Forum on Frontiers of Science & Technology

Climate Change and Ecosystems in the Northwest Pacific Ocean

15-16 April 2025, **Beijing & on line**

Forum on Frontiers of Science & Technology "Climate Change and Ecosystems in the Northwest Pacific Ocean"

Date and Time

Registration: April 14, 2025, at 14:00-21:00 (Beijing Time)

Conference: April 15, 2025, at 8:30-17:30 (Beijing Time)

April 16, 2025, at 9:00-17:30 (Beijing Time)

Location

Hotel: Xijiao Hotel, Beijing

Room: Conference Room 5, 2nd floor, Building 1

Address: No. 18 Wangzhuang Road, Haidian District, Beijing

On-line via Zoom link: https://us02web.zoom.us/j/82104649491

ID: 82104649491 Password: 237662

Co-Chair

Prof. Grigory I. Dolgikh, V.I. Il'ichev Pacific Oceanological Institute, Far Eastern Branch, Russian Academy of Sciences, Russia

Prof. Jing Zhang, East China Normal University, China

Sponsor

Chinese Academy of Sciences

Organizer

East China Normal University

Institute of Oceanography, Chinese Academy of Sciences

V.I. Il'ichev Pacific Oceanological Institute, Far Eastern Branch, Russian Academy of Sciences

Description

Forum on Frontiers of Science & Technology “Climate Change and Ecosystems in the Northwest Pacific Ocean” sponsored by the Academic Divisions of the Chinese Academy of Sciences (CAS) aims to provide a platform for marine scientists in China and Russia to share their knowledge and experience of frontier research methods and results in the Northwest Pacific Ocean, and to foster international and interdisciplinary collaboration.

By organizing such academic activities, we expect to be able to develop feasible bilateral China-Russian cooperation projects in the field of climate change and ecosystem interaction in the Northwest Pacific Ocean, which can be submitted to the funding agencies of both sides for implementation. As for the content of this academic exchange activity itself, a corresponding summary will be formed to promote the in-depth cooperation between China and Russia on multiple levels.

To synthesize an understanding of progress in marine science and technology and determine priority areas for cooperation that will provide a basis for a future research agenda, the Forum consists of interactive sessions that include different aspects of oceanography, in particular multidisciplinary topics, as well as presentations that reflect new and emerging research on the ocean and society.

The themes of the four sessions are:

- **Theme 1:** Ocean Dynamics and Climate Variability
- **Theme 2:** Paleoceanography and Land-Sea Interaction
- **Theme 3:** Ocean Biogeochemistry and Ecosystem Sustainability
- **Theme 4:** Discussion and Suggestions, Focused on the Action Plan

Program

15/04/2025, Tuesday			
08:30-09:00 (Beijing)	10:30-11:00 (Vladivostok)	**Opening Ceremony & Group Photo** Co-Chair: Grigory I. Dolgikh and Jing Zhang	
Theme 1. Ocean Dynamics and Climate Variability Co-Chair: Fei Yu and Vyacheslav B. Lobanov			
09:00-09:25 (Beijing)	11:00-11:25 (Vladivostok)	Subarctic frontal zone in the western Pacific and mesoscale water dynamics	Vyacheslav B. Lobanov
09:25-09:50 (Beijing)	11:25-11:50 (Vladivostok)	New insights on ocean eddies and their impacts	Dake Chen
09:50-10:15 (Beijing)	11:50-12:15 (Vladivostok)	Current trends and regional characteristics of interannual variability in thermal conditions and salinity fields in the Pacific subarctic in the context of ongoing global warming and intensification of the hydrological cycle	Elena V. Dmitrieva
10:15-10:30 (Beijing)	12:15-12:30 (Vladivostok)	Coffee Break (15 min)	
10:30-10:55 (Beijing)	12:30-12:55 (Vladivostok)	The multi-scale variations of subsurface cold water mass in subarctic Pacific Region	Fei Yu
10:55-11:20 (Beijing)	12:55-13:20 (Vladivostok)	Lagrangian oceanography: observations, simulation and practical issues	Sergei V. Prants
11:20-11:45 (Beijing)	13:20-13:45 (Vladivostok)	Impacts of extreme events on Arctic climate variability	Xianyao Chen
11:45-12:15 (Beijing)	13:45-14:15 (Vladivostok)	General Discussion of Theme 1 (30 min)	
12:15-14:00 (Beijing)	14:15-16:00 (Vladivostok)	Lunch Break	
Theme 2. Paleoceanography and Land-Sea Interaction Co-Chair: Yuriy P. Vasilenko and Tianyu Chen			
14:00-14:25 (Beijing)	16:00-16:25 (Vladivostok)	Late Quaternary environmental evolution of the Sea of Japan and its controlling mechanisms	Xuefa Shi
14:25-14:50 (Beijing)	16:25-16:50 (Vladivostok)	Spatial differentiation variability of the sea ice and icebergs, hydrology and productivity in the Sea of the Okhotsk over the last 130 ka, linkages with the North Pacific Intermediate Water formation, Kamchatka glaciation and atmosphere circulation	Sergey A. Gorbarenko

14:50-15:15 (Beijing)	16:50-17:15 (Vladivostok)	Depositional and circulation changes at the Chukchi margin, Arctic Ocean, during the last two glacial cycles	Wenshen Xiao
15:15-15:30 (Beijing)	17:15-17:30 (Vladivostok)	Coffee Break (15 min)	
15:30-15:55 (Beijing)	17:30-17:55 (Vladivostok)	The role of organic matter distribution in gray sedimentary strata of the Lomonosov Ridge's Siberian slope (Arctic Ocean) in deciphering depositional conditions	Yuriy P. Vasilenko
15:55-16:20 (Beijing)	17:55-18:20 (Vladivostok)	Continental shelf as an important sink of climate-sensitive trace metals	Tianyu Chen
16:20-16:45 (Beijing)	18:20-18:45 (Vladivostok)	Reflection of global orbital and millennial changes of hydrology and climate of the northwestern Pacific in the radiolarian record of sediment core from the Tenji Seamount over the last 88 kyr	Elena A. Yanchenko
16:45-17:15 (Beijing)	18:45-19:15 (Vladivostok)	General Discussion of Theme 2 (30 min)	
17:15-19:00 (Beijing)	19:15-21:00 (Vladivostok)	Dinner	

16/04/2025, Wednesday			
Theme 3. Ocean Biogeochemistry and Ecosystem Sustainability Co-chair: Sumei Liu and Pavel Ya. Tishchenko			
09:00-09:25 (Beijing)	11:00-11:25 (Vladivostok)	Processes controlling spatiotemporal dynamics of the sinks and sources of CO_2 in the Far Eastern seas	Pavel Ya. Tishchenko
09:25-09:50 (Beijing)	11:25-11:50 (Vladivostok)	Chinese coastal ecosystem in the climate changing environment	Song Sun
09:50-10:15 (Beijing)	11:50-12:15 (Vladivostok)	Impacts of submarine groundwater discharge on marine ecosystems in the East Siberian and Bering Seas	Alexander N. Charkin *Online*
10:15-10:30 (Beijing)	12:15-12:30 (Vladivostok)	Coffee Break (15 min)	
10:30-10:55 (Beijing)	12:30-12:55 (Vladivostok)	The ecosystem and physicochemical environment change of continental marginal seas	Sumei Liu
10:55-11:20 (Beijing)	12:55-13:20 (Vladivostok)	Influence of river runoff on the ecosystem of the coastal area of Eastern Kamchatka	Pavel Yu. Semkin

11:20-11:45 (Beijing)	13:20-13:45 (Vladivostok)	Carbon transport and acidification of the north Pacific subtropical mode water	Di Qi *Online*
11:45-12:15 (Beijing)	13:45-14:15 (Vladivostok)	General Discussion of Theme 3 (30 min)	
12:15-14:00 (Beijing)	14:15-16:00 (Vladivostok)	Lunch Break	
Theme 4. Discussion and Suggestions, Focused on the Action Plan Co-chair: Grigory I. Dolgikh and Jing Zhang			
14:00-15:30 (Beijing)	16:00-17:30 (Vladivostok)	1. Discussion on the "Hot Spots" of Climate Change and Ecosystems in the Northwest Pacific Ocean 2. Suggestions for the Joint Research Topics of Northwest Pacific Ocean between CAS and RAS	
15:30-15:45 (Beijing)	17:30-17:45 (Vladivostok)	Coffee Break (15 min)	
15:45-17:30 (Beijing)	17:45-19:30 (Vladivostok)	1. Synthesis of Scientific Presentations and Concluding Remarks by Session Co-chairs 2. Conclusion and Summary of Workshop with Prospects for the Future Development	
17:30-19:00 (Beijing)	19:30-21:00 (Vladivostok)	Dinner	

Chairs

Grigory I. Dolgikh

Grigory I. Dolgikh, academician and full member of Russian Academy of Sciences (RAS). He is Dr.Sc. in Physics and Mathematics and professor of Geosphere Physics Laboratory of V.I. Il'ichev Pacific Oceanological Institute (POI), Far Eastern Branch (FEB), RAS. His area of expertise includes geosphere physics, nanotechnologies, study of physics of emergence, development and transformation of geosphere processes in infrasound and sound range, development and creation of hardware and software laser-interference systems to study variations in the basic geosphere parameters with nano-level accuracy.

Jing Zhang

Jing Zhang, professor at Shanghai Jiao Tong University and East China Normal University, teaching chemical oceanography and biogeochemistry. His research work focuses on the behavior and the circulation of trace elements and biogenic elements in the ocean. His early work has concentrated on biogeochemical processes in estuaries and coastal waters, including the behavior and destination of chemical elements. Recently, he has attended many cruises in the tropical Western Pacific and equatorial Eastern Indian Ocean, focusing on the research about the distribution pattern, migration and transformation of trace elements and nutrients at different depth and in different sea areas, and understanding the intersection problems with different disciplines such as physics, biology.

Brief introduction and Abstract
(In order of oral presentation)

Vyacheslav B. Lobanov

Vyacheslav B. Lobanov is a head of Laboratory of Physical Oceanography of V.I. Il'ichev Pacific Oceanological Institute (POI), Far Eastern Branch (FEB), Russian Academy of Sciences (RAS). His major is physical oceanography and scientific interest is on ocean observations, mesoscale water dynamics in the Northwestern Pacific and marginal seas. He is an ex-director of POI and active member of various international oceanographic organizations, such as IOC/WESTPAC and PICES.

Subarctic frontal zone in the western Pacific and mesoscale water dynamics

Vyacheslav B. Lobanov *

V.I. Il'ichev Pacific Oceanological Institute, Far East Branch of the Russian Academy of Sciences, Vladivostok, Russia

*** Corresponding author (email: lobanov@poi.dvo.ru)**

Confluence zone of Kuroshio and Oyashio to the east of Japan is known as subarctic frontal area of the Northwestern Pacific. Because of high spatial gradients of temperature and salinity this area is considered as one of the most important energy-active zones of the World Ocean, where vertical fluxes between ocean and atmosphere as well as horizontal fluxes of heat, salt and momentum are extremely strong. In addition to meandering flow of Kuroshio Extension mesoscale eddies are important drivers of water dynamics and material exchange across the front. Highly energetic anticyclonic eddies, known as Kuroshio warm-core rings, are formed to the north of the main stream and transport trapped warm and saline subtropical water far to the north. POI observations demonstrated that KWCR may travel more than 4 years and reach area of central Kuril

Islands. Joined studies with Canadian (in 1990th) and Japanese (in 2000s) colleagues confirmed close relation of the Kuril eddies with warm-core rings of Kuroshio. It was also demonstrated a complicated vertical structure of the eddy with, in some cases, a few cores of trapped water. Such structure influences on vertical motion in the eddy and thus on nutrients and carbon fluxes as well as on primary production and biological species distribution. Strong cyclonic eddies are formed from southward elongated meanders of Kuroshio Extension and provide cross-frontal transport of cold and less saline subarctic mode water into subtropical area. They are less studied in compare with anticyclonic rings but no less important in terms of heath, energy and material transport. Our recent studies of the Kuroshio rings are associated with Fukushima-1 NPP incident in 2011 and recent discharge of accumulated water to understand which part of this water may reach Russian waters and with what content of radioisotopes. POI cruises of 2023-2024 proved slightly higher tritium concentration in the main stream of Kuroshio Extension and the eddies. However it was close to natural level. No notable excess of tritium was found.

Dake Chen

Dake Chen is a physical oceanographer and a member of Chinese Academy of Sciences. He worked at Lamont-Doherty Earth Observatory and Second institute of Oceanography for many years. Presently he is serving as the director of the Southern Marine Science and Engineering Guangdong Laboratory (Zhuhai). His academic career has been devoted to ocean and climate research, with significant achievements in the areas of coastal ocean dynamics, large-scale ocean circulation, and climate variability. His current research interest includes tropical ocean-atmosphere interaction, general ocean circulation, as well as polar ocean and climate change. He is also serving in many scientific organizations and editorial boards, and is playing an instrumental role in promoting national and international programs of oceanic and polar research.

New insights on ocean eddies and their impacts

Dake Chen *

Southern Marine Laboratory/Second Institute of Oceanography, China

*** Corresponding author (email: dchen@sio.org.cn)**

Mesoscale eddies are one of the most prominent and energetic physical phenomena in the world ocean, and thus have attracted a great deal of attention and research efforts over the last half of a century. Here we first briefly review the history of eddy studies, the important roles of eddies in ocean dynamics, and the hot topics in this research field. Then, based on observational data, numerical experiments and theoretical analysis, we report some recent progress on ocean eddy research, especially the new insights on the eddy's abnormal structure and movement, the eddy-induced transport and mixing, and the impact of eddies on general ocean circulation. Finally, we discuss the long-standing challenge in observing the three-dimensional structure of submesoscale eddies, and provide a possible solution based on an intelligent swift ocean observing system.

Elena V. Dmitrieva

Elena V. Dmitrieva is a senior researcher scientist and Ph.D/Kandidat of Technical Science of Laboratory of Informatics and Ocean Monitoring of V.I. Il'ichev Pacific Oceanological Institute (POI), Far Eastern Branch (FEB), Russian Academy of Sciences (RAS). She specializes in processing of oceanographic data, including working with large data volumes, data analysis, statistical research methods and others. Additionally, Elena is involved in the development and maintenance of databases containing information on oceans and the atmosphere.

Current trends and regional characteristics of interannual variability in thermal conditions and salinity fields in the Pacific subarctic in the context of ongoing global warming and intensification of the hydrological cycle

Igor Rostov *, Elena Dmitrieva

V.I. Il'ichev Pacific Oceanological Institute, Far East Branch of the Russian Academy of Sciences, Vladivostok, Russia

*** Corresponding author (email: rostov@poi.dvo.ru)**

Current global warming has a significant impact on the climate systems of the ocean and atmosphere, causing a restructuring of large-scale planetary processes, atmospheric and oceanic circulation and complex changes in the characteristics of the natural environment. Under these conditions, accumulation of excess heat and its redistribution in the ocean water column, accelerated changes in salinity on the sea surface and in the water column, caused by the intensification of the global water (hydrological) cycle, are observed. The observed climate response includes an increase in the frequency, intensity and magnitude of the impacts extreme temperatures, marine heat waves (MHWs), heavy precipitation, droughts and tropical cyclones on various natural ecosystems and economic sectors.

Using climate data from the National Oceanic and Atmospheric Administration (USA), Roshydromet, and atmospheric reanalysis from the European Weather Forecast Center, trends and regional features of interannual changes in water and air temperature, heat content, salinity, and salt content of waters in the Pacific subarctic, Far Eastern seas, East Asian seas, and the Pacific and Indian oceans over the past 4 decades have been determined. An analysis of the three-dimensional structure of trends in hydrological characteristics and cause-and-effect relationships between the conditions of their formation and large-scale and regional processes in the ocean and atmosphere has been performed.

In the last 4 decades the highest warming rate within the study area was observed in the extratropical zone of the NW Pacific, and contribution of the trend to the total variance of the average annual sea surface temperature reached 30–40%. Trends in temperature and salinity change vary significantly across layers and climate zones. In the last two decades, in the subarctic waters of NW Pacific increase in the heat content of the upper 1000-meter layer by ~3% was accompanied by a statistically significant decrease in the salinity of this layer. In the NE Pacific, there was an increase in the heat content of this layer by ~2%, accompanied by a statistically insignificant decrease in salinity.

Changes in the characteristics of the marine heat waves show significant positive trends and confirm a steady increase in these phenomena in terms of the frequency of events, their duration, intensity and integral indicators, emphasizing significant regional differences in these indicators over the past decades. Statistically significant correlations were revealed between fluctuations in various MHWs indicators and changes in the characteristics of surface air temperature anomalies, the height of the geopotential of the 500 mb isobaric surface, and climate indices.

Fei Yu

Fei Yu is a research professor of Institute of Oceanology, mainly engaged in marine survey and research of Regional Oceanography. His research field include circulation and water mass research of Yellow Sea and East China Sea, the mesoscale process of west Pacific and its interaction with general circulation et. al. Now he is chairman of Ocean Observation Branch in Chinese Society of Oceanology and limnology and co-chair of AP-CREAMS under North Pacific Scientific Organization.

The multi-scale variations of subsurface cold water mass in subarctic Pacific Region

Fei Yu *, Zifei Chen, Hongkai Wang

Key Laboratory of Ocean Observation and Forecasting and Key Laboratory of Ocean Circulation and Waves, Institute of Oceanology, Chinese Academy of Sciences, Qingdao, China

*** Corresponding author (email: yuf@qdio.ac.cn)**

Firstly, we used a mooring system to investigate the seasonal variation of subsurface cold water mass in Bering Sea and analyze the variation of subsurface cold water mass in the whole subarctic Pacific. In Bering Sea, the near-surface water is highly stratified due to surface warming and the remaining cold winter water in the subsurface layer, downward propagation of wind-generated NIWs is reported for the first time by the mooring system. It is found that in summertime the energetic wind-generated NIWs are constrained to the region of strong near-surface stratification, whereas in wintertime the NIWs can propagate into deep depths. This phenomenon is important for understanding NIW-induced mixing, upward heat transfer, and sea-ice melting in the subarctic and the broader Arctic Ocean.

Sergei V. Prants

Sergei V. Prants is a fellow of the Russian Academy of Sciences; Professor, Head of Department of Ocean and Atmospheric Physics at Pacific Oceanological Institute (Vladivostok, Russia). His research activity includes different aspects of physics and ecology of the oceans with a particular focus on development of Lagrangian methods to study ocean fronts, eddies and marine life. He authored and coauthored more than 200 peer-reviewed articles in journals indexed in the Web of Science core collection and a few books with the present Hirsch citation index of 31. Prof. Prants entered the top 2% of the most cited scientists in the world by the number of citations in Scopus and in the top 0.5% of the most influential scientists by Scholar GPS (2024). He is a member of editorial boards of five scientific journals and is the winner of the International Zaslavsky Award in nonlinear science and complexity (2014). S. Prants has worked as visiting professor at Lebedev Physical Institute (Moscow, Russia), Courant Institute of Mathematical Sciences at New York University, Institute for Pure and Applied Mathematics at University of California in Los Angeles, Galilei Institute for Theoretical Physics (Florence, Italy) and gave lectures at Xi'an Jiao Tong University (Xi'an, China) and Nanjing University of Information Science and Technology (Nanjing, China).

Lagrangian oceanography: observations, simulation and practical issues

Sergei V. Prants *

V.I. Il'ichev Pacific Oceanological Institute, Far East Branch of the Russian Academy of Sciences, Vladivostok, Russia

*** Corresponding author (email: prants@poi. dvo.ru)**

The new Lagrangian approach is developed to study transport, mixing, eddies and fronts in the ocean. It is based on calculation of relevant Lagrangian indicators which are functions of trajectories of virtual particles advected in the altimetry-based velocity field, outputs of numerical circulation models and reanalysis. In this approach, the relevant indicators of water motion are computed to provide information on the origin, advection

history, ‘age’ and other properties of water masses. We review the achievements and limitations of the Lagrangian diagnostics. The Lagrangian approach allows us not only to identify, track real mesoscale eddies and to document 'biography' of each eddy anywhere in the ocean, both retrospectively and in the near-real time. In particular, we can estimate the fractions of water masses/types the eddy's cores consist of. Using this approach and automatic eddy detection algorithm, a census of the mesoscale eddies in the northwestern Pacific have been done in the altimetry era. The ocean fronts are characterized by a confluence of waters with different properties. These features promote aggregation of nutrients, phytoplankton and zooplankton contributing to creation of oases of marine life in the oceanic desert for marine habitants, from small pelagic fish to seabirds and top predators. We have applied this approach for capturing frontal features based on extraction of Lagrangian fronts in chaotic oceanic flows with the focus on their role for fisheries. The location of Lagrangian fronts can be calculated in the real time with satellite-derived velocity fields under any weather conditions and in the areas with small contrasts of sea surface temperature. The proximity of fishing ground for different species to location of the fronts is shown with the help of statistical tests in different seas and oceans based on numerous catch reports of fishing vessels. These results may help in avoiding the risk of overfishing and bycatch. We also emphasize the importance of fronts in marine ecology, sustainable fisheries and in making decisions on the organization of marine protected areas. Transport barriers in the oceanic flows are considered from the point of view of dynamical systems theory. Special attention is paid to discussion of importance of transport barriers in some practical issues such as anthropogenic (oil spills, radionuclides etc.) and natural pollution.

Xianyao Chen

Xianyao Chen, Professor of Physical Oceanography in Ocean University of China. His primary research interests are ocean and climate dynamics, from seasonal to multidecadal time scales, and from regional to global scales, with special interest in global sea level rise, global ocean warming and the Arctic rapid change. These works are published in Science, Nature, Nature Climate Change, and other peer-reviewed journals. One of his main findings recently is to show the contributions of global ocean warming to the sea level rise and the global warming slowdown and accelerations.

Impacts of extreme events on Arctic climate variability

Xianyao Chen [1, 2] *, Xiaoyu Wang [1, 2] and Longjiang Mu [3]

[1] Frontier Science Center for Deep Ocean Multispheres and Earth System, Ocean University of China, Qingdao, China

[2] Physical Oceanography Laboratory, Ocean University of China, Qingdao, China

[3] Laoshan Laboratory, Qingdao, China

*** Corresponding author (email: chenxy@ouc.edu.cn)**

Arctic sea ice is declining rapidly in response to global anthropogenic warming. However, climate model simulations consistently predict lower rates of Arctic Sea ice decline than observations, even though there have numerous efforts on improving the models' capability on the simulations of positive feedback processes such as sea ice-ocean coupling, surface radiative forcing and sea ice-albedo. Here we present several evidences on the accumulated impacts of extreme events in the Arctic on the sea ice variability during the global warming. We show that for the lack of simulations of extreme events in the Arctic Ocean, climate models are difficult to capture their cumulative effects on the sea ice retreat. Our results suggest the need to enhance the ability of climate models to simulate or parameterize extreme events to improve the ability to simulate the rapid retreat of sea ice.

Xuefa Shi

Xuefa Shi is a Research Professor at the First Institute of Oceanography, Ministry of Natural Resources, serving as the Director of the Key Laboratory of Marine Geology and Metallogeny and the Curator of the China Ocean Sample Repository. He has dedicated his career to marine geology and deep-sea mineralization, with research interests that include marine sedimentation, past global changes, and mineralization of deep-sea rare earth element (REE) deposits. As Chief Scientist of more than 20 marine scientific expeditions, he has led comprehensive investigations of sedimentary geology along Asian continental margins, including the northeastern Arctic shelf, the northwestern Pacific, and the northeastern Indian Ocean. His research has advanced the understanding of the “source-to-sink” processes of sediment transport and environmental evolution in these regions. In recent years, he has carried out deep-sea REE resource surveys, identifying extensive REE-rich sediments in the central Indian Ocean basin, the western Pacific, and the southeastern Pacific. He has delineated four global deep-sea rare earth metallogenic belts and evaluated their resource potential. His work has contributed to a preliminary understanding of the spatial distribution, REE hosting phases, mineralization processes, and enrichment mechanisms of deep-sea REE-rich sediments. Additionally, he has played a leading role in the establishment and operation of the China Ocean Sample Repository, making contributions to the sharing and accessibility of deep-sea sample resources.

Late Quaternary environmental evolution of the Sea of Japan and its controlling mechanisms

Xuefa Shi [1]*, Jianjun Zou [1], Sergey A. Gorbarenko [2], Zhi Dong [1], Ruxi Dou [1], Zhengquan Yao [1], Yuri Vasilenko [2], Alexander Bosin [2]

[1] Key Laboratory of Marine Geology and Metallogeny, First Institute of Oceanography, Ministry of Natural Resources, Qingdao, China

[2] V.I. Il'ichev Pacific Oceanological Institute, Far East Branch of the Russian Academy of Sciences, Vladivostok, Russia

*** Corresponding author (email: xfshi@fio.org.cn)**

The Sea of Japan is a unique semi-enclosed marginal sea in the Northwestern Pacific. Through collaboration of China and Russia, systematic studies were conducted on several sediment cores from the Sea of Japan. These studies reveal that various regions within the Sea of Japan experienced significant changes during the Late Quaternary, in terms of terrigenous sources detrita, surface hydrology, vertical water mass structure, deep-water ventilation, sea-ice activity, and surrounding terrestrial vegetation, occurring at both orbital and millennial timescales. The research identified the timing of the Tsushima Warm Current intrusion into the Sea of Japan and reconstructed its paleoenvironmental evolution history. It was found that the environmental evolution of the Sea of Japan is primarily controlled by three factors: eustatic sea level, the East Asian monsoon, and the Tsushima Warm Current. However, different regions of the Sea responded differently to these factors. The eustatic sea level acts as the first-order factor influencing the environmental evolution of the Sea of Japan, directly affecting the degree of exchange and material transport between the Sea of Japan and surrounding waters. The East Asian summer monsoon impacts the surface hydrology of the Sea of Japan and the vegetation evolution of the surrounding land, while the East Asian winter monsoon influences sea-ice activity in the western part of the Sea of Japan and vertical convection of the deep water masses. Since 8,000 years ago, both the Tsushima Warm Current and the Liman Cold Current have become important factors influencing the environmental evolution of the Sea of Japan. This study highlights the complex interplay of various climatic and oceanographic factors in shaping the environmental changes of this region, providing valuable insights into how these factors interact and influence each other over long periods.

Sergey A. Gorbarenko

Professor Sergey A. Gorbarenko is Chief Researcher in the Laboratory of Paleooceanology and Paleoclimatology of V.I. Il'ichev Pacific Oceanological Institute (POI), Far Eastern Branch (FEB), Russian Academy of Sciences (RAS). He is a leading Russian specialist in the study of paleoclimate and environmental changes in the Far Eastern seas and the North Pacific in the late Quaternary. Within the framework of the "Agreement between the Government of the Russian Federation and the Government of the People's Republic of China on cooperation in the study and use of the World Ocean". He organized joint research by scientists from the Pacific Ocean Institute FEB RAS and Chinese colleagues in the study of the ocean and climate change, which has been conducted from 2009 to the present. In the period from 2010 to 2020, 9 extensive joint Russian-Chinese marine expeditions were carried out to the northwestern Pacific Ocean and the Arctic Ocean. Unique results on a planetary scale were obtained, published in numerous international journals and world-class monographs.

Spatial differentiation variability of the sea ice and icebergs, hydrology and productivity in the Sea of the Okhotsk over the last 130 ka, linkages with the North Pacific Intermediate Water formation, Kamchatka glaciation and atmosphere circulation

Sergey A. Gorbarenko [1] *, Yuriy P. Vasilenko [1] and Xuefa Shi [2,3]

[1] V.I. Il'ichev Pacific Oceanological Institute, Far East Branch of the Russian Academy of Sciences, Vladivostok, Russia

[2] Key Laboratory of Marine Sedimentology and Environmental Geology, First Institute of Oceanography, Ministry of Natural Resources, Qingdao, China

[3] Laboratory for Marine Geology, Qingdao National Laboratory for Marine Science and Technology, Qingdao, China

*** Corresponding author (email: gorbarenko@poi.dvo.ru)**

Despite the intensive studies of the Okhotsk Sea paleoceanography during the last 30 years, its southeastern part remains poorly studied compared to other parts. However, southeastern sea segment seems present extremely important area for investigation of the northwestern Pacific paleoceanography and evolution of the Kamchatka Peninsula glaciation in the past. When the southward flowing East Kamchatka Current, main current of NW Pacific, passes the peninsula, a significant part of its water turns and enters the Sea of Okhotsk and northward moved as West Kamchatka Current. According to paleogeographical investigation, the currently existed mountain-valley glaciers of Kamchatka significantly increased in volume and space and extended beyond the coastline during glaciations, dumping icebergs into the sea from the eastern and southwestern sides of Kamchatka peninsula. Probability of the episodic impact of iceberg discharges from southwestern Kamchatka into the southeastern Okhotsk Sea during glaciations was earlier suggested by Sakamoto and Nurnberg. Here we provide new isotope-geochemical, lithological and productivity results from the southeastern core 9-1 and overview earlier published similar data from seven sediment cores, recovered in the other parts of sea and one from the northwestern Pacific. Comparison of these data allow to analyzed spatial changes of the sea ice formation and periodic iceberg discharges from Kamchatka into the sea and clarify evolution of the North Pacific Intermediate water and possible origin behind them during global climate change. Deviation of $\delta^{18}O$ of benthic foraminifera *Uvigerina* spp. of used cores ($\delta^{18}OUv$) from benthic LS16 stack show millennium scale variability of North Pacific Intermediate water formation. Deviation of $\delta^{18}O$ of planktic foraminifera *N. pachyderma* (s.) of used cores ($\delta^{18}ONp$) from benthic LS16 stack provide sequence of millennium scale episodically iceberg discharge from Kamchatka into the sea, nearly synchronously with enhancement of intermediate water formation. The lithological and productivity parameters of sediment from southeastern cores markedly differ from ones from the western and central parts during last glaciation and were punctuated by abrupt and large IRD rises at the millennial scale over the relative warm Marine Isotope Stages 3. Spatial distribution of $\delta^{18}OUv$ records show increases of North Pacific Intermediate water formation in the Bering and Okhotsk seas nearly during cold Dansgaard-Oeschger stadials, forced by significand atmosphere circulation reorganization. Spatial distribution of $\delta^{18}ONp$, IRD and productivity records documents nearly coeval icebergs discharges events into the southeastern part of sea from the Kamchatka glaciers.

Wenshen Xiao

Associate Professor Wenshen Xiao works at the State Key Laboratory of Marine Geology, Tongji University. By using a variety of tools, such as microfossils, sedimentological and geochemical proxies, his research focuses on paleoenvironment changes in polar regions at different time scales. He has participated in multiple scientific expeditions to the Arctic Ocean and the Southern Ocean. His research interests include (1) evolution of ice sheets and circulation changes in the Arctic and Antarctic regions; (2) changes in surface water (temperature, sea ice, productivity, meltwater etc.) and bottom water (temperature, ventilation etc.) conditions in the polar/subpolar regions; (3) Arctic/Antarctic sediment stratigraphy; (4) climatic connections between polar and low latitude areas.

Depositional and circulation changes at the Chukchi margin, Arctic Ocean, during the last two glacial cycles

Wenshen Xiao [1] *, Leonid Polyak [2], Taoliang Zhang [2], Rujian Wang [1]

[1] State Key Laboratory of Marine Geology, Tongji University, Shanghai, China

[2] Byrd Polar and Climate Research Center, The Ohio State University, USA

[3] School of Oceanography, Shanghai Jiao Tong University, Shanghai, China

*** Corresponding author (email: wxiao@tongji.edu.cn)**

The shallow Chukchi-East Siberian margin of the Arctic Ocean was repeatedly impacted by Pleistocene glaciations and related changes in sea level and circulation. The depositional history across the last two Arctic glacial cycles is investigated in sediment core ARC6-C15 from the foot of the Chukchi Rise, an extension of the Chukchi Sea shelf that was impacted by the East Siberian Ice Sheet (ESIS). Our proxy data indicate a large extent of the ESIS, likely blocking the westward sediment transport from the Laurentide Ice Sheet (LIS) during the penultimate glaciation estimated to have occurred within an age span from Marine Isotope Stage (MIS) 4 to 6. The deglacial environments are characterized by enhanced sediment inputs from the East Siberian and Chukchi shelves, while overlying interstadial/interglacial sediments have a signature of the Chukchi Sea and the Beaufort Gyre. During the last glaciation, the ESIS had a smaller impact on the Chukchi margin, and the deglaciation was dominated by the LIS sediment sources. Glacial discharge from the Mackenzie area is identified in the Bølling/Allerød interval, while later deglacial pulses can be tracked to the Canadian Arctic Archipelago. In addition to glacigenic sediment inputs, both deglacial intervals contain Fe-Mn micronodules, possibly formed under the influence of meltwater pulses during sea level rise. An increase in the chlorite content that likely marks the flooding of the Bering Strait is identified at the start of the Holocene. A pronounced oxygen and carbon isotope excursion in the early Holocene may indicate hydrographic changes in the Arctic Ocean related to the 8.2 ka meltwater discharge event.

Yuriy P. Vasilenko

Dr. Iurii (Yuriy) P. Vasilenko (Vasilenko Iurii) is Deputy Director of the V.I. Il'ichev Pacific Oceanological Institute (POI FEB RAS) and Head of the Laboratory of Paleoceanography and Paleoclimatology. He also serves as Co-Director of the Russia-China Research Center for Marine and Climate Studies, a collaborative initiative between POI FEB RAS and the First Institute of Oceanography (China). Specializing in Late Pleistocene-Holocene paleoceanography and paleoclimatology, Dr. Vasilenko focuses on sedimentology, ice-rafted debris analysis, and the reconstruction of ice conditions in the Far Eastern seas, northwestern Pacific, and Arctic regions. His research examines interactions between regional ice dynamics and global ocean-atmosphere circulation systems, as well as climate signal transmission across various timescales. Through analysis of ice-rafted debris fluxes, Dr. Vasilenko has developed innovative approaches for reconstructing paleo-ice conditions, including methodologies for spatial-temporal reconstruction and analysis of controlling atmospheric circulation patterns.

The role of organic matter distribution in gray sedimentary strata of the Lomonosov Ridge’s Siberian slope (Arctic Ocean) in deciphering depositional conditions

Yuriy P. Vasilenko *

V.I. Il'ichev Pacific Oceanological Institute, Far East Branch of the Russian Academy of Sciences, Vladivostok, Russia

*** Corresponding author (email: vasilenko@poi.dvo.ru)**

This study addresses the problem of lithostratigraphy in the bottom sediments of the Siberian slope of the Lomonosov Ridge. It examines in detail the conditions and mechanisms governing the formation of gray layers, typically associated with glacial periods, and demonstrates how these layers can accumulate during interglacial intervals. Currently, the color characteristics of bottom sediments serve as one of the key factors in the stratigraphy of the Arctic sedimentary cover. Their use assumes that during interglacial periods and prolonged interstadials, brown—predominantly dark brown—layers of bottom sediments accumulate in the deep-water part of the Arctic Ocean, whereas glacial periods are marked by the deposition of gray, olive-gray, and beige sediments. This color differentiation across glacial cycle stages is attributed to the influx of manganese into the sediments. A significant portion (more than half) of the manganese is delivered to the Arctic basin via riverine input. During glacial phases, this input was drastically reduced, and a portion of the manganese became sequestered on the vast exposed shelves. In contrast, during interglacial phases, riverine discharge increased substantially, leading to greater manganese influx. An additional contributing factor is the remobilization of manganese accumulated on the shelves during glacial periods under interglacial transgression conditions. However, our data indicate that the gray layers in the sedimentary cover of the Siberian slope of the Lomonosov Ridge most likely formed at the beginning of interglacial periods. This pattern has been observed in the region for at least the last 120,000 years.

Tianyu Chen

Tianyu Chen is a professor at the School of Earth Sciences and Engineering, Nanjing University. His research primarily focuses on the use of isotopes to investigate deep ocean ventilation and biogeochemical cycle, as well as to explore the mechanisms of Quaternary oceanic carbon cycling. As the first or corresponding author, he has published over 20 papers in journals such as Science, Nature Geoscience, ESSL, and GCA. In recent years, he has been the principal investigator for projects including the Excellent Young Scholar Fund and Distinguished Young Scholar Fund of NSFC. He was awarded the Liu Tungsheng Prize in 2023.

Continental shelf as an important sink of climate-sensitive trace metals

Tianyu Chen [1]*, Qingquan Hong [1 2], Yang Zhang [1 3], Jianhua Gao[3] and Pinghe Cai[2]

1 School of Earth Sciences and Engineering, Nanjing University, Nanjing, China
2 State Key Laboratory of Marine Environmental Science, Xiamen University, Xiamen, China
3 School of Geography and Ocean Science, Nanjing, China
*** Corresponding author (email: tianyuchen@nju.edu.cn)**

Continental shelves are dynamic regions at the land-ocean interface that function as both sources and sinks of climate-sensitive trace metals. However, the net fluxes of trace metals, both into and out of these shelf systems, remain poorly constrained. To date, our understanding has been largely limited to a few trace metals, such as iron and manganese, and has focused predominantly on the shelves acting as sources of those trace metals to the open ocean. We will review the current state of knowledge, highlight the challenges in measuring and modeling these fluxes, and focus on our studies on the role of continental shelf as an important sink of several climate-sensitive trace metals. Addressing the role of continental shelf in oceanic trace metal budget is essential for accurately predicting how trace metal cycling—and its associated impacts on marine ecosystems and climate feedbacks—will respond to ongoing environmental change.

Elena A. Yanchenko

Elena A. Yanchenko is a researcher Laboratory of Paleooceanology and Paleoclimatology of V.I. Il'ichev Pacific Oceanological Institute (POI), Far Eastern Branch (FEB), Russian Academy of Sciences (RAS). She is a specialist in micropaleontology and studies climate and environmental changes in the Far Eastern seas, in the northwest Pacific and in the Eastern Arctic based on the analysis of radiolarian skeletons in late Pleistocene and Holocene marine bottom sediments.

Reflection of global orbital and millennial changes of hydrology and climate of the northwestern Pacific in the radiolarian record of sediment core from the Tenji Seamount over the last 88 kyr

Elena Yanchenko [1] *, Sergey Gorbarenko [1], Yuriy Vasilenko [1], Xuefa Shi [2,3]

[1] V.I. Il'ichev Pacific Oceanological Institute, Far East Branch of the Russian Academy of Sciences, Vladivostok, Russia

[2] Key Laboratory of Marine Geology and Metallogeny, First Institute of Oceanography, Ministry of Natural Resources, Qingdao, China

[3] Laboratory for Marine Geology, Qingdao Marine Science and Technology Center, Qingdao, China

*** Corresponding author (email: yan@poi.dvo.ru)**

The sediment samples for radiolarian analysis (76 samples) were taken in the upper part of core LV76-18-1, recovered from the Tenji Seamout at depth of 2863m (Northwestern Pacific). We observed 301 radiolarian taxa in the samples: 128 taxa from 56 genera of Spumellaria, 165 taxa from 66 genera of Nassellaria, and 8 taxa from 2 genera of Collodaria. Records of total radiolarian abundance and its accumulation rates (fluxes) over the 88 kyr are presented. Here we also used earlier published age model of studied core, data of $\delta^{18}O$ of planktic foraminifera and $\delta^{18}O$ of benthic foraminifera, lithological (IRD) and productivity proxies (Ba-bio, CaCO3 and total organic content) of sediments from the Okhotsk Sea and NW Pacific cores. Records of the total radiolarian abundance and its fluxes) clearly demonstrate millennium scale changes over the last 88 kyr. On order to understand reasons behind them, we reconstruct temporal variability of the North Pacific Intermediate Water at millennium scale in the past by comparison of the $\delta^{18}O$ of benthic foraminifera *Uvigerina* spp. of earlier published cores from the Sea of Okhotsk and northwestern Pacific ($\delta^{18}OUv$) with benthic LS16 stack. Larger deviation of the $\delta^{18}OUv$ these cores from benthic LS16 stack indicate increased formation of the North Pacific Intermediate Water, which bring into water column the water with lower $\delta^{18}O$ values from surface. Comparison of the total radiolarian abundance and its accumulation rates with constructed variability of the North Pacific Intermediate Water demonstrate decreases of the radiolarian abundance and accumulation rates with enhancement of North Pacific Intermediate Water, which bring into water column the water with depleted nutrient concentration from surface. Mostly, these periods with decreased of the radiolarian abundance and accumulation rates/ enhancement of North Pacific Intermediate had occurred coeval with the Heinrich Stadials. Abrupt increases of radiolarian abundance and its accumulation rates, following after its drop during the North Pacific Intermediate Water intensification, mainly occurred during long-lasted Dansgaard-Oeschger Interstadials.

Pavel Ya. Tishchenko

Pavel Ya. Tishchenko, Dr.Sc., principal researcher of Hydrochemistry Laboratory of V.I. Il'ichev Pacific Oceanological Institute (POI), Far Eastern Branch (FEB), Russian Academy of Sciences (RAS).

Processes controlling spatiotemporal dynamics of the sinks and sources of CO_2 in the Far Eastern seas

Pavel Tishchenko *, Petr Tishchenko and Ruslana Anokhina

Hydrochemistry Laboratory, V.I. Il'ichev Pacific Oceanological Institute, Far Eastern Branch, Russian Academy of Sciences, Vladivostok, Russia

*** Corresponding author (email: tpavel@poi.dvo.ru)**

The carbonate system was studied in different areas of the Sea of Japan and Sea of Okhotsk by measuring pH using a cell without liquid junction in the Pitzer's pH scale and measuring total alkalinity using the Bruevich's technique. The processes controlling the spatial and temporal dynamics of CO_2 sinks and sources are discussed for the areas of the Sea of Okhotsk and Sea of Japan: Amur River, Sakhalin Bay, Shantar's bays, open sea and Razdolnaya River, southwestern part of Peter the Great Bay, open sea, respectively. During the period when the rivers are not covered with ice, the annual CO_2 emission to the atmosphere as a result of respiration process in the rivers is 2.5×10^4 tC and 4.5×10^6 tC by Razdolnaya R. and Amur R., respectively. As result of weathering and photosynthesis processes, the annual CO_2 consumption from the atmosphere is -4.7×10^4 tC and -3.8×10^6 tC by ecosystems of Razdolnay R. and Amur R., respectively. River-dominated Ocean Margins – Amursky Bay (Sea of Japan) and Sakhalin Bay (Sea of Okhotsk) – were considered. Due to nutrient inputs from rivers and intensive photosynthesis, a biological pump which carries organic matter to the seafloor is formed, leading to seasonal hypoxia in the Amursky Bay and to the formation

of the feeding area for gray whales on the Eastern Sakhalin Slope. The Ocean-dominated Margins – southwestern part of the Peter the Great Bay (Sea of Japan) and Shantar's Bays (Sea of Okhotsk) were considered. The southwestern part of Peter the Great Bay becomes a sink for atmospheric CO_2 after the seasonal upwelling event which supply nutrients. The water exchange between the Shantar's bays and the Sea of Okhotsk is piling up nutrients to the bays. The Shantar's Bays act as the sink for atmospheric CO_2 due to photosynthesis and cooling processes occurring in spring, while most of the area of the bays acting as the source of the CO_2 to the atmosphere through respiration and heating processes occurring in late summer. Based on underway observations most surface water along of the ship route in the Sea of Okhotsk is acting as the sink of atmospheric CO_2 through photosynthesis and as the source of CO_2 to the atmosphere in the Bussol Straight area due to intense vertical mixing. Observations showed that the north part of the Sea of Japan is a source of CO_2 to the atmosphere due to heating process in summer and deep convection in winter. The southern part of the Sea of Japan is a sink of atmospheric CO_2 due to photosynthesis and cooling processes. In general, the Sea of Japan reveals negative CO_2 emission in the period 1999 – 2014 due to global eutrophication caused by atmospheric NO_2 pollution.

Song Sun

Prof. Song SUN, Senior Principal Scientist of Institute of Oceanology, Chinese Academy of Sciences (IOCAS), former director of IOCAS from 2006-2017. He earned his PhD in marine ecology from IOCAS in 1994. Since 1998, he has served as vice director of IOCAS. As the team leader in marine science, he took part in the Chinese Antarctic Expedition for three times. His research interest is mainly in marine ecology, especially in the zooplankton population dynamics and ecosystem dynamics. He was also the chairman of China Oceanology & Limnology Society; Chairman of SCOR-China; Vice Chairman of SCOR; member of GOOS Steering Committee (IOC), He is the Chief Scientist of the National Basic Research Program of China: “Jellyfish bloom in the Chinese waters, mechanism, key processes and ecological consequences”; Chief Scientist of the strategic Priority Research Program Class A of CAS: “Western Pacific Ocean System: Structure, Dynamics and Consequences”.

Chinese coastal ecosystem in the climate changing environment

Song Sun*, Xiaoxia Sun

Institute of Oceanology, Chinese Academy of Sciences, Qingdao, China

*** Corresponding author (email: sunsong@qdio.ac.cn)**

The Chinese coastal ecosystem, a vital zone of ecological and economic significance, faces escalating pressures under climate change and human activities. This study examines the ecological dynamics of China’s coastal regions, emphasizing the interaction between climate-driven stressors and anthropogenic activities. Heat waves, ocean acidification, hypoxia and imbalance of nutrients have exacerbated ecological disasters, including harmful algal blooms (red tides), large-scale green algae (e.g., *Ulva prolifera*) bloom, and jellyfish blooms, which disrupt biodiversity, fisheries, and coastal livelihoods. Concurrently, the rapid expansion of aquaculture has strained ecological carrying capacity, with overexploitation of resources and nutrient pollution

further degrading water quality and habitat integrity. We will evaluate the ecological capacity and healthy condition of key coastal zones, revealing declining resilience due to combination of climate impacts and unsustainable practices. Case studies highlight regions such as the Bohai Sea, Yellow Sea, and East China Sea, where eutrophication and hypoxia threaten marine ecosystems and aquaculture productivity. Mitigation strategies, including integrated coastal zone management, nutrient load reduction, and climate-adaptive aquaculture practices, are proposed to enhance sustainability. By synthesizing climatic, ecological, and socioeconomic data, this study underscores the urgency of balancing economic development with ecological preservation to safeguard China's coastal ecosystems in a warming world.

Sumei Liu

Sumei Liu is a fellow in Chemical Oceanography at the Ocean University of China. Her research primarily explores key processes in marine biogeochemical cycles of biogenic elements and their ecological impacts. Her work encompasses nutrient cycling, nitrogen isotopes, environmental evolution, silicon dissolution, atmospheric nutrient deposition, and the dynamics of social-ecosystem interactions. To date, she has authored over 320 academic papers in her field.

The ecosystem and physicochemical environment change of continental marginal seas

Sumei Liu [1]*, Wen Liang [1], Xinyu Guo [2], Nian Wu [1], Xiujuan Shan [3], Juying Wang [4]

[1] Frontiers Science Center for Deep Ocean Multispheres and Earth System, and Key Laboratory of Marine Chemistry Theory and Technology, Ministry of Education, Ocean University of China, Qingdao, China

[2] Center for Marine Environmental Studies, Ehime University, Matsuyama, Japan

[3] Key Laboratory of Sustainable Development of Marine Fisheries, Ministry of Agriculture and Rural Affairs, Yellow Sea Fisheries Research Institute, Chinese Academy of Fishery Sciences, Qingdao, China

[4] National Marine Environmental Monitoring Center, Dalian, China

*** Corresponding author (email: sumeiliu@ouc.edu.cn)**

Continental marginal systems are undergoing rapid transformations driven by anthropogenic activities and climate change. A comprehensive understanding of environmental, ecological, and economic interactions is crucial for optimizing ocean resource utilization and management strategies. Insights gained from

multidisciplinary syntheses and inter-regional comparative studies of coastal socio-ecological systems will enhance the rationalization and optimization of marginal seas management. The Chinese marginal seas, particularly the Bohai Sea, serve as pivotal case studies for examining the impacts of multiple stressors on ecosystems and social dynamics. Surrounded by land regions experiencing rapid population growth and economic development, these coastal waters face intense human-induced pressures, exacerbating the stress on marine ecosystems already affected by climate change. The ecological environment of the Bohai has undergone significant changes due to multiple stressors, including climate change (rising temperatures, declining river discharge) and human activities (reclamation, urbanization, industry, agriculture). These have increased sea temperature and salinity, reduced winter sea ice, intensified summer stratification, and altered coastlines through reclamation for aquaculture and construction. Sediment from the river has further disrupted tidal regimes and fragmented fish habitats. In response, stringent reclamation policies and the "Grain-for-Green" program have been implemented to mitigate damage. Nutrient shifts from agricultural practices, wastewater discharge, and seasonal river fluxes highlight the need for robust pollution control and long-term monitoring. Overfishing and environmental changes have reduced fishery resources, with large species replaced by smaller ones. While summer fishing bans and stock enhancement aid recovery, integrated measures—pollution control, habitat protection, and restoration—are crucial for long-term ecosystem restoration.

Pavel Yu. Semkin

Pavel Yu. Semkin is Head of the Hydrochemistry Laboratory of V.I. Il'ichev Pacific Oceanological Institute (POI), Far Eastern Branch (FEB), Russian Academy of Sciences (RAS). His research is centered on hydrochemical processes in marine and estuarine environments. His work explores nutrient fluxes, the carbonate system, hypoxia, and biogeochemical "hot spots" influenced by tidal conditions and freshwater runoff. Recent research by Pavel Yu. Semkin and his colleagues focuses on the impact of volcanism on the coastal ecosystems of Kamchatka, one of the world's famous volcanic regions. This is a comprehensive field and cruise works from the catchment areas on volcanic territories to deep waters and sediments on both sides of Kamchatka Peninsula.

Influence of river runoff on the ecosystem of the coastal area of Eastern Kamchatka

Semkin P.Yu *, Pavlova G.Yu., Lobanov V.B., Baigubekov K.R., Barabanshchikov Yu.A., Ulanova O.A. and Koltunov A.M.

Ocean Geochemistry and Ecology, V.I. Il'ichev Pacific Oceanological Institute, Far Eastern Branch Russian Academy of Science, Vladivostok, Russia

*** Corresponding author (email: pahno@list.ru)**

Catchment areas on volcanic territories in different regions are of great interest since they are enriched with nutrients that contribute significantly to coastal ecosystems. The Kamchatka Peninsula is one of the most active volcanic regions of the world; however, to date, the chemistry of its river waters and the state of its coastal ecosystems remain understudied in connection with volcanism. In this study, we report high concentrations of DIP and P_{org} in the Kamchatka River comparable to many rivers in urbanized areas with sewerage and agricultural sources of nutrients. A distinct increase in DIP, P_{org}, and DSi is systematically manifested in all seasons, especially in spring and summer, in the area directly influenced by the Kliuchevskaya group of volcanoes and Shiveluch Volcano. This feature is directly related to snow melting in the river valley and on the slopes of volcanoes that were covered with ash—a source of nutrients. We believe that DIP, P_{org}, DSi, DIN, and N_{org} fluxes in river runoff from volcanic catchment areas in east Kamchatka are a major trigger for spring and summer phytoplankton blooms and subsequent high zooplankton biomass, using Kamchatka Gulf as an example. This study demonstrates the connection between nutrient fluxes from a catchment area and the formation of seasonal phytoplankton blooms and high zooplankton biomass in the coastal area. We also study seasonal, year-to-year, and climatic variability of water discharges and hydrometeorological conditions to understand how nutrient fluxes can change in the foreseeable future and influence coastal ecosystems.

Di Qi

Di Qi, Ph.D. supervisor, has long been engaged in research on ocean carbon sinks, acidification, and related marine biogeochemical processes. He has been selected as a Distinguished Professor under the national "CJ Incentive Program" for major talent projects, a Young Top Talent under the National WR Program, a Distinguished Professor at Jimei University, and the Director of the Polar and Ocean Research Institute. He also serves as an expert on the Fifth Advisory Group of the National Natural Science Foundation of China's Shared Voyage Program, a member of the Expert Panel for National Key R&D Programs, a board member of the China Polar Alliance for Universities, a council member of the China Polar Young Scientists Association, and a member of the Global Ocean Acidification Observing Network (GOA-ON) China team. As the first or corresponding author, he has published over 30 SCI papers in journals such as Science, Nature Climate Change (cover article), Geophysical Research Letters, and Global Biogeochemical Cycles. His research achievements were selected as one of the "Top 10 Marine Science and Technology Advances in China in 2017" and were featured in the Frontier Science: China's Top 10 Scientific Advances of 2022 collection. He has received the Special Prize of the National Marine Engineering Science and Technology Award (ranked second), the Fujian Youth May Fourth Medal, and the title of "Most Beautiful Science and Technology Worker" in Fujian Province. He has led multiple national and provincial-level projects, including the National Key R&D Program, National Talent Programs, National Natural Science Foundation projects, the Fujian Provincial Major Undergraduate Teaching Reform Project, and the Fujian Outstanding Youth Fund.

Carbon transport and acidification of the north Pacific subtropical mode water

Di Qi *

Polar and Marine Research Institute, College of Harbor and Coastal Engineering, Jimei University, Xiamen, China

*** Corresponding author (email: qidi@jmu.edu.cn)**

The formation and movement of North Pacific Subtropical Mode Water (NPSTMW) play a crucial role in carbon absorption, transport, and storage. Through field observations and carbon isotope tracer analysis, we reveal the process of anthropogenic carbon transport via mode water circulation and finds that the acidification of mode water has accelerated over the past decade. The primary driver is the cooling of source water in the mode water formation region, which enhances the accumulation of anthropogenic carbon. Within the range of 137°E-149°E, all mode water shows evidence of anthropogenic carbon accumulation and accelerated acidification, largely controlled by mode water's role in carbon transport. Furthermore, carbon isotope tracer analysis indicates that the accelerated accumulation of anthropogenic carbon in mode water can be traced back to the surface waters of the formation region. The consistency of this accumulation rate in both vertical and horizontal dimensions suggests that mode water retains the fingerprint of anthropogenic carbon throughout its formation and transport. These findings deepen our understanding of carbon transport, storage, and acidification mechanisms in the North Pacific, providing a scientific basis for assessing the ecological effects of ocean acidification in this region.

Denis V. Makarov

Denis V. Makarov is the director of the V.I Il’ichev Pacific Oceanological Institute (POI), Far-East Branch of the Russian Academy of Sciences (FEB RAS). His main research fields are ocean acoustics, chaos theory, wave propagation in random media, and quantum systems. He is one of the world’s leading experts in the theory of ray and wave chaos in ocean acoustics. He is one of the coauthors of the monograph “Ray and wave chaos in ocean acoustics: Chaos in waveguides” published by World Scientific in 2010.

Fan Wang

Fan Wang, Ph.D., Director of Institute of Oceanology, Chinese Academy of Sciences, and Dean of College of Marine Science, University of Chinese Academy of Sciences. He is mainly working on ocean circulation dynamics, including the low-latitude western boundary currents and tropical circulation in the Pacific Ocean, and the western Pacific warm pool, etc. Dr. Wang serves as the Chairman of the International Northwest Pacific Ocean Circulation and Climate Experiment (NPOCE) science steering committee, the member of Climate and Ocean - Variability, Predictability, and Change Pacific Region Panel (CLIVAR/PRP); President of the Chinese Society for Oceanology and Limnology; the editor in chief of “Oceanology and Limnology”.

Venue and Local Transportation

Dining Arrangements

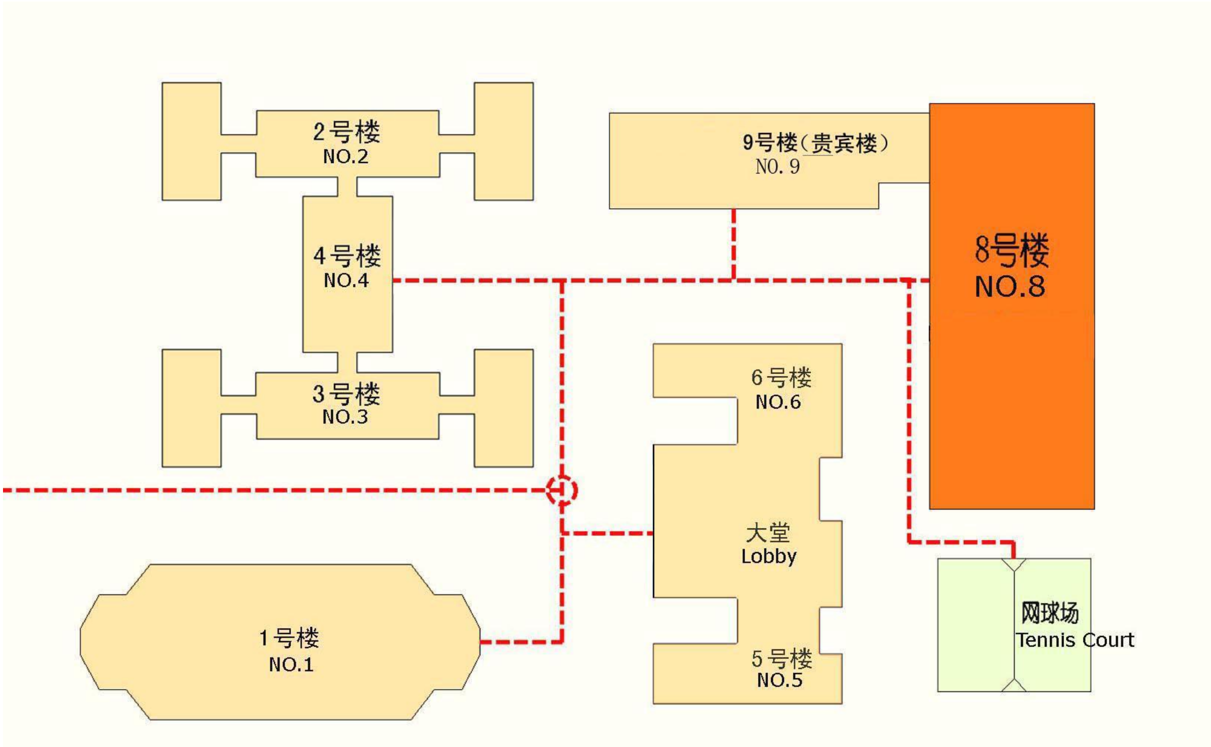
Conference meals will be provided by the organizers. Please present your meal voucher to dine in the restaurant area at the **Cafeteria, 2nd floor, Building 5**. Tea breaks are arranged outside the conference room starting at 10:00 PM and 15:00 PM (Beijing Time).

- **Breakfast (Buffet):** 7:00–9:30 AM
- **Lunch (Buffet):** 11:30 AM–13:00 PM
- **Dinner (Buffet):** 17:30–19:00 PM

Venue Transportation and Facilities

Urban Transportation: Xijiao Hotel is close to **Wudaokou subway Station of Line 13** and **Qinghua Donglu Xikou Station of Line 15**.

Hotel Layout: Check-in and meeting registration at the **1st floor lobby of Building No.5**; Dining **on the 2nd floor of Building No.5**; The venue is in **conference room 5 on the 2nd floor of Building No.1**, and the tea break is in the **public area on the 2nd floor of Building No.1**. The hotel layout is as follows:



Hotel Facilities: Laundry area in Building 2 (surcharge), swimming pool and bowling alley (surcharge), tennis court (surcharge) are available.

Conference Contact

Miaolei Ya Tel: +86-13120821808 E-mail: mlya@sklec.ecnu.edu.cn

Wei Zheng Tel: +86-13918538164 E-mail: wzheng@sklec.ecnu.edu.cn