Healthy, Productive and Sustainable Asian Marginal Seas: Understanding changes in the marine environment in response to global climate change

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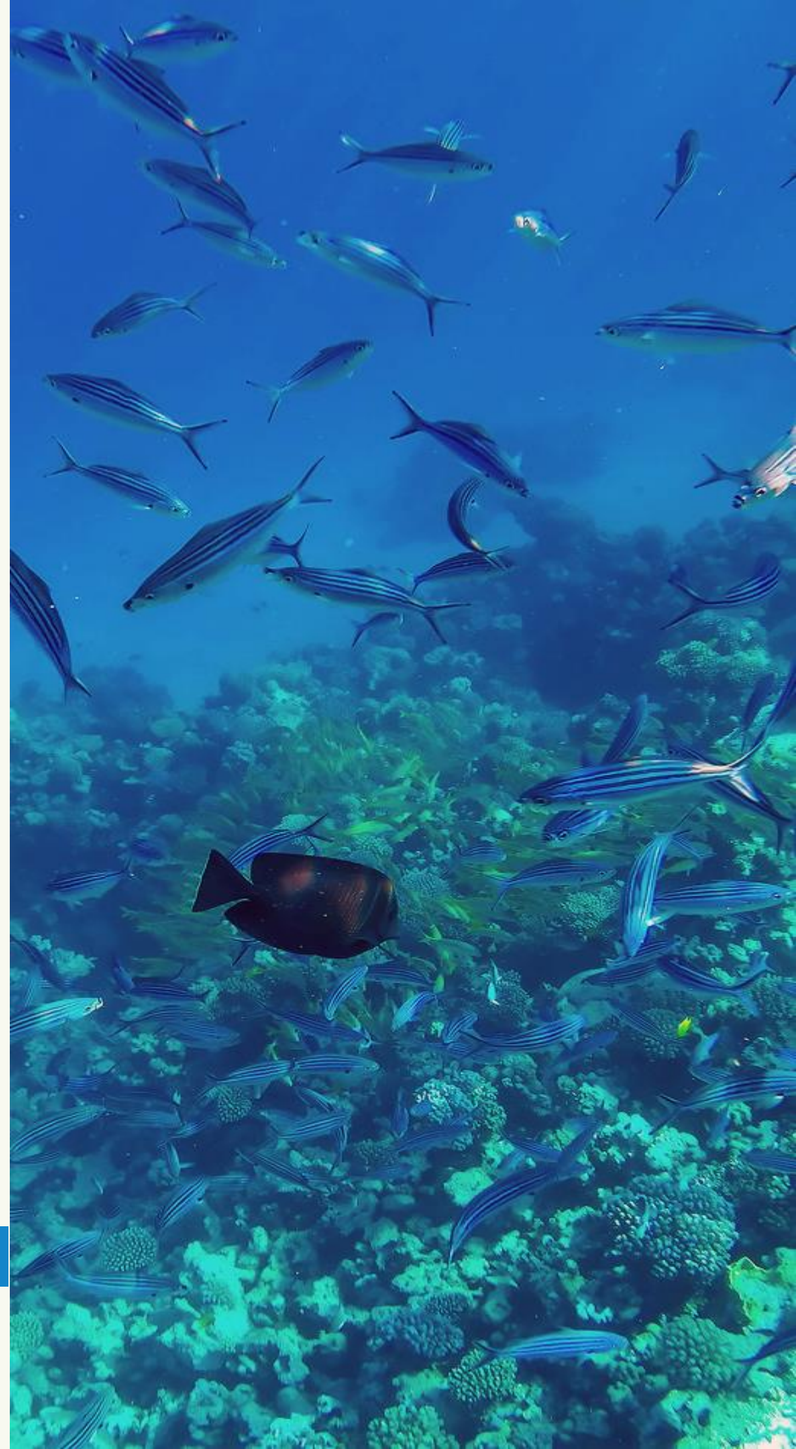

1. Justification

(Why this programme/project/working group is needed for the Sub-Commission)

Importance of the marginal seas :

the Asian Marginal Seas (AMS) are very important regions for human society caused by their productivity, fishery resources, and human population on adjacent land.

Environmental changes in the AMS :

these marginal seas have various environmental issues such as marine heatwaves, hypoxic water, and fishery resource decreases.

Maintain healthy and productive marginal seas :

it is an urgent matter to advance cooperative studies to improve our common understanding of the environments and their variability, which affects the primary production, marine ecosystems, fisheries, and society.

2. Objectives

1. To advance scientific understanding of the biogeochemical processes in the Asian Marginal Seas related to global climate changes and global warming, we set two projects,

   Project I : Nutrient footprints of primary production – physical and biogeochemical processes in the AMS
   Project II : Long-term variations in the structure and circulation of the Pacific AMS reflecting the impact of global warming

   with various tools, such as standardize satellite data, sharing of new technology and monitoring data, communicate with social sciences, etc.

   To progress the projects, we started three core projects,

   1. Healthy & Sustainable Terrestrial and Coastal Waters
      focusing interaction between land and ocean
   2. Mixing processes in the ocean
   3. Satellite remote sensing on the biological phenomena

2. Objectives

2. Improve regional networking and foster interdisciplinary research collaboration among oceanographers, biogeochemists, ecologists, and climate scientists to address region-specific issues such as monsoon impacts, nutrient loading, anthropogenic pressures, etc.

3. Provide scientific inputs cooperated with social sciences for policy developments aimed at sustainable management of WESTPAC marginal seas

3. Major activities, outputs & outcomes

Latest accomplishment, particular those during 2023 to 2024

Major activities

1. Related to the Core project 1; Nutrient footprints, scientific session " Nutrient footprint of primary production in the coastal and marginal seas of East and Southeast Asia" was arranged in the JpGU international session, held in Chiba, Japan in May 2023. Number of presentation was 18 from 3 countries.
2. Related to the Core project 2; Workshop on the mixing process in the ocean was held in Kagoshima, Japan in June 2023, where information and understanding on ocean mixing and stratification were exchanged and plan and results of cooperative research were discussed. Number of presentation was 14 from 5 countries and regions.

Timeframe

Project start year: 2021

3. Major activities, outputs & outcomes

Latest accomplishment, particular those during 2023 to 2024

Major activities (2)

3. Scientific session "Western Pacific Marginal Seas; Physics, biogeochemistry and ecosystem" was set in the 11th WESTPAC International Marine Science Conference held in Bangkok in April 2024, where around 100 participants with 38 presentations were attended from 12 countries.

   In this session, various topics such as climate changes, global warming, and anthropogenic activities which play as multiple stressors driving the biogeochemical spatiotemporal variability in the WESTPAC marginal sea were presented and discussed beyond core projects in the program.

4. Related to the Core project 3; Incubator session "Establishing decision-support tools for Eutrophication and Harmful Algal Blooms (EuHABs) Management" was set in the 11th WESTPAC International Marine Science Conference in April 2024, where information exchange and cooperative research on biological phenomena with the satellite remote sensing were discussed

Timeframe

Project start year: 2021

3. Major activities, outputs & outcomes

Latest accomplishment, particular those during 2023 to 2024

Major activities (3)

5. International workshop "promoting international collaboration for science of East Asian Marginal Seas in a changing climate: Circulation, biogeochemistry, ecosystem, and socio-economic researches" in Korea in July 2024 to summary and share the knowledge and experience in water dynamics, biogeochemistry, ecosystems, and their variability at multi-scales, and discuss the future directions of research in the area moving toward a multidisciplinary science underlying the Kuroshio and its adjacent seas.

Timeframe

Project start year: 2021

The workshop provided a broad exploration of and multidisciplinary science on the Asian Marginal Seas, learned from the past 30 years, celebrating the 30th anniversary of the first international program, Circulation Research of East Asian Marginal Seas (CREAMS). Spanning two days, the workshop consisted of ten sections, including messages from key pioneers, overview and history session, scientific sessions, future planning sessions, and panel discussions, with a total participation of about 70 people from 5 countries. It featured 5 messages from key pioneers, 4 overview and history presentations, 21 scientific talks, 16 flash talks, and panel discussions, envisioning a future international collaborations.

3. Major activities, outputs & outcomes

Latest accomplishment, particular those during 2023 to 2024

Major activities (4)

6. Cruises and Data dissemination

Cruises to monitor marine environments in key areas

Korean Peninsula	April-May, October, November 2023, May 2024,
East China Sea	July 2023, 2024
Bohai Sea and Yellow Sea	July 2024,
North Pacific Ocean	June-July 2023, August-October 2024,
upper Gulf of Thailand	August 2023, October 2023, and March 2024,
upper Gulf of Thailand; river mouths	once a month from April 2023 to March 2024,

time series measurements at a fixed station in

the east of the upper Gulf of Thailand,	June-July 2023 and June-August 2024,
east coast Peninsular Malaysia and Malacca Strait	

3. Major activities, outputs & outcomes

Latest accomplishment, particular those during 2023 to 2024

Major activities (5)

7. Workshop on turbulent mixing in Asian marginal seas will be held in Matsuyama, Japan, in Nov. 2024.

   Tentative theme of the workshop: A wide variety of aspects of turbulent mixing processes in Asian marginal seas; within the water column from the surface through the interior to the near boundary benthic mixing, including the impact of turbulent mixing on the biogeochemical processes.

8. Forum will be held in Toyama, Japan, in 6-7 Dec. 2024.

   Tentative theme of the workshop: Role of human-activities on the marine environment through the exchange materials between land and the ocean. This is a collaboration between IOC-WESTPAC and Future Earth Coasts , ensuring that research outputs are scientifically robust and in line with region's socio-economic realities, thus greatly enhancing the project's capacity to generate actionable insights for sustainable management.

3. Major activities, outputs & outcomes

Latest accomplishment, particular those during 2023 to 2024

Outputs & Outcomes

1. Publication proposal based on the presentation in the scientific session held in 11th WESTPAC International Marine Science Conference has been approved by Progress in Oceanography (PIO), submission opened Jun. 24.
   - Title of the special issue: Healthy, Productive and Sustainable Asian Marginal Seas: Understanding changes in the marine environment in response to global climate change
   - Guest editors: Jing Zhang, SungHyun Nam, Qian Liu, Akihiko Morimoto
2. Sharing continuous time series data collected from 2020 to 2023 through data repository

   Kim, S., Lee, H., Kim, Y.-G., and Nam, S. (2024). EC1, Subsurface mooring time series from 2020 to 2023. SEANOE. https://doi.org/10.17882/101590

Timeframe

Project start year: 2021

4. Problems encountered & recommended actions

Problems encountered

1. Limited Financial Travel Support: It is needed to increase financial travel support, particularly for early career professionals, to encourage their participation and development in the field.

Recommended Actions

1. Continued Thematic Sessions: Recommend ongoing sessions at future conferences to maintain focus on the AMS.
2. Dynamic Environmental Governance Strategies: Develop strategies that address environmental issues across different time stages—past, present, and future. Encourage cross-country exchange of information, technology, and experiences.
3. Utilize the UN Decade of Ocean Science Platform: Continuously utilize the platform provided by the WESTPAC & Ocean Decade for Sustainable Development.
4. Core Projects and Bilateral Collaborations: Establish specific core projects and initiate bilateral research initiatives between countries to advance science and activities.

Timeframe

Project start year: 2021

5. Strategic considerations/thoughts for future development

1. Need to enhance communication and information exchange with social sciences and industrial communities such as environmental administration and fisheries.

2. Countries in the east and south-east Asia are standing in different phase and different stage in the marine environmental view point. We promote exchange of information on the coastal environment and water quality control, because the experience of developed countries gives us the proper procedures for a better and more sustainable environment.

3. Progress the cooperative activities with Future Earth Coast, and other interdisciplinary research projects including both natural and social sciences.

6. Potential action plans for future implementation

for the period of 2025-2026 and beyond

Have scientific sessions to promote common understanding among countries in the AMS on the coastal environment

November PICES-2025 Annual Meeting, in Yokohama, Japan

- set up a session related to the core project 2 or 3
- Exchange recent research results on the mixing processes related to material transport in the AMS region

August 2026 AOGS, in Fukuoka, Japan

- set up a session from the core projects or new topics from the AMS program
- Gain a common understanding on behavior of nutrients in the marginal seas under the various stages of nutrient loading from land to the coastal water

2027 Scientific session of the WESTPAC conference

- summarize the outcomes from the AMS program in the first half period

Planned activities

Program	Plan				Funding Required		Remark
	Activities	Objectives	Expected outputs/outcomes	Date and place	IOC	Other sources (i.e. from national or international)	
Healthy, Productive and Sustainable AMS	1.Scientific session in, PICES-2025 Annual Meeting	Exchange recent research results on the mixing processes related to material transport in the AMS region	Clarify issues for common understanding on the mixing processes related to marine environment in the marginal seas	November 2025, Yokohama Japan	8,000 USD	Possible but not fixed	
	2. Scientific session in 2026 AGOS Meeting	Gain a common understanding on behavior of nutrients in the marginal seas under the various stages of nutrient loading from land to the coastal water	Recommend measures for proper coastal management based on scientific and quantitative understanding of coastal ecosystems	August 2026, Fukuoka, Japan	8,000 USD	Possible but not fixed	
	3. Scientific session in WESTPAC conference	Summarize the outcomes from the AMS program in the first half period	Finding a direction to use marine scientific results for coastal ocean management in collaboration with social science	2027	8,000 USD	Possible but not fixed	

ThankYou

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