Newsletter from

NOWPAP CEARAC

Northwest Pacific Action Plan
Special Monitoring & Coastal Environmental Assessment
Regional Activity Centre

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Greeting from Director of CEARAC

Ms. Rika HAYASHI

Hello, readers, I am Rika HAYASHI, Director of CEARAC since July 2023.

Since marine areas around the world are shared among multiple littoral countries, United Nations Environment Programme (UNEP) has promoted concerted actions on marine environmental conservation by relevant nations, namely Regional Seas Programme (RSP). Northwest Pacific Action Plan (NOWPAP) is one of the RSPs and started in 1994 by China, Japan, Korea and Russia, aiming at conservation of the marine and coastal environment of the northwest Pacific Ocean.

Each member state has a regional activity centre (RAC), and the RACs are main bodies to implement respective activities in NOWPAP. Northwest Pacific Region Environmental Cooperation Center (NPEC) in Toyama, Japan was designated as a host organization of the Special Monitoring and Coastal Environmental Assessment Regional Activity Centre (CEARAC), RAC in Japan, and since then, CEARAC has conducted various activities mainly on monitoring and assessment of the marine and coastal environment by using remote sensing techniques.

All of NOWPAP activities are carried out after adoption of their workplan and budget by the member states; however, because the political uncertainty in the world occurred in February 2022 suspended the adoption for the 2022-2023 activities, influencing CEARAC activities heavily. At present, CEARAC is extending the working term for the 2020-2021 activities; yet we strongly wish to separate environmental issues from political ones and to resume NOWPAP activities in full scale.

In 2023, CEARAC developed video manual on environmental DNA (eDNA) sampling and experiment in Chinese, Korean and Russian and uploaded them on CEARAC YouTube Channel, compiled case studies of estimating seagrass blue carbon in the selected sea areas in the NOWPAP region, upgraded the CEARAC websites, carried out a training course with Seagrass Mapper, a cloud-based seagrass mapping tool as well as introduced/disseminate CEARAC activities and exchanged information at regional and international meetings and/or workshops.

Under the rapid advancement of remote sensing and eDNA techniques in recent years, CEARAC will make more efforts to lead the world in line with their application to the marine environment and to continuously contribute to the marine conservation of the NOWPAP region while paying close attention to biodiversity, climate change and marine litter, all of which have been serious issues in the NOWPAP region.

I hope CEARAC activities will be well-known around the world, and it will trigger more attention to and interest in the environmental conservation in Toyama Bay and the NOWPAP region. I also expect CEARAC activities can help promotion of actions on marine environmental conservation by cooperation and collaboration among related organizations and institutions in national, regional and global levels.

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Tateyama mountains seen from Amaharashi Coast

1. Activity Report 2023
(Continuation of main projects for 2020-2021)

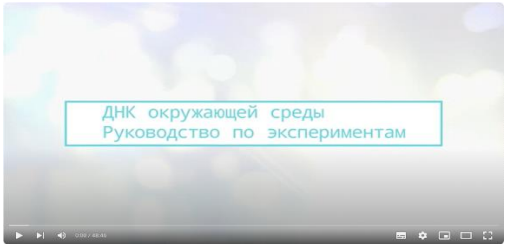
1-1. Dissemination of eDNA analysis technology

Environmental DNA (eDNA) is a technology rapidly developed in recent years, and no internationally standardized analytical method has yet been established. Japan is a leading country on this study; therefore, CEARAC prepared an English version of the Environmental DNA Sampling and Experiment Manual (hereinafter referred to as the " Manual") developed by the eDNA Society (Japan) and shared/disseminate this knowledge among the NOWPAP member states. The Manual introduces how to prepare samples and assay as well as how to use the state-of-the-art tools and instruments for analyses. At the same time, we thought it would be easier for students and young researchers who are interested in eDNA technology to deepen their understanding with visual materials, and CEARAC developed video manuals in English (https://youtu.be/I4K00_ysCtc) and in Japanese (https://youtu.be/97v-77G5I6w) in 2022with support of Profs. Toshifumi Minamoto (Kobe University) and Akihide Kasai (Hokkaido University), which shows how to prepare assay and use the analytical tools and instruments. Besides, three versions in other NOWPAP member states' languages were prepared in September 2023. All of the five manuals are uploaded on CEARAC 's YouTube Channel: Chinese (https://youtu.be/KhjWrASBr3A), Korean (https://youtu.be/V3wZ4XGeRLc), and Russian (https://youtu.be/VrVSEwz2oJw).

Along with further development of eDNA technology in recent years, the eDNA Society plans to revise their Manual. When CEARAC restarts implementation of our activities, we may upgrade the English Manual as well, aiming at disseminating the latest information on the eDNA analytical method and promoting their wider usage among the NOWPAP member states.

Chinese ver.
https://youtu.be/KhjWrASBr3A

Korean ver.
https://youtu.be/V3wZ4XGeRLc



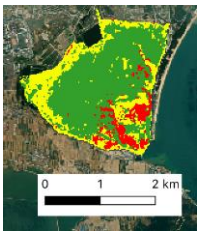
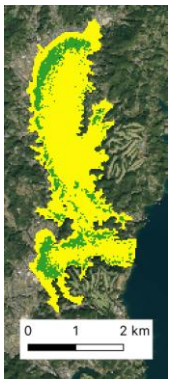
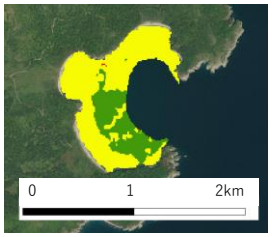
Russian ver.
https://youtu.be/VrVSEwz2oJw

1-2. Case Studies of Estimating Seagrass Blue Carbon in the Selected Sea Areas in the NOWPAP Region

Seagrass bed is receiving a lot of attention worldwide not only for its important ecological roles such as habitat, nursery and feeding ground for many marine organisms, but also for its potential of contributing to mitigating the negative impacts of climate change by capturing/storing carbon in its sediment.

Case studies have been conducted since 2020 to estimate seagrass blue carbon in selected sea areas in the NOWPAP region. In the four sea areas of Swan Lake (China), Katagami Bay (Japan), Dongdae Bay (Korea) and Srednyaya Bay (Russia) seagrass was collected in a luxuriant growth period, and the amount of blue carbon captured/stored in seagrass ecosystem in each case study area was calculated based on the manual provided by CEARAC. The four case study reports were finalized/submitted by September 2023.

Then, CEARAC started to prepare a booklet for seagrass conservation in the NOWPAP region, which introduces the case study results and a regional overview of seagrass blue carbon. The booklet will be published in spring 2024.

Swan Lake (China)	Katagami Bay (Japan)	Dongdae Bay (Korea)	Srednyaya Bay (Russia)
			

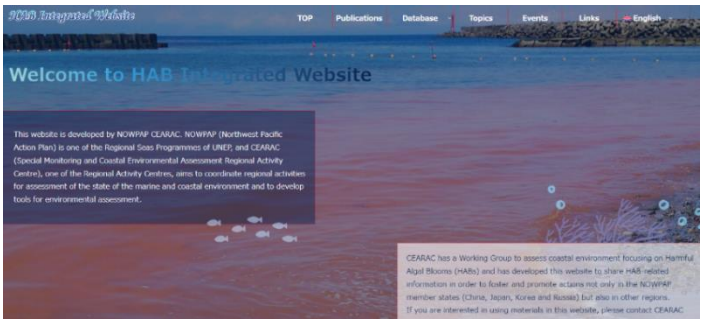
Study area	Blue carbon per ha (Mg / ha)	Seagrass area (ha)	Total blue carbon (Mg C)
Swan Lake	*Zostera marina:* 75	241.8	18,038
	Zostera Japonica: 84	18.2	1,527
Katagami Bay	*Zostera marina:* 122 (Borrowing value in Dongdae Bay)	89.7	10,993
Dongdae Bay	*Zostera marina:* 122	166.9	20,361
Srednyaya Bay	*Zostera marina:* 29.3 -36.4	18.8	551 - 685

【TOP】Distribution of seagrass and seaweed beds in case study areas in NOWPAP countries. Green indicates seagrass beds, red indicates seaweed beds, and yellow indicates sandy bottom.
【BOTTOM】The table shows the estimated results of blue carbon in the seagrass beds in each case study area.

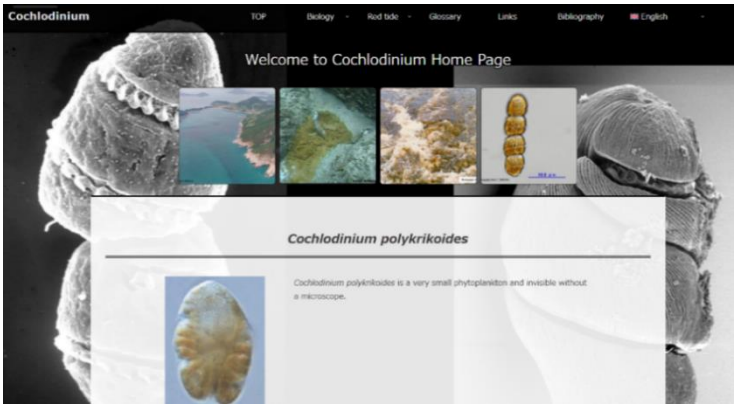
1-3. Upgrading CEARAC Website

CEARAC has been upgrading its entire websites to enhance their usability, operation and management. After reviewing the contents and identifying obstacles and difficulties in operation, CEARAC prepared a “CEARAC websites improvement plan” for renovation in September 2023. To pursue user friendliness, current 13 websites based on different CEARAC activities will be integrated with refined page design and full range of contents. CEARAC also expects smoother maintenance/management and cost cut of the websites.

The upgrade work is being progressed as planned and now in the stage of reconstruction of the website structure, alternation of the user interface design, and multilingualization of the contents to be available in English, Chinese, Japanese, Korean and Russian. Then, new pages featuring Global Eutrophication Watch will be opened in the future.



The upgraded website will be available in Spring 2024 !



2. Cooperation with NOWPAP partners and organizations

2-1. PICES 2023 Annual Meeting

Annual Meeting of the North Pacific Marine Science Organization (PICES) was held on 23-27 October in Seattle, the U.S. and two CEARAC staff members flew there to participate in the meeting and some pre-conferences prior to the meeting to strengthen cooperation in activities between NOWPAP and PICES.

Face-to-face meetings were avoided during epidemics of COVID-19 for a while; however, in-person conferences resumed little by little last year, including the PICES Annual Meeting 2022 held in Korea. (CEARAC staff joined the 2022 annual meeting online, though.) Then, despite the increase of in-person attendance, some international conflicts prevented people from China and Russia from entering the U.S., and it may take some more time for any nation to travel overseas freely.

・W4 (Oct. 20)

Advisory Panel for a Circulation Research in East Asian Marginal Seas/PICES Program (AP-CREAMS) and NOWPAP co-organized Workshop 4 “Changing social-ecological-environmental system of the North East Asian Marginal Seas: New challenges for integrative marine science”. AP-CREAMS and CEARAC have a history of co-organizing multiple training courses on remote sensing data analysis in the past, so AP-CREAMS is one of the important partners for CEARAC. This year, Dr. Takafumi Yoshida, senior researcher of NOWPAP joined the workshop as one of the convenors.

The objectives of this workshop are to connect marine study and socio-economic needs and to share information and studies on the western Pacific and its adjacent seas, aiming at contributing to achievement of the UN Decade of Ocean Science for Sustainable Development (2021-2030) and SDG 14 (Life below Water), in particular in this sea area.

In the special speech for the workshop, the speaker introduced an on-going project to develop a network of researchers, which is led by Tokyo University with researchers in the southeast Asian countries. In addition to this network development, other actions such as application of study outputs to regional environment conservation activities, human resource development, all of which pursue contribution to achieving international targets/goals on ocean.

Also, presentations on negative influences of climate change on the marine environment and marine resources of the northwest Pacific and the East China Sea reminded participants of the significance of it. In the wrap-up session, participants exchanged their views on how to reflect scientific information in national and/or regional policies and its importance and difficulties. They also shared their experiences, in which it was emphasized to provide scientific data/information to the general public and fishery operators in a repetitive and easily understandable way to raise public awareness on SDGs and the marine environment and its resources.

・S-HAB Business Meeting (Oct. 21)

Section on Ecology of Harmful Algal Blooms in the North Pacific (S-HAB) organized a workshop “International Workshop on Solutions to Control HABs in Marine and Estuarine Waters”, and NOWPAP joined it as a co-sponsor. S-HAB is also an important partner of CEARAC, so two staff members of CEARAC participated in the workshop.

Various actions on how to mitigate damage by HABs were introduced by researchers from the PICES member countries and others, such as Chile where marine culture is very active. CEARAC developed a booklet of countermeasures against HABs in the NOWPAP region in 2007 to disseminate different physical, biological or scientific approaches to address HABs. The countermeasures introduced in the booklet were collected from research papers and other sources at that time. Surprisingly, it was found out during the workshop that some of the countermeasures mentioned in the CEARAC booklet are still under development. Because enormous time and financial resources should be taken to validate their usefulness on-site as well as to secure safety on ecology and human health, the ideas introduced in the booklet have not been applied yet.

Then, one approach by Korean government seemed to be a solution, where a holistic process from submission of proposals to a final verification system before starting a countermeasure project is established. A committee by the central government reviews cost-effectiveness and safety of new technologies explained in proposals submitted by private companies and others. Then, only the ones which meet all requirements by the committee are applied to target areas. The governmental lead can help reduce burden on researchers, so this system can be one of the best practices to be used in other countries to promote utilization of new anti-HAB technology.
Outcomes of this workshop will be integrated in a PICES technical report, and CEARAC expects to use such a useful reference to upgrade our countermeasure booklet as well as our future activities.

S-HAB Business Meeting

・AP-CREAMS Business Meeting （Oct. 22）

Advisory Panel for a CREAMS/PICES Program in the East Asian Marginal Seas (AP-CREAMS) was established to monitor and share data on influences of climate change and various human activities on the marine ecosystem and physical environment of the east Asian marginal seas (such as the Northwest Pacific and East China Sea). AP-CREAMS has been collaborating with NOWPAP for many years because of our same target ocean area. CEARAC staff attended its business meeting, where the summary of the workshop 4 on 20 October was reported and the progress of the work on developing website and database of AP-CREAMS was shared with the attendees.
AP-CREAMS will celebrate their 30th anniversary next year, and several memorial events are planned to be held in Korea. At the same time, generation change among the members has started: younger researchers will be selected in China, Japan and Korea in the near future. So, it is necessary for CEARAC to contact the younger generation for future cooperative work.

・AP- NIS Business Meeting （Oct. 22）

Advisory Panel on Marine Non-indigenous Species (AP-NIS) of PICES was established to share information on the distribution of marine non-indigenous species (NIS) in the north Pacific Ocean. AP-NIS has been considering effective application of the environmental DNA (e-DNA) technology as a new research technique to identify the presence of NIS. Since CEARAC has implemented an activity on e-DNA as a new monitoring tool, AP-NIS is also an important CEARAC partner. During its business meeting, participants exchanged ideas for workshops for PICES annual meeting 2024, and they decided to propose a workshop on comparison of NIS between the east and west sides of the Pacific. It was also suggested to co-organize the workshop with NOWPAP. If organization of the proposed workshop is officially agreed, common indicative species might be selected there. As CEARAC may choose the same ones for our relevant activities in the future, we would like to actively involve in preparation for organization of the workshop.

・MEQ Business Meeting (Oct. 22)

Marine Environmental Quality Committee (MEQ): The committee, one of the seven PICES standing committees, handles overall marine environment. It is the parent committee of the above-mentioned S-HAB and AP-NIS, and a Working Group on Indicators of Marine Plastic Pollution (WG42) is also under its umbrella. 2023 is the year when the new Chair and Vice-Chair are selected. Prior to the meeting, it was agreed through an online meeting to select Dr. Thomas Therriault, representative of Canada, as new Chair; yet the selection of a new Vice-Chair was deferred there. It is the customary of MEQ that Chair and Vice-Chair are selected from the either side (east or west) of the Pacific respectively. Since the new Chair is from the east side of the Pacific, a new Vice-Chair should be a person from the west side, and Dr. Yoshida was offered that position. He has participated in MEQ meetings for some time as a NOWPAP representative and became an official member of the committee this year. So, after some coordination among the members, he accepted the position. Then, during the MEQ business meeting, it was agreed to select Dr. Therriault and Dr. Yoshida, as new Chair and Vice-Chair respectively, and this decision was adopted at the PICES intergovernmental meeting.

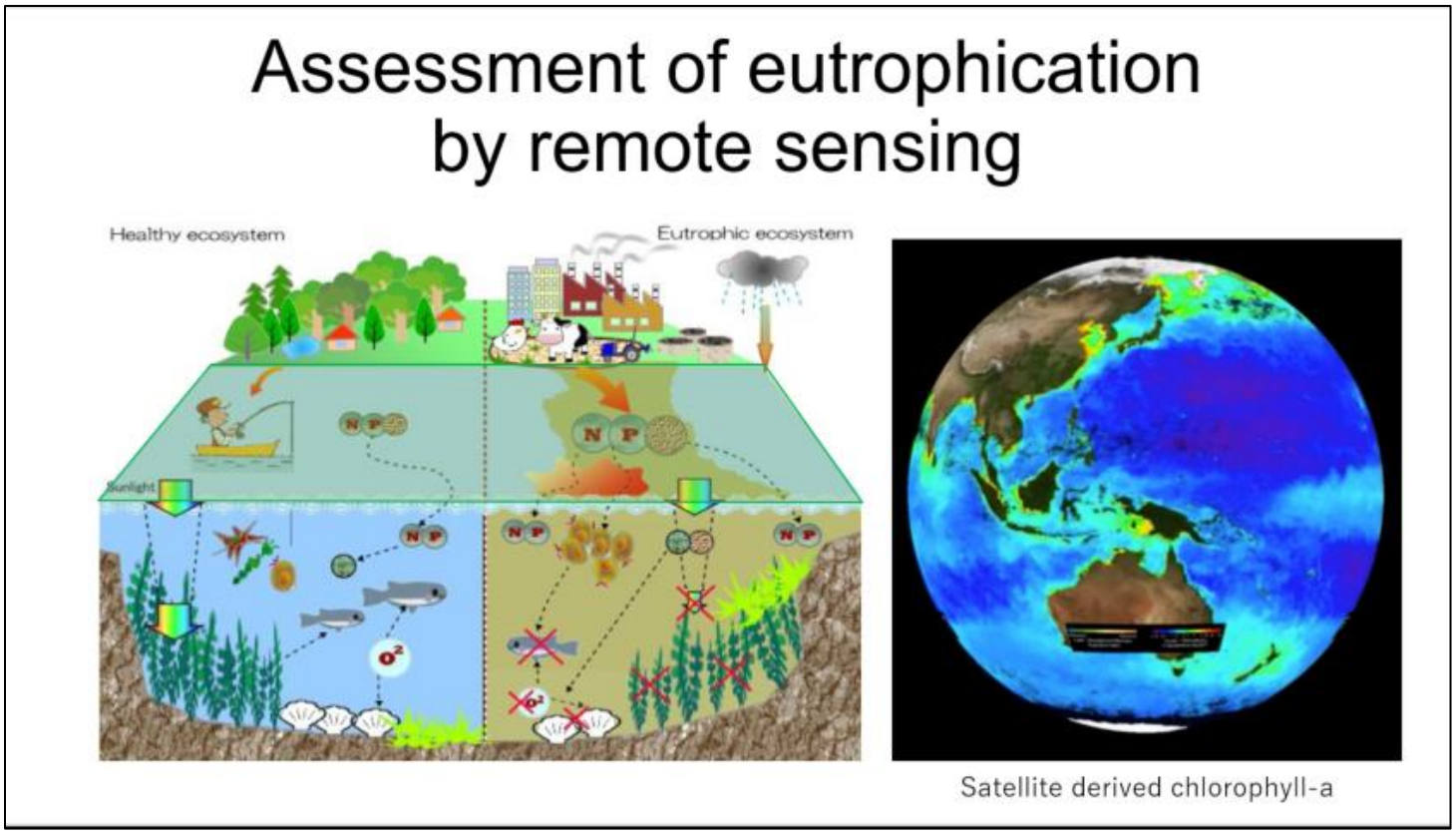
MEQ and NOWPAP have developed mutual cooperation in several activities for a long time, and when Dr. Yoshida becomes Vice-Chair, it is expected to strengthen our ties. One possible working area is a new advisory panel on marine plastic pollution. Currently, a working group on marine plastic pollution is set under MEQ, and it is proposed to move it up to an advisory panel. As marine plastic pollution is an emerging worldwide issue, cooperation between CEARAC and PICES in this working area should be intensified in the future.

・S8 (Oct. 25)

Dr. Terauchi introduced Global Eutrophication Watch in Session 8 “Occurrence and Ecological Impact of Emerging Pollutants in the Coastal Marine Environment”.

He demonstrated the functionalities of Global Eutrophication Watch and presented the detected areas of eutrophication and oligotrophication potentials in the NOWPAP region in comparison with the global indicator for SDG 14.1.1a.

Participants of the Session 8 acknowledged the usefulness of Global Eutrophication Watch and expected CEARAC to integrate JAXA SGLI data into other parts of the world to provide higher resolution spatial scale information.



2-2. Google Geo for Good Summit 2023

One of the mandates of NOWPAP CEARAC is to develop monitoring and/or assessment tools of the marine and coastal environment of the NOWPAP region, applying remote sensing technology. To catch up the global trend of its application, Dr. Genki Terauchi, senior researcher of CEARAC attended the Geo for Good Summit 2003, including its side events, held in California, the U.S.A. on 10- 12 October.

Geo for Good Summit is an annual meeting to showcase the latest trend and best practices of the state-of-the-art geo-spatial analysis tools provided by Google. Dr, Terauchi was selected as one of the 350 researchers and activists around the world to be invited to the event.

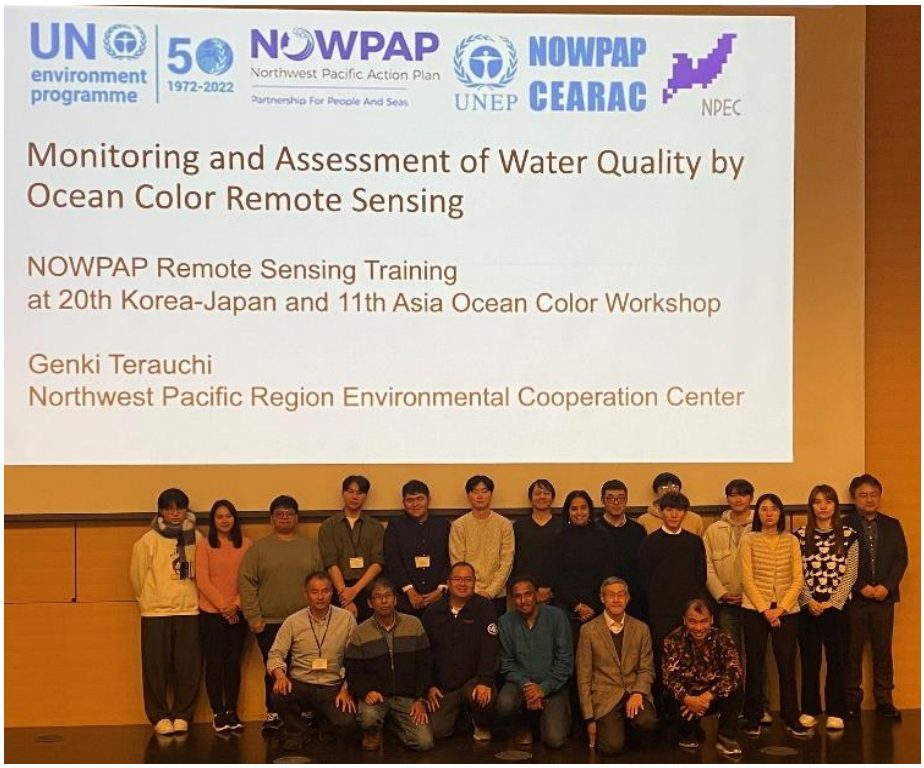
The day before the summit, Dr. Terauchi attended a workshop on how to use Python to improve the functionalities and services of Seagrass Mapper, a cloud-based seagrass mapping tool using Google Earth Engine.

On the 11th, Dr. Terauchi demonstrated Global Eutrophication Watch, a cloud-based tool for assessing ocean eutrophication on a global scale, at a booth. Visitors showed their interests in the six types of the eutrophication status provided by the NOWPAP Eutrophication Assessment Tool (NEAT) developed by CEARAC. They expected CEARAC to help develop regional dataset using JAXA SGLI data in various regions in the world. CEARAC expects the tool can be a global standard for eutrophication analysis in the near future.

2-3. Korea-Japan / Asian Workshop on Ocean Color (KJWOC /AWOC)

The 6th Symposium of the Institute for Space-Earth Environment Research (ISEE) - Workshop for Interaction of Ocean, Atmosphere, and Land by Remote Sensing and Numerical Model - was held at Nagoya University, Japan on 17-21 December. The 20th Korea-Japan/11th Asia Ocean Color Workshop (KJWOC / AWOC) was also held as part of the 6th symposium, and same as last year, Dr. Genki Terauchi joined this workshop.

He gave a presentation titled “The past and future of NOWPAP’s efforts on remote sensing of marine environment” and introduced CEARAC’s past and on-going ocean remote sensing activities in Session 1- Ocean color: Mission status, program, and operational on the 17th of December.



The symposium provided its participants with hands-on training on 21 December. Under the theme: Monitoring and assessment of water quality by ocean color remote sensing, Dr. Terauchi tried a new approach where participants log in to a common data analysis workstation to experience a procedure of analyzing ocean color remote sensing data while using the functions of NOWPAP Remote Sensing Training Program (https://nowpap-remote-sensing-training.org/npwd/) developed by CEARAC. Next, he demonstrated how to use Seagrass Mapper, CEARAC's web-based tool for mapping seagrass, with a case study in Nanao Bay, Japan. Then, he gave the participants a hands-on session with Seagrass Mapper. 25 researchers and university students from 7 countries joined this session. The CEARAC's training course on remote sensing data analysis is basically six-days long, but its essence was compacted into a one-day program for this symposium. Still, the participants learned a lot and voiced their enthusiasm of attending further training courses in the future. CEARAC also plans to continue them for capacity building in marine environmental monitoring techniques, and expects to find partners to jointly organize the training courses in the future.

3. List of CEARAC Focal Points

Country	*Name*	*Organization*
China	Dr. Xihui LIU	China National Environmental Monitoring Center
	Dr. Jianchao FAN	National Marine Environmental Monitoring Center
Japan	Ms. Noriko TAMIYA-HASE	Ministry of Environment Japan
	Dr. Joji ISHIZAKA	Nagoya University
	Dr. Nobuyuki YAGI	The University of Tokyo
Korea	Dr. Bong-Oh KWON	Kunsan National University
	Dr. Jinsoon PARK	Korea Marine and Ocean University
	Dr. Hye Seon KIM	National Marine Biodiversity Institute of Korea
Russia	Dr. Vladimir SHULKIN	Far Eastern Branch of the Russian Academy of Sciences
	Dr. Tatiana ORLOVA	Far Eastern Branch of the Russian Academy of Sciences

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