

# REPORT OF PHYSICAL OCEANOGRAPHY AND CLIMATE COMMITTEE

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The meeting of the Physical Oceanography and Climate Committee was held from 1330-1730 hours on October 10, 2001. The Chairman, Dr. Vyacheslav B. Lobanov, called the meeting to order and welcomed the participants (*POC Endnote 1*). Dr. Susan E. Allen served as rapporteur. The Committee reviewed the agenda and it was adopted as presented (*POC Endnote 2*).

## **Business arising from PICES IX (Agenda Item 2)**

Dr. Lobanov reported on the status of decisions made at PICES IX in 2000. Three sessions were convened at the PICES Tenth Annual Meeting: POC Topic Session on *Coastal ocean physical processes responsible for biological productivity and biological resource distribution*, POC/BIO/FIS Topic Session on *The physics and biology of eddies, meanders and rings in the PICES region*, and POC Paper Session. Inter-sessional workshops on *CO<sub>2</sub> data integration* were organized by WG 13 and TCODE in January 2001, in Sidney, B.C., Canada, and in August 2001, in Tokyo, Japan. Proceedings of the Symposium on *Oceanography of the Japan/East Sea* (CREAMS-2000), co-sponsored by PICES, was published, and *Review and results from 1999 and 2000 method intercomparisons for carbonate parameters* is being prepared for publication jointly with NIES, Japan. Communication with Argo, CLIVAR and NEAR-GOOS projects continued.

## **Sessions and themes at future Annual Meetings (Agenda Item 10)**

### Joint sessions at PICES XI

POC recommended convening a full-day joint Topic Session with FIS on *The nature, detection and impact of regime shifts in physics and biology*, and a joint session with BIO and FIS with the tentative title, *Topographic influences on micronekton*.

### Annual Meeting theme at PICES XI

*Technological advances in marine science research* was supported as a theme for the PICES Eleventh Annual Meeting in 2002.

### Annual Meeting theme at PICES XII

*Human dimensions of ecosystem variability* was supported as a theme for the PICES Twelfth Annual Meeting in 2003 (*SB Endnote 10*).

## **Report from WG 13 on CO<sub>2</sub> in the North Pacific (Agenda Item 4)**

Dr. Andrew Dickson reported on the Working Group activity since PICES IX and future plans. WG 13 completed its task and will prepare a final report for publication in spring 2002. POC accepted the WG 13 progress report (*POC Endnote 3*) and approved the recommendations to continue activity on CO<sub>2</sub>-related studies.

## **New Working Groups/Advisory Panels (Agenda Items 5 and 6)**

To retain scientific focus on carbonate system studies within PICES after disbanding WG 13 on *CO<sub>2</sub> in the North Pacific*, it was suggested to establish a new Working Group jointly with TCODE on *North Pacific biogeochemical data integration and synthesis* (*POC Endnote 3*).

POC also recommended organizing, collaboratively, with the Data Buoy Cooperation Panel, a *North Pacific Data Buoy Advisory Panel* (*POC Endnote 4*).

A list of Working Groups for future activity would include:

- i. Working Group on *Coastal ocean physical processes responsible for biological productivity and biological resources distribution*; and

- ii. Working Group on *Mesoscale water dynamics and its implication to biological processes*.

### **Proposals with financial implications (Agenda Item 3)**

#### Inter-sessional meetings

POC recommended that the following inter-sessional meetings be convened:

1. A 3-day International Symposium on *North Pacific transition areas* in La Paz, Mexico, in April 2002 (*SB Endnote 6*);
2. A 3-day PICES/CREAMS/ONR Workshop on *Recent progress in studies of physical processes and their impact to the Japan/East Sea ecosystem* in Seoul, Korea, in July-August 2002;
3. A 3-day PICES/JGOFS Symposium on *Biogeochemical cycles in the North Pacific* in Nagoya, Japan, in December 2002;
4. A Third Workshop on *The Okhotsk Sea and adjacent areas* in Vladivostok, Russia, in June 2003.

#### Requests for travel funding

1. 1-2 scientists from the western Pacific to attend the International Symposium on *North Pacific transition areas* in La Paz, Mexico, in April 2002;
2. 1-2 scientists from Russia and China to participate in the PICES/CREAMS/ONR Workshop on *Recent progress in studies of physical processes and their impact to the Japan/East Sea ecosystem* in Seoul, Korea, in July-August 2002.

### **Relations with other organizations and programs (Agenda Item 12)**

POC revised the Standing List of International Organizations and Programs and recommended the addition of the Data Buoy Co-operation Panel (DBCP).

### **Conveners' report on POC Paper Session at PICES X**

The POC Paper Session included presentations dealing with various issues of physical oceanography and climate, other than the POC Topic Session themes that were related this year to mesoscale phenomena, like eddies, rings and meanders, and coastal processes. That is why the papers on new results on a large-scale and long-term variability of physical environment in the North Pacific were selected for this ¼-day oral session. A large number of poster presentations provided recent findings in ocean circulation, structure of transition zones and fronts, water mass properties, transport and carbon cycle in the North Pacific, Okhotsk and Japan/East Seas.

#### **Best Presentation Award**

The nominee receiving most votes for the POC Best Presentation Award was Ms. Myong Sook Park (Korea) for her paper entitled "A numerical study on the physical processes and seasonal variability of fronts and eddies in the East/Japan Sea".

#### **POC Strategic Plan (Agenda Item 11)**

It was proposed to pay more attention to mesoscale dynamics and coastal areas, and to make the Strategic Plan more specific.

#### **Election of a new POC Chairman (Agenda Item 7)**

Dr. Kuh Kim (Korea) was unanimously elected as the new Chairman of POC. The Committee expressed its gratitude to Dr. Lobanov for his leadership and valuable contribution to POC activities over the years.

#### **Science Board items (Agenda Item 8)**

##### High priority scientific projects

POC discussed and supported the proposal for a North Pacific Ecosystem Status Report as a high priority scientific project for PICES (*SB Endnote 7*).

POC also supported the proposal on a workshop/symposium series on *Effect of human and climate interactions on fish production*.

#### CCCC Integration Plan

POC discussed and supported a plan for better integration among the Task Teams of the CCCC Program.

#### **Other business (Agenda Item 13)**

Dr. Igor Rostov of POI, Russia, reported on the preparation of the Oceanographic Atlas of the Bering, Okhotsk and Japan/East Seas. POC recommends support for this activity and publication of the atlas under PICES co-sponsorship.

#### **POC Endnote 1**

#### **Participation List**

##### Members:

Susan E. Allen (Canada, rapporteur)  
Howard J. Freeland (Canada)  
Kuh Kim (Korea)  
Vyacheslav B. Lobanov (Russia, Chairman)  
David L. Musgrave (U.S.A.)  
James E. Overland (U.S.A.)  
Stephen C. Riser (U.S.A.)  
C.S. Wong (Canada)

##### Observers:

Andrew Dickson (U.S.A.)  
Gennady Kantakov (Russia)  
Lucila Lares (Mexico)  
Guido Marinone (Mexico)  
Ron McLaren (Canada)  
Yutaka Nagata (Japan)  
Wonsun Park (Korea)  
Konstantin A. Rogachev (Russia)  
George V. Shevchenko (Russia)  
Oleg V. Zaytsev (Mexico)  
Yuriy I. Zuenko (Russia)

#### **POC Endnote 2**

#### **POC Meeting Agenda**

1. Introduction and approval/modification of the agenda
2. Completion of the decisions of PICES IX (Hakodate, 2000)
3. Proposals for 2002-2003 with financial implications (inter-sessional meetings, travel support, publications)
4. Report of WG 13 on *CO<sub>2</sub> in the North Pacific*
5. Proposal for *North Pacific Data Buoy Advisory Panel*
6. Proposals for new Working Groups
7. Election of new POC Chairman
8. PICES high priority scientific projects and role of POC in their implementation
9. PICES XI and PICES XII Annual Meetings themes
10. POC Topic Sessions for PICES XI
11. Discussion on POC Strategic Plan
12. Relations with other international scientific organizations/programs
13. Other items
14. Summary of POC recommendations to Science Board

## POC Endnote 3

### Progress report of WG 13 on *CO<sub>2</sub> in the North Pacific* and proposal for a new Working Group

#### Background

The North Pacific is an important sink for atmospheric carbon dioxide in the oceans, and consequently, plays a significant role in controlling long-term climate changes on the Earth. Some biogeochemical processes relating to the oceanic CO<sub>2</sub> system are peculiar to the North Pacific. This occurs because (i) the North Pacific is the final destination of circulation of the deep water that contains a high level of preformed nutrients, and (ii) the North Pacific Intermediate Water stores dissolved CO<sub>2</sub> for more than a few decades. There is a considerable contrast in the ecosystems producing organic carbon and CaCO<sub>3</sub> particles, one of the factors determining the strength of the CO<sub>2</sub> sink in the ocean, between the eastern and western North Pacific. The contrast is likely due to the difference in the nutrient composition in water supplied from the subsurface to the surface euphotic layer (i.e., physical forcing which affects mixed layer depth), and in the atmospheric input of iron and other substances. Continental shelf water is now receiving much attention as CO<sub>2</sub> sink. The CO<sub>2</sub> exchange under heavy winter storms in high-latitude ocean is also not well known.

#### Activities of WG 13

WG 13 focused its efforts on:

1. *Review the present level of knowledge on the processes controlling CO<sub>2</sub> in the North Pacific, and identify the gaps and problems.*

This was done through Working Group presentations and two symposia co-sponsored by PICES: *CO<sub>2</sub> in the Oceans* held in Tsukuba, Japan, in January 1999, and a further symposium on *North Pacific CO<sub>2</sub> data synthesis* in Tsukuba, Japan, in October 2000.

2. *Review the existing methodology of CO<sub>2</sub> measurements including the preparation of standards and reference materials, and advise on inter-calibration and quality control procedures.*

Two method inter-comparisons were conducted to evaluate the present methodology for total dissolved inorganic carbon and total alkalinity. These were each followed up with a Technical Workshop held in Tsukuba, Japan; the first in April 1999, and the second in October 2000. In all, 15 laboratories from 6 countries (7 from Japan, 4 from the United States, and 1 from each of Canada, Korea, Russia and China, Taipei) were involved in this activity, and about 30 scientists and technicians attended each workshop. A report on the results from these exercises will be published in the PICES Scientific Report Series by the end of 2001. A third inter-comparison is initiated for C<sup>13</sup> measurements in both CO<sub>2</sub> gas and seawater samples. Participants have been identified (8 laboratories from Canada, Japan, U.S.A., Australia, Germany, France and China-Taipei) and samples will be distributed at the beginning of December 2001.

3. *Identify and encourage ongoing and planned national and international CO<sub>2</sub>-related scientific programs in the North Pacific region, including long-term time-series observations.*

National presentations at the Working Group meetings led first to an encouragement of the Japanese re-occupation of the WOCE P1 line, and a sample exchange between the US and Japan. Subsequently, Japanese scientists have occupied P17N and are planning a re-occupation of P6 (in 2003). Initial discussions have begun for a global program of repeat hydrography and accompanying CO<sub>2</sub> measurements, to enable an understanding of the increase in the oceanic burden of anthropogenic CO<sub>2</sub>.

4. *In coordination with TCODE, identify available and suitable data sets on the oceanic CO<sub>2</sub> system, and recommend the mechanisms of data and information exchange.*

The primary activity during 2001 was to work toward the eventual goal of establishing a publicly available database of CO<sub>2</sub> measurements in the North Pacific, which will enable such measurements to be synthesized into a coherent scientific picture of the North Pacific carbon cycle. Two workshops were held in this direction.

The first of these was held at IOS in Sidney, B.C., Canada, in January 2001. It brought together a small group of scientists and data managers from various PICES countries to discuss the likely technical issues involved in such a project, and to plan a second more detailed workshop to be held in Japan later in the year. One project agreed on at this planning meeting was the establishment of PICNIC, an inventory of North Pacific CO<sub>2</sub> data which was to be prepared as a web-site by the Marine Information Research Center (Japan).

The second workshop held at JODC in Tokyo, Japan, from July 31 to August 2, 2001, aimed at examining in more detail, the technical issues in integrating presently available data into a uniform data structure or database. Again this workshop was attended by a variety of PICES scientists and data managers. A number of issues were agreed on at this meeting: (i) the importance and success of the data inventory project initiated by MIRC; (ii) a draft data format for future CO<sub>2</sub> data; (iii) the use of the Live Access Server approach to serve distributed data sets and an agreement to share technical expertise to ensure this could be achieved; and (iv) the need to continue this project in future years.

5. *Organize a symposium, workshop or an annual meeting session on CO<sub>2</sub> studies in the North Pacific.*

In October 2000, at PICES IX in Hakodate, Japan, WG 13 co-organized a POC/BIO Topic

Session on *North Pacific carbon cycling and ecosystem dynamics.*

### **New CO<sub>2</sub> Working Group**

The Working Group 13 has completed its terms of reference and should be disbanded after preparing a final report for publication in 2002.

There is clearly a need to continue activities initiated by WG 13 on a number of fronts. The data inventory needs to be transformed into a mechanism to actually access CO<sub>2</sub> data from the North Pacific, additional work needs to be conducted to ensure that future oceanic CO<sub>2</sub> measurements are of high quality, continued effort is needed to assure communication and coordination between PICES nations on CO<sub>2</sub>-related research, and finally there is a need to retain a scientific focus on the carbon cycle within PICES.

Thus WG 13 recommends the formation of a new Working Group (under POC and TCODE) on *North Pacific biogeochemical data integration and synthesis* to undertake the following:

1. Complete the CO<sub>2</sub> data inventory and facilitate its being continually updated;
2. Continue a data archiving effort to make North Pacific CO<sub>2</sub> data publicly available;
3. Integrate North Pacific CO<sub>2</sub> data including the use of quality information;
4. Continue pursuit of data quality by
  - a. preparing written method descriptions
  - b. conducting inter-laboratory method comparisons
  - c. documenting QC protocols – best practices
  - d. incorporating data quality information into data structures for North Pacific data;
5. Plan revisits of deep ocean stations for data quality assessment purposes (especially evaluation of historical data);
6. Plan/coordinate new CO<sub>2</sub> measurement activities;
7. Design a strategy that allows new data to be incorporated into integrated data format as promptly as is practical;

8. Organize a scientific symposium to address the effects of climate change on the North Pacific carbon cycle.

Potential membership:

Canada: C.S. Wong (IOS), J. Page (IOS)  
China: suggestions for suitable scientists are welcome  
Japan: Y. Nojiri (NIES, Co-Chairman), S. Watanabe (JAMSTEC), Y. Watanabe (NIRE)

Korea: T-S. Lee (SNU), K. Lee (PU)  
Russia: P. Tishchenko (POI), P. Makaveev, (P.P. Shirshov IORAS)  
U.S.A.: A. Dickson (SIO, Co-Chairman), R. Feely (PMEL), P. Quay (UW), C. Sabine (PMEL/UW)

Data Centers: Representatives from MIRC (Japan), NODC (U.S.A.), CDIAC (U.S.A.) with expertise in dealing with CO<sub>2</sub> data.

**POC Endnote 4**

**Proposal for a *North Pacific Data Buoy Advisory Panel***

The following terms of reference are intended to advise the deliberations of a group sponsored collaboratively between the Data Buoy Cooperation Panel (hereinafter DBCP) and the Physical Oceanography and Climate Committee (hereinafter POC) of PICES.

The *North Pacific Data Buoy Advisory Panel* is an independent self-funded body that maintains, as a significant element of its responsibilities, an observational buoy programme providing meteorological and oceanographic data for real-time and/or research purposes in support of the World Weather Watch (WWW), the World Climate Research Programme (WCRP), the Global Climate Observing System (GCOS), and the Global Ocean Observing System (GOOS), and other relevant WMO and IOC programmes as well as those sponsored by PICES/POC.

The *North Pacific Data Buoy Advisory Panel* will support the aims and objectives of the DBCP as set out in the terms of reference of the DBCP in particular with respect to:

- Provision of good quality and timely data to users;
- Insertion of real-time (or near real-time) data into the GTS;
- Exchange of information on data buoy activities and development and transfer of appropriate technology;

and will support the aims and objectives of PICES as expressed through POC in particular with respect to:

- Encouraging the exchange of ocean data and information in the N. Pacific;
- Encouraging the development of new sensors that increase the utility of ocean data buoys and the exchange of information about those sensors.

In accordance with the regional interests of PICES, the *North Pacific Data Buoy Advisory Panel* adopts a regional interest defined as the North Pacific Ocean, north of 30°N.

The *North Pacific Data Buoy Advisory Panel* will submit annual reports of their activities to the Chairman of the DBCP, and to the chairman of PICES/POC.

Notes:

The DBCP has at present seven action groups:

1. The European Group on Ocean Station (EGOS, adopted as AG in 1987)
2. The International Arctic Buoy Programme (IABP, adopted in 1991)
3. The International Programme for Antarctic Buoys (IPAB, adopted in 1994)
4. The International South Atlantic Buoy Programme (ISABP, adopted in 1994)
5. The International Buoy Programme for the Indian Ocean (IBPIO, adopted in 1996)
6. The Global Drifter Programme (GDP, adopted in 1996)
7. The TAO Implementation Panel (TIP, adopted in 1998)