CIC NEWSLETTER No.21 2023

Center for International Collaboration
Atmosphere and Ocean Research Institute
The University of Tokyo

Contents

The 32nd Assembly of Intergovernmental Oceanographic Commission (IOC)

Yutaka Michida, *Professor, Center for International Collaboration*

The 32nd Assembly of the Intergovernmental Oceanographic Commission (IOC) was conducted as an in-person meeting from June 21 to 30, 2023 at the UNESCO Headquarters in Paris. At the 55th session of the Executive Council of the IOC held in 2022, all Member States of the Executive Council were requested to have a maximum of four attendees in their delegations to prevent the further spread of COVID-19, and no restrictions were imposed on the number of delegates to the session in 2023. Prof. Yutaka Michida, the Director of the Center for International Collaboration (CIC) of AORI, participated as the head of the Japanese delegation. Professors at the CIC, namely, Hiroaki Saito, Mitsutaku Makino, and Naomi Harada, also joined the meeting as part of the delegation. In addition to the four professors, representatives of the Ministry of Education, Culture, Sports, Science and Technology (MEXT), Japan Meteorological Agency (JMA), Japan Coast Guard (JCG), and Japan Agency for Marine-Earth Science and Technology (JAMSTEC) also participated.

The Assembly adopted four resolutions as follows,

IOC Resolution A-32/1: Establishment of an IOC Sub-Commission for the Central Indian Ocean (IOCINDIO);
IOC Resolution A-32/2: Improving Climate Observations;
IOC Resolution A-32/3: Implementation of the United Nations Decade of Ocean Science for Sustainable Development (2021–2030);
IOC Resolution A-32/4: Governance, Programming, and Budgeting Matters of the Commission.

With the first IOC Resolution A-32/1, the Commission decided to establish a regional sub-commission for the Central Indian Ocean (IOCINDIO) by upgrading the regional committee for the Central Indian Ocean after intensive discussions among Member States and with existing neighboring Sub-Commissions. IOCINDIO is the fourth IOC sub-commission, in addition to the three Sub-Commissions for the Caribbean Ocean, Western Pacific, and Africa. This will play a key role in promoting ocean science, observations, and capacity development in the region through close collaboration with other subsidiary bodies of the Commission.

Japanese delegation to the 32nd IOC Assembly. Prof. Saito, Ms. Naoko Hirayama (Counselor of the Japanese Permanent Delegation to UNESCO), Prof. Michida, Dr. Takeshi Kawano (JAMSTEC), and Dr. Kentaro Ando of JAMSTEC (Chair of IOC Sub-Commission for the Western Pacific). (front row from the left).

Notably, Prof. Michida was elected as the Chairperson of the IOC for the 2023-

2025 biennium at the election of Officers conducted on June 28, 2023 during the 32nd Assembly. Prof. Michida is the first Japanese citizen to chair the IOC in the hinistry of Commission for more than 60 years. In respose to an interview by the UNESCO Secretariat, Prof. Michida stated “I will faithfully take the responsibility to promote the UN Decade of Ocean Science and related activities of the Commission, as well as those of its core functions, including emerging ocean-related issues, based on the spirit of ‘One Planet, One Ocean’ and with full engagement of all Member States.”

https://www.unesco.org/en/articles/dr-yutaka-michida-elected-chair-unescos-intergovernmental-oceanographic-commission

Prof. Michida with the flags of the IOC and UNESCO.

Symposium on “The United Nations Decade of Ocean Science” “How can Japan’s Atmosphere and Ocean Science Community Contribute?”

Naomi Harada,
Professor, Center for International Collaboration

On February 20-21, 2023, a two-day symposium was conducted at the auditorium of the Atmosphere and Ocean Research Institute. The context of the symposium was the adoption of the UN Decade of Ocean Science for Sustainable Development (UNDOS) (2021-2030) at the United Nations General Assembly in December 2017. To promote goal No. 14, namely, “Protecting the marine environment,” among the 17 Sustainable Development Goals (SDGs), the UN sent a strong message stating that participating countries should make further efforts in collaboration with various stakeholders, including research and educational institutions, governments, local governments, private sectors, and citizens.

The various processes that are assumed to occur as a chain of events, such as climate change caused by global warming, ocean acidification, hypoxia, disruption of biogeochemical cycles, and degradation of marine ecosystem services, are still unresolved. Additionally, elucidating and resolving these issues in collaboration with various fields and stakeholders is essential, including the discharge of new substances, such as marine plastics, into the ocean and their impact assessment, occurrence of extreme events owing to the active interaction

between the atmosphere and ocean, disaster prevention/mitigation measures to deal with such extreme climate events, and pressing social issues. Within this context, the need for a new approach to study meteorological phenomena has become increasingly important. Moreover, academia is also expected to promote the UNDOS through collaboration among domestic and international researchers. Therefore, the Atmosphere and Ocean Research Institute hosted this symposium to discuss how we, as a research community, can contribute to and promote the UNDOS by 2030. In addition to the Oceanographic Society of Japan, the symposium was supported by the Ocean Policy Society of Japan, Fisheries Society of Japan, and Japanese Society of Fisheries Oceanography.

The symposium comprised two parts: lectures in the first half and a panel discussion in the second half. The first half of the symposium featured lectures by 22 experts from various fields in Japan, including atmospheric and oceanic sciences, marine biology, fishery sciences, social sciences, and engineering. The lectures were interwoven with the seven social goals of the UNDOS (a clean ocean, healthy and resilient ocean, a productive ocean, a predicted ocean, safe ocean, an accessible ocean, and an inspiring and engaging ocean) and introduced cutting-edge research that could contribute to any of these goals.

Throughout the two days of the sessions, I was struck by the fact that many symposium speakers, who are experts in various fields, such as atmospheric and oceanographic sciences, social sciences, engineering, and earth sciences, emphasized the contribution of their research to “a predicted ocean.” In the panel discussion, participants discussed how the community can and should contribute to UNDOS by 2030, in cooperation with each other. The following questions were addressed: how to build partnerships with people outside of one’s field of expertise; what is Japanese-style “sustainability;” how to create a lenient network; how to change those who are indifferent to the "ocean" into those who are interested in it, and how to involve them; and how can conflicts of interest be balanced. Some participants suggested continuing the symposium, namely, developing it into an international symposium with overseas participants, which we plan to conduct in the future.

In addition to the 100 participants who attended the symposium at the venue and online through Zoom, some viewers watched the live stream on YouTube, indicating that although the symposium was intended for specialists, many ordinary people also participated. Videos of each presentation are available on YouTube (https://www.youtube.com/channel/UCi4WHIMHfT3-IuMJPKl9CoQ).

PICES Annual Meeting, 2023, Seattle

Mitsutaku Makino, *Professor, Center for International Collaboration*

PICES-2023 was held from October 23 to 27, 2023 in Seattle, Washington State, on the West Coast of the United States. It owes its name to Native American leader Seattle, the chief of the Duwamishes, Suquamishes, and other tribes of the Puget Sound area. This area is famous for its great natural beauty and for the most advanced IT companies, such as Microsoft and Google. Many researchers enjoyed coffee from Seattle, such as that from Starbucks, which opened its first shop near the fish market. The meeting was hosted by National Oceanic and Atmospheric Administration (NOAA) in coordination with the Secretariat of The North Pacific Marine Science Organization (PICES), and many brilliant presentations and discussions were conducted to assess the progress of PICES and set a path for the remaining period of the United Nations Decade of Ocean Science for Sustainable Development until 2030.

After the COVID-19 pandemic, many ocean scientists in the Pacific conducted face-to-face discussions. PICES-2023 is the largest annual meeting ever conducted. A total of 672 attendees, including 76 virtual participants, participated in the meeting. Remarkably, there were 244 early career ocean professionals (ECOPs) in-person participants and observers from 20 international and regional organizations and programs. We organized 19 Science Board/topic/paper sessions, 11 workshops, and 22 business meetings. The meeting was paperless (which has currently become the tradition of PICES), and participants were encouraged to use the Whova app to access the updated schedules, communicate with each other, and make announcements from organizers.

The PICES Chair Award is awarded to individuals who have contributed significantly to our organization. This year, it was awarded to Dr. Robin Brown (Canada) for his sustained dedication to the scientific activity and administration of PICES. The Wooster Award was awarded to Dr. Steven J. Bograd (USA) for his long-term and ongoing excellence in the research and teaching of North Pacific marine science. The PICES Ocean Monitoring Service Award (POMA) was awarded to the Chinese Harmful Algae Bloom Monitoring and Research Program. Finally, the Zhu-Peterson

Early Career Scientist Award was presented to Professor Minkyoung Kim (Korea), co-chair of the Advisory Panel on Early Career Ocean Professionals (AP-ECOP), who made valuable scientific contributions to PICES through her work on marine biogeochemistry and paleoceanographic research.

PICES-2023 covered a broad range of timely and relevant marine science issues under the theme of "Connecting Science and Communities for Sustainable Seas." Many presentations were fully or partly related to the UN Decade of Ocean Science (UNDOS). Dr. Matthew Savoca, one of the invited speakers of the science board symposium, presented an inspirational talk titled "Across the Boundary: Internationally Coordinated Science and Action is required to Tackle Chemical Pollution in Marine Ecosystems." He introduced the Global Plastic Ingestion Bioindicators (GPIB) project, which is hosted by the Ocean Decade Programme Sustainability of Marine Ecosystems through Global Knowledge Networks (SmartNet). Prof. Shoshiro Minobe emphasized the importance of advancing our capacity for marine biological forecasting for the success of the UN Decade of Ocean Science, for which one of seven desired outcomes is "A Predicted Ocean." This other topics of this year's sessions focused on deep learning, extreme weather, climatic events, small pelagic fish and extreme events, anticipated and realized effects of climate change, non-indigenous species, emerging pollutants, and seamount diversity.

Photo by courtesy of PICES Secretariat (Dr. Sanae Chiba)

One of the impressive activities of PICES-2023 was the mentoring program. A total of 26 mentor-mentee pairs were developed based on their background information and preferences. The program was largely successful and beneficial for both mentors and mentees. This will boost the engagement opportunities of ECOPs in PICES. AP-ECOP members have agreed to continue this scheme as one of the top priorities for 2024.

JSPS Core-to-core Project CREPSUM

Hiroaki Saito, *Professor, Center for International Collaboration*

AORI has spearheaded international collaboration and activities between Japan and Southeast Asian (SEA) countries over the past two decades. One of the leading initiatives was a multinational research and education program funded by the Japan Society for the Promotion of Science (JSPS). In autumn 2019, AORI launched a new JSPS project called *Collaborative Research and Education Project in Southeast Asia for Sustainable Use of Marine Ecosystems* (CREPSUM), which began in spring 2020. Over 200 scientists have since gathered under CREPSUM, hoping to achieve the following transdisciplinary goals: 1) establish an international science and educational network for SEA marine ecosystems; 2) develop marine ecosystem studies to address emergent issues in conservation and achieve the sustainable use of SEA marine ecosystem services; and 3) contribute to the UN Decade of Ocean Sciences (Ocean Decade) and UN SDG 14: *Life*

below water efforts by imparting the best scientific knowledge on marine ecosystems.

Fig. 1 Group photo of CREPSUM Joint Seminar

Unfortunately, the anticipated launch of the CREPSUM coincided with the global COVID-19 pandemic. Until the summer of 2022, most planned field research activities and training/educational courses were canceled. Under difficult conditions, CREPSUM scientists have made substantial efforts to summarize past collaborative studies by publishing review papers and field guides, as well as conducing online workshops and seminars. This is because of the rapid development of online meeting technologies. From the autumn of 2022, we gradually resumed field studies and seminars, but still had difficulty traveling and obtaining permission for field studies owing to the repeated waves of COVID-19 infection. Consequently, most field and laboratory studies have been conducted in each member country. We shared obtained results in online meetings. However, with the increase in new findings, we believed that in-person meetings should be held to further understand the findings and foster inspiration to develop new ideas and strategies for the sustainable use of marine ecosystem services in SEA countries.

On March 8-9, 2023, we held the CREPSUM Joint Seminar at the Atmosphere and Ocean Research Institute, the University of Tokyo. A total of 38 and 25 scientists from five SEA countries and Japan, respectively, were invited. The symposium began with a welcome speech from Prof. Tomohiko Kawamura, the director of AORI, followed by an introductory keynote titled *Marine ecosystem studies in the southeast Asia: Collaborative scientific activities for the sustainable use of ecosystem services* by the project coordinator Prof. Hiroaki Saito. Subsequently, we conducted a photo session (Fig. 1) and offered a coffee break. At the coffee break, many voices of joyful greeting echoed in the venue, and consequently, the resumption of the symposium was slightly delayed. This “rescheduling” was necessary to celebrate our reunion. Thereafter, the symposium was resumed by country reports from National Coordinators, and reports from research groups and individual scientists. We shared novel findings of the status and change in SEA marine ecosystems, and also discussed various activities to disseminate scientific knowledge to the general public and/or decision makers. These activities are expected to achieve the goals of the Ocean Decade. Notably, many excellent studies were reported by early career scientists. They are going to be future leaders of marine ecosystem studies after the Ocean Decade (2030) as the significant influence of global change on marine ecosystems and our society will continue even after 2030.

At the symposium, we recognized that our scientist network developed under JSPS projects, including CREPSUM. This is essential for the sustainable use of marine ecosystem services in the Anthropocene as our goals are too large to be achieved by one country alone. Prof. Saito stated that AORI would launch the Section for Research Alignment with Southeast Asia (SERASEA) in April 2023, which would realize joint research between SEA countries and Japan. We aim to use SERASEA as a platform for joint research and education activities to achieve the goals of the Ocean Decade and UN SDG14 *Life below water*.

UTokyo-ANU joint short courses report
Earth and Planetary Environment Excursion II

Yusuke Yokoyama, *Professor, Section for Technological Advancement and Research : STAR*

In collaboration with the Australian National University (ANU) and University of Tokyo (UTokyo), a two-week international joint short program (Earth and Planetary Environmental Excursion (EPEE) II) was held from September 3 to 16. These and related programs have been held for more than 10 years since 2006, and the 7th anniversary was celebrated this year after being reorganized as EPEE I and II. This course is supported by various organizations, including the Australian Government (New Colombo Plan of the Department of Foreign Affairs and Trade), Ministry

of Education, Culture, Sports, Science and Technology, Japan (Top Global University Initiatives of MEXT), and Atmosphere and Ocean Research Institute (AORI). More than 15 students from ANU have studied various aspects of geohazards, including science, technology, and social sciences, along with UTokyo students.

Participants from ANU were from the Research School of Earth Sciences and Center for Public Awareness of Science (CPAS), and the latter is concerned with science communication, whereas the UTokyo students came from the schools of Science and Engineering as well as Law, Literature and Economics. With such diverse backgrounds, we expected lively discussions during the group work. The mixed ANU and UTokyo students were divided into five groups and all activities were conducted accordingly. Students participated in all the discussions and provided daily accounts that were uploaded to social networking sites, which helped them think deeply about methods to engage with the public.

The students attended lectures at AORI for the first two days after the opening ceremony, which was held on the second floor of the building. During the opening ceremony (see programme), the students were warmly welcomed by staff from the Australian and Japanese embassies, directors of the International Education and Research Offices of both universities, and director of AORI, Professor Susumu Hyodo. Lectures and lab tours were provided by AORI professors and staff (Drs. Makino, Takagi, Watanabe, Aze, Miyairi, myself, and others), along with those from other institutes within and outside UTokyo (Drs. Sayuda, Sato, Heslop, and Grant).

One of the highlights of this year's trip was a visit to the Fukushima Nuclear Power Plant Decommissioning Archive Center, as the release of treated water was worldwide news. The students realized the importance of science communication, which was reflected in their final presentations after a two-week trip. We also visited Ohkawa Elementary School, which was severely affected by the 2011 tsunami and more than 80 students lost their lives. Evacuation drills were conducted and the students followed the rules; although many casualties were recorded, critical reviews were conducted and even the local government was taken to court. According to the reflective diary written by the students, they were of the same generation as the students of Ohkawa Elementary School.

東京大学 THE UNIVERSITY OF TOKYO Australian National University

Earth and Planetary Environmental Science

International Short Course II

September 4th 2023, 13:00 – 13:30（JST） 14:00 - 14:30（AET）

Time（JST）

13:00 **Opening address**
Prof. Yusuke Yokoyama (UTokyo)

Greetings from the Directors
Vice President (Global Education); Deputy Director, Division for Global Campus Initiatives
Prof. Yujin Yaguchi

Director, ANU International Office
Mr Jonathan Dampney

Director, Atmosphere and Ocean Research Institute of UTokyo
Prof. Susumu Hyodo

Director, Research School of Earth Sciences, ANU
Prof. Dorrit Jacob

Message from a student (NCP program Alumnus)
Mr. Kai Leggett (UTokyo, ANU Alumnus)

13:20 **Guest greetings**
Embassy of Japan in Australia
TBA
Embassy of Japan in Canberra
Mr Yasuhito SAKURAI

13:30 **Closing remarks**
Dr. David Heslop (ANU)

The second half of the trip was to Mt. Fuji and its surrounding areas. After a visit to the Fujitsu Research Institute in Kawasaki to learn about the cutting-edge technologies developed by the company, we travelled to Yamanashi and Shizuoka prefectures. Ecology, culture, geology, tourism, engineering, and social sciences were topics that were studied and discussed by students through lectures by experts and visits to various sites. Owing to the pleasant weather, the students enjoyed climbing the Hoei Crator that strengthened their friendships as they helped each other during the activity.

We witnessed the fostering of students' friendships across cultural and language barriers and realized the importance of this type of activity for this young generation. We are grateful for the support provided by various organizations and AORI staff for the success of this program.

The 2nd EarthCARE Modeling Workshop, March 27–29, 2023

Masaki Satoh, *Professor, Division of Ocean–Earth System Science*
Kentaro Suzuki, *Professor, Division of Climate System Research*

A new satellite called EarthCARE (Earth Clouds, Aerosols and Radiation Explorer) will be launched in May 2024 as a joint European and Japanese mission. The EarthCARE satellite is intended to observe clouds, aerosols, and radiation processes and improve climate models by better understanding these processes. To enhance collaborative studies between the EarthCARE observations and modeling, the 2nd EarthCARE Modeling Workshop was conducted on March 27-29, 2023, at Hotel Laforet Shuzenji. The workshop was organized by Profs. Masaki Satoh and Kentaro Suzuki (AORI, The University of Tokyo), Prof. Bjorn Stevens (Max Planck Institute for Meteorology), Prof. Hajime Okamoto (Kyushu University), and Dr. Takuji Kubota (Japan Aerospace Exploration Agency).

Following the 1st EarthCARE Modeling Workshop held on February 16-18, 2022, this workshop was intended to enhance the activities of the cutting-edge atmospheric climate and weather models, including "K-scale" or global storm-resolving models and their collaboration with the EarthCARE satellite. The EarthCARE satellite will provide the first global observation of the vertical motion of cloud particles from space by CPR (Cloud Profiling Radar) Doppler measurements). Before its launch, we invited modeling scientists to discuss possible directions and areas of collaboration between the EarthCARE satellite and modeling communities to enhance the model representations of cloud and convection physics. We also aimed to facilitate ongoing discussions on NASA AOS (Atmosphere Observing System), which is planned to launch around 2030.

Approximately 90 experts attended the workshop to discuss the EarthCARE satellite project, satellite simulators, and cloud and convection processes. After introducing the modelers to EarthCARE and using satellite data for evaluating global storm-resolving models and conventional climate models, issues related to the evaluation and improvement of cloud, convection, and aerosol processes in models using EarthCARE observational data were discussed in this workshop. Rapporteurs prepared daily summary reports based on these discussions.

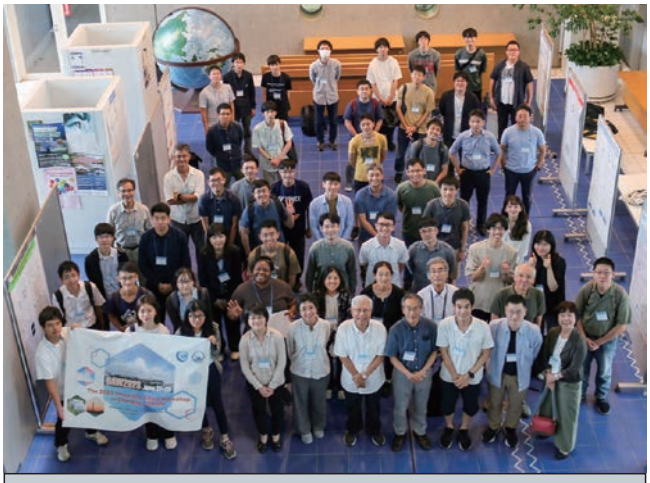
This workshop was jointly hosted by the International Core-to-Core Project on Global Storm Resolving Analysis (ICCP-GSRA). ICCP-GSRA fosters activities promoting international collaboration for global storm-resolving meteorological data analysis and their social implementation.

The presentation material and summary report are available at
https://www.eorc.jaxa.jp/EARTHCARE/event/Modeling_ws2023/2ndECARE-Model-ICCP-GSRA2023_program.html.

Group photo of the meeting of the workshop attendees (March 28, 2023).

The 2023 University Allied Workshop on Changing Climate, June 27–29, 2023

Masaki Satoh,
Professor, Division of Ocean–Earth System Science



Group photograph at the 2023 University Allied Workshop on Changing Climate, June 27-29, 2023. Atmosphere and Ocean Research Institute, The University of Tokyo.

The 2023 University Allied Workshop on Climate and Extreme Weather was jointly organized from June 27 to 29, 2023 by the Atmosphere and Ocean Research Institute (AORI) at The University of Tokyo and the Department of Atmospheric Sciences at National Taiwan University (NTU). This workshop series between AORI and NTU was originally held every two years but was postponed since the previous one in 2019 owing to the COVID-19 pandemic. This year's event will be the first of four years. Previous workshops were held at AORI on August 21-23, 2019 and NTU on August 22-24, 2017. The workshop aimed to enhance the communication between students and young researchers from both institutes. Through the workshop, we hope that participants will engage in enthusiastic discussions on research topics of interest and foster possibilities for future collaboration and communication. The information of the meeting can be found at https://cesd.aori.u-tokyo.ac.jp/uaw2023.

The student convener team and host professors. From left to right: Prof. Wei-Ting Chen (NTU), Ms. Chai-Wei Chang (NTU), Mr. Koryu Yamamoto (AORI), and Prof. Masaki Satoh (AORI).

The workshop focused on studies on climate change, climate variability, extreme weather, typhoons, mesoscale convective systems, convective water cycling processes, and transport processes of aerosols and chemical species. Recent advances in the theory, observations, satellite remote sensing, and high-resolution modeling have provided great opportunities for basic research on convection and water cycles and their interactions with weather and climate. However, the complex nature of relevant scientific issues and the large amount of data pose great challenges for processing all the information to achieve breakthroughs in such studies. We invited the participants to share recent research results and jointly synthesize outstanding research outcomes to promote communication and collaboration.

Approximately 50 participants joined the workshop, including 23 students/post-doctoral students and five faculty members of NTU. Students from AORI and NTU made the agenda and organized the workshop. Mr. Koryu Yamamoto (AORI) and Ms. Chai-Wei Chang (NTU) formed a student convener team and communicated their intention to formulate the program before the workshop. They arranged the abstracts into oral and poster presentations, and a longer presentation time was given to the PhD students. They also invited all faculty members to conduct presentations on popular topics or lectures on their specialties. On the afternoon of the second day, students were divided into five splinter groups for intensive discussion on the following topics:

1. Issues in predicting extreme rainfall events.
2. What types of satellites or spaceborne sensors are required to advance climate change research?
3. What types of geoengineering technology are envisioned for extreme weather events, and what factors should be considered when implementing them?
4. What factors influence the cloud radiative feedback on global and regional circulation and precipitation?
5. Physically informed machine learning approaches and their application in atmospheric science studies.

Each group summarized the discussions and reported the results on the third day to stimulate further discussions with all participants.

The next joint workshop between AORI and NTU will be held at NTU in 2025. Although the workshop is intended to provide an opportunity for interaction between members of both universities, students are encouraged to visit each other's universities for short or extended stays. We also encourage students to communicate with each other's faculty members to continue their research activities.

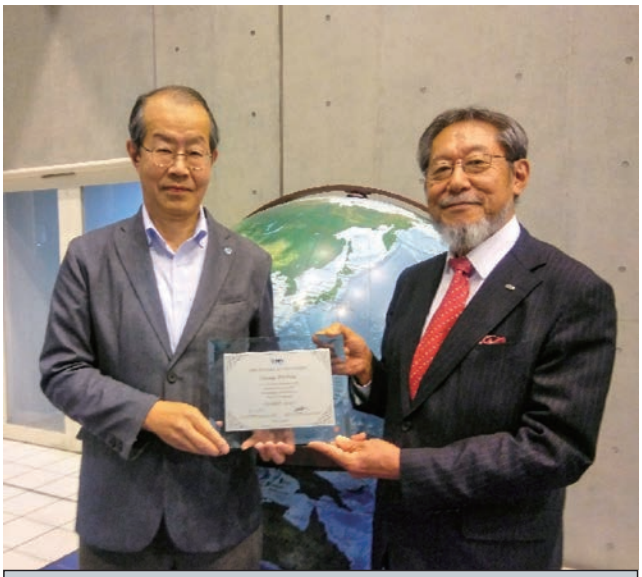
For participating students from NTU, AORI provided support in the form of travel fees. We acknowledge the support of the Virtual Laboratory for the Earth's Climate Diagnostics Program.

Techno-Ocean Award 2023

Yutaka Michida,
Professor, Center for International Collaboration

The Techno-Ocean Award 2023 was awarded to Prof. Michida on October 5, 2023 at the Techno-Ocean 2023 Conference held at the Kobe International Exhibition Hall, Kobe, Japan. The first Techno-Ocean Award was awarded to Mr. Joseph R. Vadus of the USA in 2004, and Prof. Michida has been the 11th winner since then. Previous winners of the award include Prof. Toshio Yamagata of the University of Tokyo in 2008 for his outstanding contributions to oceanographic research and Dr. Asahiko Taira for his excellent leadership in promoting marine-earch sciences as the President of JAMSTEC. The Techno-Ocean Award 2023 Citation stated "Yutaka Michida's achievements to date are substantial and he more than satisfies the evaluation criteria and standards of excellence worthy of recognition by the Techno-Ocean Award." Prof. Michida's achievements for the award mainly include his long contribution of 40 years to the promotion of international cooperation in oceanography, particularly related to the Intergovernmental Oceanographic Commission (IOC) of UNESCO. The Citation also extended its explanation to cover his active engagement in the IOC's tsunami early warning and mitigation systems, and the preparation and implementation of the UN Decade of Ocean Science for Sustainable Development (2021-2030).

The award ceremony was held during a plenary session on the first day of the conference. Unfortunately, Prof. Michida was unable to attend the ceremony in person as he was participating in another international meeting in Belgium. He gave a pre-recorded talk at the ceremony, expressing his great honor as the recipient of the Award for 2023 and highest appreciation to the Techno-Ocean Network.



Prof. Michida holding the plaque of Techno-Ocean Award 2023, together with Prof. Tamaki Ura, the Executive Director of Techno-Ocean Network (right), at the technical meeting held at AORI on October 13, 2023.

The pre-recorded talk of Prof. Michida regarding his international activities related to the award at the plenary session of the Techno-Ocean 2023 Conference in Kobe on October 5, 2023.

Towards a happy retirement

Yutaka Michida,
Professor, Center for International Collaboration

I am retiring from the University of Tokyo at the end of March 2024, the final day of the 2023 fiscal year, after 24 years of working at the Atmosphere and Ocean Research Institute (the Ocean Research Institute until 2010) since joining this Institute in April 2000. Before becoming a faculty member of the Institute in 2000, I worked for the Japan Coast Guard as a research and technical official for 16 years, after finishing a master's course on physical oceanography at the University of Tokyo in 1983. During my service as a government official, I obtained my Ph.D. in physical oceanography in 1999 from the University of Tokyo with my doctoral dissertation entitled 'Structure of the Kuroshio and the surface Ekman layer by current data analysis of shipborne ADCP (Acoustic Doppler Current Profiler).'

Michida giving a lecture on oceanic current data management at the 7th WESTPAC training course on data and information management organized and hosted by the JODC in 2006.

I was a member of the CIC for almost all of the last 24 years, except from November 2007 to March 2010, when I was a professor of the International Coastal Research Center, a branch research center of AORI located in Otsuchi Town, Iwate Prefecture. I was appointed as an Advisor to the Director of AORI from 2011–2015 and then as a Vice Director from 2015–2019. I was also appointed as an Advisor to the President of the University of Tokyo for the 2011 academic year.

My research interests covered a wide range, including physical oceanography, as my baseline background, which mainly targeted the velocity structure and variability of oceanic currents in the surface mixed layer by analyzing observational data measured with surface drifters and ADCP. Many other fields, such as oceanographic data management and ocean policy, were extended research interests over the last 20 years.

Michida (yellow helmet) on board a research boat for oceanographic observations in Kamaishi Bay in 2012 to monitor post-tsunami changes in environmental conditions.

While my research papers have mainly been published in natural science journals, some are social science journals, such as "Ecological Economics" and "Journal of Japan Society for Ocean Policy" for example. In addition, I have been involved in a series of research activities on marine microplastic pollution since 2016.

While conducting the oceanographic research and related studies above, roughly one-third to a half of my efforts have been spent on activities to promote international cooperation in ocean science, mainly through those planned and implemented by the IOC. I have attended over 150 international meetings outside of Japan, approximately 100 of which were organized by the IOC or related to its programmes and activities. I served as one of the five vice-chairs of the IOC from 2011–2015 and was

Michida as the head of Japanese delegation to the 14th Intergovernmental Session of IOC/WESTPAC, Jakarta, April 2023.

then elected as the Chair of the IOC in 2023 at its 32nd Assembly (see another article in this issue). From 2015 to 2019, I was co-chair of the International Oceanographic Data and Information Exchange (IODE), a flagship programme of the IOC with almost 60 years of history.

The CIC was established in 1994 to promote international cooperation in ocean science. One of the primary goals of the CIC was to lead IOC-related activities in Japan so that enhanced contributions from Japan to the IOC could be realized. I was in the Japan Coast Guard when the CIC was established, and I was very grateful for its establishment, as I was partially responsible for promoting IOC activities, including the operation of the Japan Oceanographic Data Center (JODC). Upon my retirement, I would like to remind all faculty members of the AORI, as well as those of the CIC, that the IOC has played and will keep playing essential roles in international coordination for ocean research, services, and marine policies, even though it is a small international organization in comparison to other ocean-related UN agencies. I do hope my successors in the CIC and AORI maintain the promotion of IOC-related business and further enhance them under even closer cooperation with the oceanographic community in Japan and with internationally leading institutes and organizations worldwide. This might be a key component for my happy retirement.

Finally, I sincerely express my most tremendous appreciation to all present and previous members of the CIC for their continuous support, in particular, all successive secretaries in my laboratory, Ms. Masumi Arai, Ms. Chizuru Kinoshita, Ms. Naomi Kobayashi, and Ms. Akiko Kasuya, for their careful and precise administrative work. Special thanks should go to late professors, including Prof. Keisuke Taira, Prof. Makoto Terazaki, and Prof. Masaki Kawabe, for encouraging and supporting me in promoting international cooperation, mainly through the IOC/UNESCO and its subsidiary bodies.

Good luck to all, and may we all have a bright future in the ocean based on the spirit proposed by the IOC: 'One Planet, One Ocean.'

Name tags of international meetings attended by Michida between 1990s and 2014. Michida has accumulated 100 more between then and 2024.

Visiting Professors

Name / Affiliation	Nationality	Length of stay	Subject for study
LIU, Hongbin Hong Kong University of Science and Technology Professor	USA	2022/12/17-2023/2/5	Biology and Ecology of Synechococcus in the Kuroshio
FAHLMAN, Andreas Fundacion Oceanografic de la Comunitat Valenciana, Valencia, Spain Adjunct Professor	Sweden Canada	2022/8/2-2022/9/25	Comparative physiology of sea turtles and cetaceans
STEVENS, Bjorn University of Hamburg Max Planck Institute for Meteorology Professor Managing Director	USA	2023/3/25-2023/5/14	Exploring the climate of Storm Resolving Earth-System Models
LOHMANN, Johannes Jakob Niels Bohr Institute, Kobenhavns Universitet, Denmark Assistant Professor	Germany	2022/11/1-2023/6/30	Constraining the risk of climate tipping points by integrating past observations and modeling
ROBERTS, Malcolm John High resolution global climate modelling, Met Office Hadley Centre, UK Manager	United Kingdom	2022/9/30-2022/12/27	Air-sea coupling and impact on tropical cyclones in the North West Pacific
GOGOI, Mukunda Vikram Sarabhai Space Center, The Indian Space Research Organization Researcher	India	2022/6/30-2022/9/27	Characterization of black carbon aerosols over India using GOSAT-2 satellite and numerical model
FIORINO, Michael CIRES (Cooperative Institute for Research in Environmental Science), University of Colorado Boulder Research Faculty	USA	2022/9/1-2022/10/29	A study on variability of typhoon characteristics over the western Pacific Ocean utilizing Super Best

Visiting Professors' report

LIU, Hongbin

Professor, Hong Kong University of Science and Technology

I visited Professor Hiroaki SAITO's lab in the Atmosphere and Ocean Research Institute (AORI), The University of Tokyo, during December 2022 to January 2023. I have known Dr. Saito since 1999 when I was a JSPS postdoctoral fellow in Nagoya University. We have been collaborating since. I have always considered AORI the best oceanographic research institute in Asia and it is my great honour to have the opportunity to work with Dr. Saito and other globally recognized scientists in this most prestigious research institute.

During my visit to the Atmosphere and Ocean Research Institute at the University of Tokyo, I had the opportunity to collaborate with Professor Hiroaki Saito and his team on our shared interest in the role of picophytoplankton in the global carbon cycle. We discussed the distribution of different ecotypes of *Prochlorococcus* and *Synechococcus*, the two most important picocyanobacterial in the open ocean,

affected by hydrographic features in the Pacific and Indian Oceans and their response to global warming. We worked together on the data collected from the Indian Ocean by Dr. Siyu Jiang, a postdoc researcher in Saito-san's team. We also worked on the draft of a paper based on the results of that dataset.

As part of my visit, I gave a seminar on the effect of nutrient limitation on phytoplankton thermal sensitivity. It was an excellent opportunity to share my research with the team and receive valuable feedback from them. We also visited Professor Hiroyuki Ogata's lab in Kyoto University, where I gave a seminar on the diversity and adaptation of *Synechococcus* in estuarine waters, which was well-received by the audience.

Apart from academic activities, I enjoyed my stay in Kashiwa and explored the vicinity of Tokyo. I hiked the Tsukuba Mountain, visited the lakes of Fuji Mountain, and tasted the wonderful food in Tokyo and Kyoto. It was a great cultural experience, and I appreciated the hospitality of the Japanese people.

Looking ahead, we plan to further collaborate on the ecophysiology and molecular mechanisms of picoplankton in the Pacific and Indian Ocean, with a focus on their role in carbon and nitrogen cycling. I am excited about this collaboration and the potential impact our research can have on our understanding of the global carbon cycle.

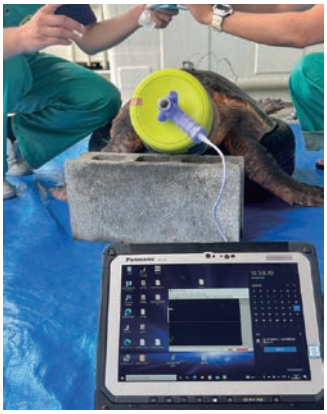
In conclusion, my visit to Professor Hiroaki Saito's lab in the Atmosphere and Ocean Research Institute at the University of Tokyo was a fruitful and enjoyable experience. It was an excellent opportunity to collaborate with a renowned researcher in my field and his team, share my research, and learn from their expertise. I am grateful for the opportunity and look forward to future collaborations.

Andreas Fahlman

Adjunct Professor, Fundacion Oceanografic de la Comunitat Valenciana, Valencia, Spain

AORI visit August-September 2022

In August 2022, Andreas Fahlman visited Japan on a scholarship from AORI to work on two projects in eco-physiology with faculty at AORI. One project, let by Drs. Kagari Aoki and Katsufumi Sato, we measured the resting metabolic rate and heart rate of small cetaceans. The heart rate was measured with a suction cup attached physio-logging device developed by Little Leonardo in Japan, and the respirometer system developed specifically for smaller dolphins. The respirometer system measured respiratory flow, and exhaled O_2 and CO_2, from which the energy consumed, and tidal volume can be estimated. These data are important to understand the basic physiology of small cetaceans, to better understand how much food they need. The concurrent measurement of heart rate and breathing allows a better understanding of how these



animals manage O_2 and CO_2 while foraging for food and makes it possible to understand limitations to diving. Thus, these measurements provide us with a method to predict how climate change may change the ability for survival in cetaceans.

The project in turtles was led by Dr. Kentaro Sakamoto and we worked with his students, and Drs. Katsufumi Sato and Kagari Aoki in Oguchi to make measurements on heart rate and respiratory flow. Recently, Dr. Sakamoto's team has developed methods to measure heart rate in free swimming turtles. This uses the same heart rate logger as was used in the dolphins, but this is attached to the carapace of the turtles. As the heart rate is affected by respiration, we wanted to see if we could use heart rate as a method to estimate breathing frequency. If so, it may be possible to determine breathing frequency in free swimming turtles. As the breathing frequency increases with metabolic demands, this would make it possible to determine how activity and diving alters metabolic cost.

Malcolm Roberts

Manager of global high resolution climate modelling at UK Met Office.

Visiting scientist at AORI, 2 Oct-26 Dec 2022.

This was my first visit to Japan for several years, and my longest stay ever – I was one of the managers of the UK-Japan Climate Collaboration back in the early 2000s which involved many shorter visits to the Earth Simulator in Sugita, and to Tokyo. During that time I got to know many Japanese colleagues at JAMSTEC, CCSR and the University of Tokyo (as well as meeting my wife Yoko!), and we've kept in touch and collaborated since those times. So when my European PRIMAVERA project finished in late 2019, we started planning this visit – unfortunately we all know what happened then! After many attempts we were finally able to make the trip, very generously hosted by Hasumi-sensei and greatly assisted by Kitajima-san.

Due to the delay in the trip, I had to split my time and continue more Met Office work than was ideal. This is because we have a new European project EERIE starting in January 2023, for which I needed to prepare and start running a global coupled model with an 8km ocean resolution. Fixing various model problems, and developing the required tools to do continuous monitoring and assessment of such simulations, took up some time. So far the model has completed 120 years of pre-industrial spin-up, and I plan to shortly include a 15km atmosphere resolution and do the full CMIP6 simulations.

A key region of the real ocean is the Labrador Sea in the North Atlantic, where ocean deep convection occurs, and where we found problems in our previous model simulations in CMIP6 HighResMIP. Discussions with Hasumi-sensei and Kawasaki-san on the key

processes in this region highlighted the importance of eddying and the representation of ocean bathymetry, and further collaboration on this would be welcome in EERIE, where we'll have 4 different models at ~10km global resolution in atmosphere and ocean.

As co-lead of HighResMIP (a new intercomparison in CMIP6 to compare global models at ~25km resolutions), we are now discussing how to progress and improve towards CMIP7. I had very useful discussions with Satoh-sensei on how HighResMIP can potentially help to make links between global km-scale modelling efforts such as NICAM and the DYAMOND project, and longer term climate simulation at lower resolutions. Satoh-sensei already had some ideas on a 1 year simulation designs for DYAMOND, and we'll discuss in HighResMIP if this could be incorporated into our designs.

We also visited various other groups for in-person discussions. At the Hokkaido University we had productive talks with Minobe-sensei about the diurnal cycle of precipitation, and using HighResMIP models to understand the causes of some recent tropical cycle trends and possible future changes to bomb cyclones. At JAMSTEC in Sugita we discussed ongoing work with

MIROC and NICAM models, including work on the synchronisation of the Kuroshio and Gulf Stream which is very relevant. I also talked with Nonaka-sensei and Nakamura-sensei and people involved in the HotSpot2 project about mid-latitude air-sea interaction processes which will also be extremely relevant to EERIE. We also visited MRI and had good discussions about HighResMIP with Mizuta-san.

As well as our work, we managed to take some time to enjoy Japan in autumn. We enjoyed the Shinkansen on our way to Hokkaido, and visited many fish markets, the Nikka whisky distillery, Toya-ko and the coastline near Sapporo. We went to the fireworks display at Tsuchiura, the Christmas market in Hibiya Park, and the Railway Museum in Omiya, and I also managed to climb Mount Tsukuba. It was also a pleasure to meet Mike Fiorino and Johannes Iohmann whom we shared an office with during our stay, and we have some ideas for future collaboration with them as well.

Overall I enjoyed a wonderful time in Japan, and now I'm back in the UK I'm missing the Tokyo sunshine very much! Dōmo arigatō gozaimashita to everyone for making me feel welcome at the University of Tokyo, and I hope to return soon.

Dr. Mukunda M Gogoi
Scientist, Vikram Sarabhai Space Centre, ISRO, India

My research activities at CCSR, AORI 05 Jul - 27 Sep, 2022

In current environmental research, atmospheric aerosol is a vital problem which plays important role in atmospheric optics, energetics, radiative transfer studies, chemistry, climate, biology, and public health. Because of their presence in the atmosphere, aerosols influence the energy balance of the terrestrial atmosphere, the hydrological cycle, atmospheric dynamics, and monsoon circulations. However, the large uncertainties in the knowledge of accurate aerosol type, their amount in the atmosphere and properties are one of the central topics in current climate and environmental research. While in situ measurements provide accurate information about aerosols' chemical composition, size distribution and local variation, the scope of such observations for wider geographical coverage and spatial variations on a regular basis is extremely limited. In this regard, remote sensing measurements can provide a broader view of the atmospheric aerosol field. Substantial progress in the retrieval of aerosol properties from satellite measurements has been made in the past three decades which has resulted in significant improvements in the knowledge of aerosol characterization and distribution over the oceanic regions. However, over land, contribution of the radiance arising from reflection of solar radiation from the surface (which is bi-directional in nature) is significantly large, and often far exceed the total radiance contribution from aerosols.

In the above backdrop, the Cloud and Aerosol-Imager-2 (CAI-2) on-board Greenhouse gases Observing Satellite-2 (GOSAT-2) is a state-of-the-art addition to the satellite based remote sensing of aerosols. Even though most the satellite sensors possess their unique strengths and weaknesses, CAI-2 on-board GOSAT-2 is expected to provide deeper insight in to the several new aspects of global aerosol characterization.

A key reason for my visit to the University of Tokyo is to explore more about scientific utilization of CAI-2 data. To this end, I would like to extend **my sincere thanks to Prof. Ryoichi Imasu** his heart-warming welcome, wholehearted support, and attention to my various tasks at AORI. During my stay, I had very fruitful scientific discussions with Prof. Imasu about satellite retrieval of aerosols from different space-borne sensors and assimilation of Black Carbon (BC) using numerical model simulations. As the light-absorbing BC aerosols have very sensitive role in affecting the Earth's radiation budget and climate, satellite-based retrieval of BC from the CAI-2 on-board the GOSAT-2, combining with surface measurements over the Indian region is unique in terms of enabling retrieval accuracy as well as expanding it to the understanding of global distribution of BC in near-real time. A first level analysis in this regard is completed during my stay at AORI.

Overall, my visit to the prestigious 1870s research university has provided me with new insights into various scientific information, academic environment and the research and cultural arenas in Japan as a whole. It was a very smooth and successful experience

for me at CCSR office all the way through. At this juncture, I also wish to express my appreciation to Dr. Makiko Hashimoto (Japanese Aerospace eXploration Agency, JAXA) who provided insightful scientific perspectives on satellite retrieval of aerosols using MWPM inversion algorithms. Thanks to Prof. Imasu for taking me to JAXA. Furthermore, it was a pleasure to visit the National Institute for Environmental Studies (NIES), Tsukuba, where I met Dr. Morino for scientific discussions, had a lab tour, and looked at the high-resolution Fourier Transform Infrared Spectrometer system. Visiting the greenhouse gas observatory at the Center for Environmental Science in Saitama (CESS) is another fantastic experience to share with Prof. Imasu. In addition to the above, I visited Kyoto and met with Prof. Sochiko Hayashida and her team at the Research Institute for Humanity and Nature (RIHN). I thoroughly enjoyed the scientific interaction that followed my presentation.

During my stay in Japan, I also took part in a lot of other activities and met many wonderful people. First of all, I want to express my thanks to Asako Ando-san for the continuous support and help she has provided me in various aspects. She helped me with everything from sharing my international travel details to making arrangements at Kashiwa International Lodge and getting a bike to roam around. Additionally, it was a pleasure to meet Anamika Anand-san, Arthur Ho Wang LI-san, Ardhi Adhary Arbain-san, Yutaka Arai-san, Qiao Wang-san, Yokifan-san. As a guide to new places, shopping and foods in Japan, Anamika-san was always helpful. Discovering live KABUKI at the National Theatre with Anamika-san is another delight. It was a great opportunity to experience the essence of Kabuki, which is listed as an intangible cultural heritage of humanity. Similar to this, I had many more enjoyable events beyond AORI, such as visiting parks, museums and shrines in Tokyo and Kyoto. I am happy to note that some temples in Japan combines the Japanese double-roofed '*irimoya*' style and the Indian '*tenjiku*' style in to one building.

Myself with Prof. Imasu during a visit to one of his observatory.

Towards the end, I was also lucky to share the office with Dr. Mike Fiorino from USA. We had many opportunities to discuss the scientific issues related to climate change and to share our experiences at Japan. Sharing the common room with friends from different countries at the international lodge at Kashiwa was yet another big enjoyment to have different varieties of food, as well as discussing about science, human life and the future of earth. It's also worth mentioning the beautiful library on the Kashiwa Campus. Its ambience was perfect for me to spend hours there and learn about different disciplines through its rich content. Thanks to the library staff for their quick action and support in arranging the visitor card within a day. Every member of the institution shows unparalleled sincerity and dedication to their work. I am truly impressed by the laboratory facilities and scientific research life in the UTokyo, Japan.

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