

## SCOR and PICES: Continuing Connections

### Report for the 2013 SCOR Executive Committee Meeting November 25–28, 2013, Wellington, New Zealand

The North Pacific Marine Science Organization (PICES) is an intergovernmental scientific organization established by an 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 slightly more than 20 years since its establishment, PICES has become 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>.

Continuing and expanding collaboration between the two organizations is based on the recognition that PICES can play an important role in bringing a North Pacific perspective to the global activities of SCOR, and that by participating in and implementing these activities in the region, PICES can advance its own scientific agenda.

To discuss on-going and future collaborations, SCOR and PICES continue to regularly exchange observers at each others' annual/executive meetings. In recent years, SCOR was represented at PICES-2009 (Jeju, Korea) by Drs. Wolfgang Fennel (President of SCOR) and Ed Urban (Executive Director of SCOR), at PICES-2010 (Portland, USA) by Dr. Fennel, and at PICES-2012 (Hiroshima, Japan) by Dr. Satoru Taguchi (Vice-President of SCOR). Dr. Alexander Bychkov (PICES Executive Secretary) attended the 2010 SCOR General Meeting (Toulouse, France) and the 2011 SCOR Executive Committee Meeting (Helsinki, Finland).

This report provides an update on PICES-SCOR collaboration since the 2012 SCOR General Meeting.

#### **LARGE-SCALE OCEAN RESEARCH PROJECTS CO-SPONSORED BY SCOR**

PICES contributes to SCOR-sponsored international large-scale ocean research projects, particularly IMBER and SOLAS (and GLOBEC before it was completed), by: (1) convening joint sessions/workshops with the projects at PICES Annual Meetings, (2) co-sponsoring symposia/workshops, (3) assisting projects having North Pacific activities with meeting logistics, and (4) contributing to participation of early-career scientists from the North Pacific region in projects' activities.

#### ***Integrated Marine Biogeochemistry and Ecosystem Research (IMBER)***

##### Joint sessions/workshops at PICES Annual Meetings

- PICES and IMBER have convened joint topic sessions at every PICES Annual Meeting since 2008, and IMBER has provided travel funds for an additional invited speaker for each of these sessions. The following sessions were organized in 2012–2013:
  - “*Changing ocean biogeochemistry and its ecosystem impacts*” (PICES-2012, Hiroshima, Japan);
  - “*Marine ecosystem services and the contribution from marine ecosystems to the economy and human well-being*” (PICES-2013, Nanaimo, Canada).
- The next PICES Annual Meeting will be held October 17–26, 2014, in Yeosu, Korea. The overall theme for PICES-2014 will be “*Toward a better understanding of the North Pacific: Reflecting on the past and steering for the future*”. IMBER was invited to co-sponsor a session/workshop at PICES-2014.

##### Co-sponsored symposia/conferences/workshops

- PICES co-sponsored IMBER IMBIZO III on “*Multi-dimensional approaches to the challenges of global change in continental margins and open ocean systems*” (January 28–31, 2013, Goa, India) by providing travel support for 3 invited speakers from the North Pacific for the workshops on “*Biogeochemistry-ecosystem interactions on changing continental margins*” and “*Understanding and forecasting human-ocean-human interactions, drivers and pressures, with respect to global change*”.

- PICES will co-sponsor a Topic Session on “*Responses of society to marine and global changes as a core mandate for IMBER: ways forward*” to be convened at the IMBER Open Science Conference (June 23–28, 2014, Bergen, Norway) by covering travel expenses for a convenor and a keynote speaker from the North Pacific.
- IMBER co-sponsored the 2<sup>nd</sup> PICES/ICES/IOC Symposium on “*Effects of climate change on the world’s oceans*” (May 13–20, 2012, Yeosu, Korea) and will be invited to co-sponsor the 3<sup>rd</sup> Symposium in this series to be held March 23–27, 2015, Santos, Brazil.

#### Capacity building activities

- IMBER co-sponsored the 2013 PICES Summer School on “*Ocean observing systems and ecosystem monitoring*” (August 19–23, 2013, Newport, Oregon, USA) by providing travel support for 3 early career scientists from PICES member countries.
- PICES agreed to co-sponsor the IMBER ClimECO4 Summer School on “*Delineating the issues of climate change and impacts to marine ecosystems: Bridging the gap between research, assessment, policy and management*” (August 4–9, 2014, Shanghai, China) by providing travel funds and arranging additional support (through national programs/agencies) for early career scientists from PICES member countries.

#### Regional Program level

- PICES Program on Forecasting and Understanding Trends, Uncertainty and Responses of North Pacific Marine Ecosystems (FUTURE)
  - Issues in marine biogeochemistry and food webs are important components of the second integrative scientific program of PICES, FUTURE ([http://www.pices.int/members/scientific\\_programs/FUTURE/FUTURE-main.aspx](http://www.pices.int/members/scientific_programs/FUTURE/FUTURE-main.aspx)). The first FUTURE Open Science Meeting (OSM) will be held in April 2014, and contributions from IMBER and its regional programs to this meeting are expected.
- IMBER Regional Program on Ecosystem Studies of Sub-Arctic Seas (ESSAS)
  - PICES and ESSAS share the goal of using a comparative approach in developing predictions of how climate variability and change affect, and will affect, the sustainability of goods and services obtained from Sub-Arctic seas.
  - A joint ESSAS/PICES workshop on “*Subarctic–Arctic interactions*” was convened at PICES-2012.
  - A PICES/ESSAS special issue of *Progress in Oceanography* on “*Modeling and observational approaches to understanding marine ecosystem dynamics*” (Guest Editors: E. Curchitser, S.I. Ito, M. Kishi, M. Peck and K. Rose) will be published electronically in late 2014 and hard copy in early 2015.
- IMBER Regional Program on CLimate Impacts on Oceanic TOP Predators (CLIOTOP)
  - PICES co-sponsored a CLIOTOP special session on “*Global science for global governance of oceanic ecosystems and fisheries*” at the Planet Under Pressure Conference (March 26–29, 2012, London, UK) by providing travel support for an invited speaker from the North Pacific.
  - CLIOTOP will co-sponsor the workshop on “*Top predators as indicators of climate change: statistical techniques, challenges and opportunities*” to be held in conjunction with the FUTURE OSM by covering travel expenses for an invited speaker on climate change and food security in the Pacific.

#### Expert Group level

- Human dimensions expert groups established by IMBER ([Working Group on Human Dimensions](#), HDWG) and PICES ([Section on Human Dimensions](#), S-HD) have same motivations, similar objectives, identical challenges, and overlapping membership (Drs. Mitsutaku Makino and Ian Perry are members of both groups) and are well set to work together to more effectively implement their tasks.
  - Dr. Alida Bundy (HDWG Co-Chair) gave an invited talk, “*Communication is a two-way process: Bringing science to the people and people to the science*”, at the PICES-2013 Science Board Symposium on “*Communicating forecasts, uncertainty and consequences of ecosystem change*”.
  - A joint HDWG/S-HD Topic Session on “*Responses of society to marine and global changes as a core mandate for IMBER: ways forward*” will be convened at the IMBER Open Science Conference.

#### Representation

- To maintain close relations, IMBER and ESSAS are normally present as observers at PICES Annual Meetings. Dr. Sinjae Yoo (IMBER SSC member) and Drs. Franz Mueter and Sei-ichi Saitoh (ESSAS SSC Co-Chairs) represented these projects at PICES-2013.

## ***Surface Ocean-Lower Atmosphere Study (SOLAS)***

### Joint sessions/workshops at PICES Annual Meetings

- PICES and SOLAS have convened joint topic sessions and workshops at PICES Annual Meeting since 2006, and SOLAS has provided travel funds for an additional invited speaker/convenor for each of these events. The following sessions were organized in 2012–2013:
  - “*Ecosystem responses to multiple stressors in the North Pacific*” (PICES-2012, Hiroshima, Japan);
  - “*Changing ocean biogeochemistry and its ecosystem impacts*” (PICES-2012, Hiroshima, Japan);
  - “*The changing carbon cycle of North Pacific continental shelves and marginal seas*” (PICES-2013, Nanaimo, Canada).
- A workshop on “*SOLAS into the future: Designing the next phase of the Surface Ocean-Lower Atmosphere Study within the context of the Future Earth Program*” is included in the program for PICES-2014 (October 17–26, 2014, Yeosu, Korea). PICES will provide travel support for an invited speaker for the workshop.
- SOLAS was invited to consider a possibility of co-sponsoring other PICES-2014 sessions/workshops relevant to the objectives and activities of the project.

### Capacity building activities

- SOLAS co-sponsored the 2013 PICES Summer School on “*Ocean observing systems and ecosystem monitoring*” (August 19–23, 2013, Newport, Oregon, USA) by providing travel support for 2 early career scientists from PICES member countries.
- PICES co-sponsored the 6<sup>th</sup> SOLAS Summer School (August 23–September 2, 2013, Xiamen, China) by providing travel funds for 3 students/early career scientists from PICES member countries.

### Representation

- SOLAS is normally present as observers at PICES Annual Meetings. Drs. Lisa Miller (SOLAS SSC member) represented SOLAS at PICES-2012 and PICES-2013.

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

### Co-sponsored symposia/conferences/workshops

- PICES partnered with GEOHAB (with ICES and NOAA as other sponsors) in organizing and funding the workshop on “*Harmful algal blooms in a changing world*” (March 18–22, 2013, Friday Harbor, WA, U.S.A.) to assess the state of knowledge on HABs and climate change, and to identify the most critical research needs that can realistically be addressed over the next 5–10 years. The workshop findings are now being integrated in a manuscript to be published in the international peer-reviewed journal *Harmful Algae*. A brief [summary of the workshop](#) was published in the summer 2013 issue of PICES Press.
- The topic areas identified by the workshop participants are expected to serve as the foundation for an Open Science Meeting on “*Harmful algal blooms and climate change*” to be convened in 2015 (as a separate meeting or in conjunction with the 3<sup>rd</sup> International Symposium on “*Effects of climate change on the world’s oceans*”), potentially with support from PICES, SCOR, IOC and ICES.

## **OCEAN CARBON ACTIVITIES SUPPORTED BY SCOR**

### Communication/coordination

- PICES, through its Working Groups on *CO<sub>2</sub> 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](#) (S-CC), has been long acting as a coordinator for synthesis of ocean carbon research and the development of a network of ocean carbon observations in the North Pacific. The importance of ensuring effective two-way communication with other international scientific groups that have a responsibility for the coordination of ocean carbon research, such as the SCOR/IOC International Ocean Carbon Coordinated Project (IOCCP) and to the SOLAS/IMBER Carbon (SIC) Research Working Group, has been explicitly included in the terms of reference for S-CC. There are S-CC members on each of SIC’s subgroups: Dr. Toshiro Saino serves on the subgroup 1 on *Surface Ocean System*, Dr. Masao Ishii is on the subgroup 2 on *Interior Ocean Carbon*, and Drs. Richard Feely and Minhan Dai are members of the subgroup 3 on *Ocean Acidification*. Two S-CC members, Drs. Masao Ishii and Alex Kozyr, are also members of the IOCCP Scientific Steering Group.

### S-CC activities

- The following scientific sessions were organized and led by S-CC in 2012–2013:
  - Two Theme Sessions, “*Changes in the marine carbon cycle*” and “*Trend and impacts of de-oxygenation in oceanic and coastal ecosystems*”, at the 2<sup>nd</sup> International Symposium on “*Effects of climate change on the world’s oceans*”;
  - PICES/ICES/IMBER/SOLAS Topic Session on “*Changing ocean biogeochemistry and its ecosystem impacts*” at PICES-2012;
  - PICES/SOLAS Topic Session on “*The changing carbon cycle of North Pacific continental shelves and marginal seas*” at PICES-2013.
- The most significant undertaking of S-CC is the data synthesis project known as PACIFICA. PACIFICA has collected biogeochemical data (DIC, TA, nutrients, oxygen, salinity) from more than 200 cruises in the Pacific and implemented a set of algorithms for crossover analysis that permitted the construction of a basin-wide, consistently calibrated data set. The PACIFICA algorithms were adapted from CARINA and implemented by Dr. Toru Suzuki (Japan). The [data product](#) was published in early 2013.
- The REgional Carbon Cycle Assessment and Processes (RECCAP) project is an international effort to develop a global carbon budget, synthesizing ocean, terrestrial, and atmospheric carbon studies. S-CC members Drs. Masao Ishii and Richard Feely are leading the [ocean carbon synthesis effort for the Pacific](#). PACIFICA data played an important role in the Pacific Ocean synthesis.
- [SOCAT](#) is “a collection of underway ocean CO<sub>2</sub> observations quality controlled by the science community”. Eight S-CC members contributed to SOCAT as data contributors and/or participants in data quality control and the development of the data product.
- The main S-CC goals for 2014–2016 include:
  - To complete publication of scientific analyses arising from PACIFICA data synthesis;
  - To develop data syntheses or products related to ocean acidification and de-oxygenation and their biological and ecosystem impacts in support of FUTURE objectives;
  - To develop strategy for assessment of the carbon cycle in coastal oceans and marginal seas of the North Pacific (data syntheses, data products, documentation of methods).

### **SCOR WORKING GROUPS**

PICES regularly provides comments on SCOR Working Group proposals and then recommends and funds an Associate Member for PICES-relevant groups. The support from PICES extends the expertise available within the group, increases the geographic coverage of the groups, and helps individual scientists from the North Pacific become more involved in SCOR activities, which benefits both organizations. Periodically, SCOR Working Groups meet in conjunction with PICES Annual Meetings or symposia led/co-organized by PICES. Examples include: (1) a 1-day SCOR WG 125 workshop on “*Zooplankton and climate: response modes and linkages among regions, regimes, and trophic levels*” convened in conjunction with the 1<sup>st</sup> PICES/ICES/IOC Symposium on “*Effects of climate change on the world’s oceans*” (May 2008, Gijón, Spain) and a ½-day SCOR WG 125 workshop on “*Updates and comparisons of zooplankton time series*” held in conjunction with the 5<sup>th</sup> PICES/ICES Zooplankton Production Symposium (March 2011, Pucón, Chile); (2) a ½-day SCOR WG 130 workshop on “*Automated visual plankton identification*” held also in Pucón, Chile; and (3) a 2-day SCOR/PICES workshop on “*Global patterns of phytoplankton dynamics in coastal ecosystems*” and a 1-day SCOR WG 137 meeting convened in conjunction with PICES-2012 (Hiroshima, Japan);

- PICES currently supports Associated Members for two SCOR Working Groups:
  - WG 137 on *Patterns of Phytoplankton Dynamics in Coastal Ecosystems: Comparative Analysis of Time Series Observation* (Dr. Sinjae Yoo, Korea);
  - WG 140 on *Biogeochemical Exchange Processes at the Sea-Ice Interfaces* (Dr. Lisa Miller, Canada).
- PICES Standing Committees reviewed the SCOR Working Group proposals for 2013 from the view point of their scientific interests and relevance to the PICES integrative science program, FUTURE, and recommended the establishment of the following groups:
  - WG on *Standard Protocols for the Development of an Atlas of Marine Plankton Biogeography*;
  - WG on *Zooplankton Production Measurement Methodologies and Their Application*;
  - WG on *Studying Ocean Acidification Effects on Continental Margin Ecosystems*.

PICES would be prepared to consider nominating and supporting an Associate Member to any of these Working Groups, if approved.

- The PICES Governing Council supported the creation of joint expert groups as an important direction of actual collaboration. It is worthwhile to explore the possibility of establishing a Working Group jointly-sponsored by SCOR and PICES. The key would be to develop ideas with both regional and global interest and to accommodate the differences in SCOR and PICES approaches to the appointments of members and funding of Working Groups. We suggest that the SCOR Secretariat and PICES Secretariat work together to develop options for consideration at the 2014 SCOR General meeting and PICES-2014.

#### **CAPACITY BUILDING**

- SCOR and PICES have long-standing cooperation in capacity building.
  - SCOR continues to provide travel support for scientists from countries with “economies in transition” to participate in SCOR-relevant sessions/workshops at PICES Annual Meetings and international symposia and capacity building events led/co-organized by PICES. In 2013, US\$5,000 from the SCOR/NSF fund was provided to each of the following two events: PICES Summer School on “*Ocean observing systems and ecosystem monitoring*” (August 19–23, 2013, Newport, Oregon, USA) and 2013 PICES Annual Meeting (October 10–20, 2013, Nanaimo, Canada).
  - PICES continues to provide travel support for students and early career scientists from PICES member countries to the summer schools and meetings of SCOR-sponsored large-scale research projects.
- SCOR and PICES have shared ideas on capacity building, and a PICES representative has participated on the SCOR Committee on Capacity Building. Dr. Harold Batchelder (U.S. national delegate to the Governing Council) serves in this capacity from September 2012.
- SCOR extended an invitation for PICES to join the [SCOR Visiting Scholars Program](#) and/or the [POGO-SCOR Fellowship Program for Operational Oceanography](#). The Governing Council was interested in this proposal and instructed the Executive Secretary to explore these Programs and provide options for decision at PICES-2014.

#### **REQUESTS FOR CONSIDERATION BY SCOR**

- Travel support at a level of US\$5,000–7,500 is requested for scientists from countries with “economies in transition” to attend SCOR-relevant sessions/workshops at the [2014 PICES Annual Meeting](#) to be held October 17–26, 2014, in Yeosu, Korea, under the theme “*Toward a better understanding of the North Pacific: Reflecting on the past and steering for the future*”.
- A contribution at a level of US\$5,000–7,500 is requested to support participation of early career scientists in the 2014 PICES Summer School on “*Ecological modeling for marine resources management and research*” to be held August 26–29, 2014, Seoul, Korea.

**PICES Summer School**  
**on *Ecological Modeling for Marine Resources Management and Research***

**Purpose:** Ecological models have applications in a wide variety of disciplines, such as natural resource management, wildlife conservation and agriculture. These models are formed by combining known complicated ecological relations with field observation data, and are being used in order to make an understanding about the process in systems and predictions about the dynamics of the real ecosystem. The purpose of this Summer School is to review and present methods of modeling in ecological relations, and to show how these models (methods) can be applied to understand and predict change in ecosystem.

**Dates:** August 26–29 (Tuesday ~ Friday), 2014

**Venue:** Seoul National University, Seoul, Korea

Lecture & Workshop: Bd. 25-1/1st floor International Conference Room

Hands-on Exercise: Bd. 25-1/2nd floor Room 210 (SEES Computer Room)

**Capacity:** maximum 30 students

**Lecturers:** up to 10 (including 5 foreign lecturers)

## **1. Description**

An ocean ecological model and its application are representation of an ecological system which is ranging in scale from an individual population to an ecological community, or even an entire system. The real systems are quite complicated because they involve biotic and abiotic components all interacting over a large area and a long time span. Understanding and predicting the changes in marine ecosystem requires high quality observation and experiment data. The models are formed by combining known ecological relations (*e.g.*, the relation of sunlight and water availability to photosynthetic rate, or the relation between predator and prey populations) with data gathered from field and laboratory experiments. Ecological models are useful tools to describe ecological conditions and have long been developed to understand ecosystem behavior mechanism and to predict changes in community composition and ecosystem functioning. In particular, there has been a rapid rise in the development of end-to-end model dealing with the effects of climate change and human activity on the marine ecosystem through the food web. End-to-end models combine physicochemical oceanographic descriptors and organisms ranging from microbes to higher-trophic-level organisms. The demand for end-to-end approaches including bottom-up and top-down control in food webs arises from the need for quantitative tools for ecosystem-based management. End-to-end models that can deal with bottom-up and top-down controls that operate simultaneously and vary in time and space and that are capable of handling the multiple impacts expected under climate change.

This summer school intends to help graduate students and early-career scientists as well as new comers by providing basic knowledge for advanced applications. The 4-day summer school will cover an introduction to marine ecosystems (*e.g.* concept of the ecosystem) and parameter optimization of marine ecosystem model and its application. The courses will be composed of lectures, seminars, and hands-on training in parameter optimization and end-to-end model application.

The official language of the school is English.

## **2. Organizers**

### Principle organizer

Prof. Chung Il Lee (Gangneung-Wonju National University, Korea; [leeci@gwnu.ac.kr](mailto:leeci@gwnu.ac.kr))

### Scientific Steering Committee/Lecturers

Timothy Essington (University of Washington, USA) – SSC member and Lecturer

Christopher Harvey (National Marine Fisheries Service, USA) – SSC member and Lecturer

Emanuele Di Lorenzo (Georgia Institute of Technology, USA) – SSC member and Lecturer

Chung-II Lee (Gangneung-Wonju National University, Korea) – SSC member, Lecturer, LOC

Yang-Ki Cho (Seoul National University, Korea) – SSC member, Lecturer, LOC

Tae-Hee Na (Seoul National University, Korea) – SSC member, Lecturer, LOC