6.0 RELATIONS WITH INTERGOVERNMENTAL ORGANIZATIONS

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6.1 Intergovernmental Oceanographic Commission (IOC) ***Enevoldsen, Burkill***

SCOR and IOC co-sponsor the Global Ecology and Oceanography of Harmful Algal Blooms (GEOHAB) project (see Tab 3.1) and the International Ocean Carbon Coordination Project (IOCCP) (see Tab 4.1).

Wolfgang Fennel and Ed Urban attended the IOC Executive Council in early July 2014 to represent SCOR. SCOR made one intervention during the meeting, in relation to the agenda item on the development of the Second International Indian Ocean Expedition (IIOE-2). Wolfgang Fennel made the intervention on behalf of SCOR.

INTERGOVERNMENTAL OCEANOGRAPHIC COMMISSION
(of UNESCO)

Forty-seventh Session of the Executive Council
UNESCO, Paris, 1 July–4 July 2014

TEMPLATE FOR SUBMISSION OF WRITTEN RECORDS TO THE EXECUTIVE COUNCIL SUMMARY REPORT

Member States that wish to provide a succinct written record of a particularly important aspect of their plenary intervention may do so in one of the four working languages of the Commission. Such statements will be annexed to the Council report in their original language. Statements should be sent using this template by email (iocgovbody@unesco.org) to the IOC Secretariat.

Member State/Name of Delegation **:** **SCOR**

Agenda Item **:** **6.3**

Date and Time of Intervention : 3/7/14 1135HRS

NAME OF DELEGATION POINT OF CONTACT FOR THIS STATEMENT: Ed Urban

Title Agenda Item : INTERNATIONAL INDIAN OCEAN EXPEDITION 2

Statement:

6-2

Thank you, Mr. Chairman. SCOR has been pleased to participate with IOC in the initial development of plans for a second International Indian Ocean Expedition (IIOE-2). As with the first expedition in the early 1960s, this activity will be most successful through the cooperative efforts of IOC and SCOR, with our different capabilities and strengths, SCOR's experience in research planning and IOC's experience in implementation. In accordance with SCOR's agreement with IOC, SCOR has set up an international committee of scientists to develop a Research Plan for the IIOE-2. This draft plan will be presented at an open workshop in Bremen, Germany on 12-13 September 2014. The purpose of this meeting will be to revise the draft plan through input from a broader group of scientists from nations that wish to participate in the IIOE-2. SCOR will provide some support for scientists from developing countries in the Indian Ocean region to participate in the Bremen meeting. The SCOR committee will revise the draft plan following the Bremen meeting and will provide the draft report to the IOC for input from Member States, Subsidiary Bodies, and IOC programs. SCOR accepts the invitation from IOC to participate in the Interim Planning Committee that will be set up by IOC after the Executive Council and will support the participation of the two SCOR-appointed members of this committee. Thank you.

Restricted distribution

EC-XLVII/DR.(6.3) Rev.
Paris, 2 July 2014
Original: English

DRAFT RESOLUTION EC-XLVII/DR.(6.3) Rev.

Submitted by: Australia, China, India, Islamic Republic of Iran, United Kingdom and USA

Second International Indian Ocean Expedition **(IIOE-2)**

ADOPTED

The Executive Council,

1. **Recalling** Decision IOC-XXVII/Dec.5.1.2 that agreed:

(i) it is appropriate for IOC, in collaboration with the Scientific Committee on Oceanic Research (SCOR) and Indian Ocean Global Ocean Observing System (IOGOOS), to further develop

a proposal for the second IIOE in commemoration of the 50th anniversary of the First International Indian Ocean Expedition (IIOE-1),

(ii) to add the International Indian Ocean Expedition 50th Anniversary Initiative to the agenda of the IOC Executive Council at its 47th Session in 2014 in order to formalize, through a Draft Resolution, IOC's involvement in an IIOE-2, implemented for the period 2015–2020,

2. **Recalling further** that:

(i) IOC played a major role in the implementation of the IIOE-1,

(ii) IIOE-1 could not have succeeded without substantial international and intergovernmental collaboration and coordination,

(iii) IIOE-1, in addition to the major scientific results obtained, had a substantial and long-lasting impact on ocean science and applications in the Indian Ocean region and globally,

3. **Having examined** document IOC/EC-XLVII/2 Annex 9, on the Proposal for IOC involvement in the second International Indian Ocean Expedition (IIOE-2),

4. **Considering:**

(i) that a number of major scientific activities have taken place since IIOE-1, which included substantial work in the Indian Ocean,

such as the World Ocean Circulation Experiment (WOCE), Joint Global Ocean Flux Study (JGOFS), and Sustained Indian Ocean Biogeochemistry and Ecosystem Research (SIBER) and the Indian Ocean Panel (IOP),

(ii) the major developments in ocean observing technology, communications and research capacity since IIOE-1, making it potentially easier and more cost-effective to undertake substantial ocean observing and data processing programmes,

5. **Recognizing**:

(i) that much remains unknown about the Indian Ocean and its interactions with and influence on the global ocean and atmosphere,

(ii) the importance of translating scientific knowledge into substantive economic and social benefits to Member States, both within the region and globally,

(iii) the added value to be gained through internationally collaborative investigations, above the value resulting from individual agency and national efforts alone,

6. **Recognizing further**:

(i) the importance of the Indian Ocean in coupled ocean-atmosphere processes influencing major climate phenomena such as the monsoon, as well as meteorological, climatological and hydrological extremes, including in waves, sea level,

temperatures, currents, acidification, droughts, floods, that impact directly on countries in the region and more widely,

(ii) the need to characterize the cascade of scales that link open ocean with coastal processes in the Indian Ocean,

(iii) the need to ensure that the great advances currently being made by ocean science in the Indian Ocean and beyond, and that could further be made under an IIOE-2, must be connected to societal benefits through pathways that link science to users, particularly in developing countries, using capacity development activities as a major tool,

7. **Decides** to**:**

(i) adopt the IIOE-2 as a major initiative of the IOC, to be undertaken jointly with SCOR and IOGOOS;

(ii) entrust the development of a research plan for the IIOE-2 to SCOR in collaboration with IOC and IOGOOS and drawing on the outputs of the Reference Group meetings as presented in Document IOC/EC-XLVII/2 Annex 9, paras 6 and 7;

(iii) establish an Interim Planning Committee (Group of Experts) (IPC) for the IIOE-2, jointly with SCOR and IOGOOS, to undertake initial planning work, based on the research plan, and to report on this work to the Assembly at its 28th session in 2015, with membership and terms of reference for the IPC as given in the annex to this resolution;

8. **Stresses the importance** of an active and adequately funded Secretariat to support the work of the IPC and subsequently the implementation of IIOE-2;

9. **Invites** SCOR and IOGOOS to join with the IOC in co-sponsoring the IIOE-2 and establishing and supporting the IPC;

10. **Invites further** other interested and relevant intergovernmental and non-governmental organizations, in particular IOC's partner organizations, to participate in and contribute to the success of the IIOE-2 initiative;

11. **Urges Member States to**:

(i) cooperate with and contribute to the IIOE-2 planning process, including in particular through providing funding and expertise for the IPC;

(ii) develop national plans to participate in the implementation of the IIOE-2;

(iii) identify national focal points and/or bodies to oversee the implementation of the IIOE-2 at the national level, and to inform the IOC Executive Secretary of such national contacts;

(iv) consider hosting and/or contributing to the establishment and maintenance of a regional secretariat/project office for the IIOE-2;

(v) where possible, provide funding and other support to the IOC Secretariat to assist in the planning and implementation of IIOE-

2;

12. **Requests** IOC's network of Regional Subsidiary Bodies, Committees and global programmes to formulate their contribution to and involvement in the IIOE-2, in close coordination with the IPC, and in line with the research plan, and to report on this to the IOC Assembly at its 28th Session;

13. **Requests** the IOC Executive Secretary to:

(i) coordinate with SCOR and IOGOOS in the establishment of the IPC as a matter of urgency;

(ii) invite Member States to nominate experts to serve on the IPC;

(iii) assist in the planning for and implementation of the IIOE-2, within the available budgetary resources.

Annex to Draft Resolution EC-XLVII/DR.(6.3) Rev.

Terms of Reference of the Interim Planning Committee (Group of Experts) for IIOE-2

The Interim Planning Committee (Group of Experts) is established for a period of one year, to June 2015. It will be responsible for the initial planning for the IIOE-2, including the establishment of relevant programme coordinating bodies, the development of implementation plans based on the research plan to be prepared by SCOR in coordination with IOGOOS and IOC, and the identification and securing of resources for management and implementation of the programme. In particular the IPC will:

1. Propose to the IIOE-2 sponsoring organizations (IOC, SCOR and IOGOOS) the establishment of committees to oversee the planning and implementation of IIOE-2 (such as a Scientific Steering Committee, an Implementation Committee, and possible sub-committees on key elements such as data and information management, cruise coordination and capacity development and outreach), including terms of reference and membership,

2. Arrange for and coordinate the development of implementation, data and information management, and capacity development plans for the IIOE-2,

3. Engage other interested organizations in the planning of the IIOE-2, in particular IOC partner organizations and space agencies,

4. Develop a draft budget for planning and implementation of the IIOE-2, and identify and secure the resources required for this planning and implementation, including for secretariat support, in both IOC Paris and the proposed regional secretariat,

5. Propose and oversee a mechanism for the formal launch of the IIOE-2 in 2015,

6. Work largely by electronic correspondence, but with a minimum of two face-to-face meetings, depending on the availability of funds, to establish the IPC work programme and prepare the final report to the sponsoring organizations, and

7. Report in detail on these activities to the IOC Assembly at its 28th session in 2015.

Membership

Maximum of 15 members to be appointed jointly (10 nominated by IOC, 3 nominated by IOGOOS, and 2 nominated by SCOR) by the Executive Secretary of IOC, the President of SCOR and the Chair of IOGOOS, to provide the necessary range of scientific, technological, geographical and gender balance to ensure the success of the planning process and the full engagement of Member States and relevant scientific and technological organizations. Where possible and relevant, consideration should be given to including those experts who have already been involved in and contributed to the initial, informal IIOE-2 planning process, as members of the IPC.

Nominations for the ten IOC members of the IPC will be invited from Member States by the IOC Executive Secretary immediately following the 47th session of the IOC Executive Council, with the final selection to be made by the IOC Executive Secretary, in consultation with the IOC Officers.

Criteria for selection of the Interim Planning Committee (Group of Experts)

1. Appropriate higher qualifications in one of the marine/ocean/maritime disciplines required for IIOE-2.
2. Extensive experience in planning and implementing major marine science projects, including field-based operations, and/or in marine data and information management and/or in marine capacity development and outreach.
3. Experience in working in the Indian Ocean region.
4. Experience in identifying and securing resources (cash and in-kind) and deployment and operation of multinational large research infrastructure required to implement major marine science projects.

Financial implications:

For the period 2014–2015 (28th Assembly): implementation will be subject to identification of extrabudgetary funding.

For the period 2015–2020, the financial implications will be identified by the IPC and submitted to the IOC Assembly for examination at its 28th Session.

6.2 International Council for the Exploration of the Sea (ICES) *Fennel*

6.3 Joint Group of Experts on the Scientific Aspects of Marine Environmental Protection (GESAMP) *Urban*

GESAMP has two activities of interest to SCOR (1) its ongoing WG 38 on Atmospheric Input of Pollutants to the Oceans and (2) a side event at the Sept. 2014 GESAMP meeting on Maritime Activities and Noise: Sources and Impacts. The later relates to the International Quiet Ocean Experiment (IQOE) and one of the IQOE co-chairs will be giving a presentation at the side event.

Report to SCOR from the Co-Chairmen of GESAMP Working Group 38

ATMOSPHERIC INPUT OF POLLUTANTS TO THE OCEANS

1 GESAMP WG 38 (Atmospheric Input of Chemicals to the Ocean) has held several working group meetings through 2012, and five scientific papers have been published in the scientific literature as a result of these meetings. These are:

Okin, G., A. R. Baker, I. Tegen, N. M. Mahowald, F. J. Dentener, R A. Duce, J. N. Galloway, K. Hunter, M. Kanakidou, N. Kubilay, J. M. Prospero, M. Sarin, V. Surapipith, M. Uematsu, T. Zhu, "Impacts of atmospheric nutrient deposition on marine productivity: roles of nitrogen, phosphorus, and iron", Global Biogeochemical Cycles, 25, GB2022, doi:10.1029/2010GB003858, (2011).

Hunter, K.A., P. S. Liss, V. Surapipith, F. Dentener, R. A. Duce, M. Kanakidou, N. Kubilay,, N. Mahowald,, G. Okin,, M. Sarin,, I. Tegen, M. Uematsu, and T. Zhu, "Impacts of anthropogenic SO_x, NO_x and NH_3 on acidification of coastal waters and shipping lanes", Geophysical Research Letters, 38, L13602, doi:10.1029/2011GL047720 (2011).

Kanakidou, M., R. Duce, J. Prospero, A. Baker, C. Benitez-Nelson F. J. Dentener, K.A. Hunter, N. Kubilay, P. S. Liss , N. Mahowald, , G. Okin, M. Sarin, K. Tsigaridis, M. Uematsu, L.M. Zamora, and T. Zhu, "Atmospheric fluxes of organic N and P to the ocean", Global Biogeochemical Cycles, 26, GB3026,doi:10.1029/2011GB004277, (2012).

Schulz, M., J. M. Prospero, A. R. Baker, F. Dentener, L. Ickes, P. S. Liss, N. M. Mahowald, S. Nickovic, C. Pérez García-Pando, S. Rodríguez, M. Sarin, I. Tegen, R.A. Duce, "The atmospheric transport and deposition of mineral dust to the ocean - Implications for research needs", Environmental Science and Technology, 46, 10,390-10,404 (2012).

Hagens, M., K.A. Hunter, P.S. Liss, and J.L. Middelburg, "Biogeochemical context impacts seawater pH changes resulting from atmospheric sulfur and nitrogen deposition", Geophysical Research Letters, 41, doi:10.1002/2013GL058796 (2014).

2 The US National Science Foundation, through the ICSU Scientific Committee on Oceanic Research (SCOR), also has supported the newest work by WG 38 described below. During and following GESAMP 39 in 2012 additional terms of reference for continued work of GESAMP WG 38 were approved to address issues related to the impact of the atmospheric deposition of anthropogenic nitrogen to the ocean. As a reminder, the additional tasks added were as follows:

.1 Update the geographical estimates of anthropogenic nitrogen deposition to the global ocean made in the SCOR-sponsored 2008 paper in *Science* (Duce, R.A., et al., "Impacts of atmospheric anthropogenic nitrogen on the open ocean", *Science, 320*, 893-897, 2008), which were based on data from 2005 or earlier. This would utilize newer and more geographically distributed data on anthropogenic atmospheric nitrogen concentrations and deposition over the global ocean as well as improved models of these processes and impacts;

.2 Considering issues related to Task 1 above, re-evaluate the impact of atmospheric nitrogen deposition on marine biogeochemistry, including re-estimating the amount of CO_2 that could be drawn down from the atmosphere into the ocean as a result of the increased productivity in the ocean derived from the additional anthropogenic nutrient nitrogen deposited. This would allow an update on the impact of the atmospheric nitrogen deposition on atmospheric radiative properties outlined in the 2008 *Science* paper;

.3 Provide a more reliable estimate of the impact of atmospheric anthropogenic nitrogen deposition on the production of additional nitrous oxide in the ocean and its subsequent emission to the atmosphere. This was one of the greatest uncertainties in the 2008 *Science* paper;

.4 Evaluate the extent to which anthropogenic nitrogen delivered to the coastal zone via rivers, atmospheric deposition, etc. is transported to the open ocean, in which regions this may happen, and what its impact is there. In the 2008 *Science* paper it was assumed that all nitrogen delivered to the coastal zone was sequestered there and did not reach the open ocean, but this may not be true in all locations; and

.5 Make a more detailed estimate of the input and impact of anthropogenic nitrogen in the area of the Northern Indian Ocean (Arabian Sea, Bay of Bengal) and the South China Sea - the areas that are expected to show the greatest increase of anthropogenic nitrogen deposition over the next few decades.

3 To address these new terms of reference, a highly successful workshop on The Atmospheric Deposition of Nitrogen and Its Impact on Marine Biogeochemistry was held at the University of East Anglia in Norwich, United Kingdom, from 11 to 14 February 2013. Twenty-

three scientists participated in the workshop, one participating by Skype. The first day of the workshop was devoted to discussions of the five tasks identified above as the foci of the workshop. Two participants were asked to summarize the issues in each of these task areas and to lead the discussions that followed. On the basis of the task area discussions above, the workshop participants broke up into sub-groups on the second through fourth days of the workshop. These sub-groups began the development of nine different scientific papers, covering the task areas above.

4 Since the workshop one of these nine papers has been published:

Kim, T.-W., K. Lee, R.A. Duce and P.S. Liss, "Impact of atmospheric nitrogen deposition on phytoplankton productivity in the South China Sea", Geophys. Res. Lett., DOI: 10.1002/2014GL059665 (2014).

5 One additional paper has been submitted and is currently under revision:

Sharples, J., et al. "Physical controls on riverine delivery of nutrients and carbon to the oceans", submitted to Nature.

6 Seven other papers are in various stages of preparation for submission, ranging from two that should be submitted in September to one that may never be submitted. We expect that in the end it is likely that 7 or 8 of the total of 9 potential new papers will be submitted and published. If 8 of these were published, this would result in a total of 13 papers published in the peer-reviewed scientific literature as a result of the efforts of GESAMP WG 38.

7 GESAMP WG 38 was asked by WMO to organize a session on atmospheric inputs to the ocean for the 2014 European Geosciences Union meeting, held in Vienna, Austria in April, 2014. WG 38 did organize this session, which was held on Tuesday, 29 April. It included a total of 6 oral papers and 14 poster papers. These papers were presented by a combination of WG 38 members and other scientists, - 13 of the 20 papers were presented by members of WG 38.

8 Ten members of GESAMP WG 38 were able to attend a luncheon in Vienna, where members provided updates on the status of their papers. We were very pleased that the new WMO Technical Secretary for GESAMP, Dr. Alexander Baklanov, was able to participate. We were also happy that the previous WMO Technical Secretary, Dr. Slobadon Nickovic, was also there.

9 Members briefly discussed possible scientific areas that the WG 38 might want to address in the future. It was decided that some of the funds remaining from the Norwich workshop should be used to help members complete their papers. This was done recently when a scientist from the University of Crete spent a week at the University of East Anglia to enable more accurate comparisons of the modeled and measured deposition to the ocean of atmospheric

nitrogen species to be made. We expect similar exchange visits supported by current funds in the coming months. It was decided that WG 38 would primarily devote the next year to completing all of our current scientific papers, but we would also like to use this time to develop possible new activities for the future - scientific issues related to the input of chemicals to the ocean that WMO, IMO, and other sponsors might be interested in the working group addressing. If that were the case, we would plan to bring these issues to GESAMP 42 in 2015. We do not request any additional funds for the period from the fall of 2014 through the summer/fall of 2015.

6.4 North Pacific Marine Science Organization (PICES) ***Batchelder, Taguchi***

SCOR and PICES: Continuing Connections

Report for the 2014 SCOR General Meeting
September 15-17, 2014, Bremen, Germany

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). SCOR was unable to send a representative to PICES-2013 (Nanaimo, Canada), but Dr. Urban provided a summary report with his assessment of PICES-SCOR relations and ideas for future cooperation. Dr. Alexander Bychkov (PICES Executive Secretary) participated in the 2010 SCOR General Meeting (Toulouse, France) and the 2011 SCOR Executive Committee Meeting (Helsinki, Finland), and Dr. Harold Batchelder (PICES, SCOR Capacity Building Committee) attended the 2013 SCOR Executive Committee Meeting (Wellington, New Zealand).

This report provides an update on PICES-SCOR collaboration since the 2013 SCOR Executive Committee 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)

IMBER position/white paper

- PICES was invited to contribute to a strategic IMBER white paper that will serve as the basis for defining new research directions for the marine biogeochemistry and ecosystem research community, beyond 2015. The consolidated responses from select PICES Expert Groups was provided to the IMBER Project Office in early May and were discussed at the June 2014 meeting of the IMBER Scientific Steering Committee.

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. A topic session on "*Tipping points: Defining reference points for ecological indicators of multiple stressors in coastal and marine ecosystems*", jointly sponsored by PICES, IMBER and ICES, will be convened at PICES-2014 (Yeosu, Republic of Korea);
- The next PICES Annual Meeting will be held October 16–26, 2015, in Qingdao, People's Republic of China. The overall theme for PICES-2015 will be "*Change and sustainability of the North Pacific*". IMBER is invited to submit a proposal for a topic session or a workshop. On-line submission is now open, and proposals are due August 18. The complete list of all approved sessions and workshops will be available in early November 2014.

Co-sponsored symposia/conferences/workshops

- PICES co-sponsored a topic session on "*Responses of society to marine and global changes as a core mandate for IMBER: ways forward*" at the IMBER Open Science Conference (June 23–28, 2014, Bergen, Norway) by covering travel expenses for a convenor from the North Pacific.
- IMBER co-sponsored the 2nd PICES/ICES/IOC Symposium on "*Effects of climate change on the world's oceans*" (May 13–20, 2012, Yeosu, Korea) and is being invited to co-sponsor the 3rd Symposium in this series to be held March 23–27, 2015, in Santos, Brazil. One of the accepted pre-symposium workshops, "*Upwelling systems under future changing climate*", was proposed by a CLIVAR/IMBER/SOLAS collaboration.

Capacity building activities

- PICES co-sponsored 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 for a lecturer and 5 early career scientists from PICES member countries (1 from Canada, 3 from China and 1 from USA).
- IMBER is co-sponsoring the 2014 PICES Summer School on "*End-to-end models for marine resources management and research*" (August 26–29, 2014, Gangneung, Republic of Korea) by providing travel support for 3 early career scientists (1 from India, 1 from Peru and 1 from Tanzania).

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). The first FUTURE Open Science Meeting (OSM) was held April 14–18, 2014 on the Kohala Coast of Hawaii, USA. Dr. Julie Hall (New Zealand), former Chair of IMBER, and a member of SCOR, contributed to the assessment of FUTURE by serving with other eminent ocean researchers on a team that evaluated the scientific progress and structure of FUTURE. The PICES Science Board received the guidance from the evaluation team and is contemplating how to remedy the structural inefficiencies to better deliver the promised FUTURE products. Scientists from IMBER were not well represented in Kohala, probably because of the temporal proximity of the FUTURE OSM (April) and the IMBER Open Science Conference, "*Future Oceans—Research for marine sustainability: multiple stressors, drivers, challenges and solutions*" (June).
- 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 topic session on "*Variability in advection and its biological consequences for Subarctic and Arctic ecosystems*" at PICES-2014 was proposed by ESSAS and will be co-convened by ESSAS Co-Chairmen.
  - 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)
  - CLIOTOP co-sponsored the workshop on "*Top predators as indicators of climate change: statistical techniques, challenges and opportunities*" held in conjunction with the FUTURE OSM by covering travel expenses for an invited speaker on climate change and food security in the Pacific. A summary of the workshop was published in the summer 2014 issue of PICES Press.

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 (IMBER HDWG Co-Chair) is being supported by PICES as a lecturer for the 2014 IMBER Summer School.

- A joint HDWG/S-HD Topic Session on "*Responses of society to marine and global changes as a core mandate for IMBER: ways forward*" was convened at the IMBER Open Science Conference.

Representation

To maintain close relations, IMBER/ESSAS and PICES regularly exchange observers at each other's annual/executive 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.
- Drs. Thomas Therriault (Science Board Chairman) and Hiroaki Saito (Science Board Vice-Chairman) represented PICES at the June 2014 IMBER SSC meeting.
- On behalf of Governing Council, IMBER was invited to be present as an observer at PICES-2014 in Yeosu, Korea. If IMBER representative is interested in addressing PICES on collaborative issues, time will be provided for this presentation at the Science Board meeting or at meetings of other relevant expert groups. To allow PICES participants to learn more about IMBER, we encourage a poster display that provides general information and highlights IMBER's scientific objectives and recent activities.

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. 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, 2014).
- PICES-2015 will be held October 16–26, 2015, in Qingdao, People's Republic of China. The overall theme for PICES-2015 will be be "*Change and sustainability of the North Pacific*". SOLAS was invited to submit a proposal for a topic session or a workshop for PICES-2015. On-line submission is now open, and proposals are due August 18. The complete list of all approved sessions and workshops will be available in early November 2014.

Capacity building activities

- PICES co-sponsored the 6th SOLAS Summer School (August 23–September 2, 2013, Xiamen, China) by providing travel funds for 3 students/early career scientists from PICES member countries (1 from Japan, 1 from Russia and 1 from USA). An article by Emilie Brévière about this school was published in the winter 2014 issue of PICES Press.

Representation

- SOLAS is normally present as observers at PICES Annual Meetings. Dr. Lisa Miller (SOLAS SSC member) represented SOLAS at PICES-2012 and PICES-2013. She will represent SOLAS again and co-convene the SOLAS workshop at PICES-2014.

HARMFUL ALGAL BLOOM ACTIVITIES SUPPORTED BY SCOR

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 May 2015, in Gothenburg, Sweden, potentially with support from PICES, SCOR, IOC and ICES. A funding proposal has been submitted to the Swedish Research Council The outcome of the proposal will be known in September.

Other Activities

- Harmful algal blooms (HABs) are important concerns in all six PICES member countries, especially so in the Asian members that border the Western North Pacific Asian seas, where HABs have been increasing in prevalence and frequency of occurrence. For this reason, the activities of the Intergovermental Panel on Harmful Algal Blooms (IPHAB) to consolidate and expand databases on harmful algal events (HAEDAT) and on occurrence of harmful algal species (data will be stored in OBIS), with the view to publish a Global Harmful Algal Bloom Status Report, are important to PICES. PICES has agreed to contribute expertise to this report for the Northeast Pacific and Northwest Pacific regions and, at PICES-2014, will discuss the possibility to co-fund this effort.

OCEAN CARBON ACTIVITIES SUPPORTED BY SCOR

Communication/coordination

- PICES, through its Working Groups on *CO_2 in the North Pacific* (WG 13; 1998–2001) and *Biogeo-chemical Data Integration and Synthesis* (WG 17; 2002–2005), and now through the Section on *Carbon and Climate* (S-CC), has provided coordination 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 SIC's subgroups: 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.
- Dr. Maciej Telszewski, Director of IOCCP, has accepted an invitation to attend PICES-2014 to update S-CC on IOCCP programmatic efforts currently underway and to provide a brief

presentation on new observing systems (Framework for Ocean Observing) to the MONITOR committee.

S-CC activities

- 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.

- 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).
- The SCOR Working Group proposals for 2014 were reviewed by PICES' Standing Committees from the view point of their scientific interests and relevance to the PICES integrative science program, FUTURE. Two of the proposed SCOR Working Groups were broadly favored by PICES. If approved by SCOR, we would consider nominating and supporting an Associate Member to these Working Groups: 1) Optimized design of an ocean Biogeochemistry Observing System; and 2) MARBIOG: Global Plankton biogeography.
- The PICES Governing Council supports the creation of joint expert groups as an important new avenue of 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 science topics 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. This year, funding from the SCOR/NSF fund was provided/committed for the following events:
  - $4,900 for the 2014 PICES Summer School on "*End-to-end models for marine resources*

management and research" (August 26–29, 2014, Gangneung, Republic of Korea);
  - $5,000 for the 2014 PICES Annual Meeting (October 17–26, 2014, Yeosu, Republic of Korea);
  - $5,000 for the 3rd PICES/ICES/IOC Symposium on "*Effects of climate change on the world's oceans*" (March 23–27, 2015, Santos, Brazil)
- PICES continues to provide travel support for students and early career scientists from PICES member countries to summer schools and meetings of SCOR-sponsored large-scale research projects. The following events were co-sponsored by PICES in 2010–2013:
  - IMBER ClimECO2 Summer School on "*Oceans, marine ecosystems, and society facing climate change - A multidisciplinary approach*" (August 23–27, 2010, Brest, France) by providing travel funds and arranging additional support (through national programs/agencies) for 9 early career scientists from all PICES member countries: 1 from Canada, 1 from Japan, 2 from Korea, 2 from China, 1 from Russia, and 2 from USA (PICES expenses ~ $7,000);
  - 5th SOLAS Summer School (August 29–September 10, 2011, Corsica, France) by providing travel funds for 3 students/early career scientists from PICES member countries: 1 from each Canada, China and USA (PICES expenses ~ $9,500);
  - IMBER ClimECO3 Summer School on "*A view towards Earth System models: Human-natural system interactions in the marine world*" (July 23–28, 2012, Ankara, Turkey) by providing travel funds and arranging additional support (through national programs/agencies) for 5 early career scientists from PICES member countries: 1 from Japan, 2 from Korea, 2 from China (PICES expenses ~ $6,400);
  - 6th SOLAS Summer School (August 23–September 2, 2013, Xiamen, China) by providing travel funds for 3 students/early career scientists from PICES member countries: 1 from each Japan, Russia and USA (PICES expenses ~ $6,000).
  - 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 for a lecturer and 5 early career scientists from PICES member countries:1 from Canada, 3 from China and 1 from USA (PICES expenses ~$6,000).
- 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 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 this proposal and provide options for decision at PICES-2014. POGO is sending an observer to PICES-2014 to discuss potential joint capacity building activities, such as a Continuous Plankton Recorder operation and data processing training program

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 2015 PICES Annual Meeting to be held October 16–26, 2015, in Qingdao, People's Republic of China, under the theme "*Change and sustainability of the North Pacific*".