

REPORT OF PHYSICAL OCEANOGRAPHY AND CLIMATE COMMITTEE

The meeting of the Physical Oceanography and Climate Committee (POC) was held from 14:00–17:30 on October 28, 2009. The Chairman, Dr. Michael Foreman, called the meeting to order and welcomed members and observers (*POC Endnote 1*). Dr. Shin-ichi Ito agreed to act as rapporteur. Several changes were made to the draft agenda in order to accommodate new Topic Session and workshop proposals for PICES-2010 and to discuss planning for the next Early Career Scientists Conference (Agenda Item 12). The new draft agenda was adopted (*POC Endnote 2*).

AGENDA ITEM 3

Completion of PICES-2008 decisions

1. The proposed PICES/ICES Working Group on *Forecasting Climate Change Impacts on Fish and Shellfish* was approved by Science Board and Governing Council, with POC and FIS as its parent committees.
2. The request for PICES to print and deliver the abstract volume for Third Argo Science Workshop in Hangzhou, China, March 25–26, 2009 was approved and carried out.
3. The travel support request for one WG20/POC member to attend the ESSAS workshop in Seattle, June 2009, was approved. Dr. Enrique Curchitser (WG 20) gave an invited presentation.
4. Travel support was approved for five non-Korean students and one foreign guest lecturer to attend the CREAMS/PICES summer school on “*Satellite oceanography*”, Seoul National University, August 2009.
5. The proposed POC Topic Session “*Exploring the predictability and mechanisms of Pacific low frequency variability beyond inter-annual time scales*” for PICES-2009 was switched to a 1½-day workshop and approved by Science Board.
6. The proposed POC/BIO topic session “*Mesoscale eddies and their roles in North Pacific ecosystems*” for PICES 2009 was also switched to a workshop and approved by Science Board.
7. The proposed POC/FUTURE Topic Session “*Future marine ecosystem predictions from an earth system science perspective*” for PICES-2009 was merged with another to become “*Outlooks and forecasts of marine ecosystems from an earth system science perspective: Challenges and opportunities*” and approved by Science Board.
8. The proposed CC-S Topic Session “*Anthropogenic perturbations of the carbon cycle and their impacts in the North Pacific*” was approved by Science Board for PICES-2009.
9. The POC Contributed Paper Session was approved by Science Board for PICES-2009.
10. The CCS workshop “*Carbon Data Synthesis*” was approved by Science Board for PICES 2009.

AGENDA ITEM 4

Reports of existing subsidiary bodies and plans for ones

Section on *Carbon and Climate* (CC-S)

Dr. James Christian, Co-Chairman of CC-S, briefly reported on its annual meeting and requests to be forwarded to Science Board. These included two carbon data synthesis workshops, one at PICES-2010 (see *POC Endnote 4*) and another to be held in June 2010 in either Japan or Seattle. The latter requests travel support for two members (see Agenda Item 10). The full CC-S annual report, including discussions on the fact that their 5-year term comes up for renewal at PICES-2010, can be found elsewhere in the PICES 2009 Annual Report.

POC-2009

Advisory Panel on *CREAMS/PICES Program in East Asian Marginal Seas* (CREAMS-AP)

Dr. Joji Ishizaka gave a brief report on the activities of the Panel in the past year, including meetings in Busan, Korea, on April 24 and in Jeju on October 25, a summer school at Seoul National University on August 25–29, a joint Russia–Korea cruise in July, two planned cruises in 2010, and a special session during the PEACE Meeting in September 2010. A full report of CREAMS-AP can be found elsewhere in the PICES 2009 Annual Report.

Working Group on *Evaluation of Climate Change Projections* (WG 20)

Dr. Foreman gave a brief report on the activities of this group over the last year. (More details can be found in the summary of the WG 20 business meeting found elsewhere in the PICES 2009 Annual Report). Highlights included: (1) a 1-year extension of the Working Group's lifetime to permit collaboration with the new ICES/PICES Working Group on *Forecasting Climate Change Impacts to Fish and Shellfish* (WG-FCCIFS), (2) contributions to the final CFAME report, (3) invited presentations at the ICES and ESSAS annual meetings, (4) co-convening a session at the Symposium on "*Climate change effects on fish and fisheries*" in Sendai, Japan, v) a business meeting on October 25 that proposed a final workshop/business meeting for PICES-2010, and that discussed the FUTURE Implementation Plan Advisory Panels and WG 20's final report.

PICES/ICES Working Group on *Forecasting Climate Change Impacts on Fish and Shellfish* (WG-FCCIFS)

Dr. Shin-ichi Ito gave a brief report summarizing activities of this Group over the past year and an update on the status of the Group's upcoming Symposium on "*Climate change effects on fish and fisheries: Forecasting impacts, assessing ecosystem responses, and evaluating management strategies*" in Sendai, Japan, April 26–29, 2010. More details can be found in the WG-FCCIFS report contained in the 2009 PICES Annual Report.

AGENDA ITEM 5

Relations with other international organizations

The following four brief presentations were given.

1. Dr. Howard Freeland reviewed the current status of the Argo program, the Third Argo Science Workshop in Hangzhou, China, March 25–26, 2009 and the OceanObs'09 meeting in Venice. He thanked PICES for producing and delivering the abstract volume for the Hangzhou meeting.
2. Hee-Dong Jeong gave a summary of NEAR-GOOS activities over the last year, including updates on both their regional near-time and delayed-mode databases and the development of new conventional observing systems and a ship-of-opportunity program using ferries and container ships.
3. Dr. William Crawford, a member of the CLIVAR Pacific Panel, gave a brief summary of their March 2009 meeting in Perth Australia, and relayed WCRP support for the 2012 symposium on "*Effects of climate change in the World's oceans*" (see *POC Endnote 3*).
4. Dr. George Hunt, Co-Chairman of the ESSAS Steering Committee, gave a brief summary of activities for the past year and those planned for 2010/11. He requested travel support for one WG 20/POC member to attend the 2010 ESSAS annual workshop in Iceland, and that PICES provide both logistical support to help organize, and \$20K of funding to support the travel of young scientists from the western Pacific to, the 2011 ESSAS Open Science Meeting in Seattle, U.S.A.

AGENDA ITEM 6

Discussion of POC Action Plan

In light of numerous changes that are anticipated when the Terms of Reference for the three FUTURE Advisory Panels are ratified, the Chairman recommended that changes to the POC Action Plan be postponed for one year. The Committee agreed that this issue will be reviewed at PICES-2010.

AGENDA ITEM 7

Discussion of the FUTURE Implementation Plan and the new Advisory Panels

This item was moved to the beginning of the meeting so the Committee would be familiar with issues by the time the Chairman of Science Board, Dr. John Stein, came around to present a summary of the initial Advisory Panel meetings the previous evening. The Chairman gave a brief summary of the final FUTURE Implementation Plan, the objectives and membership of the three new Advisory Panels, and the revised structure of Science Board. He expressed the opinion that with four POC/WG20 members on these new panels, POC issues should be well represented. More details on the FUTURE Implementation Plan can be found on the PICES webpage (http://www.pices.int/members/scientific_programs/FUTURE/FUTURE-main.aspx) and in the 2009 PICES Annual Report.

AGENDA ITEM 8

Planning for PICES-2010

The Committee approved requests for: (1) a 2-day CC-S workshop (with two invited speakers) and (2) a combined ½-day WG 20 workshop and business meeting with no invited speakers (see *POC Endnote 4*).

In addition to a POC Paper Session, three Topic Sessions were proposed. See *POC Endnote 5*.

No possible invited speakers for the Science Board session were put forward but WG20 is discussing submitting at least one contributed talk to review activities and accomplishments over their lifetime.

AGENDA ITEM 9

PICES-2011 theme

The theme suggested by the Russia for PICES-2011 is “*Mechanisms of marine ecosystem reorganization in the North Pacific Ocean*”.

AGENDA ITEM 10

Items with financial implications*Inter-sessional travel requests*

POC agreed to put forward the following list of ranked requests for financial support to Science Board:

1. CREAMS-AP requests travel funds for 2 invited speakers in the special session on “*Plan for the international cooperation for CREAMS/PICES EAST-IP*” at the PEACE Meeting in September 2010 in Gangneung, Korea.
2. CC-S requests travel support for 2 scientists (non-CC-S members) to attend their 2nd Carbon Synthesis Workshop in either Japan or U.S.A., June 2010.
3. Funding to send 1 PICES scientist to Co-Chair and speak in a WG-FCCIFS co-sponsored session at the 2010 ICES ASC in Nantes, France.
4. WG 20 requests funding to send one of their members to the PICES/ICES/FAO Symposium on “*Climate change effects on fish and fisheries*” in Sendai, Japan, in April 2010.
5. WG 20 requests funding to send one of their members to the ESSAS Annual Meeting in Iceland, August/September 2010.
6. ESSAS requests PICES logistical support to help organize their 2011 Open Science Meeting (this may have already been granted) and \$20K to support the travel of young scientists from Asian countries to this meeting.

Proposed publications for 2009 and beyond

1. CC-S had a special section in the *Journal of Oceanography* that was published in 2009 with papers arising from their Topic Session at PICES XVI in Victoria, Canada.
2. The special issue of *Continental Shelf Research* on “*Tides in marginal seas – A volume in memory of Prof. Alexei Nekrasov*” (eds. Alexander Rabinovich, Boris Kagan, Michael Foreman, and Josef Cherniawsky) received 21 manuscripts. To date, 14 have been accepted, 4 are still under review, and 3 have been rejected or withdrawn. The editors estimate 16 for final publication in 2010 and a volume size of about 200 pages.
3. Drs. Shoshiro Minobe and Emanuele Di Lorenzo, the co-conveners of the PICES 2009 workshop (W8) “*Exploring the predictability and mechanisms of Pacific low frequency variability beyond inter-annual time scales*”, are exploring the possibility of writing a review paper based on workshop presentations.

PICES-2010 travel support requests

Travel support is being requested for 1–2 invited speakers for each of the three POC co-sponsored topic sessions and 2 invited speakers for the CC-S workshop (see *POC Endnotes 4 and 5*).

AGENDA ITEM 11

POC Best Presentation and Poster awards

Drs. Ichiro Yasuda, Steven Bograd, and Elena Ustinova acted as judges for the best early career presenter and best poster in the POC Paper Session, S8, W8 and W10. The Best Presentation award was given to Xiaohui Tang for “*Influence of reducing weather noise on ENSO prediction*” (W8). The Best Poster award was given to Satoshi Osafune for his poster “*Numerical study of bidecadal water mass variations in the subarctic North Pacific related to the 18.6-year tidal cycle*” (POC Paper Session).

AGENDA ITEM 12

Other business

In light of the very successful Early Career Scientists Conferences held in 1999 and 2007, another is being planned for 2012 in southern Europe (Portugal, Spain, or Italy). A scientific steering committee of 6 young scientists (3 from PICES and 3 from ICES) needs to be identified and each of the PICES committees was requested to put forward one name. After considerable debate, the POC Committee decided that their nominee would be Hanna Na from Seoul National University.

AGENDA ITEM 13

Adoption of report and recommendations to Science Board

The POC report was circulated and approved by all Committee members. All recommendations to Science Board were brought forward by Dr. Foreman at their meeting on October 31, 2009.

POC Endnote 1**Participation List**Members

Steven Bograd (USA)
 Kyung-Il Chang (Korea)
 Dake Chen (China)
 James Christian (Canada)
 Michael Foreman (Canada, Chairman)
 Shin-ichi Ito (Japan, rapporteur)
 Hee-Dong Jeong (Korea)
 Elena Ustinova (Russia)
 Ichiro Yasuda (Japan, Vice-Chairman)
 Yury Zuenko (Russia)

Observers

Jürgen Alheit (Germany)
 William Crawford (CLIVAR)
 Howard Freeland (Argo)
 George Hunt (ESSAS)
 Joji Ishizaka (Japan)
 Vadim Navrotsky (Russia)
 Gongke Tan (China)

POC Endnote 2**POC meeting agenda (revised)**

1. Welcome, introductions, opening remarks
2. Changes to, adoption of, agenda and appointment of rapporteur
3. Completion of PICES-2008 decisions:
 - i) New PICES/ICES Working Group “*Forecasting Climate Change Impacts on Fish and Shellfish*”
 - ii) Request for PICES to print and send abstract volume for Third Argo Science Workshop in Hangzhou, China, March 25–26, 2009
 - iii) Travel support request for WG20/POC member to ESSAS workshop, Seattle, June 2009
 - iv) Travel support for five non-Korean students and one foreign lecturer to CREAMS/PICES summer school on “*Satellite oceanography*”, August 2009
 - v) Proposed POC topic session “*Exploring the predictability and mechanisms of Pacific low frequency variability beyond inter-annual time scales*” at PICES-2009
 - vi) Proposed POC/BIO topic session “*Mesoscale eddies and their roles in North Pacific ecosystems*” at PICES-2009
 - vii) Proposed POC/FUTURE Topic Session “*Future marine ecosystem predictions from an earth system science perspective*” at PICES-2009
 - viii) Proposed CC-S Topic Session “*Anthropogenic perturbations of the carbon cycle and their impacts in the North Pacific*” at PICES-2009
 - ix) POC Contributed Paper Session at PICES-2009
 - x) CCS workshop “*Carbon Data Synthesis*” at PICES-2009
4. Reports of existing and plans for new subsidiary bodies
 - i) Progress report of the Section on *Carbon and Climate* (Christian/Saino)
 - ii) Progress report of the Advisory Panel on *CREAMS/PICES Program in East Asian Marginal Seas* (Ishizaka/Lobanov/Kim)
 - iii) Progress report of WG 20 on *Evaluation of Climate Change Projections* (Foreman/Yamanaka)
 - iv) Progress report of ICES/PICES WG on *Forecasting Climate Change Impacts on Fish and Shellfish* (Ito)
5. Relations with other international organizations/programs:
 - i) Argo (Howard Freeland)
 - ii) NEAR-GOOS (Hee-dong Jeong)
 - iii) WCRP/CLIVAR (Bill Crawford)
 - iv) ESSAS (George Hunt)
 - v) Other organizations/programs ?

POC-2009

6. Discussion of the POC Action Plan
7. Discussion of FUTURE Implementation Plan and the new Advisory Panels.
8. Planning for PICES-2010 “*North Pacific ecosystems today, and challenges in understanding and forecasting change*” in Portland, U.S.A.
 - i) Topic/Paper Sessions
 - a. Marine Renewable Energy Development in Coastal and Estuarine Environments around the North Pacific (POC, MEQ, FUTURE)
 - b. POC paper session
 - c. *Comparing the two major gyres of the subarctic North Pacific – Seasonal and interannual variability and its predictability* (POC/BIO/MONITOR/FUTURE)
 - d. *Impact of climate variability on marine ecosystems: understanding functional responses to facilitate forecasting* (FIS/POC/BIO/FUTURE)
 - ii) Workshops
 - a. *Carbon data synthesis (III)* (POC/BIO)
 - b. *Working Group 20: Progress and FUTURE*
 - iii) Invited speakers for the Science Board Symposium
9. Theme for PICES-2011 in Russia “*Mechanisms of ecosystem reorganization in the North Pacific Ocean*”
10. Items with financial implications
 - i) Proposed inter-sessional meetings for 2010 and beyond
 - WG-FCCIFS workshop on *Climate Change Effects on Fish and Fisheries*, Sendai Japan
 - Carbon data synthesis workshop, June 2010, Japan or Seattle
 - PEACE workshop, Special Session on “*Plan for the international cooperation for CREAMS/ PICES EAST-IP*”, September 2010, Gangneung, Korea
 - ESSAS Open Science Meeting, May/June 2011, Seattle
 - ii) Publications for 2009 and beyond
 - CC-S section in *Journal of Oceanography* from PICES XVI
 - CSR Special volume on “*Tides in marginal seas – A volume in memory of Prof. A. Nekrasov*”
 - iii) Travel support requests
 - Sending 1 WG 20 member to the ESSAS Annual Meeting in Iceland
 - iv) Other items
11. 2009 POC Best Presentation and Poster Award (Judges will be appointed early in week and give their recommendation at the Closing Session)
12. Other business
13. Adoption of POC report and recommendations to Science Board

POC Endnote 3**WCRP letter to William Crawford supporting the 2012 Symposium on
“Effects of climate change on the World’s oceans”**

We would ask you to: 1) attend on our behalf, and 2) express our deep commitment to the Workshop. Our contribution to the Symposium will be:

- sharing the workload for workshop preparations, including not only “leg work” but also intellectual input;
- funding for travel of some scientists – the level to be agreed with other sponsors;
- reaching out to scientific community to attract best experts for the event;
- making available the climate projections for IPCC AR5, which are being coordinated by our WCRP CMIP5 project, openly available to all scientists (this contribution is not specific for the Workshop);
- providing additional guidance on how to use them for assessment of climate change impact on the oceans (that is a specific contribution);
- and any other contribution can be discussed between sponsors.

Best regards,

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POC Endnote 4**Proposals for workshops at PICES-2010****A 2-day POC/BIO Carbon data synthesis workshop***

The Carbon and Climate Section has as the major piece of unfinished business for the first 5 years of its existence (2005–2010) completion of synthesis of ship-based data sets including total dissolved inorganic carbon (DIC), alkalinity, nutrients and oxygen. Our goal is to create a consistently calibrated basin-wide data set, similar to what CARINA did for the Atlantic and compatible with earlier data sets such as GLODAP so that temporal trends can be detected. This is a key CC-S activity and very important to future PICES and FUTURE science. Collection of data and 1st-level QA/QC are complete; now we need to undertake 2nd-level QA/QC, which is a large and labour-intensive task.

* multiple small rooms, or a room that can be subdivided, and multiple computers and projectors are requested because parallel breakout groups will be examining different subsets of the data.

Co-Convenors: James Christian and Toshi Saino
 Request travel support for 2 invited speakers.

A ½ day POC business meeting and workshop on “Working Group 20: Progress and FUTURE”

Presentations and discussions on:

- progress related to the WG 20 Terms of Reference
- status of, and future work on, the final report
- follow-up activities that conform to FUTURE objectives and needs.

Co-Convenors: Michael Foreman (Canada) and Yasuhiro Yamanaka (Japan)
 No invited speakers.

POC Endnote 5

Proposals for Topic and Paper Sessions at PICES-2010

(1.) a 1-day POC Paper Session

Papers are invited on all aspects of physical oceanography and climate in the North Pacific and its marginal seas.

Co-convenors: Michael Foreman (Canada) and Ichiro Yasuda (U.S.A.)

No invited speakers.

(2.) a 1-day POC/BIO/MONITOR/FUTURE Topic Session on

“Comparing the two major gyres of the subarctic North Pacific - seasonal and interannual variability and its predictability”

In the North Pacific, there are two major gyres; the western subarctic gyre and the Alaskan gyre. Although severe winter conditions have limited observational activity, recent progress in observational networks including satellites, drifters and Argo floats have improved our understandings of the two gyres. Both gyres are mainly driven by the subarctic wind field and are expected to be synchronized with each other. However, the real responses are not so simple. For example, the western subarctic gyre shows large seasonal variability in the western boundary current (Oyashio) while the Alaskan stream does not show large seasonal variability. In addition to these physical characteristics, chemical and biological characteristics are different. For example, iron supply is larger in the western subarctic gyre since the distance from the terrestrial sources is closer than in the Alaskan gyre. This in turn affects seasonal cycling and magnitudes of phytoplankton production and zooplankton production. Therefore ecosystems are also different in the two gyres. To achieve better understanding of the mechanisms of the subarctic response to atmospheric forcing, comparisons of the responses of the two gyres are essential. This session will focus on the comparison of the physical, chemical and biological characteristics of the two gyres, on all time scales. Presentations on predictability of the two gyres, or which address additional improvements of the subarctic observation network are also welcome.

Co-Convenors: Shin-ichi Ito (Japan), James Christian (Canada), Emanuele Di Lorenzo (U.S.A.), Vyacheslav B. Lobanov (Russia), David Mackas (Canada), Atsushi Tsuda (Japan, tentative)

Request funding for 2 invited speakers: Potential candidates are Robert Pickart (U.S.A.), Osamu Isoguchi (Japan), Joaquim Goes (U.S.A.)

(3.) a ½-day POC/MEQ/FUTURE Topic Session on

“Marine renewable energy development in coastal and estuarine environments around the North Pacific”

Renewable energy projects are increasing worldwide, and many types involve the marine environment. Those under active development are typically designed to directly extract energy from waves, tides, currents, wind, or thermal gradients or indirectly from biomass energy. These novel technologies will require new emplacements, moorings, or other structures in marine and estuarine environments with attendant intrusions upon the environment, including acoustic signals, changes to mixing, and electromagnetic fields. Marine renewable energy sources are able to provide clean energy, but their effects on the physical and biological environment are not well understood. This session will examine the technologies under development in PICES nations and address the current state of our knowledge on how they will interact with estuarine, coastal, and offshore environments.

For this session we seek contributions that deal with any topics pertinent to marine renewable energy development, including:

- Status of marine renewable energy in PICES countries;
- Economic costs and benefits of different approaches;
- Marine spatial planning for renewable energy;
- Physical effects of marine renewable energy development (current flow, energy reduction, mixing, sediment transport);
- Ecological effects (larval transport, entrainment, entanglement, behavior, habitat changes, communities) on all trophic levels.

Convenors: George Boehlert (U.S.A.), Michael Foreman (Canada, POC), Kuh Kim (Korea), Glen Jamieson (Canada, MEQ)

Request travel support for one invited speaker, proposed to be Henry Jeffrey (UK). Estimated cost: \$2500

(4.) a 1-day POC/FIS/BIO/FUTURE Topic Session on “*Impact of climate variability on marine ecosystems: understanding functional responses to facilitate forecasting*”
[sponsorship later changed to POC/FIS/BIO]

Understanding the role of natural variability, occurring over a variety of temporal and spatial scales is essential for effective management of marine ecosystems in the wake of predicted global change. Evidence suggests that climate variability can trigger regime shifts in marine ecosystems. Regime shifts are characterized by a re-organization of marine communities, species dominance, and tropho-dynamic relationships. Often, synchronous shifts occur in aquatic ecosystems that are separated by thousands of kilometers. This finding suggests that atmospheric teleconnections are mediating regional system changes. We postulate that comparative studies of ecosystems that have experienced regime shifts will provide insights into the expected responses of marine organisms to climate change. We seek papers that go beyond simple pattern matching. Contributions to this Theme Session should provide statistical evidence of the functional responses and relationships that underlie regime shifts and/or statistical or modeling studies that successfully simulate observed shifts. Studies that utilize these relationships to forecast of future climate change impacts are especially welcome. The primary focus of this session will be on understanding shifts in the pelagic realm including phytoplankton, zooplankton and pelagic species (for example, small pelagic fish, squids and gadids).

Co-Convenors: Suam Kim, Jurgen Alheit, Harald Loeng, James Overland, Yasunori Sakurai

Request funding for 2 invited speakers. (ICES will be asked to co-sponsor 1 speaker). Possible European candidates are Edwards/Gregory Beaugrand, Svein Sundby