

## **Report of the FUTURE Advisory Panel on *Climate, Oceanographic Variability and Ecosystems***

The FUTURE Advisory Panel on *Climate, Oceanographic Variability and Ecosystems* (AP-COVE) held its fifth meeting from 14:00 to 17:50 on October 13, 2013 in Nanaimo. AP-COVE chairman, Dr. Hiroaki Saito, welcomed the 4 members, 2 representative from China and MONITOR (*AP-COVE Endnote 1*) and guests to the meeting. The draft agenda (*AP-COVE Endnote 2*) was reviewed and agreed upon.

### AGENDA ITEM 2

#### **Changes to, adoption of, agenda**

The agenda was adopted without changes.

### AGENDA ITEM 3

#### **Review and discussion of COVE-related expert group activity**

Chairs or representatives of AP-COVE-related expert groups attended the meeting and presented their activities, products, workplans and remaining issues.

##### a. Working Group (WG 27) on *North Pacific Climate Variability and Change*

The following results obtained from WG 27 activities in 2012–2013 are as follows:

- lower-trophic level variability tracks regional and locally defined physical forcing; higher-trophic levels integrate multiple forcing and track large-scale climate modes; changes in large-scale and regional-scale ocean circulation play a dominant role in driving ecosystem variability; spatial dimension is key for understanding the links between physical variability and ecosystem response.
- WG 27 has published >70 papers and is planning 2 synthesis papers: (1) Reduced complexity models to hindcast and forecast North Pacific climate, (2) Coherent changes in North Pacific climate and ecosystems.

Request:

- WG 27 requested an extension to its the life span to (1) analyze CMIP5, (2) further analyze the gaps, (3) organize contributions to the international Symposium on “*Effects of Climate Change in World’s Oceans*” (March 23-27, 2015, Santos, Brazil), and (4) create a possible vision and plan for new expert groups.

Suggestions for improving integrated science and exchanges with Section on *Human Dimensions*:

- (1) WG 27 Co-Chair to join S-HD and (2) establish a target interdisciplinary study group on social-ecological-environmental systems (SG-SEES) to foster examples of integrated science in the coastal ocean.

##### b. Working Group (WG 29) on *Regional Climate Modeling*

WG 29 held the 2nd Regional Climate Modeling (RCM 2) Workshop in Busan, Korea (September 10–12, 2013), including sessions on mesoscale and submesoscale, regional climate and ecosystem projections, climate variability in the North Pacific, is preparing a PICES Press article, and is planning for RCM 3. WG 29 needs to know what type of products would be useful to deliver, and clarification on developing the proper infrastructure to facilitate exchanges. COVE encourages other expert groups to send specific request to WG 29. Reviewing the WG’s TORs and objectives shows that downscaling and upscaling of models are essential activities to be done to reach the goal.

##### c. Section (S-CCME) on *Climate Change Effects on Marine Ecosystems*

S-CCME has published synthesis papers that will be cited in IPCC AR5 report. S-CCME needs to cover gaps such as building global prediction networks and communicating results to clients and stakeholders.

## AP-COVE-2013

AP-COVE pointed out to S-CCME that it needs to provide better communication to the PICES community, e.g., provide a clearer roadmap of S-CCME goals, how PICES scientists can contribute to S-CCME. S-CCME requested future PICES events be better planned so that sessions not to overlap with AP meetings.

### d. Section (S-CC) on *Climate Change Effects on Marine Ecosystems*

S-CC completed its PACIFICA data synthesis. Data was cross-validated with existing long-term time series and cross-calibrated with spatial data. S-CC objectives will refocus around ocean acidification and deoxygenation in support of FUTURE, but the Section needs/requests input from Advisory Panels and other expert groups. New members will be needed for specific analyses (e.g., subsurface circulation and hypoxia) that align with S-CC objectives or AP suggestions.

### e. Joint NPAFC-PICES Study Group (SG-SC-NP) on *Scientific Cooperation in the North Pacific Ocean*

The purpose and timeline of the SG were explained.

### f. Working Group (WG 28) on *Development of Ecosystem Indicators to Characterize Ecosystem Responses to Multiple Stressors*

WG 28 proposed FUTURE OSM Sessions on: (1) “*Identifying multiple pressures and system responses in North Pacific marine ecosystems*”, and (2) “*Bridging the divide between models and decision-making: The role of uncertainty in the uptake of forecasts by decision makers*”. WG 28 proposed a Topic Session on “*Tipping points: defining reference points for ecological indicators of multiple stressors in coastal and marine ecosystems*” at PICES-2014. A draft of the WG’s final report is set for March 2014. A table of content and assignments and case study are being prepared.

#### AP-COVE Recommendations:

- After the FUTURE OSM, identify the gaps and recommend the WGs and experts groups that are needed to cover these gaps;
- Establish a tool on the PICES website to track products (papers, reports, etc., e.g., WG 27 published more than 70 review papers, S-CCME published synthesis papers which will be cited in IPCC AR5 reports).
- A closer linkage between APs external to FUTURE (i.e., AP-MBM, AP-CPR, AP-CREAMS) and FUTURE-related expert groups need to be established;
- Have a formal session during PICES Annual Meetings to gather expert groups and AP Chairs and members to exchange information and discuss how to proceed on FUTURE science. AP-COVE considers this to be an essential activity to produce synergy between expert groups and APs, and to reach the goals of FUTURE.

#### AGENDA ITEM 4

##### **Review and discussion of COVE-related national/regional projects**

AP-COVE compiled a list of relevant national projects (*AP-COVE Endnote 3*). Dr. Saito will ask SOFE or PICES secretariat to put the table of COVE related national projects on the PICES website. Dr. Zhan reported on new Chinese projects on greenhouse gases in the Arctic.

#### AGENDA ITEM 5

##### **Identify potential for new Expert Groups to address AP-COVE priorities**

Since AP-COVE related expert groups are doing well to address their TORs, and AP-COVE can expect important products from each group to reach the goals of FUTURE, this issue will be discussed after reviewing the products.

AGENDA ITEM 6

**Discussion of the FUTURE roadmap**

This issue was discussed in the Joint FUTURE AP meeting.

AGENDA ITEM 7

**FUTURE-related sessions at PICES-2013**

Dr. Saito noted the FUTURE related sessions (MEQ/FUTURE Topic Session (S3) on “*Status, trends and effects of pollutants in coastal ecosystems: Implications for wildlife and humans*”, BIO/POC/TCODE/MONITOR/FUTURE Topic Session (S6) on “*Recent trends and future projections of North Pacific climate and ecosystems*”, BIO/FIS/MEQ/TCODE/FUTURE Topic Session (S8) on “*Ecosystem indicators to characterize ecosystem responses to multiple stressors in North Pacific marine ecosystems*”, and POC/BIO/MONITOR/FUTURE Workshop (W2) on “*Identifying mechanisms linking physical climate and ecosystem change: Observed indices, hypothesized processes, and “data dreams” for the future*” and recommended all AP members to attend these sessions.

AGENDA ITEM 8

**FUTURE OSM in 2014**

This issue was discussed in the Joint AP Meeting. Dr. Saito encouraged COVE members to attend the OSM (to take place April 15-18, 2014 at Kohala Coast, Hawaii).

AGENDA ITEM 9

**Develop/review COVE Work Plan**

Dr. Saito explained the revised Work Plan, which was slightly modified from the previous one. All the members agreed on the proposed Work Plan (*AP-COVE Endnote 4*).

AGENDA ITEM 10

**Linkages to AICE and SOFE, Committees and PICES scientists**

AP-COVE recommended that expert group Chairs meet and exchange information during the PICES Annual Meeting in order to improve the synergy in the research that targets FUTURE’s goals.

AGENDA ITEM 11

**Membership**

Dr. Saito appreciated AP-COVE members’ continuous input of ideas and comments to COVE activities. Each member agreed to be a member in the next term and to continue to support COVE activity. All members endorsed Dr. Saito’s chairmanship for the next term.

AGENDA ITEM 12

**Other issues**

AP-COVE members agreed that the selection of proposed session/workshops for PICES-2014 is to be followed by the ranking the proposals by the members.

Dr. King introduced the 3rd international symposium on the “Effects of climate change on the world’s oceans” in Brazil (March 23–27, 2015) and encouraged the members to attend.

The meeting ended at 17:50.

***AP-COVE Endnote 1***

**AP-COVE participation list**

Members

Emanuele Di Lorenzo (USA)  
Jung-Hoon Kang (Korea)  
Jacquelynn King (Canada; FIS)  
Hiroaki Saito (Japan, Chairman; BIO)  
Toru Suzuki (Japan; TCODE)

Guests

Chairs of COVE related ExGs  
Motomitsu Takahashi (WG 28)  
Enrique Curchster (WG 29)  
Jim Christian (S-CC)  
Suam Kim (S-CCME)

Representatives

Liyang Zhang (China)  
Hiroya Sugisaki (MONITOR)

Observers

Jing Ying (China)  
Wang Cuihua (China)  
Sinjae Yoo (Science Board)

***AP-COVE Endnote 2***

**AP-COVE meeting agenda**

1. Welcome, introductions, opening remarks
2. Changes to, adoption of, agenda
3. Review and discussion of COVE-related ExGs activity
  - a. WG 27 – North Pacific Climate Variability and Change
  - b. WG 29 – Regional Climate Modeling
  - c. S-CCME – Climate Change Effects on Marine Ecosystems
  - d. S-CC – Carbon and Climate
  - e. SG-SC-NP – Joint NPAFC-PICES Study Group on Scientific Cooperation in the North Pacific Ocean
  - f. WG 28 – Ecosystem Responses to Multiple Stressors
4. Review and discussion of COVE related national/regional projects
5. Identify potential for new Expert Groups to address AP-COVE priorities
6. Discussion of FUTURE roadmap from Busan ISB Meeting
7. FUTURE related session at PICES-2013 (Nanaimo)
8. FUTURE OSM in 2014
9. Develop/review COVE Work Plan
10. Linkages to AICE and SOFE, committees and PICES scientists
11. Membership
12. Other issues

## AP-COVE Endnote 3

## FUTURE's AP-COVE Related National/Regional Projects

Project	Funding agency/country	Duration	Contact	Purpose	Web
ACCASP (Aquatic Climate Change and Adaptation Services Program)	DFO, Canada		R. Brown	Annually funded projects that investigate climate change impacts to maritime sectors and fisheries, sustainable ecosystems, and safe and secure waters	<a href="http://www.dfo-mpo.gc.ca/science/oceanography-oceanographie/accasp/index-eng.html">http://www.dfo-mpo.gc.ca/science/oceanography-oceanographie/accasp/index-eng.html</a>
NEPTUNE Canada	UVic, Canada		Kim Juniper, K. Moran	Continental shelf and offshore cabled observatory system	<a href="http://www.neptunecanada.com/">http://www.neptunecanada.com/</a>
Nereus	Nippon Foundation Japan/UBC, Canada	2010-2019	V. Christensen	Simulating the future ocean - develop scientifically credible simulations of future fish populations and policy options for the world oceans; developing research capacity and international cooperation, raising public awareness of the state of the oceans	<a href="http://www.nereusprogram.org/content/about-nf-ubc-nereus-%E2%80%93-predicting-future-ocean">http://www.nereusprogram.org/content/about-nf-ubc-nereus-%E2%80%93-predicting-future-ocean</a>
Assessment of the climate impact on the South Sea ecosystem	China	2008-2013	J. Zhang, J.G. Fang, T. Xiao, D.J. Huang, S.M. Liu	Understanding the effects of climate/marine environment changes (global warming, acidification) and predicting the future changes on ecosystem structure and function	
Chinese Polar Environment Comprehensive Investigation & Assessment Programmes	SOA, China	2011-2015	L. Zhan, L. Chen (GCMAC, SOA)	Budgets of N <sub>2</sub> O and CH <sub>4</sub> in Polar and Subpolar marine systems	
Sustainability of Marine Ecosystem Production under Multi-stressors and Adaptive Management	Korea	2011-2015		Impact of external forcings (Multi-stressors) from climate change and anthropogenic perturbations on the marine ecosystems. Responses of marine ecosystem and change in function and services	
POSEIDON (Northwestern Pacific Ocean Study on Environment & Interactions bw Deep Ocean & marginal seas)	Korea	2006-2015		To suggest the best scenario for 2030 in association with the climatic impacts by examining and configuring the correlation between the Northwestern Pacific and the marginal seas	<a href="http://east-1.snu.ac.kr/intro/index.php">http://east-1.snu.ac.kr/intro/index.php</a>
YES Cold Water (The study on the impact of the Yellow Sea Bottom Cold Water Mass to the	KIOST, KOREA	2012-2014	Woong-Seo Kim, Seok Lee, Se-Jong Ju, Jung-Hoon Kang	To better understand effects of cold water mass on the ecosystem by investigating temporal and spatial variation in structure and dynamics of planktonic trophic components	

ecosystem)				in the Yellow Sea Bottom Cold Water	
KOREA EAST-1 (East Asian Seas Time Series)	Korea	2006-2015	K.-I. Chang, T. Lee, C. K. Kang, K.-R. Kim	Identify, quantify, and model the dynamic processes governing the climate variability and their linkage to changes in marine ecosystems	<a href="http://east-1.snu.ac.kr/intro/index.php">http://east-1.snu.ac.kr/intro/index.php</a>
SKED (The study of Kuroshio Ecosystem Dynamics for Sustainable Fisheries)	MEXT, Japan	2011-2021	H. Saito (FRA)	Understanding the mechanisms of high fisheries productivity from oligotrophic Kuroshio ecosystem	<a href="http://tnfri.fra.affrc.go.jp/kaiyo/sked/english/index.html">http://tnfri.fra.affrc.go.jp/kaiyo/sked/english/index.html</a>
NEOPS (New Ocean Paradigm on its Biogeochemistry, Ecosystem and Sustainable Use)	MEXT, Japan	2012-2017	K. Furuya (U. Tokyo)	Developing new ocean provinces based on BGC and ecosystem studies for sustainable use of marine ecosystem services. Half natural sciences, half social	<a href="http://ocean.fs.a.u-tokyo.ac.jp/index-e.html">http://ocean.fs.a.u-tokyo.ac.jp/index-e.html</a>
“Hot spot” in the climate system	MEXT, Japan	2010-2015	H. Nakamjura (U. Tokyo)	Extra-tropical air-sea interaction under the East Asian monsoon system	
Tohoku Ecosystem-Associated Marine Science	MEXT, Japan	2011-2020	Akihiro Kijima, Kazuhiro Kogure, Hiroshi Kitazato	Understanding the perturbation damage by 3.11 Tsunami in the coastal ecosystems in Tohoku, Japan. (AICE related project)	<a href="http://www.i-teams.jp/">http://www.i-teams.jp/</a>
NEOPS <i>Hakuho-Maru</i> cruise	various funding	2013-2014	K. Furuya, H. Ogawa (U. of Tokyo)	Meridional transect cruise of North and South Pacific (170°W) on BGC and Ecosystem	
Evaluation, Adaptation and Mitigation of Global Warming in Agriculture, Forestry and Fisheries	MAFF, Japan	2010-2015	H. Kidokoro (FRA)	Forecasting and mitigation of the impact of global warming on marine ecosystems	
Comprehensive Study of the Far Eastern Seas of Russia and Northern Pacific	Ministry of Economic Development and Russian Academy of Sciences, Russia	2011-2013	V. Lobanov (POI FEB RAS)	Comprehensive study of properties and dynamics of water, atmosphere and lithosphere, their interactions, including process in coastal zone, to understand their influence on climate and formation of biological, mineral and energetic resources and increase effectiveness of marine activity and protect environment of the Far Eastern Seas and Northwestern Pacific	
Integrated investigations of ecosystems and biological	Committee on Fisheries, Russia	2012-2016	O. Katugin (TINRO)	To understand status and variability of fisheries resources of the northwestern Pacific and its marginal seas and make	

resources of the Far Eastern Seas of Russia				assessment for sustainable fishery	
CIMEC (The Cooperative Institute for Marine Ecosystems and Climate)	NOAA, USA		D. Checkeleley	To better serve the Nation's needs through observing and understanding the marine ecosystems and climate in the California Current System, Eastern Tropical Pacific, Southern Ocean, and globally	<a href="http://cimec.ucsd.edu/index.html">http://cimec.ucsd.edu/index.html</a>
POBEX (Pacific Ocean Boundary Ecosystems)	NSF/NOAA, USA		E. Di Lorenzo	Investigating the mechanisms of climate-related variability in three Pacific boundary ecosystems: Gulf of Alaska, California Current System, the Humboldt or Peru-Chile Current System, the Kuroshio-Oyashio Extension (KOE) region	<a href="http://www.pobex.org">http://www.pobex.org</a>
Understanding the spatial and temporal variability of dissolved oxygen through a hierarchy of models	NSF, USA	2009-2013	C. Deutsch, T. Ito	Developing a hierarchy of models to understand observed variability of oxygen in the North Pacific and its relation to physical and biogeochemical processes	
The history and future of coastal upwelling in the California Current	NSF, USA	2012-2012	W. Sydeman, S. Bograd	Using historical time series and climate models to evaluate changes in the intensity and timing of upwelling in the California Current System	
Multi-Scale Modeling	NSF, USA		E. Curchitser	Assessing the role of eastern boundary upwelling regions and their ecosystems on climate variability using a fully coupled model	
BEST Synthesis	NSF, USA		E. Curchitser	The variable transport of pollock eggs and larvae over the Bering shelf: A marriage of physics and biology	
Ocean Observatories Initiative	NSF, USA		T. Cowles	Ocean Observatories Initiative (OOI) will encompass an integrated, global network of ocean sensors providing near-real time data that will transform the study of interrelated ocean processes on coastal, regional, and global spatial scales.	<a href="http://oceanobservatories.org/">http://oceanobservatories.org/</a>

**AP-COVE Endnote 4**

**AP-COVE Workplan and timeline from PICES-2012 in Hiroshima to PICES-2013 in Nanaimo**

*Mission of FUTURE COVE*

The Advisory Panel on *Climate, Oceanographic Variability and Ecosystems* (AP-COVE) is focused on regional (shelf) to basin scale ecosystem processes and Pacific basin teleconnections. Even though AP-COVE will keep all FUTURE key questions in mind while pursuing its activities, the purview of COVE is mainly the key questions (2) How do ecosystems respond to natural and anthropogenic forcing, and how might they change in the future? and (1) What determines an ecosystem's intrinsic resilience and vulnerability to natural and anthropogenic forcing?

*COVE-associated expert groups (2013):*

On-going expert groups

WG 27: Working Group on *North Pacific Climate Variability and Change* (2011–2014)

WG 29: Working Group on *Regional Climate Modeling* (Oct. 2011–2014)

S-CC: Section on *Carbon and Climate* (2005–2013)

S-CCME: Section on *Climate Change Effects on Marine Ecosystems* (2011–2020)

WG 28: Working Group on *Ecosystem Indicators to Characterize Ecosystem Responses to Multiple Stressors* (June 2011 –2014). Mainly associated with AP-AICE.

AP-MBM: Advisory Panel on *Marine Birds and Mammals* (1999–2014)

SG-SC-NP: Joint NPAFC-PICES Study Group on *Scientific Cooperation in the North Pacific Ocean*

Disbanded expert groups

WG 20: Working Group on *Evaluation of Climate Change Projections*

WG 22: Working Group on *Iron Supply and its Impact on Biogeochemistry and Ecosystems in the North Pacific*

WG 23: Working Group on *Comparative Ecology of Krill in Coastal and Oceanic Waters around the Pacific Rim*

*Workplan 2013–2014*

1. Review the activities of on-going AP-COVE related expert groups.  
*At PICES-2013*
2. Advice on revising the ToR for the AP-COVE related expert groups with the term beyond 2013 as needed.  
*PICES-2013–ISB-2014*
3. Work with Committee chairs to develop new WGs.  
*PICES-2013–PICES-2014*
4. Developing a plan of FUTURE OSM in 2014 with AP-AICE, AP-SOFE and Committees.  
*PICES-2013 – April 2014*
5. Review the progress of AP-COVE work plans and update as needed.  
*PICES-2013–ISB-2014*
6. Confirm the membership of AP-COVE.  
*At PICES-2013*
7. Initiate reviews and synthesis of information to address FUTURE goals.  
*PICES-2013–PICES-2014*