

China-Japan High-level Expert Symposium on Marine Environment

The first "China-Japan High-level Expert Symposium on Marine Environment " will focus on recent advances in the fields of marine environment and resources , providing a platform for dialogues on the future of research related to climate change, marine environmental monitoring, marine ecological restoration, microbial carbon, marine microplastics and sustainable development of marine fishery. It will offer policy suggestions for the protection and development of marine environment in China and Japan.

The purpose of the symposium is to strengthen the cooperation and exchanges between China and Japan in marine environment research, and to gather talent that will lead the future development of the fields. Furthermore, the symposium aims to make vital contributions to developing innovative solutions for marine environment challenges worldwide.

Chairs

Jiao Nianzhi, Professor of Cheung Kong Scholar, Xiamen University, Academician of Chinese Academy of Science

Tian Yongjun, Professor of College of Fisheries, Ocean University of China (OUC), the Leader of the Lab of Fisheries Oceanography in OUC

Ito Shin-ichi, Professor of Atmosphere and Ocean Research Institute, The University of Tokyo

Hosts

Department of Foreign Expert Services, Ministry of Science and Technology of the People's Republic of China

Sakura Science Program Headquarters, Japan Science and Technology Agency

Organizers

Foreign Talent Research Center, Ministry of Science and Technology of the People's Republic of China

Ocean University of China

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Foreign Talent Research Center, MOST

The Foreign Talent Research Center, Ministry of Science and Technology of the People's Republic of China, a public institution directly affiliated to China's Ministry of Science and Technology, is mainly responsible for: carrying out research on the development of foreign talent and the theories, strategies, policies, and development status of scientific and technological innovation; developing foreign talent think-tanks and promoting networks of theoretical achievements during overseas expertise introduction; undertaking the construction, operation, maintenance and development of foreign talent resource pools; providing resources, platforms and other services for the overseas expertise introduction; editing and publishing professional media articles for the overseas expertise introduction, and undertaking the publicity work entrusted by the Ministry; organizing professional meetings and major events for overseas expertise introduction as well as scientific and technological exchanges; providing services including evaluation, consultation, introduction, information, and training for foreign talent; managing the China Society for Research on International Exchange and Personnel Development; and undertaking other tasks assigned by the CPC Leading Group, MOST and leaders of the Ministry and tasks entrusted by relevant departments and bureaus.

Sakura Science Program Headquarters, JST

Japan Science and Technology Agency (JST) plays a central role in Japan's Science and Technology Basic Plan. Based on science and technology targets issued by the government, we fund strategic basic research, academia-industry collaboration and technology transfer. In recent years, we promote international joint research and the fostering of next generation human resources. JST also provides information services to support R&D activities. Our comprehensive contribution stimulates substantive progress in science and technology and helps tackle a variety of social issues.

JST continues to strengthen our close relationships with universities, research institutes and industry in and outside Japan, create collaborative science and technology innovation and ensure sustainable development of our society.

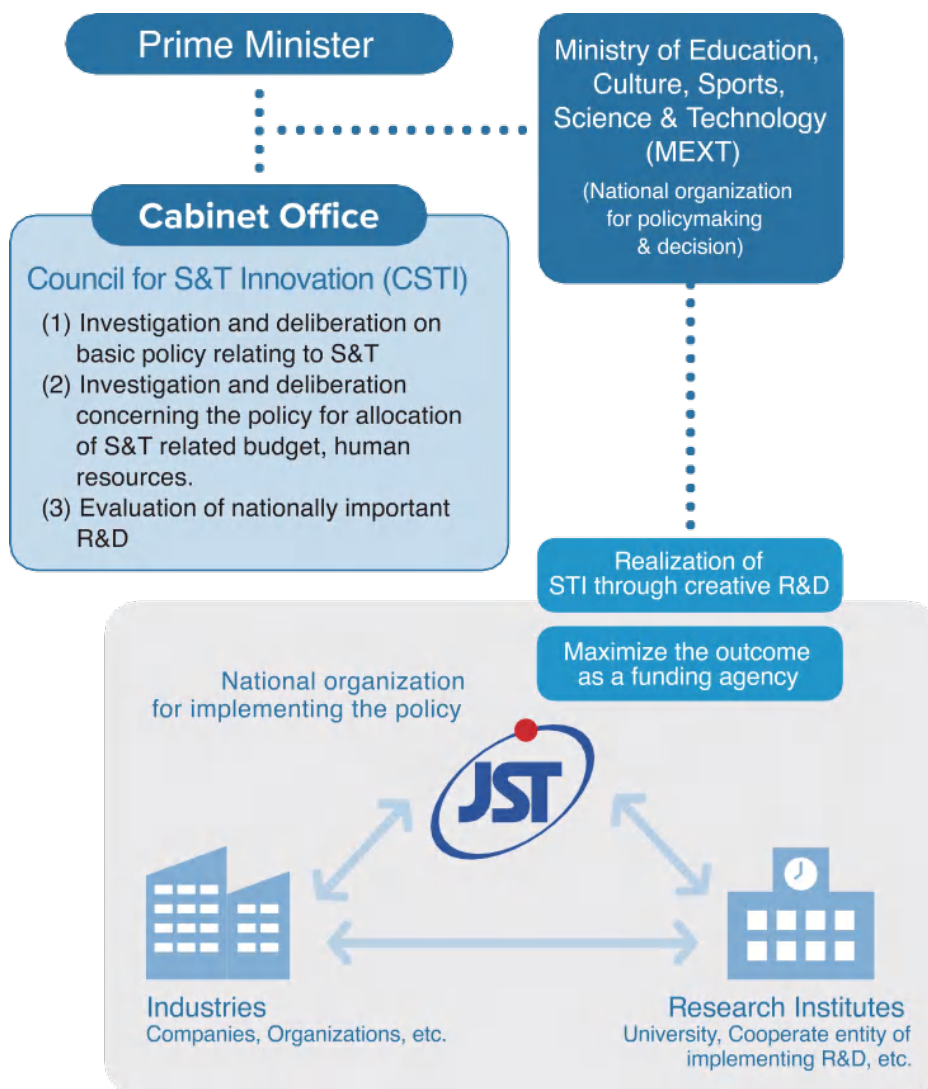
Sakura Science Program invites talented young people from other countries and regions to Japan in a form of industry-academia-government collaboration, to introduce and offer experience in science and technology. Beginning in 2014, over 33,000 young people have visited Japan through this program.

By exchanging ideas in the field of science and technology among the participants of Sakura Science Program, we:

- Support the development of talented people overseas who have the potential to contribute to the innovation in science and technology; and support continuous interaction between Japan and other countries and regions.

- Promote globalization of Japanese educational and research institutes.

- Strengthen good relationship between Japan and other countries and regions and ultimately pursue the development of science and technology in Japan and worldwide.



Ocean University of China

Ocean University of China (OUC) is a comprehensive university with unique strengths in oceanography and fisheries. OUC was one of the first universities approved to confer undergraduate and postgraduate degrees by the State Academic Degree Committee. It offers courses in science, engineering, fisheries, pharmaceuticals, economics, management, liberal arts, law, education, history, and art. In 2017 it was included in China's plan of building "Double First-Rate" universities. It is also part of the country's "Project 985" universities (China's top 40 universities) and "Project 211" institutions (China's top 100 universities). It is supported and funded by important national and provincial projects as it strives to become a world-class university. OUC has more than 30,000 full-time students and over 3,700 faculty members and staff. It has 7 fellows of the Chinese Academy of Sciences and 9 fellows of the Chinese Academy of Engineering. OUC attaches great importance to international exchanges and cooperation, having

established cooperative ties with 270 universities and research institutes in 45 countries and regions. In 2005, the International Alliance of Marine-Related Institutions was founded at OUC with new members and cooperative programs continuing to join its ranks every year. In 2005, OUC joined Sino-US 10+10, a joint program between 10 best universities in China and 10 prestigious institutions in the University of California system (US). In addition, OUC has founded the Center for Sino-German Cooperation in Marine Sciences, the Sino-British Joint Research Centre, the Sino-Australian Joint Research Centre for Coastal Management, the Sino-Korean Research Center for Marine Development, the OUC-WHOI International Joint Research Centre and the OUC-Auburn University Joint Research Centre for Aquaculture and Environment Engineering. OUC has also entered into a cooperation with the ASEAN Fisheries Education Network as a new member of ASEAN-FEN+. Moreover, OUC has joined the Nordic Center, a collaboration network between Chinese and Northern European universities.

College of Fisheries, OUC

The College of Fisheries was established in 1946, based on the Department of Fisheries at the former National Shandong University. The college has two departments, the department of aquaculture and the department of marine fisheries. We boast a complete system of talent cultivation, offering education from the undergraduate level all the way up to the postdoctoral level. We offer a master's program in fishery development, PhD programs in aquaculture, zoology, aquatic biology, fishing science, fishery resources, as well as energy and environmental protection engineering, and a postdoctoral program in fisheries. We are the only college in the field of fisheries to offer education of all levels in China. Our research in fisheries has led to revolutions in China's fishery industry. In the past 50 years and more, we have been at the forefront of research, serving as the flagship in the field. We are the first in the country to offer master's and PhD degrees and a postdoctoral program in fisheries. We have the country's only key discipline of fisheries, certified in 2007, included in Project 111 for Disciplinary Innovation and Talent Introduction at Higher Learning Institutions and funded by a supporting program of Shandong Province, starting from 2013. We ranked number one in the three national assessments on the discipline of fisheries, conducted in 2004, 2007 and 2012. In 2017, we were graded A+ for our discipline of fisheries and included in the list of building world-class disciplines decided by the Ministry of Education.

Agenda

UTC+9 (Japan Standard Time)

Opening Ceremony	
Chair: Jiao Nianzhi	
9:30-10:00	Opening Speech <ul style="list-style-type: none"> ● Li Xin, Deputy Director, Department of Foreign Expert Services, MOST, China ● Kishi Teruo, Director-General SSP Headquarters, JST ● Li Huajun, Vice President, Ocean University of China ● Ito Shin-ichi, Professor, The University of Tokyo Group Photo
Keynote Speech	
Chair: Iwamoto Yoko	
10:00-10:25	Keynote Speech 1: Ocean Negative Carbon Emission <ul style="list-style-type: none"> ● Jiao Nianzhi
10:25-10:50	Keynote Speech 2: Trends of Ocean Acidification in The Western North Pacific, Western Equatorial Pacific Warm Pool, and in The Seas around Japan <ul style="list-style-type: none"> ● Ishii Masao
10:50-11:00	Coffee Break
Chair: Tang Danling	
11:00-11:25	Keynote Speech 3: Pacific Decadal Climate Change and Fish Catches <ul style="list-style-type: none"> ● Lin Xiaopei
11:25-11:50	Keynote Speech 4: Decadal-to-centennial Variability: Linkages from Physics to Biology <ul style="list-style-type: none"> ● Minobe Shoshiro
11:50-12:15	Keynote Speech 5: Seasonal to Decadal Variability of Biogeochemical Parameters in the North Pacific <ul style="list-style-type: none"> ● Yasunaka Sayaka
Roundtable Discussion	
Chair: Ito Shin-ichi	
12:15-13:00	Climate Change and the Oceans <ul style="list-style-type: none"> ● Attendee: Xu Jianjun, Suga Toshio, Song Zhenya, Bahareh Kamranzad, Feng Jingchun, Nakaoka Shin-Ichiro, Liu Yang, Iwamoto Yoko, Li JingyuI

13:00-14:30	Lunch & Break
Keynote Speech	
Chair: Lin Xiaopei	
14:30-14:55	Keynote Speech 6: Fishery Resources and Climate Change ● Tian Yongjun
14:55-15:20	Keynote Speech 7: Implications of Ocean Acidification on Marine Organisms and Coastal Ecosystem Services ● Kurihara Haruko
Chair: Hiroya Yamano	
15:20-15:45	Keynote Speech 8: Distribution Characteristics of Microplastics in Typical Bays of China ● Huang Wei
15:45-16:10	Keynote Speech 9: Multilevel Dataset of Microplastic Abundance in the World's Upper Ocean ● Isobe Atsuhiko
16:10-16:35	Keynote Speech 10: Research Progress of Typhoon "Wind-Pump" Impacts on Marine Systems ● Tang Danling
16:35-16:45	Coffee Break
Roundtable Discussion	
Chair: Dong Yunwei	
16:45-17:30	Marine Environment and Marine Ecology Protection, Marine Fishery Sustainable Development ● Attendee: Michida Yutaka, Cao Ling, Greta Pecl, Zhang Fan, Yamano Hiroya, Lin Qiang, Ichinokawa Momoko, Zhang Hui
Closing Ceremony	
17:30-18:00	● Speech by Tian Yongjun, Professor, College of Fisheries, Ocean University of China ● Speech by Yoneyama Haruko, Executive officer, JST

Speakers and Chairs

Session1

Jiao Nianzhi

Professor, Xiamen University
Academician of the Chinese Academy of Sciences



Jiao Nianzhi is a Professor of Cheung Kong Scholar, Xiamen University, Academician of Chinese Academy of Sciences, Fellow of The World Academy of Sciences, Fellow of The American Academy of Microbiology, Co-Chair of the International Joint Working Group on negative ocean emissions (WG46) of the International Council for ocean exploration (ICES) and the North Pacific Ocean Science Organization (PICES). He mainly engaged in marine ecological process and its impacts on natural resources and environmental effects, and has published more than 300 academic papers in *Science* and *Nature* series journals, *PNAS*, *NSR* and other first-class journals, which have been cited more than 10,000 times. Since 2014, he has been selected as one of the ESI most cited authors in China. He proposed the concept of the "Microbial Carbon Pump" (MCP), a new mechanism of carbon sequestration in the ocean. *Science* commented MCP as "the Invisible Hand Behind A Vast Carbon Reservoir". The MCP framework has been included in the IPCC special report (2019) and the Carbon Research Report by Intergovernmental Oceanographic Commission (IOC) of UNESCO (2021).

Title: Microbial Carbon Sequestration in The Ocean

Abstract

The ocean holds the largest carbon reservoir on the earth, playing a significant role in regulating climate changes. The known biological mechanisms of ocean carbon sequestration include the biological carbon pump (BCP) based on particulate organic carbon sinking processes, the carbonate counter pump (CCP) based on carbonate precipitation processes, and the microbial carbon pump (MCP) based on microbial transformation to refractory organic carbon. These three pumps are usually investigated separately and there are gaps in understanding their comprehensive effects on ocean negative carbon emission (ONCE). An international ONCE program is proposed based on collaborations of scientists under the guidance of the joint expert group of the International Committee for Exploration of the Sea (ICES) and the North Pacific Marine Science Organization (PICES). A recent ONCE action is to integrate the MCP, BCP and CCP to form a comprehensive approach for negative emission. i.e., microbially mediated biogeochemical processes sequester carbon in the forms of organic carbon, alkalinity and carbonates at the same time. The goal is to maximize output of total amount of organic and inorganic carbon to the sediment in specific environments such as aquaculture fields where eutrophication, acidification and hypoxia often take place. This ecoengineering approach could turn the anthropogenic impacted aquaculture sediment with harmful conditions to a carbon sequestration site with improved environment.

Ito Shin-ichi

Professor, Atmosphere and Ocean Research Institute, The University of Tokyo

Ito Shin-ichi is Professor of Fisheries Environmental Oceanography at the Atmosphere and Ocean Research Institute, The University of Tokyo. He is broadly interested in climate impacts on ocean ecosystems. His particular interest is the formation of ecological hotspots by ocean currents, fish response to climate variability and change, and comparative studies on fish responses to global climate. He developed a fish growth model coupled to the lower-trophic-level ecosystem model NEMURO.FISH (North Pacific Ecosystem Model for Understanding Regional Oceanography For including Saury and Herring). His laboratory conducts swimming and respirometry experiments to estimate the parameters in the model. They also conduct rearing experiments to estimate the relationship between water temperature and otolith oxygen isotope ratio to estimate the migration routes of fish species using otolith microchemistry information. Recently they are applying ocean environmental DNA (OceanDNA) to detect the distribution of fish species. In addition, they are actively investigating overlap of microplastic distribution and fish species. He serves on a couple of editorial boards including "Progress in Oceanography" and "Fisheries Oceanography", a lead author of IPCC WG-II Sixth Assessment Report, and the Vice President of Oceanographic Society of Japan. He is also a Co-Chairman of the Joint ICES/PICES Working Group on Impacts of Warming on Growth Rates and Fisheries Yields (WGGRAFY).



Ishii Masao

Senior Director for Research Affairs, Meteorological Research Institute, Japan Meteorological Agency

Ishii Masao is now a Senior Director for Research Affairs in Meteorological Research Institute of Japan Meteorological Agency (JMA). A chemist by training, he is studying ocean carbon cycle and biogeochemistry based on shipboard high-quality measurements. Masao works mainly in the western North Pacific, equatorial Pacific, and the Southern Ocean, while supporting operational oceanographic observations by JMA. He aims at understanding natural variability and anthropogenic changes in ocean carbon and biogeochemistry and their impacts in regional to global scales. He served as an IMBeR Science Steering Committee member (2015-2017), IOCCP/GOOS BGC Panel co-chair (2017-2020) and is serving as a PICES S-CC member, a GO-SHIP executive group member and a Lead Author of IPCC WG1 AR6.



Title: Trends of Ocean Acidification in the Western North Pacific, Western Equatorial Pacific Warm Pool, and in the Seas around Japan

Abstract

To elucidate changes in ocean carbon content over decades as a result of the anthropogenic CO₂ uptake and the impacts of climate variability/change on the dynamics of biogeochemical cycles is the key to understand the role of ocean in controlling the atmospheric CO₂ concentration. It is also closely connected with how the acid-base system of seawater is changing and thereby impacting on marine organisms and ecosystems. In this talk, we present the results of quasi-time-series measurements of inorganic carbon in the surface and in the interior of the western North Pacific along 137°E and of the western equatorial Pacific warm pool over the past three decades since mid-1980s. In the Kuroshio Recirculation region (26°N-30°N) at 137°E, the mean rate of pH change was -0.0193 ± 0.0008 per decade for 1983-2017. This is consistent with that anticipated from the rate of atmospheric CO₂ increase, but the rate of pH change showed a significant variability in a decadal time-scale. On the other hand, the mean rate of pH change in the tropics (5°N-10°N) at 137°E was -0.0124 ± 0.0008 per decade. The slower acidification has also been observed over the western equatorial Pacific warm pool. These variability of the acidification trend in space and time is thought to be ascribed to the time-scale and the variability of ocean circulation in the upper layer of the North Pacific as well as the change in the rate of atmospheric CO₂ increase. Trends of acidification and warming in the seas around Japan are also to be presented.

Lin Xiaopei

Professor, Ocean University of China

Vice Director, Physical Oceanography Laboratory, Ocean University of China

Lin Xiaopei has focused on the Kuroshio and Atlantic Meridional Overturning Circulation (AMOC). Their variability and multi-scale interaction are the key scientific issues in ocean and climate change study. He took into account the topographic effect which has often been ignored in the traditional circulation theory. He found the interaction between mesoscale eddies and the above circulations, analyzed the impact of AMOC to the low frequency variability in the Kuroshio region. The new findings are as below.

Firstly, the interaction between mesoscale eddies and the Kuroshio is one of the major mechanisms that help the Kuroshio to overcome topographic barrier and intrusion into the East China Sea. Secondly, the interaction between mesoscales eddies and the AMOC is important to the mass and heat flux variability of the AMOC in the North Subpolar Atlantic Ocean. Thirdly, the change of AMOC will regulate the low frequency variability of the Kuroshio front and related mode water. The above results are published on 130 papers on the international journals (40 papers in recent 5 years). He also contributes to several international observation projects.



Title: Pacific Decadal Climate Change and Fish Catches

Abstract

The decadal climate change in the North Pacific is believed to be determined by the Pacific Decadal Oscillation (PDO), which was firstly found from the Salmon catches in the North Eastern Pacific Ocean. But our recent studies show that the Atlantic Multidecadal Oscillation (AMO) could regulate the decadal variability of the Kuroshio front and upper layer ocean temperature in the Northwestern Pacific Ocean. Then the fish catches near the Japan will also vary with the AMO rather than the PDO.

Minobe Shoshiro

Professor, Hokkaido University

Minobe Shoshiro is a professor at the Faculty of Science, Hokkaido University. He took his BS in 1985, MS in 1987, and Ph.D. in 1994 at Hokkaido University. He has been working on variability and change both in the ocean and atmosphere and their interactions. Specific topics include mid-latitude air-sea interaction, sea-level rise, ocean deoxygenation, and marine ecosystem variability and change. He reported multi-decadal variability over the North Pacific in 1997, which has been more than 500 times according to Web of Science. His paper with co-authors shown as the cover of Nature in 2008 has stimulated the international research community in mid-latitude air-sea



interaction. His theory about the western boundary sea-level has been highlighted in the Bulletin of the American Meteorological Society. Recently, he has served as the main guest editor for the research topic of “North Pacific Climate and Ecosystem Predictability on Seasonal to Decadal Timescales” on Frontiers in Marine Science. He received the Japan Oceanographic Society Award in 2013, the Commendation for Science and Technology by the Minister of Education, Culture, Sports, Science and Technology in 2014, and The Ninth National Maritime Awards (Prime Minister Awards) in 2016. He is also recently selected as one of the most influential 1,000 climate scientists by Reuter in 2021.

Title: Decadal-to-centennial Variability: Linkages from Physics to Biology

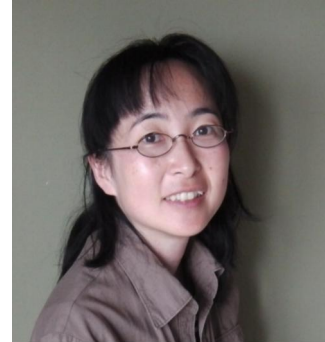
Abstract

The importance of the physical variability and change of the ocean to human society may take three routes: a direct route such as sea-level rise, a route via the atmosphere as the ocean modulates the climate and weather, which influence human society, and a route via the biogeochemistry and biology. In this presentation, I would like to report some examples of the final route, i.e., linkage of physics, biogeochemistry, and biology on decadal to centennial timescales. The variability and change on these timescales arise both from natural variability and anthropogenic changes such as global warming. Thus, understanding and predicting the superposition of variations arising from different mechanisms are crucial.

Yasunaka Sayaka

Researcher, Japan Agency for Marine-Earth Science and Technology Center

Yasunaka Sayaka got her Ph.D. in Science in Tohoku University. After working as a postdoctor at The University of Tokyo and in National Institute for Environmental Study (NIES), she moved to Japan Agency for Marine-Earth Science and Technology Center (JASMTEC) in 2014. Her area of expertise is ocean environmental science, and her recent research interest is ocean carbon and nutrient cycles.



Title: Seasonal to Decadal Variability of Biogeochemical Parameters in the North Pacific

Abstract

Nutrient concentration at the ocean surface is closely related to the ocean ecosystem. I present seasonal to decadal variability of ocean surface nutrients and dissolved inorganic carbon (DIC) in the North Pacific. Nutrient and DIC seasonal drawdown corresponds well with the biological production. The Pacific Decadal Oscillation and the North Pacific Gyre Oscillation, which are the dominant climate variations in the North Pacific, affect the nutrient and DIC concentrations in the entire basin. Phosphate and silicate averaged over the North Pacific show a trend to decrease in line with the global warming, while nitrate trend is insignificant probably because of the atmospheric nitrogen deposition.

Session2

Tian Yongjun

Professor, Fisheries College, Ocean University of China

Tian Yongjun is a marine fisheries scientist, known for his works on fisheries oceanography and fish population dynamics. He obtained his Master and Ph.D. degrees in fisheries science at the University of Tokyo, Japan. He had been served as a senior researcher for Japan Fisheries Research and Education Agency (FRA). After studying and working in Japan for more than 30 years, he joined in College of Fisheries, Ocean University of China (OUC) as a professor in 2015. His research interests include 1) fisheries oceanography (and climatology), particularly the impacts of climate regime shift and variability on fisheries and fish community; 2) fish life history and recruitment process, fish population dynamics including the stock assessment and ecological modeling for fisheries management. He has published more than 100 papers in the top-ranked journals on fisheries and oceanography, and was the 2014 awardee of the Japanese Society of Fisheries Science (JSFS). As the leader of the Lab of Fisheries Oceanography in OUC, his current research aims at understanding the ecological response of individual species to ecosystem to multi-pressures including the climate variability and over-exploitation, with particular concerns on the ecosystems of over-exploited China Seas, the Kuroshio Current and Antarctic ocean.



Title: Fishery Resources and Climate Change

Abstract

The sustainable utilization and management of marine fishery resources is important not only for high quality food supply, but also for maintaining the health of marine ecosystem. Under the multiple pressures of climate change and overfishing, a lot of fishery resources are seriously declining with changes in stock structure, and the sustainable utilization of marine fishery resources is facing serious challenges. This presentation aims to provide an overview of the impacts and mechanisms of climate change and fishing on the variability in fisheries resources with case studies on China Seas and northwestern Pacific, and discusses the direction and perspective in the context of the ecosystem-based fisheries management.

Kurihara Haruko

Professor, University of the Ryukyus

Kurihara Haruko is a professor at Faculty of Science, Biology in University of the Ryukyus, Japan. She got her PhD at Kyoto University in 2004. Her research focuses on climate change impacts on the marine organisms and marine coastal ecosystems. She has published extensively on ocean acidification (OA) and has been working on the eco-physiological impacts of OA on several marine organisms including sea urchins, shellfishes, crustaceans, corals, sea grass, seaweeds, etc. Her research interests are understanding the climate change including OA on marine fisheries and coastal ecosystems, including coral reef ecosystems for better sustainable ecosystem services management and conservation.



Title: Implications of Ocean Acidification on Marine organisms and Coastal Ecosystem Services

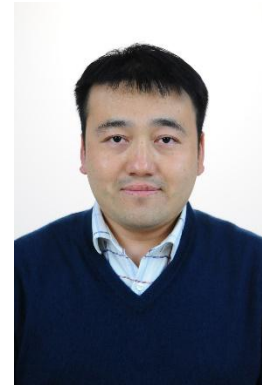
Abstract

Increase of atmospheric CO₂ is now acidifying the whole ocean, and harming shellfishes and other marine organisms. Here, we aim to introduce the potential impacts of ocean acidification on the marine organisms and its implication on the coastal ecosystems. Particularly, we will focus on the effects on marine shellfishes and reef organisms which provide number of ecosystem services such as food source and tourism. We will also discuss about multiple-stress impacts including ocean acidification, ocean warming and eutrophication on the coastal ecosystems and evaluation about potential conservation strategies.

Huang Wei

Professor, Second Institute of Oceanography, Ministry of Natural Resources of China

Huang Wei is recipient of the Funding for Distinguished Young Scholars of Zhejiang Province. He obtained his Ph.D. from the Institute of Oceanology, Chinese Academy of Sciences. He was a visiting scholar of the University of Maryland of the United States (2016) and the University of Alberta of Canada (2018). He mainly focuses on marine ecology and marine spatial planning. He is the principal investigator of more than 30 research projects, including National Natural Science Foundation of China, Marine Public Welfare Research Project, sub-projects of National Key R & D Program of China, China-APEC Cooperation Fund, etc. Prof. Huang has published more than 80 research papers on recognized journals, such as *Journal of Hazardous Materials*, *Environmental Pollution*, *Science of the Total Environment*, and 6 books in marine ecology areas. He is the recipient of award (second prize) from the Marine Engineering Science and Technology of China. Among his publications, 2 papers are ESI (1%) Highly Cited Papers, and 1 paper is selected as Frontrunner 5000 of Top Academic Papers of Chinese Science and Technology Journals. Prof. Huang is member of Marine Ecological Safety Committee of Chinese Society for Environmental Sciences, vice chairman of Environmental Ecology and Marine Ecology Committee of Zhejiang Ecological Society, grant reviewer for National Natural Science Foundation of China, Ministry of Science and Technology, and Ministry of Ecology and Environment. Concurrently he is the associate editor of the journal *Frontiers in Marine Science*, and board member of *Frontiers in Physiology*.



Title: Distribution Characteristics of Microplastics in Typical Bays of China

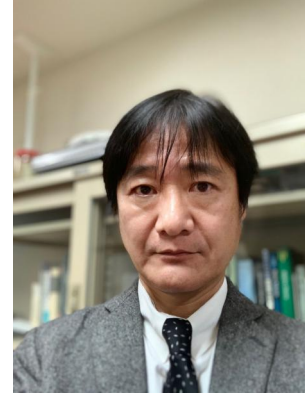
Abstract

The widespread occurrence of microplastics in the marine environment has drawn global attention because microplastics may impact the populations of marine organisms. As such, aquaculture industry may suffer from microplastic pollution, especially when plastic products are widely used for aquaculture. Here, we assessed the abundance and characteristics (type, size and composition) of microplastics in sediment and typical commercial species in typical bays of China, which has been operated intensively for decades. Satellite remote sensing images revealed that aquaculture activities were associated with microplastic pollution in sediment, where the microplastics (51–88 items/kg dry weight) were mostly fibres (>94%) and between 500 and 2000 μm . Cellulose was the predominant polymer (60–88% of microplastic composition), followed by polypropylene. Microplastics accumulated in all the commercial species (0.95–2.1 items per individual), where shrimp (*Parapenaeopsis hardwickii*) had lower potential for microplastic accumulation than the other species. The predominance of fibres and cellulose in the commercial species implies their limited ability to recognize the type and composition of microplastics during ingestion.

Isobe Atsuhiko

Professor, Research Institute for Applied Mechanics, Kyusyu University

Isobe Atsuhiko is a professor of the Research Institute for Applied Mechanics, Kyushu University. After graduating from Ehime University, he worked as a research associate at the National Fisheries University, an associate professor at Kyushu University, professor at Center for Marine Environmental Studies, Ehime University, and is currently working in Kyushu University. He is now working as the principal investigator of multiple marine plastic research projects sponsored by the Japanese government. Because of his outstanding on marine plastic pollution research, he was awarded the Environment Minister's prize in 2018, the Prime Minister's prize in 2019, and the Prize for Science and Technology from the Minister of Education, Culture, Sports, Science and Technology in 2020.



Title: Multilevel Dataset of Microplastic Abundance in the World's Upper Ocean

Abstract

A total of 8,218 pelagic microplastic samples from the world oceans were synthesized to create a dataset composed of raw, calibrated, processed, and gridded data which are made available to the public. The raw microplastic abundance data were obtained by different research projects using surface net tows or continuous seawater intake. Fibrous microplastics were removed from the calibrated dataset. Microplastic abundance which fluctuates due to vertical mixing under different oceanic conditions was standardized. An optimum interpolation method was used to create the gridded data; in total, there were 24.4 trillion pieces ($8.2 \times 10^4 \sim 57.8 \times 10^4$ tons) of microplastics in the world's upper oceans. A numerical model approach validated using the above dataset was established to represent generation, horizontal transport, and removal of ocean plastics over the world ocean.

Tang Danling

Director, Guangdong Key Lab of Ocean Remote Sensing (The South China Sea Institute of Oceanology, Chinese Academy of Sciences)

Tang Danling, the Director of Guangdong Key Lab of Ocean Remote Sensing (The South China Sea Institute of Oceanology, Chinese Academy of Sciences), is also a High-level PI for the Southern Marine Science and Engineering Guangdong Laboratory (Guangzhou). She has been working at the forefront of scientific research for a long time, engaged in ocean remote sensing and marine biology. She has served for scientific communities: the President of the Pan Ocean Remote Sensing Conference (PORSEC) Association, and the President of Pacific Congress on Marine Science and Technology (PACON). Her scientific achievements have been repeatedly highlighted in the ICSU journal *Space Research Today*. She received Ph.D. from Hong Kong University of Science and Technology, then conducted research and teaching in the USA and Japan before returning to China. Her research interests is Satellite remote sensing of marine ecology/environment, Global environmental changes; Ocean dynamics of phytoplankton ecology; and “Wind-Pump” impacts on marine systems.



Title: Research Progress of Typhoon “Wind-Pump” Impacts on

Marine Systems

Abstract

“Wind Pump” is defined as a series of processes driven by wind that influence ocean currents and water movement which subsequently affects ocean’s ecological status. This study will introduce the conceptual model of “Wind Pump” and its latest research progress. Here are monsoon wind pump, strong wind pump, low-level jet wind pump and typhoon wind pump on the oceans, wind pump can change the transport of nutrients, promote the cycling of major elements in the ocean, thus drive primary production and marine ecosystem and affect carbon fixation and global fishery resources. In the context of global warming, the typhoon wind pump have significant impacts on marine ecology and environment. Satellite remote sensing data has been fully applied in this study.

Roundtable Attendees

Session1

Xu Jianjun

Professor, Guangdong Ocean University
Director, South China Sea Institute of Marine Meteorology

Xu Jianjun is a professor in marine meteorology and Director of South China Sea Institute of Marine Meteorology (SSIM) in Guangdong Ocean University in China. He was a research professor in George Mason University in the United States and a senior scientist in Joint Center for Satellite Data Assimilation in National Oceanic and Atmospheric Administration (NOAA). There are around hundred and fifty refereed journal articles published in *Nature Communications*, *Journal of Climate*, *Journal of Geophysical Research*, etc.



Suga Toshio

Professor, Graduate School of Science, Tohoku University

Suga Toshio is a Professor of Physical Oceanography at Tohoku University and a Visiting Senior Scientist at Japan Agency for Marine-Earth Science and Technology (JAMSTEC). His research interests include ventilation and stratification of upper/intermediate ocean, water mass formation/spreading processes, physical-biogeochemical-biological processes and the role of the oceans in climate and climate variability. He has been leading the Japan Argo program as an executive member of the International Argo Steering Team (AST) since 2008 and currently serves as a Co-chair of AST (2018-). He has been active in coordinating ocean observing systems, serving as a member of GCOS-GOOS-WCRP Ocean Observations Panel for Climate (OOPC) (2007-2012), a Co-chair of OOPC (2013-2015), a core member of Global Ocean Observing System (GOOS) Steering Committee (2016-) and a member of Global Climate Observing System (GCOS) Steering Committee (2018-). Also active in a number of international and national scientific programs/organizations, he was a member of the Japanese committee for WCRP/CLIVAR from 2003 to 2020, a committee which he chaired from 2003 to 2005, served as a member of CLIVAR Pacific Panel (2005-2011) and served as a Vice President of the Oceanographic Society of Japan (JOS) (2013-2015). He was awarded the Okada Prize of JOS in 1997 and the JOS Prize (the Prize of the Oceanographic Society of Japan) in 2017 for his outstanding scientific achievements in oceanography.



Song Zhenya

Director, First Institute of Oceanography, Ministry of Natural Resources of China

Song Zhenya is a professor of the First Institute of Oceanography (FIO), Ministry of Natural Resources of China. He obtained the Ph.D. degree in Physical Oceanography of Ocean University of China in 2011. He has been working on the ocean and climate simulation, climate change, and HPC since 2004 when he was a master student. He weaved a surface wave model into a global climate model for the first time and found that the wave-induced vertical mixing plays a crucial role in improving the numerical modeling of the climate system by improving the simulation of ocean mixed layer. Then he developed two generations the earth system model name FIO-ESM (First Institute of Oceanography-Earth System Model) and participated CMIP (Climate Model Inter-comparison Project). Furthermore, based on the FIO-ESM, he established a short-term climate forecast system to predict ENSO, Arctic sea-ice concentration, Monsoon, and China rainfall. Recently, he started to work on the convergence of machine learning and numerical simulations.



Bahareh Kamranzad

Assistant Professor, Kyoto University

Bahareh Kamranzad works at the Hakubi Center for Advanced Research and Graduate School of Advanced Integrated Studies in Human Survivability (GSAIS/Shishukan), Kyoto University. She is specialized in Civil and Hydraulic/Coastal Engineering, and her research activities mainly focus on ocean renewable energies, climate change impacts, wave climate and modeling, and coastal protection. She has received several national and international awards, and has achieved highly competitive positions, including JSPS (Japan Society for the Promotion of Science) Postdoctoral Research fellowship, and Hakubi Global Type faculty position at Kyoto University. She has contributed to several research projects as PI, Co-PI, and collaborator and has secured funding from internal and external supporters such as JSPS and Sichuan University. Until now, she has published 70 peer-reviewed journal papers and conference proceedings in her area of expertise. She is also a topic/guest editor of *Frontiers in Marine Science*, *Journal of Marine Science and Engineering* and *Climate*. She is the co-founder and chair of the International Integrated Wave Energy Research (IIWER) Group. Moreover, she regularly acts as a reviewer of high-tier international journals and has been active in various knowledge exchange and research promotion activities such as invited and public talks.



Feng Jingchun

Professor, Institute of Environmental and Ecological Engineering, Guangdong University of Technology

Feng Jingchun has been engaged in the environmental and ecological effects of Marine energy exploitation for a long time. Recently, she has been engaged in and concerned about the migration, transformation and ecological effects of new Marine environmental pollutants, Marine sustainable development and negative carbon emission effects. She has published more than 60 papers in the related areas. She won the National Natural Science Foundation of China Outstanding Youth Science Fund, and she was selected as a member of Youth Promotion Association of Chinese Academy of Sciences. She got the Special Award of President of Chinese Academy of Sciences and Outstanding Doctoral Dissertation of Chinese Academy of Sciences as well.



Nakaoka Shin-Ichiro

Senior Researcher, National Institute for Environmental Studies

Nakaoka Shin-Ichiro started to study carbon cycle on earth at Tohoku University and participated in research cruises in the Greenland Sea, the Barents Sea, and the Antarctic (Southern) Ocean. After receiving his Doctor of Science degree in 2006, he worked as a postdoc for examining the role of oceanic biological activity to the oceanic carbon cycle in the Southern Ocean at National Institute of Polar Research until 2008. Then he started his career at National Institute for Environmental Studies (NIES) as a postdoc to evaluate air-sea CO₂ exchange mainly in the North Pacific. He has managed NIES voluntary observing ship (VOS) program using cargo ships measuring atmospheric and ocean surface CO₂ since 2012 when he was promoted as a tenure-track researcher in NIES and supported to international database of Surface Ocean CO₂ Atlas (SOCAT) for evaluating the oceanic CO₂ uptake in the global ocean.



Liu Yang

Deputy Director, Haizhou Bay Fishery Ecosystem Field Scientific Observation and Research Station, Ministry of Education

Dean Assistant, Fisheries College, Ocean University of China

Liu Yang received his Ph.D. from the graduate school of Agriculture at Hokkaido University and worked as Postdoctoral Fellow at Faculty of Fisheries Sciences, Hokkaido University nearly 7 years under the supervision of Professor Sei-Ichi Saitoh. In 2017, He was introduced back to China by the First Level of Young Talents Project of Ocean University of China. For recent ten years, he applied many researches on satellite remote sensing technology and GIS in aquaculture, fishery resources and coastal environmental management. He has published more than 40 SCI articles including Top journals *ICES Journal of Marine Science*, *Aquaculture*, etc. He also serves as a review editor of the journal *Remote Sensing*.



Iwamoto Yoko

Associate Professor, Hiroshima University

In 2009, after completing a Ph.D. program in Earth and Planetary Sciences, Graduate School of Science, The University of Tokyo, Iwamoto Yoko became a postdoctoral researcher and assistant professor at Nagoya University, Kanazawa University, and Tokyo University of Science. Since 2017, she has been an assistant professor (currently an associate professor) of the Graduate School of Biosphere Sciences of Hiroshima University (now the Graduate School of Integrated Sciences for Life). She is working on physical measurement and chemical analysis of particulate matter present in the atmosphere and oceans, elucidation of biogeochemical cycles between the atmosphere and the oceans through the particulate matter, and elucidation of the interaction between atmospheric aerosol, cloud, and precipitation.



Li Jingyu

Executive Director, Sino–Thai Academic Center on Marine and Fishery Sciences, Ocean University of China

Li Jingyu is a professor at College of Fisheries, Ocean University of China. She received her bachelor's degree and master's degree from Qingdao Ocean University in 1995 and 1999 respectively, and her doctoral degree from Nagasaki University in Japan in 2004. From 2005 to 2009, she served as an assistant professor in the Graduate School of Agronomy, Tohoku University, Japan. She returned to Ocean University of China in 2009 as an associate professor and promoted to professor in 2021. Her research focuses on algae physiology and ecology, which involves the physiology and ecology of macroalgae, seaweed culture technology, marine forest construction and habitat restoration, algae bloom and control, and seaweed food safety. In the past five years, she has presided over or participated in 5 national, provincial or ministerial-level scientific research projects, published 5 SCI papers, and participated in editing 1 monograph.



Session2

Dong Yunwei

Professor, College of Fisheries, Ocean University of China

Dong Yunwei is a distinguished Professor at Ocean University of China. He received his Ph.D. in 2002 from Beijing Normal University and established the Laboratory of Intertidal Ecophysiology (LInE). His research focuses on developing an integrated understanding of the impacts of climate change and human activity on the biogeographic patterning of intertidal species. His work employs a wide range of experimental approaches - from molecular biology to biogeographic analysis - to provide a mechanistic understanding of the drivers of these distribution shifts and to enable construction of models for predicting the structure and function of ecosystems under different environmental change scenarios.



Michida Yutaka

Professor, Atmosphere and Ocean Research Institute, The University of Tokyo

Michida Yutaka graduated from The University of Tokyo in 1981 and received his Ph.D. in geophysics (physical oceanography) in 1999. After 16 years' work as a research and administrative officer in the Hydrographic Department, he moved to the Ocean Research Institute of The University of Tokyo in 2000. He published more than 80 refereed papers and over 90 other articles in the fields of his primary major, physical oceanography, and of other related to marine policy including oceanographic data management. Recently,



he has been assigned as the leader for a national research project on marine microplastics supported by Nippon Foundation, and also appointed as the chairperson of a series of international expert workshops organized annually by the Ministry of Environment of Japan since 2016. He was one of the vice chairs of the Intergovernmental Oceanographic Commission of UNESCO from 2011-2015, and then appointed as the co-chair of International Oceanographic Data and Information Exchange, a flagship program of IOC, from 2015-2019. He has been awarded with several level of prizes, including Japan Prime Minister's Prize of promotion of ocean state in 2015. Currently Prof. Michida has been involved in several professional activities, for example, as the President of Japan Society of Marine Surveys and Technology, Vice President of Japan Society of Ocean Policy, and officers and/or members of academic and governmental committees and initiatives related to the ocean issues. He was deeply involved in the China-Japan Joint Research Project on the Kuroshio (JRK) in 1980s and 1990s. While he participated in JRK as an oceanographer, he was the administrative contact point of the project from 1989 to 1991 during his service as a governmental official of Science and Technology Agency (currently MEXT).

Cao Ling

Professor, Shanghai Jiao Tong University

Cao Ling completed her Ph.D. in Natural Resources and Environment at the University of Michigan, Ann Arbor and worked at Stanford University before she joined Shanghai Jiao Tong University. Growing up on a family fish farm in China and trained as an agronomist and environmental scientist, she has focused on interdisciplinary research at the interface between sustainable aquaculture and fisheries management and environmental conservation. She has published extensively on sustainable seafood production in high-profile journals such as *Nature*, *Science*, and *Proceedings of National Academy of Science (PNAS)*. She was selected Pew Marine Fellow in 2020.



Gretta Pecl

Director, Center for Marine Socioecology, University of Tasmania

Gretta Pecl is a Professor of marine ecology at the Institute for Marine and Antarctic Studies. She is also the lead of the Future Seas project and Curious Climate Tasmania. She is a marine 'generalist' with broad interdisciplinary research interests, building on a background in population dynamics, fisheries biology, and movement and migration of commercial species. She currently focuses on species and ecosystem responses to climate change, and the development of adaptation options for natural resource management. She has specific interest in exploring the mechanisms and processes underpinning climate-driven species redistribution, and the ecosystem implications of these, including co-convening the 2016 & 2019 'Species on the Move' conferences. One of the approaches she uses to examine climate-driven changes in species distribution includes citizen science; she developed and leads the National citizen science project Redmap Australia, the Range Extension Database and mapping project, which invites fishers and divers around our coastline to help monitor changes in Australian seas. Gretta has a strong passion for science communication and engagement with the public. She is also a Lead Author for the IPCC AR6 report, an Australian Research Council 'Future Fellow' and an associate editor for *Reviews in Fish Biology and Fisheries*, *Echography*, *Frontiers Ocean Solutions* and *Citizen Science Theory & Practice*. She is also on the Australian Society of Fish Biology Hall of Fame.



Zhang Fan

Professor, Shanghai Ocean University

Zhang Fan is a Professor at Shanghai Ocean University, and the Professor of Special Appointment (Eastern Scholar) at Shanghai Institutions of Higher Learning. He received his BSc and Master degrees at Ocean University of China and Ph.D. degree at University of Guelph. He has been employed as post-doc at University of Guelph and research scientist at Memorial University of Newfoundland, and his research focused on stock assessment and management of important commercial fisheries in the Laurentian Great Lakes and the Northwest Atlantic. His current research focuses on stock assessment and management of tuna, and his lab works on non-stationary population dynamics under ecosystem change, fish recruitment mechanisms, and dynamic management reference points. His studies aim to provide scientific support for the sustainable exploitation of fisheries resource, and he has been invited as external reviewer of stock assessment meetings held by ICES and DFO. His studies were published on *Fish and Fisheries* and other prestigious fisheries journals.



Yamano Hiroya

Director, National Institute for Environmental Studies

Yamano Hiroya is a specialist for shallow-water coastal ecosystems and geomorphology, especially for coral reefs. His recent work includes the effect of environmental change on coral reefs, both regional (e.g., anthropogenic impact) and global (e.g., climate change). He presented first solid evidence on poleward range expansion of corals due to rising temperatures by developing database on 80-yr coral occurrence records in Japan. He is also involved in future projection of coastal ecosystems using climate model outputs and contributes to the adaptation planning. He served as a lead author for the IPBES (Intergovernmental Platform on Biodiversity and Ecosystem Services) Asia-Pacific regional assessment report and World Ocean Assessment II.



Lin Qiang

Committee member and Deputy Director, South China Sea Institute of Oceanology, Chinese Academy of Sciences

Lin Qiang's research has been supported by a series of funding including the National Science Fund for Distinguished Young Scholars, the National Science Fund for Excellent Young Scholars, and the Outstanding Youth Foundation in Guangdong Province. He has been awarded as the young and middle-aged leading scientists, engineers and innovators from the Ministry of Science and Technology of China, the Outstanding Young Scientists of Chinese Academy of Science (CAS), the leading scientists of Special Support Program for the High Level Talent in Guangdong, and the chief scientist of the Basic Research Works for Science and Technology. He has over 110 publications in *Nature* (as an article and made the cover of *Nature*), *National Science Review*, *Nature Communications* (as the featured article that highlighted by editor), *PNAS* and so on, and some of them had been reviewed by the top journals including *Nature* and *Science*. Besides, he has 25 patents of invention patent. He has won the highest honor of "the Model Collective Awarded by the Central Committee of the Communist Party of China (CPC) and the State Council" (2018), and the research achievements had been selected for "Top 10 Marine Science and Technology Developments in China" (2016) and "Ten Major Developments in Marine Ecology in China in the past five years". He has been selected as member of The IUCN Species Survival Commission since 2018, and the rotating chairperson of the SyngBio from 2020 to 2021. In recent years, the applicant has won "The Lu Jia-Xi Young Talent Award" (2018), the excellent member of "The Youth Innovation Promotion Association" (2018), "The Distinguished Scientific Achievement Award of CAS" (2019), and "The Young Scientist Award of CAS" (2019).



Ichinokawa Momoko

Group leader, Fisheries Resources Institute, Fisheries Research and Education Agency

Associate Professor, Tokyo University of Marine Science and Technology

Ichinokawa Momoko is the head of a group responsible for developing statistical and mathematical modeling methods for fisheries science (Applied Statistical Modeling Group) at Fisheries Resources Institute, Fisheries Research and Education Agency. She got her Ph.D. in College of Arts and Science at Tokyo University. Her research has focused on fisheries biology, developing stock assessment methods, evaluation of the effectiveness of fisheries management. The number of publications account for more than twenty since 2006 with 350 citations in total. Her study published in 2017 reviewed stock status of major Japanese domestic fishery stocks in relative to Maximum Sustainable Yield (MSY) reference points, which is the first integrated trial to evaluate yield potential of Japanese fishery stocks. Under the 2018 reform of the *Fisheries Act* in Japan, she has been playing an important role in revising harvest control rule to calculate allowable biological catch of Japanese domestic fishery stocks. She has also been involved actively in scientific outreach to translate and publish an educational book in Japanese, *Overfishing: What Everyone Needs to Know*, written by Ray Hilborn and Ulrike Hilborn.



Zhang Hui

Professor, Institute of Oceanology, Chinese Academy of Sciences

Professor, Huiquan Young Scholars

Member of Youth Innovation Promotion Association, Chinese Academy of Sciences

Secretary General, Ocean Resources Professional Committee, China Society of Natural Resources

Zhang Hui has been engaged in fishery resources and fisheries ecological related research for many years. He has achieved some results in the basic research of fishery resources, fisheries ecological monitoring methods and resource changes. His outcomes fill the gap of the regional research. He has published 60 research results, including 32 first author/corresponding author papers covered by SCI and many of them are published in the field TOP journal. He hosted more than 10 competitive scientific research and talent projects such as the National Natural Science Foundation (4 items), the Chinese Academy of Sciences and the provincial level projects. He served as an associate editor for *Frontiers in Marine Science* and reviewers for many international journals. He is the member of SPFWG of ICES and PICES.

