

SCOR and PICES: Continuing Connections

Report for the 2010 SCOR General Meeting September 13–16, 2010 Toulouse, France

The North Pacific Marine Science Organization (PICES) is an intergovernmental scientific organization established by the international convention in 1992 in order to promote and coordinate marine scientific research in the North Pacific and adjacent seas. Our current member countries are Canada, Japan, People's Republic of China, Republic of Korea, Russian Federation and the United States of America. Our goals are to (1) advance scientific knowledge and capacity available for the member countries, including information on human activities affecting, and affected by marine ecosystems, and (2) provide a mechanism for collaboration among scientists in addressing timely and critical scientific questions. In less than 20 years since its establishment, PICES became a major forum for marine science in the North Pacific. Information on the Organization and its activities can be found on the PICES website at <http://www.pices.int>.

SCOR and PICES are natural partners. Continuing and extending collaboration between the two organizations is based on the recognition that PICES could play an important role in bringing a North Pacific perspective to the global activities of SCOR, and that by participating in these activities, PICES could advance its own scientific agenda. PICES contributes to SCOR-sponsored international large-scale ocean research projects, to ocean carbon activities supported by SCOR, and to several SCOR Working Groups. To discuss ongoing and future collaborations between the two organizations, SCOR and PICES continue to regularly exchange observers at each others annual meetings. Drs. Wolfgang Fennel (President of SCOR) and Ed Urban (Executive Director of SCOR) attended the 2009 PICES Annual Meeting (Jeju, Korea). Dr. Alexander Bychkov (PICES Executive Secretary) will attend the 2010 SCOR General Meeting (Toulouse, France), and Dr. Fennel is planning to participate in the 2010 PICES Annual Meeting (Portland, U.S.A.).

LARGE-SCALE OCEAN RESEARCH PROGRAMS CO-SPONSORED BY SCOR

By the invitation from SCOR, PICES was represented (by Dr. Michael Dagg, PICES Biological Oceanography Committee Chairman) at the Third SCOR Project Summit (April 2009, Newark, U.S.A.) to discuss common opportunities and challenges in interactions between large-scale international ocean research projects and organizations that sponsor such projects. Dr. Dagg informed the participants on the level of interaction between PICES and SCOR-supported ocean research projects and, after the summit completion, reported to PICES on expectations by projects from intergovernmental organizations.

Global Ocean Ecosystem Dynamics project (GLOBEC)

- The PICES Climate Change and Carrying Capacity (CCCC) Program provided a mechanism for integrating national GLOBEC or GLOBEC-like research programs in the North Pacific and was a regional component of the international GLOBEC effort. Results from the CCCC Program were included in several chapters of the GLOBEC Synthesis Book on “*Marine Ecosystems and Global Change*” published in 2010. A special issue of *Progress in Oceanography* resulted from the PICES/GLOBEC Symposium on “*Climate variability and ecosystem impacts on the North Pacific: A basin-scale synthesis*” and published in June 2008 (Vol. 77, Nos. 2–3, pp. 83–268; Guest Editors: H. Batchelder and S. Kim) (April 19–21, 2006, Honolulu, U.S.A.) is also considered as a part of GLOBEC synthesis effort.
- Dr. Manuel Barange (GLOBEC Executive Director) attended PICES-2009 as an observer and briefed the FUTURE Advisory Panel on *Status, Outlooks, Forecasts, and Engagement* (SOFE) on GLOBEC activities related to international engagement and knowledge transfer.
- PICES co-sponsored the Third GLOBEC Open Science Meeting (June 22–26, 2009, Victoria, Canada) by (1) providing travel support for invited speakers from the Pacific (\$10,000) and for early career scientists from PICES member countries (\$5,000), and (2) assisting in local arrangements for this event held at the location of the PICES Secretariat.

Integrated Marine Biogeochemistry and Ecosystem Research (IMBER)

- Issues of marine biogeochemistry and food webs are important components of the new integrative scientific program of PICES on “*Forecasting and Understanding Trends, Uncertainty and Responses of North Pacific Ecosystems*” (FUTURE). FUTURE was invited to become a Contributing Project to IMBER.
- Several joint PICES/IMBER Topic Sessions were convened at PICES Annual Meetings (IMBER provided travel funds for an additional invited speaker):
 - “*End-to-end foodwebs: Impacts of a changing ocean*” – session at PICES-2008 (Dalian, PR China);
 - “*Outlooks and forecasts of marine ecosystems from an earth system science perspective: Challenges and opportunities*” – session at PICES-2009 (Jeju, Korea);
 - “*Anthropogenic forcing in North Pacific coastal ecosystems: Understanding changes in ecosystem structure and function*” – session at PICES-2010 (Portland, U.S.A.).
- PICES co-sponsored the International Summer School on “*ClimECO2: Oceans, Marine ecosystems, and society facing climate change - A multidisciplinary approach*” by providing travel funds and arranging additional support (through national programs/agencies) for 9 early career scientists from PICES member countries (Canada - 1, Japan - 1, Korea - 2, PR China - 2, Russia - 1, and U.S.A. - 2).
- PICES agreed to co-sponsor the 2010 IMBER IMBIZO on “*Integrating biogeochemistry and ecosystems in a changing ocean: Regional comparisons*” (October 2010, Crete, Greece) by providing travel support for 3 invited speakers from the North Pacific.
- PICES and ESSAS (*Ecosystem Studies of Subarctic Seas*), a regional program initiated by GLOBEC in 2005 and moved under IMBER since 2009, share the goal of developing comparative studies of the subarctic seas and understanding how climate variability affects their productivity and ability to support sustainable commercial and subsistence harvests.
 - PICES and ESSAS organized a series of joint workshops on “*Marine ecosystem model inter-comparisons*” convened in conjunction with PICES Annual Meetings.
 - PICES agreed to provide organizational support for the ESSAS Open Science Meeting on “*Comparative studies of climate effects on polar and sub-polar ocean ecosystems: Progress in observation and prediction*” to be held May 22–26, 2011, in Seattle, U.S.A. This support includes: maintaining the OSM website, handling on-line registration and abstract submission, compiling the book of abstracts, and arranging the logistics for the venue.

Surface Ocean-Lower Atmosphere Study (SOLAS)

- The main research area for collaboration between PICES and SOLAS has been impact of iron on biogeochemistry and marine ecosystems. PICES, through its Advisory Panel on the *Iron Fertilization Experiment in the Subarctic Pacific Ocean* (IFEP-AP; 1999–2007), and now through Working Group on *Iron Supply and its Impact on Biogeochemistry and Ecosystems in the North Pacific Ocean* (WG-22; 2007–present), has long been acting as a regional coordinator for these activities. Terms of reference for WG 22 are closely linked with those of SOLAS Implementation Group 1 on *Biogeochemical Interactions and Feedbacks between Ocean and Atmosphere*.
- A set of 19 papers resulting from the Second Subarctic Pacific Iron Experiment for Ecosystem Dynamics Study (SEEDS-II; 2004) developed under the umbrella of IFEP-AP and SOLAS-Japan was published as a special issue of *Deep-Sea Research II* (Guest editors: M. Uematsu, M. Wells, A. Tsuda and H. Saito) in 2009 (Vol. 56, No. 26, pp. 2731–2957). The results from the two previous meso-scale iron enrichment experiments in the Subarctic Pacific, SEEDS-I (2001) and SERIES (Subarctic Ecosystem Response to Iron Enrichment Study; 2002), were published in special issues of *Progress in Oceanography* (2005, Vol. 64, Nos. 2–4, pp. 91–324) and *Deep-Sea Research II* (2006, Vol. 53, Nos. 20–22, pp. 2005–2454), respectively.
- Several joint PICES/SOLAS workshops and Topic Sessions were convened at PICES Annual Meetings (SOLAS provided travel funds for an additional invited speaker):
 - “*Modeling iron biogeochemistry and ocean ecosystems*” – workshop at PICES-2006 (Yokohama, Japan);
 - “*Natural supplies of iron to the North Pacific and linkages between iron supply and ecosystem responses*” – workshop at PICES-2009 (Jeju, Korea);
 - “*Understanding the role of iron in regulating biogeochemical cycles and ecosystem structures in the North Pacific Ocean*” – session at PICES-2010 (Portland, U.S.A.).

- The final report of WG-22 to be published in 2011 will include:
 - data sets of iron and related parameters in the North Pacific;
 - descriptions on the natural supplies of iron to the North Pacific, and linkages between iron supply and ecosystem responses;
 - basic questions and hypothesis for future Fe-related activities in the North Pacific;
 - proposal of national and international scientific programs for testing the hypothesis;
 - extended abstracts from the WG-22 workshops/sessions.

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

- PICES is communicating with various international HAB programs, including GEOHAB and IPHAB (UNESCO-IOC International Panel on Harmful Algal Blooms), through the Section on *Ecology of Harmful Algal Blooms in the North Pacific* (HAB-S) established in 2003.
 - 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. Event records are compiled and stored annually in the format specified in the **Harmful Algal Event Database** (HAE-DAT). The HAE-DAT partnership is open to other appropriate and complementary regional organizations so as to achieve global coverage. Building a common data resource allows inter-comparison of HAB species composition and the magnitude of their environmental and economic impacts.
 - A 5-year PICES Seafood Safety Project was initiated in 2007 in order to (1) assist in the prevention of impacts of harmful aquatic organisms on fisheries and ecosystems, and (2) build the capacity of scientists studying this topic in developing countries in the Pacific Rim:
 - The Project is funded by a voluntary contribution from Japan's Ministry of Agriculture, Forestry and Fisheries (MAFF), and is conducted by HAB-S, with Dr. Vera Trainer (U.S.A), who is co-chairing this Section, as PI.
 - The Project focuses on teaching country-specific training courses most required to ensure seafood safety in Pacific countries outside the PICES region, *i.e.*, in Southeast Asia and Central/South America. PICES has partnered with IOC to determine [through to a questionnaire distributed via the IOC network] countries which have the greatest need and a strong interest in improving HAB monitoring and testing, and a commitment to sustainability.
 - The following training courses were conducted or planned:
 - Manila, Philippines, January 15–23, 2009: training in screening methods for testing shellfish for PSP toxins (14 participants) and phytoplankton identification, with specific focus on harmful species in the Philippines (33 participants), and introduction to on-line HAB databases;
 - Guatemala City (31 participants) and San Jose (17 Participants), Guatemala, February 15–19, 2010: training in screening methods for testing shellfish for PSP toxins and phytoplankton identification, with specific focus on harmful species in Guatemala (33 participants), and introduction of basic concepts in oceanography as there is no oceanography program in all of Guatemala;
 - Guatemala City (8 participants), Guatemala, April 26–29, 2010: training on High Performance Liquid Chromatography and Mass Spectrometry for detection of domoic acid and saxitoxins;
 - University of South Pacific, Fiji, early 2011: training course is under planning for the entire South Pacific Islands (22 nations).
 - Since 2005, HAB-S 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. These workshops are normally preceded by a laboratory demonstration on cell and toxin identification and detection methods/technique. This series will continue, and GEOHAB is invited to play an active role in the future workshops.
 - Since 2006, HAB-S has been convening Topic Sessions at PICES Annual Meetings. Examples include:
 - “*Species succession and long-term data set analysis pertaining to HABs*” at PICES-2008 (Dalian, PR China);
 - “*Mitigation of harmful algal blooms*” at PICES-2009 (Jeju, Korea);
 - “*Conceptual and numerical models of HAB dynamics*” at PICES-2010 (Portland, U.S.A.); Dr. Wolfgang Fennel is one of invited speakers for this session.
- GEOHAB is invited to propose topics and play an active role in organizing future sessions.

OCEAN CARBON ACTIVITIES SUPPORTED BY SCOR

The International Ocean Carbon Coordinated Project (IOCCP), co-sponsored by SCOR and IOC, 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 *CO₂ in the North Pacific* (WG-13; 1998–2001) and *Biogeochemical Data Integration and Synthesis* (WG-17; 2002–2005), and now through the Section on *Carbon and Climate* (CC-S; 2006–present), has been long acting as a regional coordinator for these activities. The Section on *Carbon and Climate* provides channels of communication to IOCCP. IOCCP is normally represented as an observer at PICES Annual Meetings. Dr. Christopher Sabine (IOCCP SSC Chairman and CC-S member) serves as a liaison between these two groups.

- CC-S scientific sessions:
 - PICES-2007 Topic Session on “*Decadal changes in carbon and biogeochemical systems in the North Pacific*” (Victoria, Canada)
 - PICES/ICES Theme Session on “*The effects of ocean acidification on fisheries and ecosystems*” at the 2008 SCOR/IOC/IAEA/IGBP Symposium on “*The ocean in a high CO₂ world – II*” (Monaco)
 - PICES-2009 Topic Session on “*Anthropogenic perturbations of the carbon cycle and their impacts in the North Pacific*” (Jeju, Republic of Korea)
- CC-S publications:
 - PICES/SCOR/IOC “*Guide to Best Practices for Ocean CO₂ Measurements*” (December 2007, PICES Special Publication No. 3 and IOCCP Report No. 8); The Guide is available on-line from the Carbon Dioxide Information Analysis Center (CDIAC) web-site in individual chapters or as a whole document. Hard copies are also available upon request from PICES and CDIAC. To increase the use of the Guide, volunteers are being sought to assist with translations of the Guide to languages other than English. The Korean and Chinese translations of the Guide were published in 2010.
 - Special section on “*PICES North Pacific Carbon Synthesis*” in a regular issue of *Journal of Oceanography* (September 2009, Vol. 65, No. 5) based on selected papers from the PICES-2007 Topic Session;
 - Special section on “*Anthropogenic Perturbations of the Carbon Cycle in the North Pacific*” in a regular issue of *Journal of Oceanography* (spring 2011, Vol. 67) based on selected papers from the PICES-2009 Topic Session.
- CC-S data synthesis:

The PACIFICA data synthesis project (database of water-column CO₂-related parameters for the Pacific Ocean) is the most ambitious and significant work of CC-S. By comparison with previous efforts such as GLODAP and CARINA, PACIFICA contains an unprecedented amount of temporal information, which will create opportunities for interdisciplinary studies of future ocean change in the context of past variability and change. The project has progressed very rapidly over the past two years, through the series of workshops (3) on “*Carbon data synthesis*” (the next workshop to finalize all corrections to individual data sets will be held at PICES-2010), and is expected to be completed in 2011. The project’s legacy will include data products accessible to the broader community as well as publications.
- CC-S contribution to PICES integrative science program FUTURE:
 - *productivity and hypoxia*: address a broad spectrum of issues relating ocean circulation and biogeochemical cycles to ecosystem structure and function (*e.g.*, CO₂ uptake, anoxia impacts on shelf benthic fisheries)
 - *ocean acidification*: address both feedbacks of CO₂-induced acidification on future CO₂ uptake and acidification impacts on the broader ecosystem
- By the invitation of the organizers, PICES convened, jointly with ICES, a Theme Session on “*The effects of ocean acidification on fisheries and ecosystems*” at the 2008 Symposium on “*The ocean in a high CO₂ world – II*” (Monaco). PICES (through CC-S) is going to submit a proposal to the International Planning Committee for a session to be convened at the 2012 Symposium on “*The ocean in a high CO₂ world – III*” (Monterey, U.S.A.).

SCOR WORKING GROUPS

- SCOR WG 125 on *Global Comparisons of Zooplankton Time Series*:
 - PICES strongly supported the formation of SCOR WG 125 and funded an associate member from the North Pacific (Dr. Harold Batchelder, Oregon State University, U.S.A.) to participate in its activities.
 - Two meetings of this WG were held in conjunction with international symposia co-organized by PICES, the 2007 Zooplankton Production Symposium on “*Human and Climate Forcing of Zooplankton Populations*” (Hiroshima, Japan) and the 2009 Symposium on “*Effects of Climate Change on the World’s Oceans*” (Gijón, Spain).
 - A workshop on “*Zooplankton and climate: Response modes and linkages among regions, regimes, and trophic levels*” was also convened in conjunction with the 2009 Gijón Symposium, and another workshop on “*Updates and comparisons of zooplankton time series*” is planned for the 2011 PICES/ICES Zooplankton Production Symposium on “*Population Connections, Community Dynamics, and Climate Variability*” (Pucón, Chile).
- SCOR WG 130 on *Automatic Plankton Visual Identification*:
 - A meeting of SCOR WG 130 and a workshop on “*Automatic plankton visual identification*” will be held in conjunction with the 2011 PICES/ICES Zooplankton Production Symposium.
- SCOR WG 131 on *The Legacy of in situ Iron Enrichment: Data Compilation and Modeling*:
 - Terms of reference for PICES Working Group 22 on *Iron Supply and its Impact on Biogeochemistry and Ecosystems in the North Pacific Ocean* include compiling and synthesizing available iron biogeochemistry data in the North Pacific, and data sets of iron and related parameters in the North Pacific will be included in the WG 22 final report to be published in 2011. These activities are closely linked to the mandate of SCOR WG 131 to develop a database for open access of the completed iron-enrichment experiments.
- SCOR WG 137 on *Patterns of Phytoplankton Dynamics in Coastal Ecosystems: Comparative Analysis of Time-Series Observations*:
 - There are many phytoplankton data sets from diverse parts of the globe that warrant a comparative examination, and SCOR WG 137 was seen as a logical methodological continuation of SCOR WG 125. PICES strongly supported the establishment of SCOR WG 137 and agreed to finance an associate member from the North Pacific (Dr. Sinjae Yoo, Korea Ocean Research and Development Institute, Republic of Korea) to participate in its activities.

SCOR CAPACITY BUILDING

- PICES appointed a liaison (Dr. George Boehlert, U.S. national delegate to PICES Governing Council) to the SCOR Committee on Capacity Building and participated in the SCOR-led meeting to discuss a global capacity building strategy for ocean science.
- SCOR continues to provide travel support for scientists from countries with “economies in transition” to attend SCOR-relevant sessions/workshops at PICES Annual Meetings and international symposia led/co-organized by PICES. In 2010, \$5,000 US from the SCOR/NSF fund were allocated for each of the following two events:
 - PICES/ICES/FAO Symposium on “*Climate Change Effects on Fish and Fisheries: Forecasting Impacts, Assessing Ecosystem Responses, and Evaluating Management Strategies*” convened from April 26–29, 2010, in Sendai, Japan. The symposium (more than 300 abstracts presented by 337 scientists from 37 countries) provided an opportunity for scientists and policymakers to discuss the potential effects of climate change on marine ecosystems and strategies that society can take to be prepared for anticipated impacts on fish and fisheries. Selected papers from the symposium (61 papers were submitted) will be published as a special issue of *ICES Journal of Marine Science* in 2011, with sufficient time for them to be considered by review panels responsible for the next assessment report (AR5) of the Intergovernmental Panel on Climate Change (IPCC).
 - PICES Annual Meeting to be held under the theme “*North Pacific Ecosystems Today, and Challenges in Understanding and Forecasting Change*” (October 22–31, 2010, Portland, U.S.A.).

REQUESTS FOR CONSIDERATION BY SCOR

- On behalf of PICES:
 - Travel support at the level of US\$5,000–7,500 is requested for scientists from countries with “economies in transition” from the Pacific Rim to attend SCOR-relevant sessions/workshops at the 2011 PICES Annual Meeting to be held October 14–22, 2011, in Khabarovsk, Russia, under the theme “*Mechanisms of marine ecosystem reorganization in the North Pacific Ocean*”. The scientific program for this event will be finalized in October 2010 at PICES-2010.
- On behalf of symposium organizers:
 - Travel support at the level of US\$10,000 is requested for scientists from countries with “economies in transition” to attend the 5th Zooplankton Production Symposium on “*Population Connections, Community Dynamics, and Climate Variability*” to be held in March 2011, in Pucón, Chile. The first three symposia in this series were held in Europe (in 1961 in Charlottenlund, Denmark; in 1994 in Plymouth, UK, and in 2003 in Gijón, Spain,) and the most recent took place in Asia (in 2007 in Hiroshima, Japan). These symposia have become major events with a significant effect on the direction and effectiveness of plankton research worldwide, and the publications resulting from the symposia have had broad impact. The 2011 symposium is the first one to be held in the Southern Hemisphere, and as such it represents an important opportunity to further develop the truly international nature of zooplankton research. We expect that this symposium will provide a forum to discuss zooplankton and their role in the global ecosystem. Two workshops at the symposium, on “*Updates and comparisons of zooplankton time series*” and “*Automatic plankton visual identification*” will be led by SCOR WG 125 and WG 130. The current status of preparations for the symposium can be reviewed at <http://www.pices.int/zooplankton2011.aspx>. Substantial funding for the symposium was expected from the local sources, but after the recent earthquake/tsunami it is very uncertain. In this situation, your support is becoming even more critical.