GEOMAR, D)
- 1.2 Mobility and communication (C. Duarte, CSIC, ES)

WP2 Data Integration:

- 2.1 Observing systems (R. Lampitt, SOC/NERC, UK)
- 2.2 Networked database, data rescue (M. Diepenbroek, Univ. Bremen, D)

WP3 Model Integration:

- 3.1 Model interfacing (P. Monfray, CNRS, F)
- 3.2 Modelling the Global Ocean (C. Le Quéré, MPI-BGC, D)
- 3.3 Large-scale Earth System modelling (F. Joos, Univ. Bern, CH)

3b- Jointly Executed Research (JER)

- WP4 Ecosystems end-to-end (M. St John, Univ. Hamburg, D)
- WP5 Biogeochemistry (F. Thingstad, Univ. Bergen, NO)
- WP6 Ecosystem approach to marine resources (P. Cury, IRD, F)
- WP7 Within-system integration (P. Monfray, CNRS, F; C. Lancelot, ULB, B)

3c- Spreading Excellence (SE)

- WP8 Training for researchers and other key staff (C. Duarte, CSIC, ES)
- WP9 Transfer to socio-economic users (M. Barange, PML, UK)
- WP10 Public Outreach (S. Ghiron, Océanopolis, F)

3d- EUR-OCEANS Systems:

- Arctic and Nordic Seas (AN) (S. Sundby, IMR, NO)
- Baltic Sea (BS) (D. Turner, UGOT, S; F. Köster, DIFRES, DK)
- Mediterranean Sea (MS) (J. Ruiz, CSIC, E; I. Siokou-Frangou, HCMR, EL)
- North Atlantic Ocean (NO) (K. Richardson, Univ. Aarhus, DK; R. Harris, PML, UK)

North Atlantic Shelves (NS) (C. Fox, CEFAS, UK)
Southern Ocean (SO) (E. Murphy, BAS, UK)
Eastern Boundary Upwelling Systems (UP) (P. Fréon, IRD, F)

4-Planned implementation (at this point)

12-14 March 2005: BASIN Meeting, NSF-GLOBEC-EUR-OCEANS, Reykjavik, Iceland

5-8 April 2005: ICES workshop co-organised by EUR-OCEANS: Modelling of physical & biological interactions, Hamburg, Germany

14-16 April 2005: EUR-OCEANS kick-off meeting, Paris, France

15 May 2005: Call for PhD and post-doc programme (www.eur-oceans.org)

24-26 May 2005: ICCED meeting, E. Murphy, U. Bathmann, endorsed by EUR-OCEANS and IMBER, also sponsored by SCAR & GLOBEC, Cambridge, UK

27-30 June 2005: Ecosystems modelling meeting, AMEMR, hosted by the PML; endorsed by EUR-OCEANS, GLOBEC, & IMBER, Plymouth, UK

30 June: Adjoint meeting organised by EUR-OCEANS on Atlantic shelf-seas, C. Fox

November 2005: Meetings of System Integration Task Team and Network Scientific

Spring 2006: International symposium on "Parameterisation of Trophic Interactions in Ecosystem Modelling", EUR-OCEANS/GLOBEC/IMBER/NSF (planned).

Summer 2006: summer school on ecosystem approach to Fisheries: Philippe Cury + Carlos Duarte

Appendix 4

AIMES

Attached is the Beijing version of a draft Executive Summary of the AIMES Science Plan as it was presented at the recent SC-IGBP. We will not make any additional changes until the AIMES SSC is appointed, which we are finalising. However some of the likely directions that this document will go are clear given SC-IGBP discussions. The points below reflect advice from the chairs and directors of the core projects and SC-IGBP, however, changes are not limited to the points below and we expect major contributions from the AIMES SSC. In summary, the document will reflect:

- Clarification of the mechanisms for interactions between AIMES and the core projects;
- Specifically, the opportunity for AIMES models to collaborate with core projects to study the coupled Earth System implications of more disciplinary phenomena (e.g., hydrologic cycle, nutrient cycles) studied within a core

project by using the AIMES suite of global models. This would be a third mechanism for interaction similar to what's proposed for coupled regional studies but addressing global phenomena studied within a core project. An example would be adding additional experiments and/or observations to a project such as C4MIP or the EPICA Challenge

- Maintaining a focus on a practical number of achievable project goals
- Sharpening the discussion of objectives and thematic approaches to make the AIMES strategy clear and understandable

Finally, we had a very positive discussion about involving the chairs or their representatives of the core project SSC's joining the AIMES SSC in a meeting to cement the scientific strategy linking the core projects and AIMES Science Plans together. This meeting would address both the scientific strategy issues of which questions to address together and the tactical issues of how to actually make it work. This can happen, for example, by linking Feedbacks Sections of existing core project Science Plans to AIMES' objectives and models. The timing for this meeting will be at the first AIMES SSC meeting which, realistically can not occur before early fall, 2005.

A pre-condition for the success of the 2005 joint core project-AIMES meeting will be good communication in the intervening period, including, if requested AIMES IPO representation at your upcoming SSC meeting. Please let us know as soon as possible if you would like to have one of us attend. Please also note that the first AIMES SSC meeting will be held in the Colorado Rockies outside Boulder during foliage season.

Kathy

Appendix 5

CLIVAR

CLIVAR Report to IMBER SSC-2 Shanghai, China 18-20 April 2005.

CLIVAR had its first Science conference in June of 2004, immediately followed by an internal review of the international programme. The conference was deemed a major success with 650 participants from 56 countries. 2004 also saw the spin up of the CLIVAR Global Synthesis and Observations Panel (GSOP) whose primary focus initially will be the development and coordination of Ocean Reanalysis activities, including ensuring the necessary data streams are available to reanalysis groups.

CLIVAR/Carbon Observation Activities.

CLIVAR has established a close relationship with IOCCP to coordinate deep hydrography activities that satisfy the requirements of both the physical and carbon/biogeochemical communities. To this end, carbon representatives sit on the CLIVAR basin panels, and information on hydrography plans are shared on a database. CLIVAR and IOCCP have also made plans to update and revise the WOCE Hydrographic Programme manual and are in the early stages of planning a joint international workshop to develop an internationally agreed strategy for global

hydrography with the ultimate aim of identifying a permanent secretariat for this activity.

CLIVAR also look forward to working with the newly established SOLAS/IMBER Carbon Coordination Group, and we look forward to discussing how best to interact with IOCCP and the SOLAS/IMBER group.

Global Synthesis and Observation Panel (GSOP) / Reanalysis activities.

The Global Synthesis and Observations Panel met for the first time 10 – 12 November 2005 in Boulder Colorado. The panel meeting immediately followed the CLIVAR Ocean Reanalysis Workshop to allow the panel to consider workshop outcomes.

GSOP reviewed each element of the sustained ocean observing system from the CLIVAR perspective. The sustained ocean observing system is overall about 50% of completion. OmT*culaserim thsere

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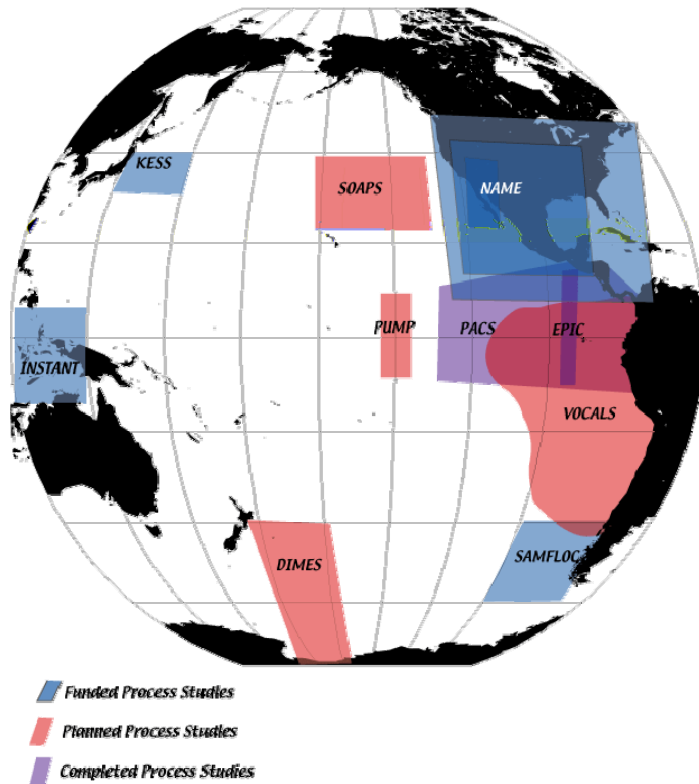
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Process Studies in the Pacific Basin.



Details are available by basin using the following links:

Atlantic: <http://www.clivar.org/organization/atlantic/IMPL/index.htm>

Pacific: <http://www.clivar.org/organization/pacific/implementation/pacdatanew.htm>

Southern Ocean: http://www.clivar.org/organization/southern/CLIVAR_CliC_Obs.html

An observations page for the Indian Ocean panel is not yet available, however Process studies are on the list of topics for discussion at the upcoming panel meeting at the end of March in Hobart, where the Indian Ocean Panel is drawing up a science implementation plan that will include carbon and some biogeochemical observations. Input is welcome. Please contact Indian Ocean panel carbon representative Bronte Tilbrook: Bronte.Tilbrooke@csiro.au.

The Pacific Panel are organising a workshop focusing on the South Pacific. The aim is to highlight South Pacific science issues, and requirements for observations in the region. The meeting will be co-sponsored by OOPC, GOOS and Argo. Further information can be found at: www.clivar.org/organization/pacific/implementation/south_pac.html.

CLIVAR is also taking a lead in some of the International Polar Year (IPY) activities. The IPY steering committee is organising the Eols under a number of themes, each of which has a potential lead project. CLIVAR/CliC via the Southern Ocean panel's Climate in Antarctica and the Southern Ocean (CASO) project is going to be the umbrella project for Ocean Circulation in the Antarctic (AOSB in the Arctic). ICCED/SCAR/SCOR are going to be the lead organisations for Biogeochemistry and Ecosystems in the Antarctic (OASIS in the Arctic). It is evident that the IPY will provide many opportunities for cross project collaboration

Joint PICES/CLIVAR workshop, Honolulu, 23-24 October 2004
Scale interactions of climate and marine ecosystems

The physical climate system varies on a wide range of scales: changing storminess and severe weather, recognised modes of variability (such as NAO, PDO and ENSO), and changes to mean global characteristics. Likewise the marine ecosystem has many interacting scales: small-scale patchiness vs global, shelf vs deep-sea populations, and individuals vs communities. To date, most studies considering the impact of the complexities of climate variability on the equally complex marine ecosystem have used correlation statistics of a given population and physical climate indices. We need to go beyond simple correlations to tease out the relationships between the changing physical and biological systems if we are to understand what controls what. How do the various scales of climate variability project onto the variability of the population of a given species or the ecosystem as a whole? How does the changing climate impact on the scale interactions of the biogeochemical system? What do we need to get right in models used to predict the impact of climate change on the marine ecosystem and fisheries?

A joint PICES/CLIVAR workshop focused on the above was held in Honolulu in October 2004 as part of the PICES XIII meeting, and sponsored by CLIVAR, among others. The workshop brought together experts in the physical oceanography of the Pacific, climate dynamics and variability, marine ecosystems and biogeochemistry, and fisheries. In all there were 12 invited and 9 contributed talks. Abstracts of the talks can be found at www.pices.int/meetings/annual/Pices13. The talks demonstrated that there has been much progress in recent years in our understanding of the factors that influence changes to the physical environment on interannual to decadal timescales and improvements in our ability to model these changes at the basin and regional scales. In situ and satellite observations reveal changes in the eco-system at all levels on basin-wide and regional scales, and in many instances these changes can be linked to changes in the physical environment. Managing fisheries in the face of uncertainties of changes in climate is particularly challenging, but progress has been made by consideration of the timing of the impact of environmental variability on the growth of populations at various stages of their life cycle.

Much of the discussion focused on the so-called “regime shift” that occurred in the mid 70s, which was first revealed in biological data, and latter discovered to coincide with basin-wide changes to the physical environment. The question is whether or not what occurred was truly a regime shift or a relatively rapid, but otherwise unremarkable, change in a randomly varying system. The prevailing view is that there is no evidence for a regime shift in the physical system. In which case attention should be placed on looking for thresholds in the ecosystem, which could trigger a shift in regime.

The paper that perhaps best captured the spirit and essence of the workshop was that by Nate Mantua “To upscale or downscale”. He notes that comparing large-scale climate indices to local/regional fishery data does not reveal the processes involved in any correlations found, real or otherwise. On the other hand “upscaling” of locally varying important environmental parameters to large-scale climate variability promises to yield a better understanding of cause and effect. Insightful use of data and models is required, but such an approach is likely to provide significant improvements in our understanding of the linkages between climate and the marine ecosystem.

Further information can be sought from co-convenor, Kelvin Richards
rkelvin@hawaii.edu

Appendix 6

Census of Marine Life (CoML)

Update on the Census of Marine Life

The Census of Marine Life (CoML) is maturing as a global organization (see www.coml.org) and is an extremely valuable partner for IMBER. Recently, the role of CoML National and Regional Implementation Committees (N/RICs) has been considered in greater detail. These committees may provide a useful contact for IMBER activities in each country or region. CoML also has superb outreach and education capacity, which could be useful for IMBER's needs in societal relevance.

Two recent CoML ocean realm field projects relate closely to IMBER's programmatic goals:

1. The International Census of Marine Microbes (ICOMM; see <http://icomm.mbl.edu/>) will document the genetic and metabolic diversity of microbial life. ICOMM has started off the year with three successful meetings. The Benthic Systems Working Group meeting was held at the Southampton Oceanography Centre, UK during January. Also that month, the Technology Working Group met at the Max Planck Institute in Bremen, Germany. And the first Scientific Advisory Council and Scientific Organizing Committee Meeting was held during February in Amsterdam, the Netherlands. ICOMM is planning an Open Ocean and Coastal Systems meeting for 10-11 May with the help of the David Karl who is chairing this working group.

2. The Census of Marine Zooplankton (CMarZ; see www.CMarZ.org) is a global biodiversity survey of holozooplankton. CMarZ is carrying out a number of cooperating projects during 2005, involving collection of zooplankton samples during oceanographic research cruises in Antarctic, Arctic, southeast Asia, Mediterranean, and N. Atlantic regions. The first CMarZ Steering Group meeting is planned for June 29 – July 1 in Bremerhaven, Germany.

The CoML SSC has endorsed proposals for two new ocean realm field projects: one on coral reef ecosystems and another on continental margin ecosystems. Both projects are expected to launch in April 2005. To gain a broad view of CoML activities, interested IMBER SSC members and researchers may consider attending the CoML All Program Meeting, in Frankfurt, Germany, scheduled for 4-5 November 2005.

Appendix 7

GEOTRACES

Report to IMBER on recent planning developments for the GEOTRACES programme

March 2005

Since its formation, the SCOR Planning Group for GEOTRACES has met on two occasions. The full group met in early June 2004 (Oxford, UK) to plan the structure of the Science Plan and to commence work on its writing. Following writing and editing work, a complete draft of the Science Plan was ready for discussion by a writing sub-group of the Planning Group at a meeting in early December 2004 (Boston, USA). This group readied the Science Plan for public comment. The first public draft of the GEOTRACES Science Plan was posted on the web in late February 2005, and is available from the following website:

<http://www.ldeo.columbia.edu/res/pi/geotraces/index.html>

The GEOTRACES Planning Group actively encourages feedback from all quarters on the content of this plan, and would be particularly interested in comments from those involved in planning IMBER. Such feedback should reach the co-chairs of the GEOTRACES Planning Group (Bob Anderson; Gideon Henderson) no later than April 15th 2005. All feedback will be discussed at the next GEOTRACES Planning Group meeting to be held in Vienna from 30th April to 2nd May 2005. Following revision at this meeting, the Science Plan will go for formal review by SCOR.

GEOTRACES continues to seek active collaboration with IMBER during the development of the two programmes. Although no representative from GEOTRACES is able to attend the April 2005 IMBER meeting, we have endeavoured to highlight links between the programmes in the GEOTRACES Science Plan, and we would welcome an IMBER representative to the Vienna GEOTRACES meeting.

Appendix 8

GCP

A BLUEPRINT FOR A GREENHOUSE GASES MONITOR SYSTEM IN EUROPE

4-5 April 2005, Amsterdam, Holland

The aim of the workshop is to assess the current monitoring capabilities, identify and quantify the uncertainties involved, and outline the direction to a pan-European GHG monitoring network.

Description: <http://www.globalcarbonproject.org/meetings/2005/ghg/description.pdf> (pdf, 49Kb)

Invitation: <http://www.globalcarbonproject.org/meetings/2005/ghg/invitation.pdf> (pdf, 220Kb)

Registration: <http://www.globalcarbonproject.org/meetings/2005/ghg/registration.doc> doc, 33Kb)

Contact: Han Dolman - han.dolman@geo.falw.vu.nl

SOCIAL NETWORK THEORY AND METHODS: TOWARDS APPLICATIONS TO CARBON MANAGEMENT

5-7 April 2005, Tsukuba, Japan

The purpose of the workshop is to convene top minds in social network theory and analysis to construct a framework to guide future research relevant to carbon management. In the workshop we will explore the current state of network theory and methods; explore directions for application of network theory & methods for regional carbon management; organize into subgroups around theoretical, methodological, and practical concerns; and, outline an article for co-authored publication: "Social Network Theory Applications for Regional Ecosystem Management." Contact: Penelope Canan - penelope.canan@nies.go.jp

OPTIONS FOR INCLUDING LULUCF ACTIVITIES IN A POST-2012 INTERNATIONAL CLIMATE AGREEMENT

5-6 May 2005, Graz, Austria

The focus of the workshop is on the objectives of LULUCF activities - how LULUCF could be included in an international climate framework in order to move towards achieving these objectives, and an evaluation of the options. The objectives of the workshop are to:

- Assess and discuss the benefits and difficulties of LULUCF within the Kyoto Protocol;
- Discuss the objectives for LULUCF within a post-2012 international climate change agreement;
- Discuss improvements to the current modalities, new activities for inclusion within a post-2012 international climate change agreement; and alternative architectures for consideration of LULUCF;
- Document and evaluate the options identified.

Contact: Neil Bird - Neil.Bird@joanneum.at

CARBON FROM SPACE

6-10 June 2005, European Space Agency-ESRIN, Frascati, Italy

The workshop will focus on i) obtaining information on gaseous concentrations of carbon in the atmosphere from space-based observations and the development of new sensors and programmes to provide continuity, and ii) global provision of key parameters required to estimate surface-atmosphere exchange, particularly land cover status, disturbance extent and timing, vegetation activity, ocean colour and ancillary atmospheric ocean variables controlling the fluxes.

Contact: Stephen Plummer - Stephen.Plummer@esa.int

ATMOSPHERIC TRACES TRANSPORT MODEL INTERCOMPARISON (TRANSCOM)

13-17 June 2005, Paris, France

Contact: Peter Rayner - Peter.Rayner@csiro.au

VULNERABILITIES OF THE CARBON-CLIMATE-HUMAN SYSTEM

15 June 2005, UNESCO, Paris, France

This is a one-day mini-conference associated with the GCP Scientific Steering Committee meeting. The Conference will focus on the vulnerabilities of the carbon-climate-human system. Speakers will cover a diverse number of topics including permafrost thawing, fires in tropical peatlands, unchecked logging in Russia, vulnerability of the biological pump, etc.

If you are interested in attending and/or presenting, please contact Pep Canadell - pep.canadell@csiro.au

MODEL-DATA FUSION FOR CARBON CYCLE MODELING: INTERCOMPARISON OF OPTIMIZATION TECHNIQUES FOR PARAMETER ESTIMATION (Opt-IC)

Tbd, July 2005, Canberra, Australia

The aim is to evaluate comparatively several parameter estimation and data assimilation methods for the task of parameterising terrestrial carbon cycle and biogeochemical models from multiple data sources, particularly remotely sensed data. The approach is through an international intercomparison of data assimilation and parameter estimation methods by applying them to a simple but realistic test problem simulating a terrestrial carbon cycle model and remotely sensed data. For more information visit <http://www.globalcarbonproject.org/ACTIVITIES/OptIC.htm>

Contact: Mike Raupach - Michael.raupach@csiro.au

CARBON CYCLE AND CLIMATE

2-11 August 2005, Beijing, China

Symposium at the IAMAS Conference

The symposium on carbon cycle and climate invites contributions from studies of magnitudes and distributions of global carbon sources and sinks at various temporal and spatial scales and interactions between global carbon cycle and climate. The aim of this session is to encourage multiple-disciplinary approach in studying carbon cycles and its interactions with climate. Topics of relevance include: regional and national carbon inventories, CO₂ emissions from land use change and fires, measurements or modeling of net CO₂ exchange of terrestrial ecosystems, land surface models including carbon dynamics in global climate models, interactions between carbon cycle and climate in the past, present and future and applications of model-data fusion in regional and global carbon cycle studies. Papers are also welcome on studies of carbon cycling in an earth systems model and in the context of human dimensions. Conference website: www.iamas2005.com

Contact: Ying Ping Wang – Yingping.wang@csiro.au

DIDACTIC SEMINAR ON SOCIOLOGY, GLOBAL WARMING AND THE CARBON CYCLE AT THE AMERICAN SOCIOLOGICAL ASSOCIATION

12 August 2005, Philadelphia, USA

The GCP will conduct a day-long didactic seminar at the ASA's Annual Meetings to bring together sociological research relevant to GCP's three themes and to promote the development of a new generation of junior and senior scientists trained in the highly interdisciplinary topics of the carbon-climate-human system. Contact: Penelope Canan - penelope.canan@nies.go.jp

7th INTERNATIONAL CO₂ CONFERENCE

26-30 September 2005, Broomfield, CO, USA

The purpose of this conference is to bring together scientists from different disciplines to communicate the most recent results pertinent to the global carbon cycle, with an emphasis on the contemporary increase of atmospheric carbon dioxide. Topics will include atmospheric and oceanic measurements and monitoring networks, terrestrial ecosystems and land use change, carbon cycle process models, source/sink inverse models, the ice core record, new observational techniques, long-term potentials and vulnerabilities of carbon sequestration, and more generally, the human impact on the carbon cycle.

For more information: <http://www.cmdl.noaa.gov/info/icdc7/>

OPEN MEETING OF THE HUMAN DIMENSIONS COMMUNITY

9-13 October 2005, Bonn, Germany

The GCP is organizing/sponsoring four sessions at the IHDP open meeting to further develop the activities on regional development and carbon management:

- Human Dimensions of the Carbon Cycle: Networks of Research and Policy Making. Contact: Ingrid Nestle - nestle@uni-flensburg.de.
- Urban Carbon Management Case Studies. Contact: Penelope Canan at penelope.canan@nies.gov.jp
- A two-way lane: Cities as drivers and targets of climate change. Contact: Patricia Romero at prlankao@correo.xoc.uam.mx
- Regional Perspectives on Sustainable Management – Penelope Canan – penelope.canan@nies.gov.jp

For more information visit the Web Conference: <http://openmeeting.homelinux.org>.

GREENHOUSE 2005: ACTION ON CLIMATE CONTROL

13-17 November, Melbourne, Australia

There is a clear need for industry, scientists and government at all levels to work closely together to tackle this significant environmental issue. Demand is strong for the latest information on the science, the likely impacts of climate change, adaptation strategies and approaches to reducing atmospheric greenhouse gas concentrations. The Conference will cover these themes as well as international issues, policy development, communication and education.

For More information: <http://www.greenhouse2005.com>

Contact: Paul Holper - paul.holper@csiro.au

ADVANCE TRAINING WORKSHOP ON CARBON AND WATER ISSUES IN SOUTHEAST ASIA

15-28 November, Taiwan

An international team of 20 natural and social scientists/policy makers will train 35 junior faculty or senior technician/staff with full support from the National Science Council of China-Taipei. The program will cover of a wide range of carbon and water issues relevant to the Southeast Asia region. The Workshop is organized by the Southeast Asia Regional Committee for START (SARCS) and sponsored by the GCP.

Contact: Chen-Tung Arthur Chen: ctchen@mail.nsysu.edu.tw

PERMAFROST AND CARBON EMISSIONS (PEACE) FOR IPY (2007-08)

A collaborative effort between the GCP, the Climate and the Cryosphere (CliC) of WCRP, and the International Permafrost Association (IPA) has resulted in the submissions of a proposal on the vulnerability of the permafrost-carbon-climate system for the International Polar Year (2007-08). If you are interested in contributing to this activity, please, contact Pep Canadell - pep.canadell@csiro.au. The submission can be downloaded from <http://www.globalcarbonproject.org/ACTIVITIES/peace.doc>

VULNERABILITIES OF CARBON IN PEATLANDS TO CLIMATE AND LAND USE CHANGE

Carbon pools in peatlands as positive feedbacks to global warming

An activity focusing on peatlands as vulnerable carbon pools is being developed under the GCP umbrella, with an initial interest (but not exclusive) on tropical peatlands. The activity will synthesize existing ground and remotely sensed data on peatland extension and carbon contents, develop new algorithms for carbon dynamics modeling, and couple biogeochemical models with hydrological and land use change processes. Future warming and land use change scenarios will be used to explore possible future C emission trajectories. If you are interested in participating, contact: Pep Canadell - pep.canadell@csiro.au.

TERRESTRIAL CARBON CYCLE MANAGEMENT PROJECT (TCCM-P)

The Biospheric Carbon Management - Project aims at broadening our understanding of how to manage terrestrial ecosystems under global change. In particular, the adoption of environmental technologies mitigating anthropogenic greenhouse gas (GHG) emissions via management of emissions, sequestration and offset processes in the agricultural and forestry sectors will be appraised in a context of various development scenarios. The project aims at developing a transparent toolbox that can be trusted, understood, and shared by

stakeholders, as well as sharing scientifically validated data. Particular interest is in coupling ecosystem and economic models with a framework of sustainable development.
 Contact: Michael Obersteiner - oberstei@iiasa.ac.at, Yoshi Yamagata, and Bruce McCarl.

GCP SCIENCE FRAMEWORK IN CHINESE-MANDARIN AND RUSSIAN

The ESSP Report No.1 was translated to Chinese Mandarin by scientists from the Institute of Botany in Beijing (lead by Guangsheng Zhou) and the Chinese National Science Foundation. The pdf can be downloaded from:

<http://www.globalcarbonproject.org/science.htm>

The Science Framework has also been translated to Russian for which a first order draft already exists. A polished executive summary is available at:

http://www.globalcarbonproject.org/science_plan_and_implementation.htm

Contact Georgii - g.alexandrov@nies.go.jp

	
2005	Global Carbon Project
Scientific Steering Committee (SSC)	<p>Michael Raupach, <i>Co-Chair</i>, CSIRO Atmospheric Research, Canberra, AU Robert Dickinson, <i>Co-Chair</i> Georgia Institute of Technology, Atlanta, USA Oran Young, <i>Co-Chair</i> University of California, Santa Barbara, USA Michael Apps Canadian Forest Service, Victoria, CA Cheng-Tung Arthur Chen, National Sun Yat-sen University, Kaohsiung, TW Philippe Ciais, Commissariat a L'Energie Atomique, Laboratoire des Sciences du Climat et de l'Environnement, Gif sur Yvette, FR Christopher Field, Carnegie Institution of Washington, Stanford, USA Patricia Romero Lankao, Universidad Nacional Autónoma de México (UNAM), México Louis Philippe Lebel, Chiang Mai University, TH Corinne Lequere, Max-Planck-Institute for Biogeochemistry, Jena, DE Nebojsa Nakicenovic, International Institute for Applied Systems Analysis, Laxenburg, AT Annan Partwardhan, Indian Institute of Technology-Bombay, IN Christopher Sabine, University of Washington, Seattle, USA Riccardo Valentini, University of Tuscia, Viterbo, IT Yoshiki Yamagata, National Institute for Environmental Studies, Tsukuba, JP</p>
Project Offices	<p>International Project Office Australia Global Carbon Project Pep Canadell, Executive Director Rowena Foster, Centre Manager CSIRO Earth Observation Centre GPO Box 3023, Canberra, ACT 2601, Australia Tel.: 61-26246-5631; Fax: 61-2-6246-5988</p> <p>Email: pep.canadell@csiro.au; Rowena.Foster@csiro.au www.globalcarbonproject.org</p> <p>International Project Office Japan Penelope Canan, Executive Director</p>

Melanie Hartman, Senior Researcher
Harumi Kato, Special Assignment Researcher
Yukako Ojima, Secretary
Centre for Global Environment Research
National Institute of Environmental Studies (NIES)
16-2 Onogawa
Tsukuba, Ibaraki 305-8506 Japan
Tel: 81-298-50-2672
Fax: 81-298-50-2960
Email: penelope.canan@nies.go.jp; melanie.hartman@nies.go.jp;

The objective of the conference was to contribute to the ongoing dialogue among urban researchers, policy makers, earth system scientists, and the general public worldwide on the relations of regional development pathways, especially urbanization and urban transformations, and the global carbon cycle (http://www.sea-user.org/e_conference.php).

14-18 June 2004 Tsukuba, Japan

ATMOSPHERIC TRACER TRANSPORT MODEL INTERCOMPARISON PROJECT (TRANSCOM)

With the support of the GCP, an atmospheric tracer transport model inter-comparison project (TransCom) workshop was held at the National Institute of Advanced Industrial Science and Technology (AIST) and was a major contribution to GCP research agenda Activity 1.2. For more information: contact: Shoichi Taguchi (s.taguchi@aist.go.jp).

5-9 July 2004 Singapore

DYNAMICS OF THE COUPLED CARBON-CLIMATE-HUMAN SYSTEM

The GCP organized a session on the "Dynamics of the Coupled Carbon Climate Human System" at the 1st Annual Meeting of the Asia Oceania Geosciences Society (AOGS) in Singapore, the first week in July 2004. The session saw presentations that treated, in terms of models, the connections between climate, carbon, and humans, either with one or more exogenous or fully coupled as a dynamic system. Bob Dickinson was the chair of the session (robtcd@eas.gatech.edu).

12-15 July 2004 Goa, India

Annual GCP SSC Meeting. The SSC embarked on two signature projects. The RC6 Initiative is a research framework for policy relevant place-based carbon science and management. RC6 refers to "Regions, Carbon, Culture, Cities, Climate, Change and Consequences." The Vulnerability of the Carbon Cycle in the 21st Century focuses on carbon, climate, and human interactions in understanding the interactions and feedbacks from vulnerability analyses.

7-9 September 2004, Canberra, Australia

MODEL-DATA ASSIMILATION: INTERCOMPARISON OF OPTIMISATION TECHNIQUES FOR PARAMETER ESTIMATION (OPT-IC).

For more information, contact Mike Raupach (mike.raupach@csiro.au).

26-27 October 2004, Yamagata, Japan

YAMAGATA AND COLORADO SYMPOSIUM ON GLOBAL WARMING AND REGIONAL SOLUTIONS

The GCP, along with the Wirth Chair of the University of Colorado Graduate School of Public Policy (USA), the Yamagata Environmental Network, the Tohoku University of Art and Design, and local businesses, produced a two-day seminar exploring issues and opportunities for carbon management in regional development plans. For more information, For more information, contact Penelope Canan (penelope.canan@nies.go.jp).

15-18 November 2004, Beijing, China

REGIONAL CARBON BUDGETS: FROM METHODOLOGIES TO QUANTIFICATION.

The aim of this workshop is to develop a common framework to improve comparability among different approaches and estimates of carbon stocks and fluxes based on their scope and system boundaries (constraints, time-space scales). For more information please refer to the GCP website or contact: [Pep Canadell](#).

June-December 2004, Tsukuba, Japan

GLOBAL CARBON PROJECT 2004 SEMINAR SERIES

Monthly seminar presentations by resident and visiting researchers, with topics including: Fostering Expert Networks to Integrate Science and Policy (Canan/Shimura); DeCanio's *A Critique of Economic Models of Climate Change* (Canan/Yamagata); The Global Carbon Cycle as Viewed From the Water Sciences (Lüger; Fransson; Chierici/Watanabe); From Growth of Forest to Economic Growth

	<p>(Albrecht/Alexandrov); a Comparative Analysis of the Growth of Electricity Consumption in the USA and USSR (Albrecht/Alexandrov); Issues in Regionalism and Carbon Management (Wallis/Canan, Yamagata); Report of the IGES Post Kyoto Symposium (Kameyama/Canan); Overview of the IHDP's Current Activity Plan (Göbel); Survey Results of a Preview of The Day After Tomorrow in Japan (Aoyagi-Usui/Inoue); Models of the Human Dimensions of the Carbon Cycle (Hartman/Canan). For more information on the seminar series, contact Melanie Hartman (melanie.hartman@nies.go.jp).</p> <p><i>6-7 December, Paris, France</i></p> <p>INTERNATIONAL OCEAN CARBON STAKEHOLDERS MEETING The meeting was held at UNESCO in Paris to evaluate the most efficient way to meet these coordination needs. The meeting, sponsored by the U.S. National Science Foundation, IOC, and SCOR, included representatives of IOC, SCOR, IGBP, SOLAS, IMBER, GCP, CLIVAR, GOOS, GCOS, CARBOOCEAN, NASA, NSF, and JCOMM. The meeting identified two types of coordination activities – those specific to meeting research program goals and those to address a global ocean carbon observing system. See meeting report for details: http://www.globalcarbonproject.org/MEETINGS/2004/IOCCP_Statement.pdf</p> <p><i>6-8 January, Chiang Mai, Thailand</i></p> <p>U-TURN ASIA COMBINED APN SYNTHESIS WORKSHOP AND SARCS EMISSION PROJECT INITIAL MEETING Contact: Louis Lebel</p> <p><i>13 January 2005, Tokyo, Japan</i> INDUSTRIAL TRANSFORMATION RESEARCH REVIEW MEETING The purpose of the meeting is to review research activities under the Industrial Transformation project of the IHDP. Discussion will also cover the plan for a book on globalization, technology transfer and energy efficiency in energy intensive industries of Asia. Penelope will participate in this meeting to explore collaboration with IT activities on urban development. Contact Roland Fuchs at rfuchs@agu.org.</p>
<p>Publications</p>	<p>Canadell J, Ciais P, Cox P, Heimann M (2004) Quantifying terrestrial carbon sinks. Special issue in Climatic Change (in preparation)</p> <p>Field C, Raupach M, (eds.) (2004) Towards CO2 Stabilization: Issues, Strategies, and Consequences, Island Press (in press).</p> <p>Global Carbon Project (2003). The GCP Science framework and Implementation. Canadell JG, Dickson R, Raupach M, Young O (eds). Earth Science System, Partnership (ESS) Report Series No.1, GCP Report Series No 1, Canberra, pp. 69.</p> <p>Sabine C, Hood M (2003) Ocean carbon scientists organize to achieve better coordination, cooperation. EOS 84: 218-220.</p> <p>Canadell J, Zhou G, Noble I, (eds.) (2002) Land use/cover change effects on terrestrial carbon cycle in the Asian Pacific region. Science in China. Special Issue 45 Supp.: 1-141.</p> <p>Hibbard K, Steffen W, Benedict S, Busalachi T, Canadell J, Dickinson R, Raupach M, Smith B, Tilbrook B, Velling P, Young O (2001) The carbon challenge. An IGBP-IHDP-WCRP project. Stockholm.</p> <p>Pre-project products</p> <p>Schimel DS, House JI, Hibbard KA, Bousquet P, Ciais P, Peylin P, Braswell BH, Apps MA, Baker D, Bondeau A, Canadell J, Churkina G, Cramer W, Denning AS, Field CB, Friedlingstein P, Goodale C, Heimann M, Houghton RA, Melillo JM, Moore III B, Murdiyarso D, Noble I, Pacala SW, Prentice IC, Raupach MR,</p>

	<p>Rayner PJ, Scholes RJ, Steffen WL, Wirth C (2001) Recent patterns and mechanisms of carbon exchange by terrestrial ecosystems. Nature 414: 169-172.</p> <p>Gupta J, Lebel L, Velling P, Young O, IHDP Secretariat (2001) IHDP Global carbon cycle research. Bonn, IHDP.</p> <p>Falkowski P, RJ Scholes, E Boyle, J Canadell, D Canfield, J Elser, N Gruber, K Hibbard, P Högberg, S Linder, F T Mackenzie, B Moore III, T Pederson, Y Rosenthal, S Seitzinger, V Smetacek, W Steffen [The IGBP Carbon Working Group] (2000) The global carbon cycle: A test of our knowledge of earth as a system. Science 290: 291-296.</p> <p>Canadell J G, Mooney HA, Baldocchi D D, Berry J A , Ehleringer J R, Field C B, Gower S T, Hollinger DY, Hunt J E, Jackson R B, Running S W, Shaver G R, Steffen W, Trumbore S E, Valentini R, Bond BY (2000). Carbon metabolism of the terrestrial biosphere: A multi-technique approach for improved understanding. Ecosystems 3: 115-130.</p> <p>Steffen W, Noble I, Canadell J, Apps M, Schulze E-D, Jarvis PG, Baldocchi D, Ciais P, Cramer W, Ehleringer J, Farquhar G, Field C B, Ghazi A, Gifford R, Heimann M, Houghton R, Kabat P, Körner C, Lambin E, Linder S, Mooney HA, Murdiyarso D, Post WM, Prentice I C, Raupach M R, Schimel D S, Shvidenko A and Valentini R (1998) The terrestrial carbon cycle: Implications for the Kyoto Protocol. Science 280: 1393-1394.</p>
<p>Outlook 2005</p>	<p>VULNERABILITIES OF THE CARBON-CLIMATE SYSTEM <i>Carbon pools in peatlands as positive feedbacks to global warming</i> A proposal focusing on peatlands as vulnerable carbon pools was submitted to the Asian Pacific Network to hold two workshops on carbon content assessment and potential future C emissions, including an assessment of drivers of change. The primary focus is tropical peatlands. Successful applications will be notified in February 2005. Contact: Pep Canadell.</p> <p>VULNERABILITY OF CARBON IN PERMAFROST: <i>Pool size and potential effects on the climate system</i> A proposal on vulnerabilities of the permafrost-carbon-climate system for two workshops has been submitted to the National Center of Analyses and Ecological Synthesis (NCEAS) in Santa Barbara, CA, USA. Contact: Chris Field, Pep Canadell</p> <p>PERMAFROST AND CARBON EMISSIONS (PEACE) FOR IPY (2007-08) A collaborative effort between the GCP, the Climate and the Cryosphere (CliC) WCRP project, and the International Permafrost Association (IPA) has resulted in the submissions of a proposal on the vulnerability of the permafrost-carbon-climate system for the International Polar Year (2007-08). The most relevant development is the partnership between these various projects to address a critical carbon-climate vulnerability of the Earth System. The submission can be downloaded at: http://www.globalcarbonproject.org/ACTIVITIES/peace.doc</p> <p>SOUTHEAST ASIA REGIONAL CARBON PORJECT - Call for Proposals The Southeast Asia Regional Committee for START (SARCS) continues being committed to support a major regional carbon contribution to the GCP agenda, and has issued a new call for proposals for carbon research: http://www.globalcarbonproject.org/News.html. GCP linked proposals are welcomed for support. Arthur Chen is the driver of this contribution.</p> <p>RC⁶ COMMITTEE OF THE SSC The SSC in June will discuss the “RC⁶ Straw man Proposal” being prepared by the Tsukuba GCP office staff. It will contain a comprehensive literature review; theoretical foundations; methodological approaches in social and natural sciences; potential indices; a suggested typology of cities with populations of 500,000 or more;</p>

possibilities for merging natural and social science data; programmatic suggestions; an evaluation of future research funding sources; and, an inventory of current urban and regional carbon reduction initiatives as potential partners and sources of data for the research effort (e.g., ICLEI, the Climate Group, Megacities, IHDP's Cities Project, IGBP's IHOPE, and the Latin American and Asian urban development and carbon cycle research networks sponsored by the Inter-American Institute for Global Change Research, the IHDP, and the APN). For more information, contact Penelope Canan at penelope.canan@nies.go.jp.

OPTIONS FOR INCLUDING LULUCF ACTIVITIES IN A POST-2012 INTERNATIONAL CLIMATE AGREEMENT

5-6 May, Gaz, Austria

An expert meeting to 'brainstorm' on objectives of LULUCF, options for inclusion of LULUCF, and implications of these options.

Contact: Neil Bird (neil.bird@joanneum.at)

A BLUEPRINT FOR A GHG MONITORING SYSTEM IN EUROPE

4-5 April, Amsterdam, Holland

The aim of the proposed workshop is to assess our current monitoring capabilities, identify and quantify the uncertainties involved, and outline the direction to a pan-European GHG monitoring network. For more information:

<http://www.globalcarbonproject.org/meetings/2005/ghg/description.pdf>

Contact: Han Dolman (han.dolman@geo.talw.vu.nl)

SOCIAL NETWORK THEORY AND METHODS: TOWARDS APPLICATIONS TO ECOSYSTEM MANAGEMENT

5-7 April 2005, Tsukuba, Japan

The purpose of the workshop is to convene top minds in social network theory and analysis to construct a framework to guide future research relevant to carbon management. In the workshop we will explore the current state of network theory and methods; explore directions for application of network theory & methods for regional carbon management; organize into subgroups around theoretical, methodological, and practical concerns; and, outline an article for co-authored publication: "Social Network Theory Applications for Regional Ecosystem Management." Contact: Penelope Canan at penelope.canan@nies.go.jp.

CARBON SOURCES AND SINKS REPORTING: BEYOND 2012

5-6 May 2005, Austria

It is becoming timely to start exploring ways to account for carbon sources and sinks after the first commitment period of the current Kyoto Protocol, in light of new understanding and methodological advancements. The GCP will co-organize a workshop with IUCN, INSEA, CarboEurope, IPAM to address this. This will be the first contribution of the newly established GCP Carbon Cycle Management Project (CCM-P). Contact: Bernhard Schlamadinger (bernhard.schlamadinger@joanneum.at); Yoshi Yamagata (yamagata@nies.go.jp)

Carbon from Space

6-10 June, ESA-ESRIN, Frascati, Italy

The workshop will be targeted at:

- obtaining information on gaseous concentrations of carbon in the atmosphere from space-based observations and the development of new sensors and programmes to provide continuity, and
- provision, again globally, of the key parameters required to estimate surface-atmosphere exchange, particularly land cover status, disturbance extent and timing, vegetation activity, ocean colour and ancillary atmospheric ocean variables controlling the fluxes

Contact: Stephen Plummer (stephen.plummer@esa.int)

GCP SCIENCE MEDIA PARTNERSHIP WORKSHOP

2-4 June 2005, Tokyo, Japan

A half-day seminar on science and journalism sponsored by the Japan Federation for Environmental Journalism and the Global Environmental Forum of Japan will precede the GCP/MEKONG RIVER ECOSYSTEM MONITORING PROJECT (MeREM) WORKSHOP ON SCIENCE-JOURNALISM PARTNERSHIPS. On the last afternoon, an open meeting for the public and journalists from Japan will feature a keynote speech for the Global Environmental Forum that will be on the GCP, the Global Carbon Cycle and Regional Carbon Management. For more information, contact Penelope Canan at penelope.canan@nies.go.jp or Motoko Watanabe at the National Institute for Environmental Sciences, Tsukuba, Japan.

VULNERABILITIES OF THE CARBON-CLIMATE-HUMAN SYSTEM

15 June 2005, UNESCO, Paris, France

This is a one-day mini-conference associated with the GCP Scientific Steering Committee meeting. The Conference will focus on the vulnerabilities of the carbon-climate-human system. Speakers will cover a diverse number of topics including permafrost thawing, fires in tropical peatlands, unchecked logging in Russia, vulnerability of the biological pump, etc.

If you are interested in attending and/or presenting, please contact Pep Canadell - pep.canadell@csiro.au

Carbon cycle and climate session for the 2005 IAMAS meeting

AUGUST 2-11, BEIJING, CHINA

The symposium on carbon cycle and climate invites contributions from studies of magnitudes and distributions of global carbon sources and sinks at various temporal and spatial scales and interactions between global carbon cycle and climate. The aim of this session is to encourage multiple-disciplinary approach in studying carbon cycles and its interactions with climate. Topics of relevance include: regional and national carbon inventories, CO₂ emissions from land use change and fires, measurements or modeling of net CO₂ exchange of terrestrial ecosystems, land surface models including carbon dynamics in global climate models, interactions between carbon cycle and climate in the past, present and future and applications of model-data fusion in regional and global carbon cycle studies. Papers are also welcome on studies of carbon cycling in an earth systems model and in the context of human dimensions. This symposium is initiated by and sponsored by the Global Carbon Project. Session abstract:

<http://www.globalcarbonproject.org/MEETINGS/2005/IAMASBeijing2005.pdf>

Conference website www.iamas2005.com

Contact: Dr Ying Ping Wang (yingpang.wang@csiro.au), Dr Yongjiu Dai (yongjiudai@bnu.edu.cn), Professor Jin-Jun Ji (jjjj@mail.iap.ac.cn)

DIDACTIC SEMINAR ON SOCIOLOGY, GLOBAL WARMING AND THE CARBON CYCLE AT THE AMERICAN SOCIOLOGICAL ASSOCIATION

12 August 2005, Philadelphia, USA

The GCP has been invited to conduct a day-long didactic seminar at the ASA's Annual Meetings to bring together sociological research relevant to GCP's three themes and to promote the development of a new generation of junior and senior scientists trained in the highly interdisciplinary topics of the carbon-climate-human system. Contact: Penelope Canan at penelope.canan@nies.go.jp.

TERRESTRIAL CARBON CYCLE MANAGEMENT PROJECT (TCCM-P)

The SSC approved the above project in the last SSC meeting in Goa (under the name INSEA). After developing a new policy for GCP projects and endorsement, the TCCM-P leading team has resubmitted the proposal. We'll circulate the document again with a specific request for your comments. The leading team is Michael Obersteiner, Yoshi Yamagata, and Bruce McCarl.

7th INTERNATIONAL CO₂ CONFERENCE

26-30 September 2005, Broomfield, CO, USA

For those who have not attended this conference before, it is the largest gathering of natural scientists working on the carbon cycle, it takes place every four years, and it is not associated with any international programs or associations. Pieter Tans from NOAA at CMDL in Colorado is the Chair of next year's conference.

There are many reasons this conference is important to the GCP, but most importantly, there is recognition for the first time that the conference should open up to include a "human dimensions" component. This is indeed a big achievement considering the history of the conference. Both Chris Field and Pep Canadell are members of the scientific committee, so please, send them any feedback you may have on session topics and invited speakers.

For more information: <http://www.cmdl.noaa.gov/info/icdc7/>

OPEN MEETING OF THE HUMAN DIMENSIONS COMMUNITY

9-13 October 2005, Bonn, Germany

The GCP has submitted four proposals for session/panels at the IHDP open meeting to further develop the activities on regional development and carbon management:

- Regional Perspectives on Sustainable Management
- Urban Carbon Management Case Studies
- Human Dimensions of the Carbon Cycle: Networks of Research and Policy Making
- A two-way lane: Cities as drivers and targets of climate change

Contact: Penelope Canan (penelope.canan@nies.go.jp) or Paty Romero (prlankao@correo.xoc.uam.mx).

Greenhouse 2005: Action on climate control

13-17 November, Melbourne, Australia

For more information: <http://www.greenhouse2005.com>

Contact: Paul Holper (Paul.Holper@csiro.au)

Advanced Training Workshop on Carbon and Water Issues in Southeast Asia

15-28 November, Taiwan

An international team of 20 natural and social scientists/policy makers will train 35 junior faculty or senior technician/staff with full support from the National Science Council of China-Taipei. The program will cover of a wide range of carbon and water issues relevant to the Southeast Asia region. The Workshop is organized by the Southeast Asia Regional Committee for START (SARCS) and sponsored by the GCP.

Contact: Chen-Tung Arthur Chen (ctchen@mail.nsysu.edu.tw)

GCP SCIENCE FRAMEWORK IN CHINESE-MANDARIN AND RUSSIAN

The ESSP Report No.1 was translated to Chinese Mandarin by scientists from the Institute of Botany in Beijing (lead by Guangsheng Zhou) and the Chinese National Science Foundation. It was a tremendous effort which resulted in a high quality document. You should have received a hard copy by now, please, let us know if you would like to have extra copies. The document was presented at the GCP Beijing meeting last November. The pdf file will be available shortly.

The Science Framework has also been translated to Russian for which a first order draft already exists with a polished executive summary available at:

http://www.globalcarbonproject.org/science_plan_and_implementation.htm

Georgii Alexandrov is leading the effort. For more information, contact Georgii at g.alexandrov@nies.go.jp.

GCP AFFILIATED OFFICE IN CHINA

During the meeting in Beijing this last November, the Chinese Academy of Science (CAS) and the Institute of Geographical Sciences and Natural Resource Research (IGSNRR) made a formal commitment to establish and fund a regional office for the GCP with the goals of 1) coordinating carbon research in China, 2) fostering coordination of carbon research regionally in Asia, 3) providing capacity building opportunities for sciences in the region, 4) providing data management for the region,

	<p>and 5) becoming a regional contribution to the GCP efforts.</p> <p>5TH SSC MEETING OF THE GLOBAL CARBON PROJECT The dates and location for the next SSC meeting are: 14-17 June 2005 UNESCO, Paris The meeting will include a one day mini-conference on vulnerabilities of the carbon-climate-human system.</p>
<p>Achievements/ Challenges/ Constraints</p>	<p><i>Achievements</i> After year 2003 saw the launching of the GCP, the level of activity that the GCP carried out and the number of products published or in press increased. First networks around specific activities were established, and discussed as well as further developed during the last SSC meeting in Goa. Critical partnerships resulted in specific activities and products (e.g., with TCO of GTOS; and the CO₂ Panel). A PDF copy of the GCP Science Plan and Implementation Framework can be downloaded from: http://www.globalcarbonproject.org/science_plan_and_implementation.htm Recently discussions with the CliC project of WCRP has also strengthen the links with WCRP.</p> <p>A most awaited achievement during 2004 was the appointment of Penelope Canan for the Executive Director position of the IPO in Tsukuba. She started her new job in April that year. With an opening ceremony on April 22, 2004at Japan's National Institute for Environmental Studies, the new office became fully operational. Staff include Melanie Hartman (senior researcher), Harumi Kato (special assignment researcher), Stephan Scholz (assistant fellow, starting January 2005), and Yukako Ojima (secretary).</p> <p><i>Challenges</i> The meeting in Goa was the first meeting with the Implementation Strategy published and with a suite of own GCP projects. The activity portfolio includes four type of activities:</p> <ol style="list-style-type: none"> 1. Existing GCP activities that were identified by the SSC and are operational at the present time (e.g., urban and regional development activities). The challenge will be to steer these activities to better fit in the bigger C picture, set SSC priorities, assess how they are performing, and how they could be done better. 2. Proposed GCP activities (e.g., INSEA). The challenge will be to link these activities in a meaningful way to the significant implementation areas in the Implementation Strategy and make suggestions that make them even more GCP relevant. 3. Furthermore, the GCP needs to identify any major research areas missing compared to what is in the Implementation Strategy and set up new projects where appropriate. This might require a pro-active attitude in initiating new projects in such gap areas, particularly with regard to coupling issues between human dimensions and natural sciences. 4. Endorsement of projects initiated outside of the SSC but that are relevant in various degrees to the GCP Implementation Strategy need to be linked in a meaningful way to the portfolio of GCP activities. <p>One of the main challenges of the GCP remains the development of a formal framework for coupling the natural and human dimensions of the carbon cycle and its links to the climate system. Unfortunately, the launching of the workshop series for this activity was postponed several times due to the delay in establishing the IPO in Tsukuba. Currently the Tsukuba office is preparing an inventory of carbon-human-climate models. For more information, contact Melanie Hartman (melanie.hartman@nies.go.jp).</p> <p>A second major challenge for the GCP is to establish strong links with all major national and regional C cycle research projects. This will take a few years before the</p>

GCP can claim success but we are currently working to strengthen the links and make them more specific with the US and China. (There are already good links with Europe, Australia, Japan, Southeast Asia, and Central America.) Other major regions not currently represented in the GCP are Russia and South America, and a big gap

We propose to compare the eastern, continuously iron-limited, Gulf of Alaska with the western Oyashio that has a strong spring bloom leading later to HNLC conditions. We are prepared to attach our ideas and goals to any national or international program for which they are a good match, such as IMBER (International Marine Biogeochemical and Ecosystem Research). We are going to need the sort of significant funding that such programs intend to develop for cooperative international, interdisciplinary oceanography.

Both of the western and eastern sides of the subarctic Pacific have the same array of mesozooplankton species dominated by copepods with annual life cycles, principal growth phase in spring and very deep ontogenetic migrations. The OECOS interregional comparison will allow us to examine the growth of oceanic copepods under food-replete (west) and food-limited (east) conditions. The time to do this is the spring transition period (mid-April to mid-June) when the upper water column thermally stratifies, production ramps up dramatically all across the subarctic Pacific and these copepods grow. The production increase generates phytoplankton biomass increase, a spring bloom, in the west (because of iron sufficiency presumably, but that needs study) but not in the east (continuous iron limitation). For both regions we will propose very long (~60 day), very high frequency time series of habitat and biological observations during the spring transition of the same year. We are looking to field this OECOS project in 2008. One realization of such a time series may seem inadequate, but each of the cruises proposed, one from North America and one from Asia both using modern instrumentation, will generate massive amounts of data and sample, so that a three year program will just be enough to prepare for sea, complete the long cruises, then work up the data from one seasonal comparison.

The North American component will focus on two aspects of HNLC pelagic ecology. First, in this region there are recurring cycles of phytoplankton abundance (0.15 to 0.6 mg chlorophyll m⁻³) in opposite phase to cycles in ammonium concentration. These must represent limit cycles of the main, nano- and microplankton food web that is persistent under iron limitation. We propose to document and explain essentially every aspect of this limit cycle. Second, the copepod fauna (90% of zooplankton biomass in the region) sustains its development on the output of this nano-food web, feeding at its second and third trophic levels. Growth is certainly much slower than for the same species in food-replete coastal regions and probably than in the west (where no high resolution data are yet available, a goal of the Asian project). We will use an array of old and new techniques to characterize copepod production rates during the spring transition and analyze the coupling to the limit cycle of the nano-food web.

PICES is supporting development of OECOS through partial funding of a workshop to be held in Corvallis this coming May. Other support is being provided by Oregon State University. We are still seeking about \$2000 to fill out the necessary budget, but we will hold the workshop even if we don't get that. North American attendees will be the following, together with the areas they will address in the project:

Batchelder, Harold (OSU)– modeling, possibly observations
Chase, Zana (OSU) – aspects of iron chemistry
Cowles, Tim (OSU)- mixing physics combined with fine scale profiling of phytoplankton in the water column by optical techniques
Cullen, Jay T. (U. Victoria) - Iron availability and iron cycling
Dagg, Michael. (LUMCON) - mesozooplankton feeding
Erdner, Lisa (WHOI) - in situ indices of iron limitation in phytoplankton
Mackas, David (IOS, Victoria) - mesozooplankton distribution pattern

Miller, Charles. (OSU) - mesozooplankton growth rates
Selph, Karen (U. Hawaii) - Phytoplankton biomass and systematics with flowcytometry and direct microscopy (both at sea)
Strom, Suzanne. (Shannon Point Marine Lab)- microzooplankton variability and activity
Strutton, Peter (OSU) – Water column monitoring from station-marking floats
Welschmeyer, Nicholas (MLML) - phytoplankton growth rates (14C and 14C dilution experiments)

Asian attendees (for the moment all participants are Japanese) will be five of the following seven proposed participants:

Kishi, Michio - modeling
Kuma, Kenshi - iron and nutrients
Furuya, Ken – phytoplankton abundance and composition
Ota, Takashi – microzooplankton abundance and activity
Kobari, Toru - mesozooplankton
Yamaguchi, Atsushi - mesozooplankton
Ikeda, Tsutomu – mesozooplankton

A detailed exposition of the proposed OECOS science is available on request.

Charles B. Miller
Prof. Emer. Oceanography
Oregon State University

Appendix 11

10. SOLAS

SOLAS report to be inserted

Appendix 12

11 Report on SOLAS/IMBER Development of Carbon Implementation Plans Dennis Hansell

Development of the SOLAS/IMBER Carbon Implementation is plan is moving forward, though slowly.

The draft outline for the plan is:

- I. Introduction of SOLAS and IMBER goals/issues questions
- II. Fluxes and Inventories
 - a. Spatial and Temporal Variability of Air/Sea CO₂ Fluxes
 - b. Oceanic Storage and Transport of Anthropogenic CO₂
- III. Sensitivities
 - a. Goals
 - b. Process Studies and Observations
 - c. Natural Perturbations
 - d. Manipulative Experiments

- e. Coupled Biogeochemical/Ecosystem Modeling
- IV. Domains Highlighted
 - a. Role of Margins in CO₂ Global Fluxes and Inventories
 - b. Assessment of Remineralization and Lateral Transport in the Mesopelagic
- c. Sensitivities of Margins and Mesopelagic to Climate and Anthropogenic Changes
- V. Enabling Activities
 - a. Data Management
 - b. Technology Development
 - c. International Cooperation

The document is now (mid March) in the hands of Casey Ryan at the SOLAS IPO for formatting. When he completes that work, it will be returned to Truls Johannessen (SOLAS) and Dennis Hansell (IMBER) for additional input. We will then send it back out the participants of the Miami meeting.

The main components of the document include the SOLAS Focus 3 implementation document (created at the SOLAS Bergen meeting) and text generated at the Miami meeting on carbon storage /sensitivities/technology /enabling activities. The document contains verbiage on the science required, but we must decide the degree of planning detail we can bring into it. Details can only go to the level of existing national plans for research.

Dr. Johannessen will seek direction from the executive SOLAS SSC meeting being held at the end of March. He is seeking to make all of SOLAS carbon research interests a joint SOLAS/IMBER venture. Presently SOLAS has isolated some of its carbon interests in Focus 1 from IMBER involvement. Intellectually this is fine, but in developing implementation plans it is difficult to separate carbon in artificial ways.

Joint IMBER/SOLAS Carbon Research Implementation plan

Part 1: Global Ocean Inventories and Fluxes

- I) Carbon Inventories and Fluxes
 - A) Implementation of Goal I. (air/sea fluxes)
 - a) Measurement Efforts
 - b) Technology Development
 - c) Data Analysis and Synthesis
 - B) Implementation of Goal II. (inventories)
 - a) Modeling
 - C) Implementation of Goal III.
 - a) Modeling
- II) Oceanic Storage and Transport of Anthropogenic CO₂
 - A) Implementation of Goal IV. and V.
 - a) Measurement Efforts
 - b) Technology Development
 - c) Data Analysis and Synthesis
 - B) Implementation of Goal VI.
 - a) Modeling

- C) Implementation of Goal VII.
 - a) Modeling

III) Data management

Part 2: Future Oceans and System Sensitivities

Introduction

Global Change Driven Perturbations
System responses

Implementation of GCDP (Broad Goals)

- A) Process Studies and Observation
 - a. Measuring changes
 - b. Time series
 - c. Natural perturbations
- B) Manipulative Experiments
- C) Coupled Biogeochemical/Ecosystem Modeling
 - a. Process Models
 - b. Global Ocean Models
 - c. Earth System Models

References part 2

PART 3 Air-sea Flux of N₂O and CH₄ and sensitivity of the sources•

Introduction–

- A) Marine Emissions–
- B) Controls on production–
- C) Factors controlling surface saturation state•

References part 3•

PART 4 Boxes, tables and figures

PART 5 Cross cutting issues

- A) New Technology Development
- B) Remote sensing
- C) Data Management

The implementation plan is presently presented in terms of goals. At present, these goals are:

Goals Part 1: Global Inventories and Fluxes

- I. "Support the establishment of [1]ocean and atmosphere carbon observing systems (including associated data assimilation schemes) suited to constraining net annual ocean-atmosphere CO₂ flux at the scale of an ocean basin to <0.2 Pg C yr⁻¹."
- II. "Critically evaluate the performance of prognostic carbon cycle models against field observations of seasonal to centennial variability, in order to guide model development and gain insight into the impact of changed forcing."
- III. "Use observation-based estimates of air-sea fluxes and atmospheric inversion models to improve determinations of the magnitude and location of terrestrial carbon sinks."
- IV. "Determine the changes in uptake, transport and storage of anthropogenic CO₂ on decadal timescale to within 10%."
- V. What are the spatial and temporal scales of storage of carbon in the interior of the ocean?
- VI. "Determine the sensitivity of the oceanic uptake of anthropogenic CO₂ to climate change"
- VII. "Project future uptake of anthropogenic CO₂ given atmospheric CO₂ scenarios, with and without climate change. Years 2025, 2050, 2100, 2200", (this has to be consistent with IPCC report, targets, etc...)

Goals for Part II: Future Oceans and System Sensitivities

- I. Examine the existence, and then direction of, feedbacks between projected changes in forcings and processes transforming carbon in the ocean
- II. Quantify the feedback on the atmospheric CO₂ reservoir (improve estimates of magnitude (in Pg C yr⁻¹) on decadal and centennial timescale)

Goals for Part III: Air-sea Flux of N₂O and CH₄ and sensitivity of the sources

- I. Determine the contribution of marine emissions, particularly from coastal regions, to the global N₂O budget.
- II. Improve understanding of factors regulating surface saturation of N₂O and CH₄, including assessment of sensitivity to climate change and anthropogenic riverine input.

Appendix 13

GODAE

2nd Int'l GODAE Symposium, November 1st-3rd, 2004, St. Petersburg, FL
Report to IMBER-SSC of Breakout Session3 on
"Marine Ecosystems Management: Fisheries and Biogeochemistry"

Context

- GODAE should move actively towards ecosystem modeling and include this goal within its mandate. GODAE should develop models with living marine resources

(thus providing products for users) and form partnerships with others (e.g. IMBER, LOICZ, GLOBEC, GEOHAB) to develop and apply assimilation techniques for ecosystem models.

Product Lines relevant for IMBER

- Real-time in situ data and remote sensed data to provide warning on extreme conditions for operational use;
- Real-time model forecast to optimize field campaign with predictions of extreme temperature events or eddies/fronts within 1 or 2 weeks;
- Reanalysis products for retrospective analysis of carbon cycle or ecosystems dynamics.

Product Types relevant for IMBER

- Data types – Circulation fields, T, S, turbulence, light levels, mixed-layer depth ;
- Global or basin scale, however downscale to the inner shelf coastal applications is crucial but tricky (CODAE system required);
- Retrospective reanalysis of data and hindcasting could go back to 1950, but much better since 1992 by using satellite altimetry, then 2003 with the new ARGO float system.

Challenge for IMBER

- Development of ecosystem models that used GODAE products: offline mode for hindcast over years to decades, realtime nesting within GODAE system for nowcast and/or forecast, online mode for feedback loop from plankton dynamics to physics via regulation of solar heat penetration;
- Development of real-time in-situ observing system, as geochemical or biological sensors on ARGO float or ship of opportunity;
- Development of advanced assimilation schemes to constrain in a coherent manner both dynamics of physics, biogeochemistry and biology.
- Partnerships with GODAE must be proactively encouraged by IMBER-SSC on such issues.

Message to GODAE to serve and interact with the IMBER user community

- Assimilation matching - Need to ensure that the data collected and specific assimilation schemes represent the right aspects of ecosystem dynamics to make the model most useful for the users (special attention needed for vertical transport and turbulence).
- Specific verification - Each 'product' must be tested (locally) against the requirement of its defined user need. It is not simply possible to test the 'generic' model but is necessary to know what 'type' of output is required by the user and in what form. Benchmarks and verification are important to ensure data quality and gain trust of users.
- Translation – GODAE should help to make the products understandable to the users, making vast amounts of information useful and more easily understandable. Ease of access is also important. Communications with new users may be difficult.
- Dialogue - Some simple results of data already in use would require relatively little discussion for development but in general development of useful products will require many local and regional bi-lateral and multi-lateral discussions between developers and users. General strategic support could probably be provided by GODAE but perhaps only at strategic level.
- Partnerships with IMBER must be proactively encouraged by GODAE-SSC on such issues.

Appendix 14

Summer School Draft Proposal: Ocean Biogeochemical Impacts of Climate Changes and Feedbacks

Temel Oguz

Objectives:

Evidence has been mounting that human-induced climate change is occurring, and future global climate is a very serious concern to mankind. The ocean is an important regulator of climate as well as a major absorber of CO₂. Over the past decade, a series of multi-national research programs have led to considerable advances in the ocean-climate interactions. It is now timely to share the outcome of these studies, to transfer and distribute knowledge, technical expertise and understanding to the next generation of ocean scientists around the world through a series of lectures and topical discussions with scientists of international stature. This intensive summer school aims to introduce participants recent developments in understanding of the ocean-climate interactions, encompassing observational advances, interpretations of new data, and improved mechanistic understanding through modeling. It is intended primarily for advanced Ph.D students and young scientists at the postdoctoral level. Participants will be accepted from a variety of scientific backgrounds and geographic regions.

Justification:

Among the most important research initiatives of the 1990s is the study of global climate change. Considerable progress has been made in understanding ocean processes, human effects on marine systems, and the coupling of the ocean and atmosphere in regulating Earth's climate. There is now compelling observational and modelling evidence that the relentless emissions and atmospheric accumulation of anthropogenic greenhouse gases since the early 19th century are responsible for the global warming trends, sea level rise and climate extremes recorded since the 1980s. Even if emissions are stabilised to some extent now, anthropogenic climate change is expected to continue for several centuries because of the long time scales required for oceanic feedback.

The international scientific community developed a set of global research programmes (WCRP, IGBP, IHDP, DIVERSITAS, etc.) in response to the scientific challenges of global climate change. It is now timely to share the outcome of these studies; to transfer and distribute more evenly the scientific knowledge, technical expertise and understanding to young scientists who are entering the field. While great advances have been made, there are still enormous gaps in our understanding, both within the scientific community and society at large. We hope that the lecture series can inspire and educate young scientists to meet the outstanding challenges. We consider it is essential to encourage the development and training the next generation of ocean scientists around the world in this topic of truly international importance.

Outline of the program:

The summer school will be a high-level teaching activity, where the chosen topics are systematically treated in depth, and new advances are reported in tutorial form by

lecturers of international standing to Ph.D students and young scientists at postdoctoral level. The main theme of the course is "ocean biogeochemical impacts of climate changes and feedbacks". It is intended to cover the following topics:

- (a) the role of ocean biogeochemistry and ecosystems in regulating climate
- (b) biogeochemical interactions and feedbacks between ocean and atmosphere,
- (c) interactions between biogeochemical cycles and the structure, function and dynamics of marine food webs,
- (d) modeling natural and anthropogenic climate changes,
- (e) observational evidence of climate change,
- (f) response of climate-induced changes in ocean thermohaline circulation on marine biogeochemical cycles and ecosystems,

Lecturers:

There will be a total of 10-12 lecturers

Participants:

Depending on financial resources, we expect to invite around 40-60 students to the summer school.

Funding:

An approximate cost of a student to the summer school organization is

Accommodation	20 Euro X 15 days = 300 Euro
Living Expenses	20 Euro X 15 days = 300 Euro
Air fare	600 Euro

Total 1200 Euro (~1500 US \$)

HERE ARE SOME NOTES ABOUT FINANCE OF THE SUMMER SCHOOL:

- (a) For the time being, SCOR, IOC, EUR-OCEANS, IMBER expressed their interest to provide financial support.
- (b) We also expect to have financial support from NSF, NOAA, and other US agencies for US participants.
- (c) NATO used to provide financial support for Advanced Study Institute (ASI). During the last few years, NATO's main interest is "international terrorism". There is one discipline called "environmental security" in which our proposal to NATO might fit in. Although we submit a proposal, my personal feeling of getting support from NATO is low.
- (d) We are now exploring how IMBER and EUR-OCEANS may contribute financially to the summer school.

We expect to devote the SCOR and IOC funds for participants from former Soviet Union countries and the Third World Countries. It will be nice to support 10 students by SCOR and a similar number by IOC supports (approximately half of the participants). The students from European Union countries may use EU funding either within the framework of EUR-OCEANS or their individual projects.

Organising committee:

It will be formed soon (within the May-June) once the role of funding agencies are defined more definitely during April-May. But, we tentatively suggest a committee formed by

Temel Oguz (Host, Turkey)

Paul Treguer or Louis Legendre, or someone else (representing EURO-OCEANS)

An IMBER representative

Mick Follows or ??? (USA)

Venue:

Middle East Technical University Campus, Ankara, Turkey
7-18 August 2006.

Accommodation:

The lecturers will stay in a special guesthouse in the METU campus which is specially reserved for visiting senior scientists. Other participants will stay in student guesthouses for a single person with bath and shower, a mini refrigerator, and