

Prof. Mitsumasa Okada appointed to President of International EMECS Center

Prof. Mitsumasa Okada (Professor Emeritus, Hiroshima University / Professor Emeritus, The Open University of Japan) assumed the position of President of the International EMECS Center on June 26, 2023.

Enclosed coastal seas are sea areas that are influenced not only by the open sea but also by land through human activities, etc. in coastal areas. They are, so to speak, sea areas where land and sea intersect. In the Seto Inland Sea, a representative example of an enclosed coastal sea, the quality of water was once so deteriorated that it was called a "dying sea," and thus various effluent regulations, including TMDL (Total Maximum Daily Loadings), have been implemented. Under these circumstances, in 1994, the International EMECS Center was established with the aim of creating and preserving the environment not only in the Seto Inland Sea but also in other enclosed coastal seas throughout the world that were facing similar problems.

Since then, the quality of water in the Seto Inland Sea has been improved by effluent regulations and other measures. However, in recent years, biological productivity has stagnated, as evidenced by the decrease in fish catch and the deterioration of seaweed quality, and it is now believed that improvement of water quality alone will not restore the richness of the Seto Inland Sea as it once was. Therefore, the 2015 amendment to the Act on Special Measures concerning Conservation of the Environment of the Seto Inland Sea included a provision to "make the Seto Inland Sea a rich sea that maximizes its multifaceted value and functions, such as ensuring biological diversity and productivity," and the 2021 amendment of the same act newly incorporated a special exception allowing measures to appropriately manage nutrient concentration in specific areas of the sea.

In the meanwhile, in 2023, the "National Biodiversity Strategy and Action Plan (2023 - 2030)" was established, setting a target to conserve at least 30% of the land and sea as healthy ecosystems (30by30), and it was decided to certify sea areas where sustainable human activities contribute to biodiversity conservation as Other Effective area-based Conservation Measures (OECMs).

In this way, environmental conservation of enclosed coastal seas has shifted from unilateral load reduction, as was the case when the Center was founded, to load management to restore biodiversity, and then to conservation of biodiversity in coastal ecosystems. Integrated coastal management and the creation of *satoumi*, which have been the focus of attention at recent EMECS Conferences and other events, are precisely in response to these changes.

To further promote these approaches, the Center is required more than ever to build an organic network among administrative bodies, researchers, businesses, citizens and other parties concerned and to promote international and academic exchanges. Your cooperation and support would be greatly appreciated.



International EMECS Center
President Mitsumasa Okada

岡田 光正

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Recipients selected for FY 2023 Grants-in-Aid for Young Researchers

As part of its efforts to strengthen its survey and research activities, the International EMECS Center established the Grants-in-Aid for Young Researchers in FY 2020 to provide support for outstanding young researchers who are engaged in research that contributes to environmental conservation in enclosed seas.

This fiscal year, the fourth year of the program, we received 11 applications, and on June 6, 2023, seven researchers, including five continuing from the previous year, were selected as grant recipients after a rigorous selection process at an EMECS researchers' meeting.

[FY2023 Grant recipients]

Researcher	Affiliation	Research topics
Megumu Fujibayashi	Department of Urban and Environmental Engineering Faculty of Engineering, Kyushu University	Historical changes of the supply of silica in the coastal areas and its effects on community structure in tidal flat ecosystems (Third year)
Masatoshi Nakakuni	Faculty of Agriculture, Kagawa University	Relationships in seasonal fatty acid composition between oysters and microalgae
Tomohiro Okamura	Fisheries Technology Institute, National Research and Development Agency, Japan Fisheries Research and Education Agency	Studies on the physiology and ecology of nanoplanktonic diatoms as food for bivalve larvae ~ Growth characteristics and effects on the vitality and settlement of bivalve larvae ~
Hikaru Itakura	Atmosphere and Ocean Research Institute, The University of Tokyo	Spawning and migration ecology of anadromous Japanese grenadier anchovy in the Ariake Sea (2)
Tomonori Isada	Akkeshi Marine Station Field Science Center for Northern Biosphere, Hokkaido University	Dynamics of Transparent Exopolymer Particles (TEPs) in the eelgrass meadows of Akkeshi-ko estuary, Japan (Part 2)
Takashi Nakamura	School of Environment and Society, Tokyo Institute of Technology	Development of a Shizugawa Bay Digital Twin using an integrated watershed-ocean-ecosystem model
Hidetaka Kobayashi	Faculty of Science, Academic Assembly, University of Toyama	Elucidating the Carbon Budget in Coastal Areas: A Case Study of Toyama Bay

Recipients introduction



Historical changes of the supply of silica in the coastal areas and its effects on community structure in tidal flat ecosystems (Third year)

Megumu Fujibayashi
 Assistant Professor
 Department of Urban and Environmental Engineering
 Faculty of Engineering
 Kyushu University

I would like to offer my sincere gratitude regarding my selection for EMECS Grants-in-Aid for young researchers. I am studying the dynamics of dissolved silicon (DSi), which is essential for the growth of diatoms, which are producers of eicosapentaenoic acid, an important nutrient for animals. In the previous years, I investigated the effects of a reservoir, sewage treatment facilities, and in-channel vegetation on DSi dynamics in

the Zuibaiji River in Fukuoka Prefecture. In this year, I focus on rice paddies, which account for the majority of land use in the Zuibaiji River basin, and aim to quantitatively evaluate the DSi dynamics. In addition, I will examine the effects of the DSi load on the production of benthic diatoms and secondary production of benthic animals on the Imazu tidal flat.



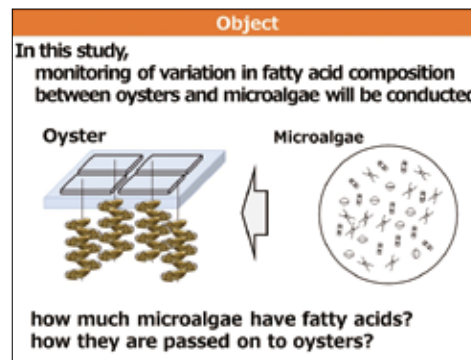
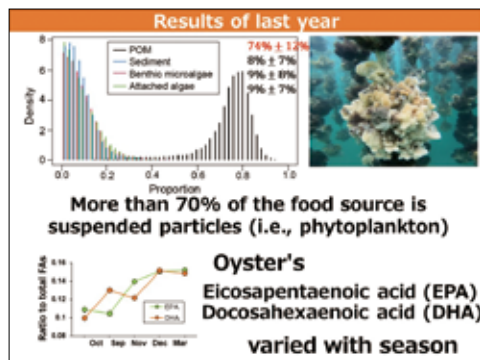


Relationships in seasonal fatty acid composition between oysters and microalgae

Masatoshi Nakakuni
Postdoctoral research associate
Faculty of Agriculture
Kagawa University

I am a postdoctoral research associate at the Faculty of Agriculture, Kagawa University. The theme of this research is "Relationships in seasonal fatty acid composition between oysters and microalgae". Essential fatty acids such as EPA and DHA are important for fish growth and are known to improve the growth rate

of fish. Even if the amount of food is high, if the food does not contain sufficient nutrients, the organisms that eat the food are not expected to grow well. In this study, I will evaluate prey quality and follow changes in predator nutrients in more detail by analyzing fatty acid compositions in oysters and microalgae.

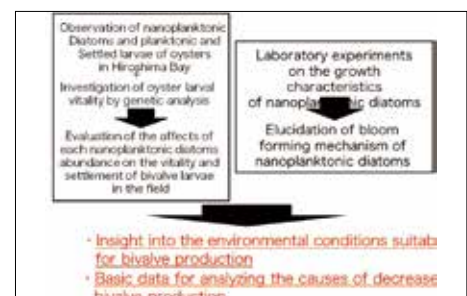


Studies on the physiology and ecology of nanoplanktonic diatoms as food for bivalve larvae ~ Growth characteristics and effects on the vitality and settlement of bivalve larvae ~

Tomohiro Okamura
Researcher
Coastal Productivity Research Group
Coastal and Inland Fisheries Ecosystems Division
Environmental Fisheries Applied Techniques Research Department
Fisheries Technology Institute
National Research and Development Agency
Japan Fisheries Research and Education Agency

In the Seto Inland Sea, production of bivalves has been decreasing since the mid-1980s. Our previous study has shown that nanoplanktonic diatoms are important food for bivalve larvae and their biomass affects the larval settlement which could influence bivalve resources. In this study, we will investigate the effects of each nanoplanktonic diatom abundance on the vitality and settlement of bivalve larvae in the field. From our previous study also, we hypothesized "nanoplanktonic diatoms utilize the organic matter derived from

medium-sized diatoms". In this study, we will reveal the bloom formation mechanism of nanoplanktonic diatoms in laboratory experiments. The results of this study will provide insight into the environmental conditions suitable for bivalve production and also provide the basic data for analyzing the causes of decrease in bivalve production.





Spawning and migration ecology of anadromous Japanese grenadier anchovy in the Ariake Sea (2)

Hikaru Itakura
 Assistant Professor
 Atmosphere and Ocean Research Institute
 The University of Tokyo

I'm Hikaru Itakura working at Atmosphere and Ocean Research Institute (AORI), the University of Tokyo. I received my PhD from the University of Tokyo in 2014, and then worked at Kobe University and the University of Maryland, USA as a JSPS Research Fellow. My research topic is understanding response mechanisms of fisheries resources to environmental change, with primary interest of how diversity in migration and life history contribute to resilience in exploited fishes under environmental change.

In this research project, I'm studying about spawning and migration ecology of anadromous Japanese grenadier anchovy (*Coilia nasus*) inhabiting Ariake Sea and its inflowing rivers, to contribute to the conservation for enclosed coastal seas and resources management of the species. Fishes of genus *Coilia* (family Engraulidae), which are widely distributed in East

Asia, strongly depend on enclosed coastal seas, especially the estuarine turbidity maximum (ETM) zones, and migrate between the sea and rivers. Thus, they have a potential to be an indicator species for conservation of health of ETM zones and connectivity between rivers and enclosed coastal seas. I'm exploring their potential spawning rivers, nursery grounds within rivers, migration patterns, and spatial distribution in the Ariake Sea using otolith stable-isotopic ratio and environmental DNA analyses, in order to clarify environmental characteristics that the fish represents along their life history.



Dynamics of Transparent Exopolymer Particles (TEPs) in the eelgrass meadows of Akkeshi-ko estuary, Japan (Part 2)

Tomonori Isada
 Associate Professor
 Akkeshi Marine Station
 Field Science Center for Northern Biosphere
 Hokkaido University

Seagrass meadows in estuarine and shallow coastal areas have a significant role in carbon burial and sequestration to mitigate climate change as blue carbon. This project focuses on the Transparent Exopolymer Particles (TEPs) dynamics in eelgrass meadows in Akkeshi-ko estuary. TEPs consist of acid polysaccharides and are sticky particles with > 0.4 μm diameter, resulting in particle aggregation like marine snow. TEPs significantly contribute to marine carbon burial. However, little is known about the concentration of TEPs and their controlling factors in seagrass meadows. Last year, we found a higher contribution of epiphytic diatoms to TEP production in eelgrass beds. Next, we aim to investigate the epiphytic diatoms in eelgrass beds

in more detail.





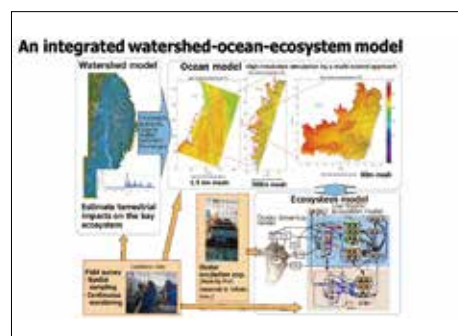
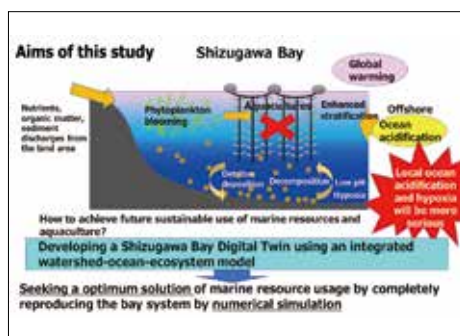
Development of a Shizugawa Bay Digital Twin using an integrated watershed-ocean-ecosystem model

Takashi Nakamura
Associate Professor
School of Environment and Society
Tokyo Institute of Technology

My name is Takashi Nakamura of Tokyo Institute of Technology. I would like to thank you for selecting me for the EMECS Grants-in-Aid for young researchers.

Global warming and ocean acidification may enhance stratification, especially in summer, and worsen hypoxia and acidification in the bottom layer in semi-closed bays, such as Shizugawa Bay. And it has been suggested that the progress of acidification may have serious impacts on marine resources, especially calcifiers, such

as oysters. This study aims to develop a digital twin of Shizugawa Bay using an integrated watershed-ocean-ecosystem model to fully reproduce the bay environment and ecosystem. The aim is to fully reproduce the bay environment and ecosystem, including the dynamics of marine resources, through numerical simulation, and to search for the optimal sustainable use of marine resources and aquaculture in the present and in the future under climate change.



Elucidating the Carbon Budget in Coastal Areas: A Case Study of Toyama Bay

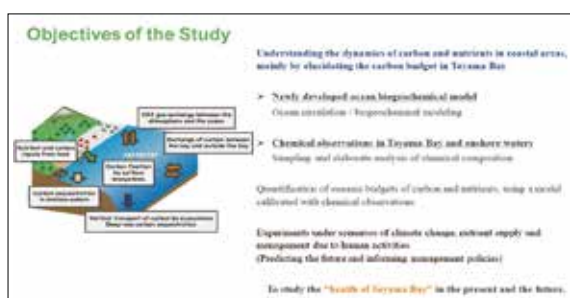
Hidetaka Kobayashi
Assistant Professor
Faculty of Science
Academic Assembly
University of Toyama

My name is Hidetaka Kobayashi and I am at the Faculty of Science, University of Toyama. I have been working at the laboratory of environmental and analytical geochemistry since 2022.

In this study, the focus is on Toyama Bay, aiming to understand its ocean biogeochemical cycle, using both numerical modeling and sample analyses from observations.

An ocean biogeochemical cycle model will be employed

to quantify the balance of dissolved substances, including nutrients and carbon in Toyama Bay. Moreover, Toyama Bay receives nutrient-rich inputs from rivers and submarine groundwater discharge originating from the terrestrial environment. By incorporating observation data to constrain these inflow rates, the study will assess the impact of terrestrial-derived nutrients on the coastal ecosystem in Toyama Bay.



Participation report of Coast Caen 2023 : The 19th French-Japanese Oceanography Symposium

Takehiro Tanaka

Director and Secretary General, NPO Satoumi Research Institute

The 19th French-Japanese Oceanography Symposium "Coast Caen 2023" was held from October 24 to 27, 2023 at the University of Caen Normandy, located in northwestern France, close to the English Channel, in conjunction with an international symposium on the main theme "Constraints and adaptations to global change at the land-sea interface for a shared ecological and energy transition."

I participated in the symposium, including the excursion on October 22 and 23, and would like to give you an overview of the event.

What triggered my participation in the symposium was the 3rd Satoumi Conference "Satoumi in Japan ~ Explore the factors that led to the creation of Satoumi and its diverse roles ~" held in Kobe, Japan on October 30, 2022, jointly hosted by the International EMECS Center (hereinafter referred to as "EMECS") and the NPO Satoumi Research Institute.

The symposium compared and examined the factors that contribute to the establishment and sustainability of four representative Japanese Satoumi in Hinase Town, Bizen City, Okayama Prefecture; Onna Village, Kunigami-gun, Okinawa Prefecture; Minami-Sanriku Town, Miyagi Prefecture; and Kashiwa Island, Otsuki Town, Kochi Prefecture, was attended by Prof. Teruhisa Komatsu, President of the Japanese-French Oceanographic Society, who invited us to participate in the Satoumi session of the 19th French-Japanese Oceanography Symposium.

Prof. Osamu Matsuda (Professor Emeritus, Hiroshima University) was invited by the French side as a representative of EMECS, which is a member of the organizing body of this symposium, and Prof. Shinichiro Kakuma (Specially Appointed Professor, Saga University) and I were sent by EMECS to participate. The excursion started with a cocktail party on the 21st hosted by Prof. Jean-Claude Dauvin of the University of Caen Normandy, the chairman of the Coast Caen 2023 Steering Committee, at which we were briefed on the itinerary. On the 22nd, we were overwhelmed by the majesty of the Mont Saint-Michel (Photo 1) which is the world heritage site and experienced its magnificent history and culture, were astonished by the vast tidal flat with a tidal range of 12 meters (Photo 2) , learned that a variety of polychaetes support a healthy environment. We then visited to the dam, a sluice gate structure installed at the estuary to prevent the deterioration of the material balance due to the accumulation of bottom sediment particles during the tides. On the 23rd, we were guided to a shellfish farm. There are more than 300 shellfish farms in Normandy, and were treated to local whelks,



(Photo 1) Majestic Mont Saint-Michel



(Photo 2) Vast tidal flats around Mont Saint-Michel

mussels, scallops, oysters, and clams. The raw clams are especially delicious and more expensive than oysters, costing as much as 12 Euros per dozen locally, and are skillfully peeled by kneading the top of the shell. At the fishing port, there were amphibious fishing boats that were designed to cope with the large tidal range of more than 10 meters. However, the fishing gear was stacked in the open, just as in Japan, and among the bottom trawling fishing gear, we found fishing gear that closely resembled prohibited fishing gear in the Seto Inland Sea, and were convinced that Japan and France have something in common in their fishermen's pursuit of fishing efficiency.

The symposium, held at the University of Caen Normandy from the 24th to the 27th, was divided into two parts, a forum and a conference, and they were conducted concurrently. The conference was dedicated to academia and was presented in English, while the forum to which we participated was simultaneously interpreted in French and Japanese to allow non-researchers to participate and discuss. Professor Matsuda as the representative of EMECS joined the opening ceremony with Prof. Patrick Prouzet, President of the French-Japanese Oceanographic Society (hereinafter referred to as "SFJO") , Prof. Teruhisa Komatsu, President of the Japanese-French Oceanographic Society, and the First Secretary of the Embassy of Japan, and then gave a keynote speech as "Satoumi Master" and received thunderous applause and many "Congratulations!".

Professor Matsuda chaired the session afterwards, and I am sure he must have been very tired, as he and Dr. Nakayama, President of the Japan Fisheries Research and Education Agency, were pulled to the stage at the welcome party at the Esplanade Jean-Marie Louvel Men's Monastery, where the Mayor of Caen was also in attendance.

Professor Kakuma and I gave presentations on "Coral reef Satoumi in Okinawa, Japan" and "Satoumi created by eelgrass beds and oyster farming" respectively at the session "The Satoumi concept and management of Commons: An Integrated Approach, a link between land and sea and between nature and culture" co-hosted by EMECS and SFJO, and they were evaluated as hopeful reports with many questions. In his general review (Photo 3) , Professor Matsuda mentioned that the international development of Satoumi started at the EMECS7 (7th International Conference on the Environmental Management of Enclosed Coastal Seas) held in Caen in 2006, and emphasized that while at that time the main focus was on natural science, this symposium introduced many results from cultural and social science approaches. He emphasized that this is the evolution of Satoumi over the past 17 years. He concluded the symposium with a round of applause, expressing his gratitude to the interpreters for their excellent simultaneous interpretation.



(Photo 3) General review by Prof. Osamu Matsuda

Participation report of the International Eelgrass and Blue Carbon Workshop 2023 (Amamo 2023)

The International Eelgrass and Blue Carbon Workshop 2023 (Amamo 2023) organized by the International Eelgrass and Blue Carbon Workshop Executive Committee, was held at the Sasakawa Peace Foundation International Conference Center (Toranomon, Minato-ku, Tokyo, Japan) from November 17 to 19, 2023, with on-site participation and online streaming.

The International EMECS Center (hereinafter referred to as "EMECS") agreed and supported the workshop's aim of "sharing the latest knowledge on blue carbon ecosystems, strengthening cooperation among organizations working on preservation and restoration of beaches, and promoting initiatives through a variety of participatory workshops with the participation of a diverse range of stakeholders." and participated in the workshop.

The first day featured an opening ceremony, four keynote speeches, and a panel discussion. In the keynote speeches, there were comprehensive presentations on the necessity of blue carbon ecosystem conservation, as well as presentations on the status of initiatives and promotion in Japan and abroad. In the panel discussion, the participants asked questions and discussed the need to consider the benefits to the community, building relationships with stakeholders, and economic aspects of blue carbon initiatives.

The second day of the conference featured four keynote speeches and a session on "Forefront of Practice 1-3". The keynote speeches included presentations on the practice of quantitative evaluation of carbon sequestration based on extensive surveys, biodiversity observation using environmental DNA, and conservation and restoration of blue carbon ecosystems in the Philippines and the Red Sea. In the session that followed, presentations were made on the efforts of domestic fishermen, companies, governments, citizens, elementary and high school students, and university students to restore eelgrass beds and conduct environmental activities along the seashore.

On the third and final day, a keynote lecture on the research being conducted by the Coast Card Project

(Belmont Forum International Collaborative Research) and the session "Forefront of Practice 4" were held in the morning, with presentations on sustainable environmental management of watershed and coastal environments in Japan, the United States, and the Philippines.

In the afternoon of the third day, under the title of "Dialogue with the World", a role-playing game "Get the Grade" was held with the participation of speakers and audience participants, in which participants considered environmental management from the standpoint of governments, companies, citizens, and others involved in natural resource and water management. The game was very enjoyable, despite the difficulty of not only expressing one's own position, but also thinking about how it would affect various aspects of the economy, environment, tourism, etc., as one proceeded and scored points for the game.

The entire workshop program concluded with this game and the event was closed with a final greeting from a representative of the Coast Card project.

What was impressive during the three-day workshop was that not only the government, companies, and fishermen, but also young people such as elementary school students, high school students, and university students were actively involved in efforts to make many people aware of blue carbon, to restore and transplant eelgrass beds, to encourage youth participation in activities to protect the seashore environment.

Since EMECS holds a "High School Marine Environmental Conservation Research Presentation" for high school students who are engaged in research activities for environmental conservation in watersheds and coastal areas, introduced this event to the high schools participating in the workshop.



Role-playing game "Get the Grade"



EMECS banner

Participation report of Techno-Ocean 2023

The International EMECS Center, together with the Association for the Environmental Conservation of the Seto Inland Sea, exhibited at the Techno-Ocean 2023 exhibition (hosted by Techno-Ocean Network) held at the Kobe International Exhibition Hall from October 5 (Thursday) to 7 (Saturday), 2023.

Under the theme of "Sustainable Utilization of the Ocean," the event featured an exhibition, keynote speeches, panel sessions on topics such as shipping, offshore wind power generation, and aquaculture, and an underwater robot competition. The exhibition, in which EMECS participated, was attended by 82 companies and organizations, which exhibited marine science and technology and marine environmental conservation, and introduced networking and initiatives.

In addition to explaining about enclosed sea areas and the EMECS Conference, EMECS introduced the voluntary commitment for the SDG14 "Life below water", for which EMECS registered, and displayed panels related to the "High School Students Marine

Environmental Conservation Research and Presentation" which has been held since 2022 as a new project.

Techno-Ocean 2023 was attended by 7,877 people (according to the organizer's announcement), and our booth was also visited by government officials, business people, and citizens.



Report of FY 2023 High School Students Marine Environmental Conservation Research and Presentation

Since FY 2022, the International EMECS Center has held a guidance meeting of the High School Students Marine Environmental Conservation Research Presentation in which experts give advice to high school students on their research activities that contribute to environmental conservation in coastal areas and watersheds, in order to promote the development of human resources who will be responsible for marine environmental conservation in the next generation.

On November 3, 2023, a guidance meeting was held as a closed event, and twenty-eight students from nine high schools in Hokkaido, Miyagi, Tokyo, Hyogo, Hiroshima, and Ehime prefectures participated, presenting a wide range of research and activities in watershed and coastal environmental conservation focusing on seawalls, tidal flats, microplastics, plankton, etc. They received enthusiastic guidance and advice from five presentation advisors on how to proceed with their research and activities, how to give a good presentation, how to properly present slides, etc.

The results of the research, based on the advice received at the guidance meeting, were presented publicly at the

" FY2023 High School Students Marine Environmental Conservation Research and Presentation " (Venue: Space Alpha Sannomiya, Kobe city), which was held onsite and via online streaming on January 27, 2024.

After the presentations were completed, they were judged by the presentation advisors, and Tokyo Metropolitan Shiba Commercial High School was awarded the Grand Prize, and Miyagi Prefecture Minamisanriku High School, Hiroshima Prefectural Hiroshima Kokutaiji High School, and Ehime Prefectural Iyo Agricultural High School were awarded the Excellence Prize.

The presentations will be available on demand on the EMECS website within March.



Call for Articles

Contributions from readers (reports of research on enclosed coastal seas, conference information, etc) would be greatly appreciated.

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