

Report of the Physical Oceanography and Climate Committee

The Physical Oceanography and Climate Committee (POC) held two meetings in hybrid format during PICES-2022, one on Sunday, from 6:00 pm to 8:30 pm, Busan local time, September 25, 2022, and one from 2:00 pm to 6:00 pm, Busan local time, on Wednesday, September 28, 2022. The meetings were chaired by Dr. Emanuele Di Lorenzo. Participants for both meetings are given in *POC Endnote 1*. Dr. Di Lorenzo welcomed members and self introductions were made. The draft agenda for both meetings was reviewed and approved and is included as *POC Endnote 2*.



POC meeting participants (pictured only) during PICES-2022, Busan, Korea. Left to right: Jae Hak Lee, Bo Qiu, Tatsuki Oshima, Jennifer Jackson, Emanuele Di Lorenzo, SungHyun Nam, Chan Joo Jang, Diasuke Hasegawa, Charles Hannah, Steven Bograd. On-line, left to right, from top: Shoshiro Minobe, Elena Ustinova, Hiromichi Ueno, Lei Zhou, Shin-ichi Ito, Jerome Fiechter, Toshio Suga, Yisen Zhong

Day 1: Sunday, September 25, 2022

AGENDA ITEM 2

Membership updates

POC: Dr. Jennifer Jackson (Canada) was elected for a first term as Vice-Chair of the POC Committee replacing Dr. Yury Zuenko (Russia).

S-CC: Dr. Masahide Wakita is a newly appointed member of S-CC, replacing Dr. Akihiko Murata and representing Japan.

POC – 2022

AGENDA ITEM 3

POC sessions at PICES-2022

POC sponsored or co-sponsored the following:

- Topic Session (S3) on “*Realizing scalable artificial intelligence in marine science*”. Convenors: Pramod Thupaki, Thomas Chen, Hernan Garcia, Igor Shevchenko, Di Wan;
- Topic Session (S7) on “*Forecasting and projecting climate variability and change on northern hemisphere marine ecosystems using coupled next generation biophysical model*”. Convenors: Kirstin Holsman, Shin-ichi Ito, Sukyung Kang, Kathy Mills and Xiujuan Shan;
- POC Contributed Paper Session. Convenors: Emanuele Di Lorenzo and Jennifer Jackson;
- Workshop (W3) on “SmartNet: Promoting PICES and ICES Leadership in the UN Decade of Ocean Science for Sustainable Development”. Convenors: Steven Bograd and Sanae Chiba.

AGENDA ITEM 4

POC Best Presentation and Poster Awards

Best presentations at a POC-sponsored session at PICES-2022:

- Best Oral Presentation at POC Contributed Paper Session: Youngji Joh (co-authors Youngji Joh, Thomas L. Delworth, Andrew T. Wittenberg, William F. Cooke, Anthony J. Rosati, and Liping Zhang) on “*Stronger decadal variability of the Kuroshio Extension under simulated future climate change*”;
- Best Poster at POC Contributed Paper Session: Saat Mubarrok (co-author Chan Joo Jang) on “*Evaluation of thermocline depth bias in the Seychelles-Chagos Thermocline Ridge (SCTR) simulated by the CMIP6 models*”.

AGENDA ITEM 5

Publications

- POC approved the Final Report of WG 38 for publication in the PICES Scientific Report series pending minor revisions;
- POC approved citing papers contributed by members of WG 40 from the special issue on “North Pacific Climate and Ecosystem Predictability on Seasonal to Decadal Timescales” in *Frontiers in Marine Science* to the Final Report of WG 40;
- Dr. Sunghyun Nam reported that the AP-CREAMS special issue on “Physics and biogeochemistry of East Asian seas” in *Frontiers in Marine Science* is progressing; there are currently 30 articles;
- S-CC is sponsoring a special issue on “Oxygen Decline in Coastal Waters: Its Cause, Present Situation and Future Projection” in *Frontiers in Marine Science*.

AGENDA ITEM 6

Upcoming meetings

Two upcoming meetings relevant to POC and with POC participation were briefly discussed by members:

- ECCWO 2023 (Norway) – Smartnet/UNDOS workshop (W2) on “*The Climate-Fisheries Nexus Within the UN Decade of Ocean Science for Sustainable Development: Co-Designing Actions and Solutions for a Productive, Healthy and Resilient Ocean*”. Corresponding Convenor: Steven Bograd;
- WCRP Open Science Conference 2023, October 23–27, 2023, Kigali, Rwanda.

AGENDA ITEM 7

Review of POC Action Plan 2019–2022

Dr. Di Lorenzo reviewed the POC Action Plan with members.

AGENDA ITEM 8

POC Action Plan 2023–2026

A panel discussion took place with each member providing short 2-3 minute input towards a new Action Plan for 2023–2026 (*POC Endnote 3*).

AGENDA ITEM 9

Election of new POC Chair

Two nominations were put forward for POC Chair. Dr. Lei Zhou (China) accepted the nomination and was elected unanimously.

Day 2: Wednesday, September 28, 2022

AGENDA ITEM 10

Updates from international observers and projects**CLIVAR (Jing Li)**

- Current research foci: Tropical Basin Interaction, Sea level change and coastal impacts grand challenge, eastern boundary currents,
- Pacific Region Panel – research priority is i) tropical Pacific (TPDV), ii) ENSO conceptual model, iii) ENSO metrics,
- Tropical basins interaction (TBI) research foci – 4 working groups are working on these,
- CLIVAR/CliC northern oceans research panel – has an Arctic focus,
- CLIVAR has a long-standing interaction with POC, and was part of PICES WG 27, WG 29, WG 38, and WG 40,
- Future – climate extreme and marine heatwave – existing effort is through WG 49; research foci open call with deadline October 31,
- CLIVAR shares a mission to advance Early Career Scientist capacity building,
- WCRP Ocean Science Conference, October 23–27, 2023, in Kigali, Rwanda.

Request

- Request to have a CLIVAR Co-Chair in WG 49 (Dr. Antonietta Capotondi). CLIVAR and POC support this action.

SOLAS (Kitack Lee)

- Several core themes for 2015–2025 and cross-cutting themes are upwelling zones, polar oceans, Indian Ocean,
- SOLAS largely endorses research activity but rarely sponsors activities,
- PICES-SOLAS collaborations include joint workshops, UNDOS proposals.

Discussion/Questions

- Dr. Jang: Can CO₂ measurements be collected from Argo? – yes.
- Dr. Zhou: POC should have more collaborations with SOLAS based on air–sea flux interests.
- Dr. Di Lorenzo: At some point should we strategize on a way to focus on air–sea fluxes? POC members agree it is a good direction.

BECI (Robin Brown)

- BECI (Basin Scale Coastal Impacts) may become a project under SmartNet, pending approval,
- Indigenous data and knowledge is important for this project; data mobilization can help with this,
- Expanded Argo will be very helpful for this project,
- Need to identify experts who can help approve the BECI Science Plan; also need to identify complementary projects and potential partners.

POC – 2022

Discussion/Questions

- Dr. Qiao: How can you make real-time monitoring without new technology? End-users are regional fisheries managers, several of which have MOUs with PICES; all these organizations are interested in working with PICES on climate science and fisheries. Real-time monitoring idea is to support existing initiatives (e.g., Argo) - BECI will be looking for resources to support established groups.
- Dr. Suga: Confirm that BECI will be a project within program; it may be possible to connect BECI with other UNDOS programs that support Argo; under GOOS there are a lot of real time observing systems.
- Dr. Enrique Curchitser: What is the geographical extent of BECI –using the PICES definition?
- Dr. Nam: CSK Kuroshio program would be a relevant program for collaboration with BECI.
- Dr. Di Lorenzo: Is there space within BECI for an artificial intelligence working group? POC agrees this is a good direction.

Argo (Toshio Suga)

- Argo is in major transition to OneArgo – global full depth multidisciplinary array that will increase the value of Argo data to end users – increase BGCArgo and deep Argo floats. To do this, we will need to triple the current investment and this has many challenges.
- The North Pacific array is deteriorating and needs attention (aging floats) – a strong voice from PICES is essential.

Discussion/Questions

- Dr. Jang: What biogeochemical sensors are on BGC Argo? O₂, chlorophyll, nitrate, downwelling irradiance, optical backscatter, pH are approved sensors by Argo and UNESCO.

AGENDA ITEM 11

ExGs progress reports

S-CCME: Joint PICES/ICES Section on *Climate Change Effects on Marine Ecosystems* (Kirstin Holsman))

- Contributions made to IPCC AR6 WKII;
- Contributions made to 5th US Climate Assessment;
- Several workshops and sessions have been submitted for ECCWO5;
- S-CCME is lead support for SUPREME and other decade programs;
- Monthly meetings have helped to build momentum.

S-CCME requests to POC

- Need a replacement for Canadian member, Dr. Jackie King, who stepped down;
- Proposal for a 1.5-day Workshop on “*Towards climate-informed ecosystem-based fisheries management by building international collaborations and standardizing indicators*” at PICES-2023;
- 1-day non-formal workshop/meeting at PICES-2023.
 - POC approved these requests.

Discussion/Questions

- Dr. Di Lorenzo: How will S-CCME navigate the growth of programs under UNDOS that are operating in fisheries space? – Still working on it and it is evolving; currently developing a database of projects that people are involved in.

AP-CREAMS: Advisory Panel for a *CREAMS/PICES Program in East Asian Marginal Seas*

- PICES AP-CREAMS 2022 virtual Summer School completed – 25 students and ECOPs from 10 countries;
- Co-Chair Prof Joji Ishizaka awarded the Uda Prize from the Oceanographic Society of Japan;
- Special issue on Physics and Biogeochemistry of the East Asian Marginal Seas published in *Frontiers*

in Marine Science – physics and biogeochemistry of the East Asian marginal seas (did not know about the required PICES process);

- Currently developing an AP-CREAMS web page, CREAMS database in celebration of CREAMS 30 years' anniversary.

Discussion/Questions

- Dr. Jang commented that the Summer School on Ocean Turbulence was very positive – Could AP-CREAMS make a presentation slide or provide a link about the school to the PICES website?

AP-CREAMS requests to POC

- Proposal for a 1-day Workshop on “*Changing social-ecological-environmental system of the North East Asian Marginal Seas: New challenges for integrative marine science*” at PICES-2023.
 - POC approved this request.

S-CC: Section on *Carbon and Climate* (Tsueno Ono) – presentation deferred.

WG 38: Working Group on *Mesoscale and Submesoscale Processes* (Hiromichi Ueno)

- A review paper was submitted to *Progress in Oceanography*; after minor revisions the manuscript will be resubmitted in October 2022;
- WG 38 Final Report still outstanding;
- WG 38 requests \$3300 to publish review paper in open access.
 - POC approved this request.

WG 40: Working Group on *Climate and Ecosystem Predictability* (Shoshiro Minobe)

- WG 40 outcome is a special issue with 13 articles on “North Pacific Climate and Ecosystem Predictability on Seasonal to Decadal Timescales” in *Frontiers in Marine Science*; several papers have already be cited widely;
- Has analyzed biological indicators from both eastern and western basins;
- Hope that PICES and CLIVAR will continue to collaborate in the future, as it was successful in past joint activities;
 - POC approved WG 40 special issue papers as a report for the Working Group.
- Possibility of a new working group aimed at machine learning.

WG 46: Joint PICES/ICES Working Group on *Ocean Negative Carbon Emissions* (Rui Zhang)

- WG 46 reported on the development of the new ONCE program now endorsed under the UN ocean decade. A detail presentation of this is available online here:
<https://www.dropbox.com/s/z0cgf6qk90ymg9s/ONCE-WG46-presentation.pdf?dl=0>.

Discussion/Questions

- Dr. Di Lorenzo inquired about WG 46 future plans – will it continue or has it merged into ONCE? This is also Dr. Jiao’s concern –new members will be needed to keep WG 46 going. WG 46 will continue but will be focused on NCP pathway.

WG 50: Working Group on *Sub-mesoscale Processes and Marine Ecosystems* (Bo Qiu)

- Moving to less than 10 km(?) spatial range;
- Currently have 9 members from all member countries;
- SWOT (Surface Water and Ocean Topography) mission will be launched December 5, 2022 so will have SSH high resolution data to 15 km resolution (better than AVISO data);
- WG 50 has had 1 online meeting and 1 face-to-face meeting at PICES-2022;
- Proposal for a Topic Session on “*Multi-scale ocean processes and their impacts on marine ecosystems*” was submitted for PICES 2023.

POC – 2022

AGENDA ITEM 12

New proposals

POC is supportive of a new SG-DATA.

POC Endnote 1

POC participation list

Members

Emanuele Di Lorenzo (USA, Chair)
Jennifer Jackson (Canada, Vice-Chair)
Charles Hannah (Canada)
Fangli Qiao (China)
Lei Zhou (China, on-line)
Diasuke Hasegawa (Japan)
Shin-ichi Ito (Japan, on-line)
Hiromichi Ueno (Japan, on-line)
Chan Joo Jang (Korea)
SungHyun Nam (Korea)
Elena Ustinova (Russia, on-line)
Steven Bograd (USA)
Jerome Fiechter (USA, on-line)

Members unable to attend

Canada: James Christian
China: Fan Wang
Korea: Joon-Soo Lee
Russia: Vyacheslav Lobanov, Yury
Zuenko

Observers

Shoshiro Minobe (Japan, on-line)
Toshio Suga (Japan, on-line)
Dmitry Stepanov (Russia, on-line)
Yisen Zhong (China, WG 50 Co-Chair, on-line)
Mengqi Pei (China, on-line)
Jing Li (China, on-line)
Niazhji Jiao (China, WG 46 PICES Co-Chair, on-line)
Kirsten Holsman (USA, S-CCME PICES Co-Chair)
Kitack Lee (Korea)
Jae Hak Lee (Korea, AP-CREAMS Co-Chair)
Robin Brown (Canada)
Bo Qiu (USA, WG 50 Co-Chair)
Tatsuki Oshima (F&A)
Emily Lemagie (USA)
Khush Jhugroo (Canada)
Rui Zhang (China)

PICES

Enrique Curchitser (Chair)

POC Endnote 2

POC meeting agenda

Sunday, September 25, 6:00pm–8:30pm KST

1. Welcome, introductions and agenda updates
2. Membership updates
3. POC sessions at PICES-2022
4. POC Best Presentation and Poster Awards, ECOP judges for POC
5. Publication updates
6. Upcoming events relevant to POC
7. Review of POC Action Plan 2019–2022
8. Panel discussion, drafting POC Action Plan 2023–2026
9. Election of new POC Chair

Goal 1: Foster collaboration among scientists within PICES and with other multinational organizations focusing on the U.N. Ocean Decade

- Coordinate research and communication among international organizations and programs focusing on climate-ecosystem interactions, including WCRP, CLIVAR, PACON, WESTPAC, APN, and IOC through implementation of the UN Decade of Ocean Science.
- Facilitate partnerships with organizations and programs, within and outside the PICES region, with interests in understanding Pacific climate processes and impacts.
- Establish active collaboration with Tropical and South Pacific institutions and colleagues as part of contribution to the SMARTNET Program.
- Engage with Ocean Decade DCCs and Programmes that focus on ocean and climate services, modeling, innovative observing technologies and systems

Goal 2: Understand and communicate the status and trends of ocean & climate, and its impacts on marine ecosystems

- Communicate the status and trends of North Pacific climate conditions to the PICES and broader scientific communities.
- Promote coordinated activities dedicated to understanding physical and chemical processes in the North Pacific, their impacts on ecosystems, and their current status and trends.
- Facilitate the development of observing and modeling frameworks to improve climate and ecosystem predictability.
- Guide research and communication about the drivers and impacts of extreme events

Goal 3: Understand and quantify how marine ecosystems respond to natural forcing and human activities

- Lead PICES efforts for improving understanding and advancing predictability of North Pacific climate variability and change, through guidance of collaborative research projects, parenting of Expert Groups, and organizing sessions and workshops..
- In the near term, a research focus is on understanding the drivers, impacts and predictability of climate extreme events, and diagnosing the links between coastal ecosystems and large-scale climate with a focus on multi-scale processes.

Goal 4: Advance methods and tools that enhance PICES ability to study social–ecological–environmental systems

- Advance the development of regional to basin-scale models of North Pacific physics and biogeochemistry, including subseasonal-to-seasonal (S2S) forecasts and multi-decadal projections.
- Develop modeling toolkit to facilitate research and operational forecasts throughout the North Pacific.
- Promote advanced observational technologies and the rapid dissemination of data to the PICES community and other stakeholders.
- Promote the use of artificial intelligence (AI) to better understand ocean and climate dynamics, and its interactions with social-ecological systems.
- Work with other PICES committees and expert groups to identify stakeholder needs that inform the delivery of ocean and climate services for decision making.

Goal 5: Publish scientific knowledge and data that is pertinent to North Pacific ecosystems

- Provide data, products and information on North Pacific oceanographic conditions and climate variability and change to the PICES and broader scientific community through peer-reviewed publications and other PICES communication outlets.
- Contribute to a publication of a special journal issue on North Pacific climate and ecosystem predictability, the North Pacific Ecosystem Status Reports, and contribute to other special issues on emerging issues of interest to PICES.

Goal 6: Engage with early career ocean professionals (ECOP) to sustain a vibrant and cutting edge PICES scientific community

- Promote the engagement of ECOP in the work and leadership of POC and PICES, including the organization of Summer Schools on ocean processes, climate variability and change, methods of ocean modeling and observing, data analysis and management, and impacts of extreme events.
- Work through PICES partners to support the participation and involvement of ECOP in PICES meetings and projects.
- Support AP-ECOP in the creation of professional development programs.