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INTERGOVERNMENTAL OCEANOGRAPHIC COMMISSION
(of UNESCO)

**Progress Report and Proposed Terms of Reference
for the International Ocean Carbon Coordination Project**

Rationale for the IOCCP

Studies of the global carbon cycle and climate change necessarily involve investigations across national and regional boundaries. Recognizing the need to develop an international research framework, various working groups of programmes such as the International Geosphere-Biosphere Programme (IGBP), the Scientific Committee on Oceanic Research (SCOR), and the World Climate Research Program (WCRP) have developed research strategies for carbon cycle studies. Several nations are also moving ahead with plans for large-scale carbon cycle research and field programs. Many of these national and regional studies are similar in focus, and have been designed to complement studies in other countries. However, there is an immediate need for global-scale coordination and assessment of these carbon observations and research efforts to ensure that the results, when combined, will meet the requirements of the research community. The Global Carbon Project and the SCOR-IOC Advisory Panel on Ocean CO₂ established a joint pilot project in 2003 to coordinate ongoing and planned large-scale ocean carbon observations to meet the scientific objectives of global carbon cycle research.

Summary of Activities, 2003–2005

In its first two years of operation, the IOCCP has employed an open membership structure that has included the direct participation of over 100 scientists from 17 countries, and has attracted external financial support from national agencies and programmes to implement its activities. The IOCCP has also worked directly with many groups in the observing system community. The IOCCP has been endorsed as the ocean carbon focal point for the GCOS-GOOS-WCRP Ocean Observations Panel for Climate (OOPC) and has been active in the development of the 2nd Report on the Adequacy of the Global Observing Systems for Climate in support of the United Nations Framework Convention on Climate Change, and the follow-up implementation plan. The IOCCP works in close partnership with CLIVAR, coordinating the ocean carbon measurements in the repeat hydrography programme, and hosting a joint web-based information database on these activities. The IOCCP works closely with the JCOMM Observations Coordination Group to provide information on ocean carbon observation activities and to foster closer integration of carbon measurements with the operational system. The IOCCP also provides expertise to the IGOS Partners Integrated Global Carbon Observation strategy and implementation plan, and has worked with GOOS, GCOS, and POGO to provide advice for ocean carbon observations in the GEOSS strategy.

Major Activities 2003:

- 1st IOCCP Workshop: Ocean Carbon Observations from Ships of Opportunity and Repeat Hydrographic Sections, Paris, France. Fifty-six participants from 17 countries. Produced compilations of on-going and planned activities for carbon SOOP and hydrography programmes, including on-line maps and tables. Presentations, working group reports, and programme compilations are available on-line or on CD.
- Development of an on-line information database and communications network to provide up-to-date information on ocean carbon activities and plans. This communication service includes quarterly newsletters to approximately 200 scientists in 17 countries.

- International pCO₂ Sensor Intercomparison Experiment: National Research Institute of Fishery Engineering, Ibaraki, Japan, lead by Dr Yukihiro Nojiri, National Institute for Environmental Studies, Japan. This project, carried out as a contribution to the IOCCP work plan, brought together 9 underway systems from Japan, the U.S., Korea, New Zealand, Germany, and the UK, to perform precise comparisons of the equilibrators and gas measurement systems in a controlled seawater pool. Products: Numerical Data Package report and technical paper (in preparation).

Major Activities 2004:

- 2nd IOCCP Workshop: Ocean Surface pCO₂, Data Integration and Database Development, Tsukuba, Japan. Forty-four participants from 12 countries. Produced international agreements on a recommended format for pCO₂ metadata and data file reporting from underway systems, and a set of recommended practices for data exchange and data integration. Workshop presentations, compilations, and results are available on-line or on CD.
- Establishment of carbon representatives on CLIVAR Basin Panels and participation in three basin panel meetings (financially supported by IOCCP.)
- Two International Ocean Carbon Stakeholders' Meeting, May and December, Paris. Highlighted the planned activities for ocean carbon research in several developing global, regional, and national research programmes and how the IOCCP could be used to provide coordination services between them. Produced a joint statement outlining how the global research programmes would coordinate their ocean carbon programmes and how the IOCCP would work with these programmes to provide coordination services and a link to the global observing systems.

Major Planned Activities — 2005:

- Development of new Terms of Reference and convening first Scientific Steering Group meeting, joint with SOLAS-IMBER carbon implementation group, September 2005.
- Development of an internationally-agreed implementation strategy for carbon measurements on the repeat hydrographic sections of CLIVAR, including critical lines for uptake and transport estimates as well as a list of core and ancillary measurements (meeting scheduled for November 2005)
- Development of a technical white-paper and peer-reviewed publication on underway pCO₂ systems, and an international consensus of necessary steps towards the commercial development of sensors.
- Development of a new comprehensive coordination structure for ocean carbon research and observations from national, regional, and global programmes, and a comprehensive ocean carbon portal on the IOCCP web site.

Requests to Expand IOCCP Activities

Following the stakeholders' meetings, several global, regional, and national research programmes have now asked the IOCCP to expand its activities to provide similar

coordination services for process studies of research programmes as well as observation activities. Because of the large amount of research activity occurring at many levels, there is an immediate need to provide a comprehensive global forum for coordination of ocean carbon studies, including data collection, large-scale synthesis efforts, model-data integration, and the development of a sustained ocean carbon observing system. Coordination is central to the achievement of the climate and carbon-related goals of CLIVAR, as well as the new SCOR / IGBP global research projects, SOLAS and IMBER.

To meet these requests without developing a new programme at the IOC and to keep the financial implications constant, it is proposed to expand the work of the IOCCP by replacing the existing CO₂ Panel Terms of Reference with those of the new IOCCP given below, and changing the name of the project accordingly.

Proposed Terms of Reference for the International Ocean Carbon Coordination Project (replaces the title “Advisory Panel on Ocean CO₂”)

General Description of Activities

IOC and SCOR will provide financing, in-kind assistance, and stewardship for the IOCCP.

The IOCCP will undertake specific tasks (as listed in Specific Terms of Reference, below) and provide ready expertise on ocean carbon observations and research, including ocean carbon sequestration issues, as required by SCOR, IOC, their programmes (e.g., IMBER, SOLAS, OOPC, GOOS, GCOS, and JCOMM) and the IOC Member States.

Specific Terms of Reference

- i. To develop an international communication centre 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. To 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 programmes, as requested;
 - b. Facilitating and aiding the development of historical databases for ocean carbon, including data recovery activities, as necessary;
 - c. Ensuring long-term data availability by working with data management groups and World Data Centres to archive data sets beyond the lifetime of the individual projects.

- iv. To work with global research and observation programmes to promote and document the development and status of a sustained ocean carbon observing system;
- v. To liaise with integrated programmes (IGCO, GCP) to promote the integration of ocean carbon into earth system studies.

Financial Implications and Staff Requirements

Support from IOC is requested at a level of 12,500 US dollars per year to convene one annual meeting of a small scientific steering group (with matching financial contributions from SCOR). This represents no change from the existing support level, approved by the 33rd Session of the Executive Council in 2000. Financial support for IOCCP activities beyond the annual meeting is to be raised through extra-budgetary grants and in-kind contributions.