Working Group 27 on *North Pacific Climate Variability and Change*

The final meeting of the Working Group on *North Pacific Climate Variability and Change* (WG 27) was held from 9:00 to 18:00 h on October 15, 2015 in Qingdao, China, under the chairmanship of Drs. Shoshiro Minobe (Japan) and Emanuele Di Lorenzo (USA) who welcomed participants. All member countries were represented (*WG 27 Endnote 1*). The agenda was reviewed and no changes were made (*WG 27 Endnote 2*).

AGENDA ITEM 3
Review of 3rd Climate Change Symposium

Dr. Jacquelynne King gave a brief summary of the 3rd PICES/ICES/IOC Symposium on "*Climate change effects on the world's oceans*" (Santos Brazil, March 21–27, 2015). She was the symposium co-convenor and Dr. Minobe was a member of the Scientific Steering Committee. Close to 300 people attended the symposium that included 12 sessions and 6 workshops.

Dr. Minobe co-convened (with Dr. Kenneth Drinkwater) a 2-day workshop (W4) on "*Upwelling systems under future climate change*". Seven talks were presented, including two invited talks, one by WG 27 member Enrique Curchitser. Dr. Minobe was also a co-convenor, with Dr. Curchitser, for the Topic Session (S4) on "*Regional models for predictions of climate change impacts: Methods, uncertainties and challenges*". Dr. Shin-ichi Ito was the invited speaker. Selected papers from oral and poster presentations from the Symposium and workshops will be included in a special issue of the *ICES Journal of Marine Science* scheduled for publication in 2016.

AGENDA ITEM 4
CLIVAR collaboration

Invited guest, Dr. Valery Detemmerman (ICPO Executive Director) made a short presentation on CLIVAR's research focus and activities that will take place under its anticipated new Science Plan, which will be reviewed and discussed at the 2016 CLIVAR Open Science Conference (September 19–23, 2016, Qingdao), and invited PICES members to participate. CLIVAR's scientific scope will be shaped by feedback at the conference. She discussed past and on-going CLIVAR collaboration with PICES, but desired a more formal collaboration, especially in the sociological aspects of the Pacific Ocean. Suggestions included exchanging representation between POC and CLIVAR's Pacific Panel, having CLIVAR join a PICES expert group on climate and ecosystem predications, and do informal brainstorming (*e.g.*, *ad hoc* meetings) with PICES on other areas of potential cooperation.

WG 27 supported the idea of a joint PICES/CLIVAR expert group, and recommended to POC the establishment of a Study Group on *Climate and Ecosystem Predictability* to explore such a collaboration (see *WG 27 Endnote 3*).

AGENDA ITEM 5
Final WG 27 report progress and tasks

Most of the meeting was devoted to finalizing the structure and content of the final report. The report is organized into four main sections (see *WG 27 Endnote 4*). In the synthesis section, WG27 members are still working on completing some of the papers related to 3.2 Climate and ecosystem linkages between eastern and western boundaries, 3.3 Forecasting North Pacific Climate and Ecosystem Change: Advances and Challenge, 3.4 Reduced Complexity Models to Hindcast and forecast North Pacific Climate.

AGENDA ITEM 6
Other business

None

WG 27 Endnote 1

WG 27 participation list

Members	Observers
Steven J. Bograd (USA)	Kyung-Il Chang (Korea)
Emanuele Di Lorenzo (USA, Co-Chairman)	Valery Detemmerman **(**CLIVAR)
Jingtian Guo (China)	and others
Shin-ichi Ito (Japan)	
Chan Joo Jang (Korea)	
Jacquelynne R. King (Canada)	
Xiaopei Lin (China)	
Takashi Mochizuki (Japan)	
Shoshiro Minobe (Japan, Co-Chairman)	
Lixin Wu (China)	
Yury I. Zuenko (Russia)	

WG 27 Endnote 2

WG 27 meeting agenda

1. Welcome and introductions
2. Meeting agenda
3. Review of 3rd Climate Change Symposium
4. CLIVAR collaboration
5. Final WG 27 report progress and tasks
6. Other business

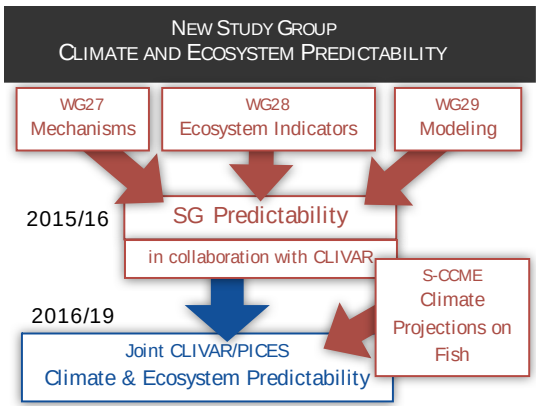
WG 27 Endnote 3

Proposal for a Study Group on *Climate and Ecosystem Predictability*

Background and Motivation

The PICES Working Groups 27, 28, and 29 on *North Pacific Climate Variability and Change*, *Regional Climate Modeling*, and *Development of Ecosystem Indicators to Characterize Ecosystem Responses to Multiple Stressors* ended in 2015. WG 27 has identified and described a series of climate and ecosystem mechanisms that have forecast potentials ranging from 3 months to 10 years and WG 29 has developed a set of modeling strategies to simulate these mechanisms at both the basin and regional-scale over the North Pacific. Complementary to WG 27 and WG 29, the outcomes of WG29 provide us with a series of key ecosystem indicators that can be connected to climate processes identified by WG 27 and modeled by WG 29. Furthermore, the activities of WG 27 and WG 29 strongly leveraged collaborations with CLIVAR by conducting joint sessions and by entraining CLIVAR expertise.

Building on the outcomes of WGs 27, 28, and 29, and the CLIVAR collaborations, we propose a new study group that use the knowledge gained on the mechanisms of Pacific climate, regional modeling, and ecosystem indicators to develop the terms of reference of a new CLIVAR/PICES joint working group that focus on climate and ecosystem predictions. Establishing this group, in collaboration with CLIVAR, will allow PICES to integrate CLIVAR expertise and interest in seasonal to decadal predictions.



Mission and Goal

Develop TORs for establishing a Joint PICES/CLIVAR Working Group on Climate and Ecosystem Predictability.

The SG will (1) collect the outcomes and previous knowledge gained through WGs 27, 28 and 29, (2) identify synergies with S-CCME, and (3) leverage CLIVAR expertise with the goal of developing the terms of reference for establishing a new joint working group between PICES and CLIVAR on Climate and Ecosystem Predictability. The main goal for establishing this new working group would be to allow PICES to identify and quantify the skill of marine ecosystem predictability associated with climate-driven processes. To do so we propose the following terms of reference.

Terms of Reference

1. *Identify a set of North Pacific climate mechanisms that can be used for predicting physical, chemical and biological processes that impact the marine ecosystem and its food web dynamics.*

The SG will identify a finite number of mechanisms that are essential for making climate predictions. The selected mechanisms can act on any of the following timescales: intra-seasonal, seasonal, interannual, decadal and climate change. To identify this set of mechanisms, the SG will (a) use findings from WG 27 on the forecast potentials associated with various mechanisms of climate and ecosystem variability & change, (b) coordinate with the S-CCME to align some of the prediction efforts to complement gaps in S-CCME, and (c) leverage CLIVAR expertise.

2. *Identify a set of North Pacific ecological indicators and/or marine ecosystem functional responses of fish and shellfish, which are impacted by the forcing processes identified in TOR1.*

The SG will identify a finite number of ecological indicators and/or marine ecosystem functional responses that are prime for making ecosystem predictions. The selected mechanisms can act on any of the following timescales: intra-seasonal, seasonal, interannual, decadal and climate change. To identify this set of mechanisms, the SG will (a) use findings from WG 28 on the ecosystem indicators, and (b) coordinate with S-CCME to align some of the prediction efforts to complement gaps in S-CCME.

3. *Identify modeling frameworks for climate and ecosystem predictability*.

The SG will identify a set of modeling frameworks and existing model outputs (*e.g*., IPCC-class climate models) that can be used to evaluate the predictability dynamics identified in TOR 1 and 2. To do so, the SG will leverage outcomes and products from WG 29.

4. *Develop TORs for a potential new Joint PICES/CLIVAR working group on Climate & Ecosystem Predictability.*

Using the activities outlined in TORs 1-3, the SG will develop a set of new TORs to establish a Joint PICES/CLIVAR WG on Climate and Ecosystem Predictability.

5. *Showcase an example of short-term regional climate predictions.*

For the PICES 25-year anniversary in San Diego, the SG will present an example of a short-term prediction system that can be used to accomplish the science goals of FUTURE. This example will provide an important roadmap to explore predictions of different ocean ecosystems in the North Pacific.

Membership

Suggested Chairman: Nick Bond (USA) or Fangli Qiao (China)
In order to leverage the existing knowledge and products generated by the ending WGs 27, 28 and 29, we propose that the past co-chairs of these working groups join as members of the SG. We also ask the co-chairs of S-CCME also join the SG to ensure the establishment of strong synergies between the TORs of the proposed new WG on Climate and Ecosystem Predictability and S-CCME efforts. Lastly, given the goal of involving CLIVAR expertise in the formation of the new WG on Climate & Ecosystem Predictability, we ask that CLIVAR representatives are invited to participate *ex-officio* in the SG activities.

Suggested PICES members representing WGs 27, 28, 29, and S-CCME
Ian Perry (Canada, WG 28 Co-Chair), Motomitsu Takahashi (Japan, WG 28 Co-Chair), Chan Joo Jang (Korea, WG 29 Co-Chair), Emanuele Di Lorenzo (USA, WG 27 Co-Chair), Shoshiro Minobe (Japan, WG 27 Co-Chair), Shin-ichi Ito (Japan, S-CCME Co-Chair), Anne Hollowed (USA, S-CCME Co-Chair).

Suggested *Ex-Officio* CLIVAR members
Xiaopei Lin (China, Co-Chair elect of CLIVAR Pacific Panel) and/or Ken Takahasi (Peru, CLIVAR Pacific Panel), Shang-Ping Xie or Mat Collins (CLIVAR Climate Dynamics Panel), Enrique Curchitser (USA, CLIVAR Upwelling Research Focus), Ryan Rykaczewski (USA, CLIVAR Upwelling Research Focus).

WG 27 Endnote 4

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