SCOR and PICES: Continuing Connections

Report at the 2007 SCOR Executive Committee Meeting
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The North Pacific Marine Science Organization (PICES) is an intergovernmental scientific organization and its current membership includes Canada, Japan, People's Republic of China, Republic of Korea, the Russian Federation, and the United States of America. The Organization was established in 1992: (i) to promote and co-ordinate marine scientific research in the northern North Pacific and adjacent marginal seas; (ii) to advance scientific knowledge about the ocean environment, global weather and climate change, living resources and their ecosystems, and the impact of human activities on them; and (iii) to promote the collection and rapid exchange of scientific information on these issues. Information on the Organization and its activities can be found on the PICES website at http://www.pices.int.

Continuing and extending collaboration between SCOR and PICES is based on the recognition that PICES could play an important role in bringing a North Pacific perspective to global activities of SCOR, and that by participating in these activities, PICES could advance its own scientific agenda. PICES is a major regional participant in the Global Ocean Ecosystem Dynamics (GLOBEC) project, through the PICES/GLOBEC Climate Change and Carrying Capacity (CCCC) Program. PICES also contributes to other SCOR-sponsored international large-scale ocean research projects, including the Integrated Marine Biogeochemistry and Ecosystem Research (IMBER), the Surface Ocean-Lower Atmosphere Study (SOLAS), and the Global Ecology and Oceanography of Harmful Algal Blooms Program (GEOHAB), to SCOR Working Groups and to Ocean Carbon activities supported by SCOR.

LARGE-SCALE OCEAN RESEARCH PROGRAMS CO-SPONSORED BY SCOR

Global Ocean Ecosystem Dynamics project (GLOBEC)

- The PICES Climate Change and Carrying Capacity (CCCC) Program provides a mechanism for integrating national GLOBEC research programs in the North Pacific and is a regional component of the international GLOBEC effort.
- The PICES/GLOBEC Symposium on "*Climate variability and ecosystem impacts on the North Pacific: A basin-scale synthesis*" was held April 19-21, 2006, in Honolulu, U.S.A. This symposium and a special issue of *Progress in Oceanography* to be published in late 2007 or early 2008 are considered as a part of GLOBEC synthesis efforts.
- Several sessions/workshops of scientific interest to GLOBEC were convened at PICES XV held from October 13-22, 2006, in Yokohama, Japan. Examples include: "*Boundary current ecosystems*" (S1), "*Modeling and historical data analysis of pelagic fish, with special focus on sardine and anchovy*" (S6), "*Key recruitment processes and life history strategies: Bridging the temporal and special gap between models and data*" (S7), "*Synchronous and asynchronous responses of North Pacific boundary current systems to climate variability*" (S10), CCCC Contributed Paper Session and "Linking climate to trends in productivity of key commercial species in the subarctic Pacific" (W2).
- Dr. Manuel Barange (GLOBEC Executive Director) and Dr. Francisco Werner (GLOBEC SSC Chairman) attended PICES XV as observers and briefed Science Board on GLOBEC's synthesis and integration efforts and invited PICES' involvement in these activities.
- PICES, GLOBEC and ICES jointly sponsored the highly successful 4th International Zooplankton Production Symposium on "*Human and climate forcing of zooplankton populations*", held May 28 - June 1, 2007, in Hiroshima, Japan. For this symposium, 334 participants from 46 countries contributed 141 oral and 250 poster presentations.

- A special issue of *Ecological Modelling* (Vol. 202, No. 1-2) on NEMURO and NEMURO.FISH models (Guest editors: M. Kishi, B. Megrey, S.-I. Ito and F. Werner) was published in March 2007. The issue is dedicated to Dr. Daniel Ware, the first PICES Science Board Chairman, and includes 19 peer-reviewed papers by authors from 4 PICES member countries.
- A joint PICES/GLOBEC Topic Session on "*Towards ecosystem-based management: Recent developments and successes in multi-species modeling*" (S3) will be convened on October 30, 2007, at PICES XVI in Victoria, Canada. Other scientific sessions/workshops directly related to GLOBEC activities will be convened at PICES XVI (October 26-November 5, 2007) include: "*The changing North Pacific: Previous patterns, future projections and ecosystem impacts*" (S1), "*Fisheries interactions and local ecology*" (S5), CCCC Contributed Paper Session and "*Climate scenarios for ecosystem modeling*" (W6).
- PICES was invited and agreed to co-sponsor the 1st Symposium of a GLOBEC regional CLIOTOP (*CLimate Impacts on Oceanic Top Predators*) program to be held December 3-7, 2007, in La Paz, Mexico.
- GLOBEC has been invited and agreed to join PICES, ICES and IOC as a co-sponsor for the Symposium on "*Effects of climate change on the world's oceans*" to be held May 19-23, 2008, in Gijón, Spain.

Ecosystem Studies of Subarctic Seas (ESSAS)

- PICES and a new GLOBEC regional program on *Ecosystem Studies of Sub-Arctic Seas* (ESSAS) share the goal of developing comparative studies of the sub-arctic seas and understanding how climate variability affects their productivity and ability to support sustainable commercial and subsistence harvests.
- PICES assisted in local arrangements for the First Annual Meeting of ESSAS (June 12-14, 2006, St. Petersburg, Russia) and provided travel funds to scientists from the PICES region to attend a workshop to develop comparative studies of the subarctic seas convened during the Annual Meeting.
- Drs. Kenneth Drinkwater and George Hunt (ESSAS SSC Co-Chairmen) attended PICES XV (October 13-22, 2006, Yokohama, Japan) as observers and addressed Council on potential areas of cooperation between ESSAS and its U.S. component for the Bering Sea (BEST) and PICES. ESSAS and BEST also had posters at this meeting outlining general information and highlighting scientific objectives and recent activities of both projects.
- Peer-review is completed for a special issue of *Progress in Oceanography* (Guest editors: K. Drinkwater, G. Hunt, D. Mackas and S. McKinnell) based on papers from the ESSAS Symposium on "*Climate variability and sub-arctic marine ecosystems*". The publication is expected in 2007.
- PICES co-sponsored the Second Annual Meeting of ESSAS (June 4-9, 2007, Hakodate, Japan) by providing travel fund to scientists from the PICES region to attend a workshops on "*The role of seasonal sea ice cover in marine ecosystems*" and meetings of the ESSAS Working Group 1 on *Regional Climate Prediction and* Working Group 3 on *Modeling Ecosystem Response* convened during the Annual Meeting.

Integrated Marine Biogeochemistry and Ecosystem Research (IMBER)

- The joint PICES/IMBER Topic Session on "*Interactions between biogeochemical cycles and marine foodwebs in the North Pacific*" was convened at PICES XV (October 13-22, 2006, Yokohama, Japan).
- Dr. Julie Hall (IMBER SSC Chairman) attended PICES XV as an observer and addressed Council on potential areas of cooperation between IMBER and PICES. IMBER also had a poster at this meeting outlining general information and highlighting scientific objectives and recent activities of the project;
- There is a strong interest in including issues of marine biogeochemistry and food webs that would link PICES with IMBER in a new PICES integrative scientific program to follow the CCCC Program.

Surface Ocean-Lower Atmosphere Study (SOLAS)

- Meso-scale iron enhancement experiments are an important part in the agenda of both SOLAS and PICES. Three international collaborative field projects were developed under the umbrella of PICES, through its Advisory Panel on the *Iron Fertilization Experiment in the Subarctic Pacific Ocean* (IFEP) established in 2000. SERIES (Subarctic Ecosystem Response to Iron Enrichment Study) was performed in the eastern subarctic Pacific in summer of 2002, and SEEDS-I and SEEDS-II (Subarctic Pacific Iron Experiment for Ecosystem Dynamics Study) were conducted in the western subarctic Pacific in the summers of 2001 and 2004, respectively.
- Important new findings from the first two experiments were published in *Science* (SEEDS-I: Tsuda *et al.* 2003, 300: 958-961) and *Nature* (SERIES: Boyd *et al.* 2004, 428: 549-553). More detailed results from these experiments can be found in special issues of *Prog. Oceanogr.* 2005. Vol. 64, Nos. 2-4, pp. 91-324 (SEEDS-I) and *Deep-Sea Research II*. 2006. Vol. 53, Nos. 20-22, pp. 2005-2454 (SERIES). The results of the SEEDS-II experiment are expected to be published as a special issue of *Deep-Sea Research II* in 2008.
- In order to attract a broad interest in the oceanographic community to meso-scale iron enhancement experiments in the subarctic Pacific, a summary paper of SEED-I, SEED-II and SERIES will be submitted to *Eos*, when the submission of original papers to the SEEDS-II special issue has been completed (presumably fall 2007).
- A joint PICES/SOLAS workshop on "*Modeling iron biogeochemistry and ocean ecosystems*" and a Topic Session on "*Synthesis of* in situ *iron enrichment experiments in the eastern and western subarctic Pacific*" were convened at PICES XV (October 13-22, 2006, Yokohama, Japan).
- Dr. Shigenobu Takeda (SOLAS SSC member) attended PICES XV as an observer and addressed Council on potential areas of cooperation between SOLAS and PICES. SOLAS also had a poster at this meeting outlining general information and highlighting scientific objectives and recent activities of the project;
- PICES agreed to provide travel support for young Asian scientists to attend the SOLAS Open Science Meeting (March 2007, Xiamen, People's Republic of China).
- PICES Science Board supported forming a new Working Group on *Natural iron fertilization and its impact on marine ecosystems in the North Pacific Ocean*, under the Biological Oceanography Committee. It is expected that TOR will be finalized and formally approved at PICES XVI (October 26-November 5, 2007, Victoria, Canada).

Global Ecology and Oceanography of Harmful Algal Blooms Program (GEOHAB)

- Responding to interest in sharing information from active science and management HAB programs in each of its member countries, and to achieve the appropriate level of coordination and collaboration among these countries, PICES established in 2003 a Section on *Harmful algal blooms and their impacts*. (see http://www.pices.int/members/sections/HAB.aspx for TOR and reports) It is expected that through this Section PICES will participate in international collaborations, including GEOHAB.
- In June 2005, IOC and PICES signed a formal agreement to establish a partnership in systematically compiling, storing and presenting on-line, records on harmful algal events. A similar agreement was also signed between IOC and ICES. Event records will be compiled and stored annually in the format specified in the harmful algal event database (HAE-DAT). HAE-DAT is hosted at the IOC server in Paris and presented with equal credit to the partner organizations (PICES and ICES). The HAE-DAT partnership is open to other appropriate and complementary regional organizations as to achieve global coverage of HAE-DAT. Building a common data resource will allow inter-comparison of HAB species composition and the magnitude of environmental and economic impacts;
- Since 2005, the PICES HAB Section has been convening an annual series of workshops, "*Review of selected harmful algae in the PICES region*", to document the existing knowledge on the eco-physiology of HAB species that impact all, or most, countries in the North Pacific. The previous workshops focused on *Pseudo-nitzschia* and *Alexandrium* (2005), *Dinophysis* and *Cochlodinium*

(2006). A workshop at PICES XVI (2007) will consider *Heterosigma akashiwo* and other harmful raphidophytes. GEOHAB is invited to play an active role in future workshops of this series.

- A Topic Session on "*Harmful algal blooms in the PICES region: New trends and potential links with anthropogenic influences*" was held on October 18, 2006, at PICES XV in Yokohama, Japan. A Topic Session on "*The relative contributions of off-shore and in-shore sources to harmful algal bloom development and persistence in the PICES region*", directly related to GEOHAB activities, will be convened on October 30, 2007, at PICES XVI in Victoria, Canada.
- A PICES summer school on "*Recent methods of investigating red-tide organisms and controlling red-tide*" (tentative title) is planned for August 2009, in Busan, Republic of Korea. SCOR is invited to co-sponsor this event.

OCEAN CARBON ACTIVITIES SUPPORTED BY SCOR

International Ocean Carbon Coordinated Project (IOCCP)

- IOCCP is working on establishing international agreements on observation methods, best practices, data management, and data sharing that will lead to the joint development of global data products and synthesis activities documenting the ocean carbon cycle. PICES, through its Working Groups on *CO_2 in the North Pacific* (WG 13, 1998-2001) and *Biogeochemical data integration and synthesis* (WG 17, 2002-2005), has been long acting as a regional coordinator for these activities. The PICES Section on *Carbon and Climate* (http://www.pices.int/members/sections/CC.aspx) provides clear channels of communication to IOCCP, and to large-scale programs such as SOLAS and IMBER.
- PICES, IOOCP and CDIAC (Carbon Dioxide Information Analysis Center) worked together to prepare the "*Guide to best practices for oceanic CO_2 measurements and data reporting*". This Guide will be published in the *PICES Scientific Report Series* in October 2007.
- A Topic Session on "*Decadal changes in carbon and biogeochemical systems in the North Pacific*" at PICES XVI will be held on October 30, 2007, at PICES XVI in Victoria, Canada. This session is directly related to IOCCP and IMBER activities.

SCOR WORKING GROUPS

Working Group 125 on *Global comparisons of zooplankton time series*

- PICES strongly supported the formation of the SCOR WG 125 on *Global Comparisons of Zooplankton Time Series* and agreed to provide funding for one additional member from the North Pacific (Dr. Harold P. Batchelder, Oregon State University, U.S.A.) to participate in its activities. Some future meetings of this SCOR WG 125 are planned to be held in conjunction with symposia organized/co-sponsored by PICES;

SCOR TRAVEL GRANT FOR PICES XVII

PICES is very grateful for continuing support from SCOR for our Annual Meetings. The 2006 SCOR General Meeting approved US$ 5,000 for travel of developing country scientists to PICES XVI (October 26-November 5, 2007, Victoria, Canada) for SCOR-relevant sessions/workshops, and we would like to request travel support at the level of US$ 6,000-10,000 for scientists from countries with "economies in transition" from the Pacific Rim to attend sessions/workshops of interest to SCOR at PICES XVII to be held October 23 - November 2, 2008, in Dalian, People's Republic of China. The overall theme for PICES XVI is "*Beyond observations to achieving understanding and forecasting in a changing North PacificForward to the future*". The scientific program for PICES XVII will be finalized at the upcoming PICES Annual Meeting in October 2007.