

S9 POC/FUTURE Topic Session **Outlooks and forecasts of marine ecosystems from an earth system science perspective: Challenges and opportunities**

Co-sponsored by IMBER

Co-Convenors: *Harold P. Batchelder (U.S.A.), Michael Foreman (Canada), Anne B. Hollowed (U.S.A.) and Hiroaki Saito (Japan)*

The prediction of responses of marine ecosystems to future climate scenarios is an important objective of PICES' new science program, FUTURE (Forecasting and Understanding Trends, Uncertainty and Responses of North Pacific Marine Ecosystems). However, the marine ecosystem is part of the earth system and its prediction needs integrated knowledge from physical, chemical, and biological perspectives. Earth system science is an interdisciplinary approach that integrates anthropology, atmospheric science, biology, oceanography, geophysics and policy to provide predictions of ecosystem response to climate change. The earth system is complex with non-linear feedbacks, threshold responses, and, in some cases, irreversible change. Understanding the mechanisms controlling these system properties is critical to accurately forecasting future states of nature in a changing climate. Moreover, conducting large-scale experiments on the earth system is impossible. Therefore, regional marine ecosystem models should include the earth system science links that are essential for producing better predictions of marine ecosystem response to future climate scenarios. This session will focus on multi-disciplinary coupled models and theoretical, observational and experimental studies designed to provide outlooks and/or forecasts of marine ecosystems. Outlooks and forecasts differ in that outlooks are qualitative with (often) unbounded uncertainties, while forecasts are often quantitative, but must have bounded certainties. Presentations that focus on both long-term and short-term predictions, and that link two or more disciplines (such as physical oceanography, climate, ecosystem dynamics, marine resource management, or socio-economic systems) are welcome. Presentations that explore what additional information or data are needed to provide outlooks and forecasts, and especially to transition from providing outlooks to providing forecasts are desired.

Day 1, Wednesday, October 28 (9:00-12:30)

- 9:00 **Takeshi Okunishi, Shin-ichi Ito, Atsushi Kawabata, Hiroshi Kubota, Taketo Hashioka, Hiroshi Sumata and Yasuhiro Yamanaka (Invited)**
 A multi-trophic level ecosystem model for understanding mechanisms of small pelagic fish species alternation (S9-5745)
- 9:25 **Fei Chai, Francisco Chavez, Yi Chao, Lei Shi, Hongchun Zhang and Richard Barber**
 Using remote sensing and modeling in operational forecasting of fisheries (S9-5934)
- 9:45 **Keiji Kiyomatsu, Takuji Waseda and Yasumasa Miyazawa**
 Reconstruction of high-resolution historical February SST in the northwestern Pacific and its application to larval dispersion (S9-5898)
- 10:05 **Yury I. Zuenko**
 How trends, shifts, and interdecadal fluctuations in climate reconstruct the ecosystem of the Japan/East Sea (S9-5549)
- 10:25 *Coffee / tea break*
- 10:45 **Raghu Murtugudde (Invited)**
 Marine ecosystem forecasting with an Earth System Prediction model (S9-5980)
- 11:10 **V.S. Labay**
 Evolution of a benthos of coastal lagoons of Sakhalin Island: Causes and consequences (S9-5958)
- 11:30 **Yumiko Yara, Masahiko Fujii, Yasuhiro Yamanaka, Naosuke Okada, Hiroya Yamano and Kazuhiro Oshima**
 Projected effects of global warming on coral reefs in seas close to Japan (S9-5798)

- 11:50 **Hiroaki Saito**
Modeling of organic matter dynamics in the mesopelagic zone: A perspective on modeling and ecosystem studies (S9-5692)
- 12:10 **Enrique N. Curchitser, Kenneth A. Rose, Kate Hedstrom, Jerome Fiechter, Shin-ichi Ito, Salvador Lluch-Cota and Bernard A. Megrey**
Development of a climate-to-fish-to-fishers model: Progress, issues, and some solutions (S9-5979)
- 12:30 **Day 1 Session ends**

Day 2, Thursday, October 29 (14:00-17:50)

- 14:00 **Manuel Barange, Icarus Allen, Eddie Allison, Marie-Caroline Badjeck, Julia Blanchard, James Harle, Robert Holmes, Jason Holt, Simon Jennings, Gorka Merino, Christian Mullon and Emma Tompkins (Invited)**
Predicting the impacts and socio-economic consequences of climate change on global marine ecosystems and fisheries: The QUEST_Fish framework (S9-5834)
- 14:25 **Anne B. Hollowed, Nicholas A. Bond, James E. Overland and Thomas Wilderbuer**
Future conditions in the Bering Sea: Applications to walleye pollock and flatfish (S9-5973)
- 14:45 **Akihiko Yatsu, Sanae Chiba, Yasuhiro Yamanaka, Shin-ichi Ito, Yugo Shimizu, Masahide Kaeriyama and Yoshiro Watanabe**
Future of Kuroshio/Oyashio ecosystems: An outcome of the CFAME Task Team and WG20 (S9-5600)
- 15:05 **William T. Peterson, Edmundo Casillas, Hongsheng Bi and Cheryl A. Morgan**
Forecasting returns of coho and Chinook salmon: Presentation of a mechanism that links the PDO with ocean circulation, ecosystem structure and salmon returns in the coastal northern California Current (S9-5985)
- 15:25 **Coffee / tea break**
- 15:45 **Michael Dalton (Invited)**
Climate change and marine ecosystems: Demographic and economic implications under IPCC scenarios (S9-5994)
- 16:10 **Harold P. Batchelder, Enrique N. Curchitser and Kate Hedstrom**
Modeling physical processes in the Northeast Pacific: model-data comparisons for assessing when model skill is sufficient as a basis for ecosystem simulation (S9-5969)
- 16:30 **Jie Shi, Hao Wei and Liang Zhao**
Numerical study of the aquaculture carrying capacity in a typical raft culture bay of China (S9-5787)
- 16:50 **Licheng Feng, Baochao Liu, Yi Cai, Zhanggui Wang, Jiping Chao and Jianping Li**
Numerical simulation of the Changjiang estuary ecosystem (S9-5773)
- 17:10 **Hernan Garcia, Sydney Levitus, Tim Boyer, Ricardo Locarnini, John Antonov, Daphne Johnson, Olga Baranova, Alexey Mishonov, Dan Seidov, Igor Smolyar, Melisa Zweng and Evgeney Yarosh**
The World Ocean Database and Atlas 2009 (S9-6005)
- 17:30 **Steven J. Bograd, Bryan A. Black, William J. Sydeman, Isaac Schroeder and Peter Lawson**
Wintertime ocean conditions synchronize rockfish growth and seabird reproduction in the California Current (S9-5889)
- 17:50 **Session ends**