

REPORT OF WORKING GROUP 17 ON BIOGEOCHEMICAL DATA INTEGRATION AND SYNTHESIS

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The meeting of Working Group 17 (WG 17) was held from 08:30 – 17:00 hours on October 22, 2004. After a brief welcome by the Co-Chairman, Dr. Andrew G. Dickson (see *WG 17 Endnote 1* for attendance) and a discussion of the proposed agenda (*WG 17 Endnote 2*), the meeting continued with a series of status reports and technical presentations.

Workshop on “Ocean surface $p\text{CO}_2$ database and data integration (Agenda item 3)

Dr. Dickson presented a report on the workshop on “Ocean surface $p(\text{CO}_2)$ database and data integration” held January 14–17, 2004, in Tsukuba, Japan. This workshop was sponsored by the National Institute for Environmental Studies, the International Ocean Carbon Coordination Project (IOCCP), and PICES Working Group 17. Support for this workshop was provided by a grant from NIES/MEX and by the US National Science Foundation Award No. OCE-0245278 to SCOR.

The workshop included 44 participants from 12 countries. The goals of this workshop were (i) to understand potential sources of error and differences in ocean $p(\text{CO}_2)$ systems; (ii) to develop guidelines for improving the systems and measurement practices; (iii) to reach agreements on data and metadata formats and data exchange practices; and (iv) to discuss ways in which we could begin to connect existing activities into a coordinated global network capable of producing high-quality, global data sets of $p(\text{CO}_2)$ and air-sea flux of CO_2 . While much of the workshop focused on technical issues, it also addressed the need to go beyond simply connecting existing activities through common practices, and to develop an international implementation strategy for a global network of observations. The results of the workshop include:

- A technical report of the inter-comparison experiment, to be published by CDIAC, entitled “The International Indoor Seawater Pool $p(\text{CO}_2)$ inter-comparison - Results and recommended practices”. A more concise version of the report may be developed for publication in a peer-reviewed journal;
- The development of an IOCCP recommendation for metadata and data formats;
- Agreements on data center coordination and data management;
- Agreements on public data release and a system of acknowledgement for data use;
- Agreements on the coordination of data integration, synthesis and modeling activities;
- Plans for the development of an implementation strategy for a coordinated global network of surface $p(\text{CO}_2)$ observations.

A more detailed description of the workshop including the full workshop report is available on the IOCCP website at <http://ioc.unesco.org/ioccp/Tsukuba2004Results.htm> (see also *PICES Press*, Vol. 12 (2), 25-29). In the discussion of the workshop, it became clear that the final technical report on the Hazaki inter-comparison experiment was not yet available, however WG 17 members were optimistic that this could be completed, and some follow-up is needed.

Workshop on “Understanding North Pacific carbon-cycle change: Data synthesis and modeling” (Agenda Item 4)

Dr. Christopher L. Sabine gave a brief overview of this workshop co-sponsored by NOAA, the Global Carbon Project (GCP) and PICES Working Group 17. The workshop was held June 2-4, 2004, in Seattle, and attended by about 60 scientists from 5 countries (Canada, Japan,

Korea, Russia and the United States). The workshop was organized using a three-step approach with active coordination, communication and collaboration among the participants before, during, and after the actual meeting. It provided a venue for significant interactions between scientists who brought their measurement results and ideas to the workshop for discussion and for synthesis. Many of the interactions at this workshop were focused on planning and carrying out work that was presented at PICES XIII in the POC Topic Session S8 (see below). A brief report of the workshop will appear in the next issue of PICES Press (January 2005, Vol. 13, No. 1). The synthesis manuscripts generated from the workshop are expected to be published as a *Journal of Geophysical Research* special issue in 2005.

Topic Session on “The impacts of climate change on the carbon cycle in the North Pacific” (Agenda Item 5)

One of the activities arranged by Working Group 17 for the PICES XIII meeting was the POC Topic Session S8 on “The impacts of climate change on the carbon cycle in the North Pacific”. This session was co-sponsored by the IOCCP, and the session convenors were Christopher Sabine (U.S.A.) and Kitack Lee (Korea). It was held on the afternoon of October 20 and the morning of October 21, and comprised of 18 oral presentations (including 2 invited talks) together with a number of posters. The report of the session is included elsewhere in this Annual Report. As noted above, this session provided a forum for presentation of new insights into such links between climate change and the carbon cycle as are manifest in the North Pacific, and showcased – in part – the results from a synthesis and modeling workshop that took place in June 2004.

Guide to best practices for oceanic CO₂ measurements and data reporting (Agenda Item 6)

Dr. Dickson summarized the current status of this project. It is still progressing at a very slow pace as it relies on his writing the parts

personally. At the meeting, he expressed the hope that it would be complete by the end of 2004. (Events have proved otherwise.)

The completed sections include methods for (a) sampling, (b) measurement of total inorganic carbon, and (c) measurement of total alkalinity. The statements on data reporting are based on guidelines proposed by PICES WG 13 and WG 17. In addition, drafts exist for an overview of the current status of methodology for the various measurements and indicating the rationale for the proposed “best practices”. The parts that are presently missing are methods for pH (this is problematic as there is a possible calibration problem in the thermodynamics of the commonly used indicator dyes that still needs to be clarified), and for $p(\text{CO}_2)$ – here a “best practice” would be based on the results from the various inter-comparisons and the Tsukuba workshop mentioned above.

Planning for the future of carbon cycle studies within PICES (Agenda Item 8)

This meeting in Honolulu is likely the penultimate meeting of WG 17, and although good progress has been made on fulfilling the various terms of reference of this Working Group, it is clear that there remains a clear need in the future for broad coordination of carbon cycle studies among PICES nations.

There are a number of new international ocean programs moving ahead: CLIVAR, IMBER and SOLAS, that are still in the process of discussing just how they will coordinate issues of common interest, such as CO₂ measurements. A possible coordinator of these activities is IOCCP (supported by Dr. Maria Hood at IOC) but this office presently has a quite restricted focus. One strategy that has been articulated involved setting up regional groups that have a clear interest in the science. Obviously this is an area in which PICES could play a role.

The Working Group members discussed this idea in some detail. In particular, it was felt that it would be desirable to set up a Section within PICES so as to ensure long-term continuation of this important activity. Possible tasks of such a

Section were discussed, and the following themes emerged:

- Coordinate and encourage ongoing and planned national and international syntheses of carbon cycle research studies in the North Pacific;
- Review the present level of knowledge on the processes controlling the carbon cycle in the North Pacific, and identify the gaps and problems;
- Identify available and suitable data sets on the oceanic CO₂ system, and work to enable effective mechanisms of data and information exchange;
- Regularly review the existing methodology of CO₂ measurements including the preparation of standards and reference materials, and advise on intercalibration and quality control procedures;
- Organize symposia, workshops, or PICES annual meeting sessions on carbon cycle and climate studies in the North Pacific.

In particular, it was recognized that it would be extremely important for such a Section to coordinate effectively on a more global level with the emerging international programs such

as CLIVAR, IMBER and SOLAS as well as with IOCCP. (A subsequent meeting of *International Ocean Carbon Stakeholders* in December 2004 re-iterated a need for similar activities on a global scale.)

Member reports (Agenda Item 9)

The meeting then concluded with a number of brief member reports on their recent activities in studying the carbon cycle and proposed future activities. The US activities were articulated by Drs. Richard A. Feely and Christopher L. Sabine, and Dr. Shuichi Watanabe provided an overview of activities of JAMSTEC in this area.

Action items for 2005

- Complete the proposed “Guide to best practices for oceanic CO₂ measurements and data reporting”;
- Complete the Technical Report on the *p*(CO₂) inter-comparison experiment;
- Prepare a proposal to POC and PICES articulating the need to create a Section to coordinate North Pacific carbon cycle studies.

WG 17 Endnote 1

Participation List

Members

Andrei G. Andreev (Russia)
Robin M. Brown (Canada)
Andrew G. Dickson (U.S.A., Co-Chairman)
Richard A. Feely (U.S.A.)
Hernan E. Garcia (U.S.A.)
Alexander Kozyr (U.S.A.)
Christopher L. Sabine (U.S.A.)
Toru Suzuki (Japan)
Shuichi Watanabe (Japan)
Yutaka Watanabe (Japan)

Observers

Alexander Bychkov (PICES)
Fei Chai (U.S.A.)
James Christian (Canada)
Curtis Deutsch (U.S.A.)
Maria Hood (IOC/IOCCP)
Hisayuki Inoue (Japan)
Kitack Lee (Korea)
Sachiko Oguma (Japan)

WG 17 Endnote 2

WG 17 Meeting Agenda

1. Welcome and introductions
2. Discussion of agenda
3. Report on IOCCP/NIES/PICES Workshop on “Ocean surface $p\text{CO}_2$ database and data integration”
4. Report on NOAA/GCP/PICES Workshop on “Understanding North Pacific carbon-cycle change: Data synthesis and modeling”
5. Report on PICES XIII Topic Session on “The impacts of climate change on the carbon cycle in the North Pacific”
6. Distribution and discussion of draft “Guide to best practices for oceanic CO_2 measurements and data reporting”
7. Proposal and discussion of plans for inter-sessional activities in 2004/2005
8. Planning for the future of carbon cycle studies within PICES
9. Members reports and plans for future national activities
10. Summary and review of action items