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 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 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.

AP-COVE-2013

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

<u>Members</u> <u>Guests</u>

Emanuele Di Lorenzo (USA)

Chairs of COVE related ExGs

Jung-Hoon Kang (Korea)

Motomitsu Takahashi (WG 28)

Jacquelynne King (Canada; FIS)

Enrique Curchster (WG 29)

Hiroaki Saito (Japan, Chairman; BIO)

Toru Suzuki (Japan; TCODE)

Jim Christian (S-CC)

Suam Kim (S-CCME)

Representatives Observers

Liyang Zhang (China)

Hiroya Sugisaki (MONITOR)

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

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|---|--|-----------|--|--|--|
| KOREA EAST-1 (East Asian Seas Time Series) | Korea | 2006-2015 | KI. Chang, T. Lee, C. K. Kang, KR. Kim | Water Identify, quantify, and model the dynamic processes governing the climate variability and their linkage to changes in marine ecosystems | http://east-1.snu.ac.kr/intro/i ndex.ph p |
| 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 | http://tnfri.fra.affrc.go.jp/kai yo/sked/english/index.html |
| 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 | http://ocean.fs.a.u- tokyo.ac.jp/index-e.html |
| "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-Assoc iated Marine Science | MEXT, Japan | 2011-2020 | Akihiro Kijma, Kazuhiro Kogure, Hiroshi Kitazato | Understanding the perturbation damage by 3.11 Tsunami in the coastal ecosystems in Tohoku, Japan. (AICE related project) | http://www.i-teams.jp/ |
| NEOPS Hakuho-Maru 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 | | | | assessment for sustainable | |
| Far Eastern Seas | | | | fishery | |
| of Russia | NO.1 : 777 | | D 01 1 1 | m 1 1 3-1 1 | 1 // |
| CIMEC (The | NOAA, USA | | D. Checkeley | To better serve the Nation's | http://cimec.ucsd.edu/index. |
| Cooperative | | | | needs through observing and | html |
| Institute for | | | | understanding the marine | |
| Marine | | | | ecosystems and climate in the | |
| Ecosystems and | | | | California Current System, | |
| Climate) | | | | Eastern Tropical Pacific, | |
| | | | | Southern Ocean, and globally | |
| POBEX (Pacific | NSF/NOAA, | | E. Di Lorenzo | Investigating the mechanisms of | http://www.pobex.org |
| Ocean Boundary | USA | | | climate-related variability in | |
| Ecosystems) | | | | three Pacific boundary | |
| | | | | ecosystems: Gulf of Alaska, | |
| | | | | California Current System, the | |
| | | | | Humboldt or Peru-Chile Current | |
| | | | | System, the Kuroshio-Oyashio | |
| | | | | Extension (KOE) region | |
| Understanding | NSF, USA | 2009-2013 | C. Deutsch, | Developing a hierarchy of | |
| the spatial and | , | | T. Ito | models to understand observed | |
| temporal | | | | variability of oxygen in the | |
| variability of | | | | North Pacific and its relation to | |
| dissolved oxygen | | | | physical and biogeochemical | |
| through a | | | | processes | |
| hierarchy of | | | | processes | |
| models | | | | | |
| The history and | NSF, USA | 2012-2012 | W. Sydeman, | Using historical time series and | |
| future of coastal | 1151, 0571 | 2012 2012 | S. Bograd | climate models to evaluate | |
| upwelling in the | | | S. Bogiau | changes in the intensity and | |
| California Current | | | | timing of upwelling in the | |
| Camorina Current | | | | California Current System | |
| Multi-Scale | NSF, USA | | E. Curchitser | Assessing the role of eastern | |
| | NSF, USA | | E. Culcilitsei | boundary upwelling regions and | |
| Modeling | | | | | |
| | | | | their ecosystems on climate | |
| | | | | variability using a fully coupled | |
| DEGE G . d . t | NOT HOL | | F. C. 11: | 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 | NSF, USA | | T. Cowles | Ocean Observatories Initiative | http://oceanobservatories.org/ |
| Observatories | | | | (OOI) will encompass an | |
| Initiative | | | | 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. | |

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