

# AO

# GEO

Earth Observations  
for Asia-Oceania

## Task Group – 4: Oceans, Coasts, Islands (OCI)

### Activity report

**Genki Terauchi**, *Northwest Pacific Region Environmental Cooperation Center*

**Aletta Yniguez**, *University of the Philippines*

**Eko Siswanto**, *Japan Agency for Marine-Earth Science and Technology*

**Jonson Lumban-Gaol**, *IPB University*

**Anukul Buranapratheprat**, *Burapha University*

**Sam Wouthuyzen**, *National Research and Innovation Agency*

**Nurul Hazrina Idris**, *Universiti Teknologi Malaysia*

**Aidy M Muslin**, *Universiti Malaysia Terengganu*

**Jutarak Luang-on**, *Japan Agency for Marine-Earth Science and Technology*

**Salem Ibrahim Salem**, *Kyoto University of Advanced Science*

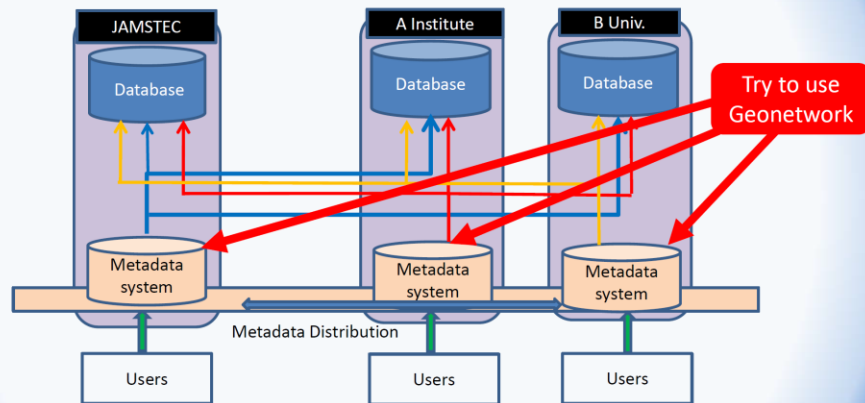
**Victor Kuwahara**, *Soka University*



## TG4 pre-2025 achievements:

### Data Inventory System (Geonetwork) enables access metadata from in situ observation database

New System to access to observation database by using metadata search (Geonetworks)



Search of metadata for acquiring various observation data of various organizations.

Australia IMOS: <https://portal.aodn.org.au/>

CSIRO: <https://research.csiro.au/ncmi-idc/>

Japan JAMSTEC Argo: (not available now, due to security issue in JAMSTEC)

JAMSTEC data base: <http://www.jamstec.go.jp/e/database> (not available)

Indonesia LIPI: <http://pusdata oseanografi.lipi.go.id/>  
<http://gis oseanografi.lipi.go.id/>

Malaysia UMT: <https://www.mynodc.gov.my/>

Thailand GISDA: <http://marinegiscenter.dmcg.go.th>

OFS: <http://ofs.dmcg.go.th/thailand/>

Viet Nam IO: <http://vodc.vnio.org.vn/>

NEARGOOS: <https://ds.data.jma.go.jp/gmd/goos/data/rtrtdb/in-situ.html>

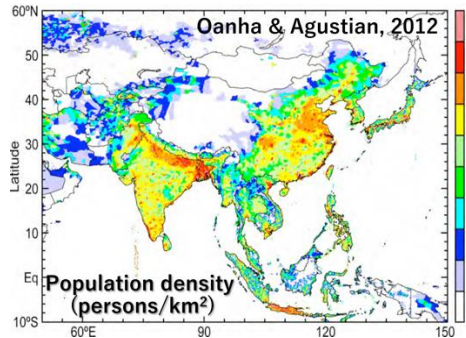
### Demonstration site on Amazon Web Service (AWS)

<http://3.112.1.116:8080/geonetwork/> on AWS

The screenshot shows the Geonetwork web interface. At the top, there is a search bar and navigation options. Below the search bar, there is a filter section on the left with categories like 'TYPE OF RESOURCES', 'KEYWORDS', 'PROVIDED BY', and 'FORMATS'. The main content area displays search results for 17 items, sorted by relevancy. The results include 'Indo-Pacific Tropical Buoy Network web page', 'Polar Ocean Profiling System (POPS)', 'Okinotorishima Web Page', and 'PFRR Flux Observation Super Site'. Each result shows a thumbnail image and a URL. The footer of the page indicates it is powered by GeoNetwork 3.10.0.0 and includes social media links and a map icon.

# Threats and Environmental Issues in Asian Coastal Oceans

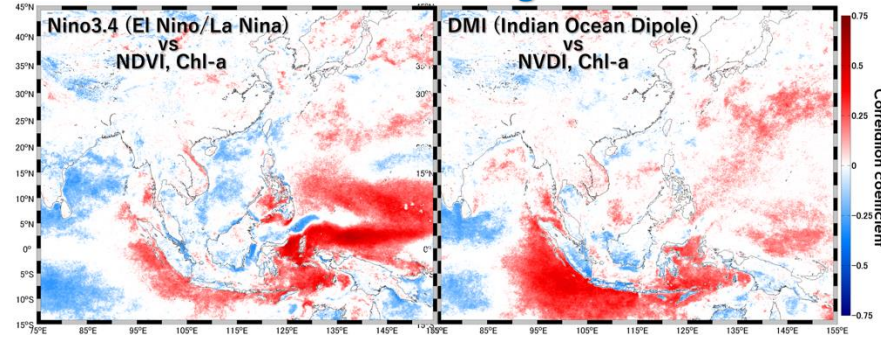
## Human activities



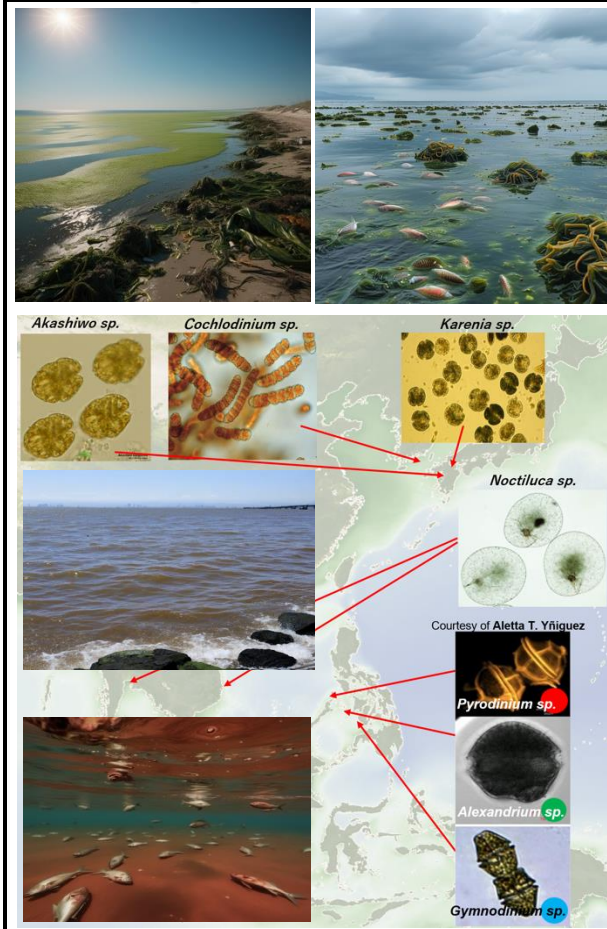
## Marine plastic debris



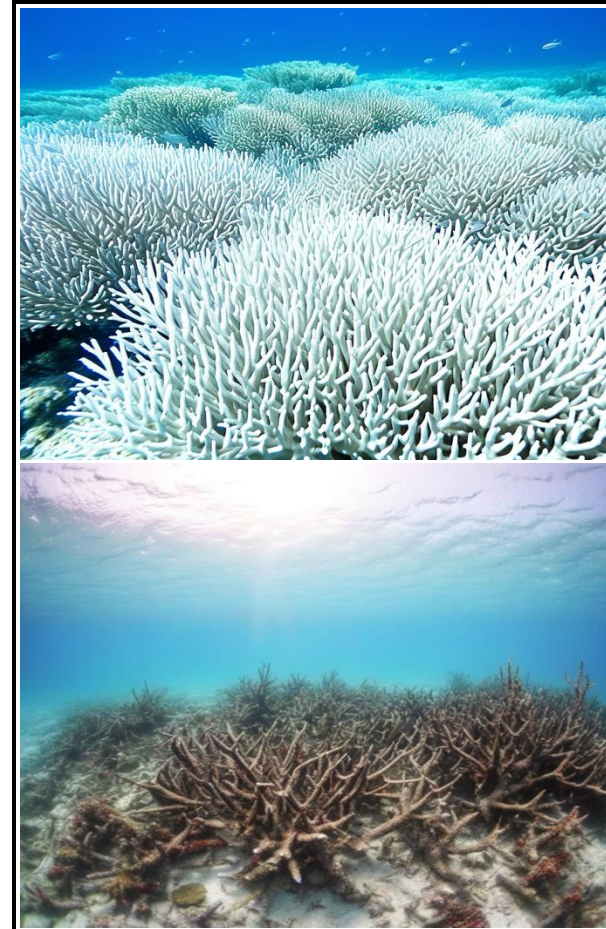
## Climate changes



## Eutrophication & red tide



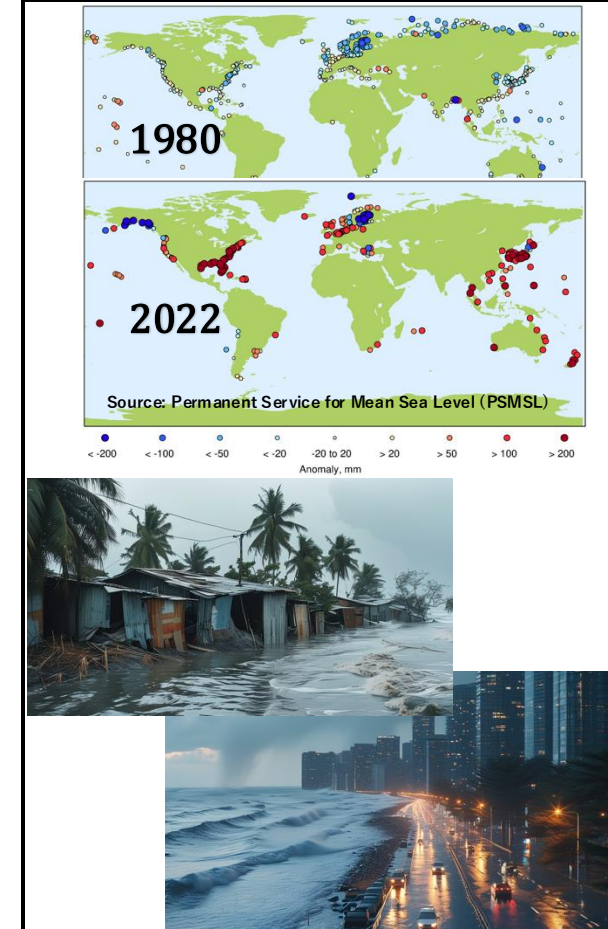
## Coral reef bleaching



## Global warming



## Sea level rise



# TG4 Session with new members

Time	Presentation Titles	Speakers
<b>Day-1, Sep 3, 15:40 – 18:40, Moderator: Eko Siswanto</b>		
15:40 – 16:00	Welcome remarks & Introduction to Task Group 4 Session	Aidy M. Shawal bin M. Muslim & Eko Siswanto
16:00 – 16:20	Understanding and managing harmful algal blooms in the Philippines	Aletta T. Yñiguez
16:20 – 16:40	Monitoring coastal ocean ecosystem climate change using GCOM-C and in situ bio-optical observations	Victor Kuwahara
16:40 – 16:50	<b>Short break</b>	
16:50 – 17:10	Seamless detection of harmful algal blooms with machine learning and satellite imagery	Salem Ibrahim Salem
17:10 – 17:30	Satellite-based observation of red tides in the eutrophic coastal waters	Jutarak Luang-on
17:30 – 17:50	Potential of SGLI-derived chlorophyll-a as an index of coastal eutrophication	Genki Terauchi
17:50 – 18:10	<b>Discussion</b>	
<b>Day-2, Sep 4, 10:00 – 13:00, Moderator: Aletta T. Yñiguez</b>		
10:00 – 10:20	Converting satellite-derived remote sensing reflectance to optical water quality for the entire Asian waters	Eko Siswanto
10:20 – 10:40	Integration of ocean color remote sensing and ocean modeling for understanding and predicting changes in coastal marine ecosystems	Anukul Buranapratheprat
10:40 – 11:00	Modelling and forecasting the effects of increasing sea surface temperature on coral bleaching in the Indo-Pacific region	Aidy M. Shawal bin M. Muslim
11:00 – 11:20	<b>Short break</b>	
11:20 – 11:40	Satellite radar altimeters for observing the sea level over the marginal sea in Southeast Asia	Nurul Hazrina binti Idris
11:40 – 12:00	Earth observation data for operational fisheries oceanography	Jonson Lumban Gaol
12:00 – 12:30	<b>Discussion for Task Group 4 activity reports</b>	



- **Optical sensors**
  - \* Eutrophication
  - \* Harmful algal blooms
  - \* Fisheries
  - \* Water quality
- **Coupled numerical model-marine ecosystem model**
  - \* Ocean surface current
  - \* Harmful algal blooms
- **Infrared sensor**
  - \* Coral reef bleaching
  - \* Fisheries
- **In situ observers**
  - \* Harmful algal blooms
  - \* Fisheries
- **Altimeter**
  - \* Sea level

# Asian Coast and Ocean Portal (A-COP)

## Products/maps

### Optical/ocean color sensor

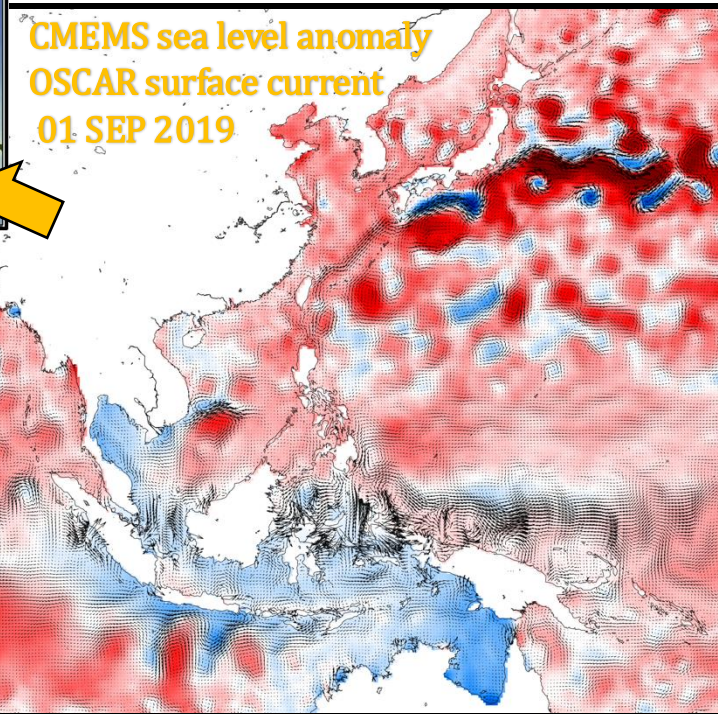
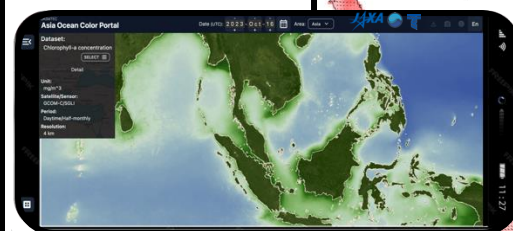
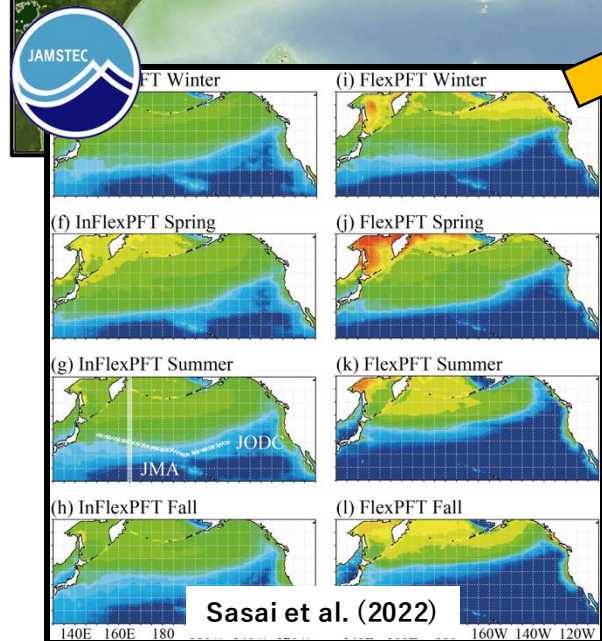
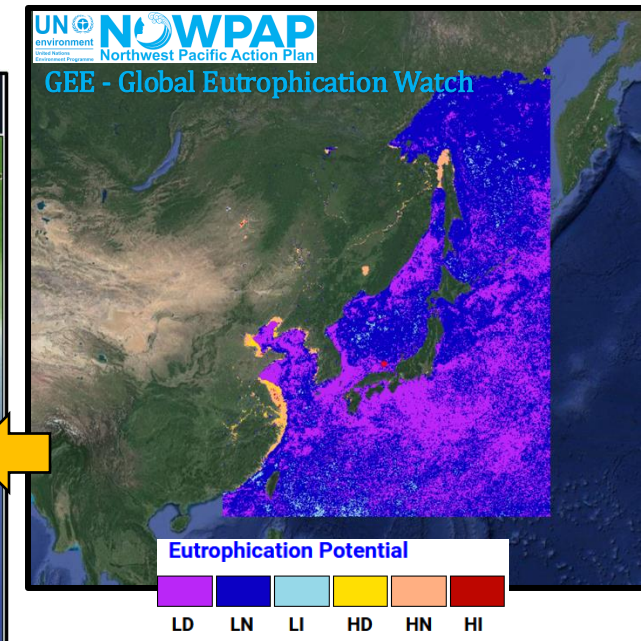
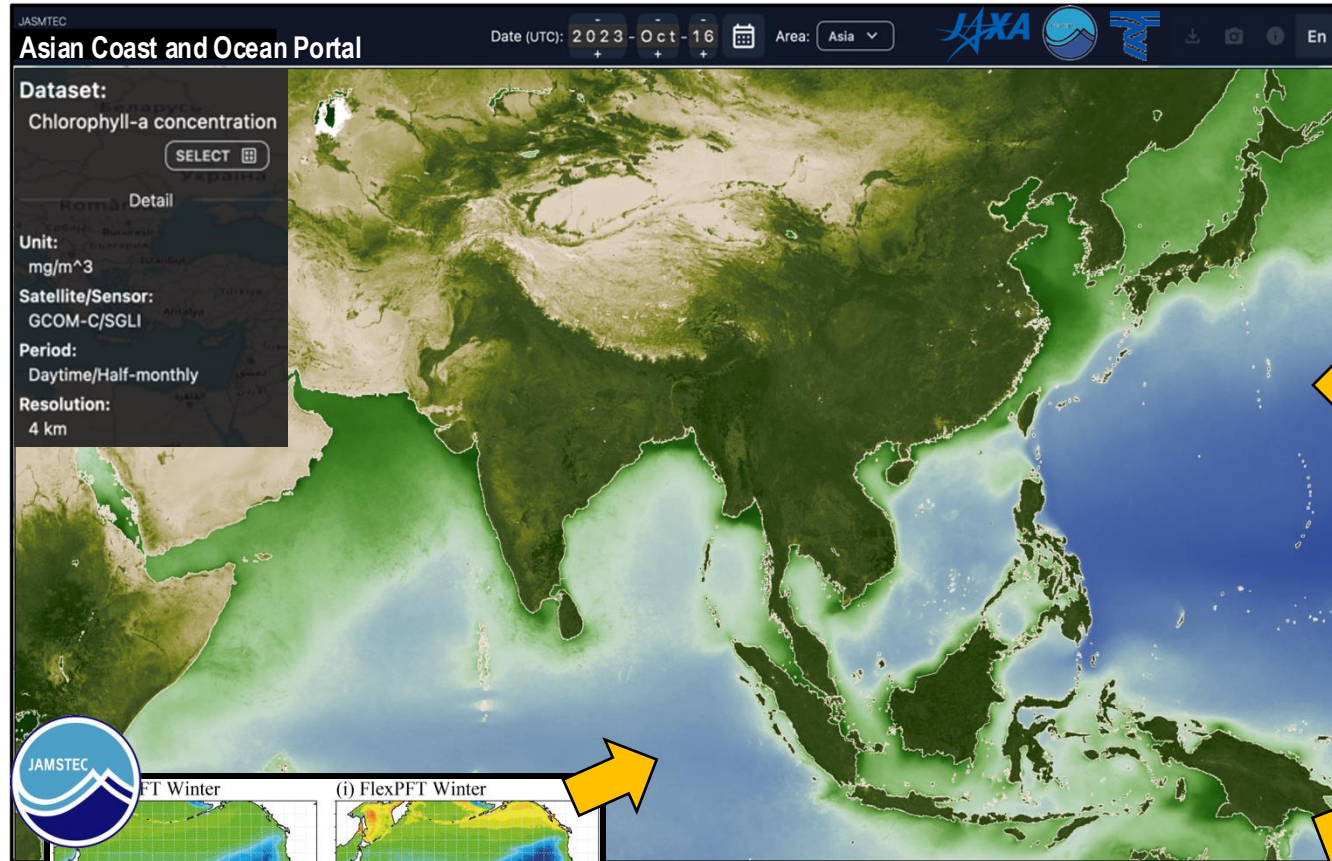
- Phytoplankton chlorophyll-a, CDOM, TSM
- Remote sensing reflectance (380 nm ~ 670 nm)
- Optically-based water quality
- Chlorophyll-a anomaly
- Red tide

### Infrared sensor

- Sea surface temperature

### Other products/maps under consideration/discussion

- Eutrophication
- Bio-optical properties
- Phytoplankton functional types
- Net primary production (NPP)
- Sea level anomaly/trend
- Surface ocean current
- Plastic debris
- Modeled chlorophyll-a / NPP
- Fisheries-related information
- etc.



Integrated Earth &  
social science-derived  
knowledge & insights

Inform strategic  
decisions

**Earth  
Intelligence  
for All**

Build regional  
capacities &  
empower society

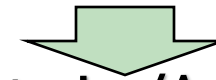
Address environmental,  
societal, and economic  
challenges

**Earth Intelligence  
For All**

GEO POST 2025 STRATEGY

## Objectives of the TG4 OCI Task

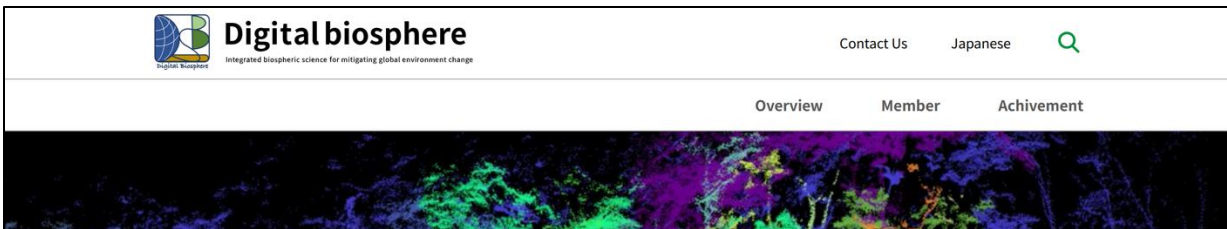
**Harness Earth Observation (EO) to enhance coastal ocean environmental management by monitoring and assessing changes in key variables, informing evidence-based decision-making, and supporting Sustainable Development Goals (SDGs)**



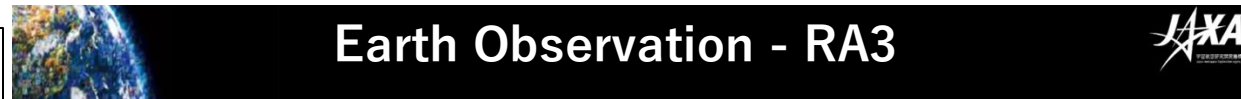
## Strategies/Actions

- Developing a portal to provide information mainly based on satellite observations (SGLI, Sentinel etc.)
- Promoting research collaborations (in situ data collections, algorithm and model developments, calibration/validation, etc.)
- Regional research capacity building (workshops, training, early-career scientist engagement, etc.)
- Linking with ongoing projects/programmes (e.g. Asia-Pacific Network for Global Change Research, CoastPredict) to strengthen the outputs/outcomes
- Promoting science-policy interfacing (e.g., UN Ocean Decade Action, stakeholder engagement)

Hiring early-career scientist



Portal development



EO-RA4 Research Category

Satellite Project Research			Earth Observation Research Programs	
(A) AMSR3 & GCOM-W	① Algorithm Development ② Calibration/Validation	③ Earth Observation Research Program (Applied Research)	<p><b>Proposed</b></p> <p>(2) Contribution to Climate Change Solutions</p> <p>(2-a) Disaster Prevention, Mitigation and National Resilience</p> <p>(2-b) Land</p> <p>(2-c) Ocean</p> <p>(3) Contribution to socio-economic issues</p>	<ul style="list-style-type: none"> <li>① Preparing for and responding to water-related disasters, earthquakes, volcanic eruptions, etc.</li> <li>② Fundamental information and digital national land for national resilience</li> <li>③ Improving forecast of extreme events that cause weather and water-related disasters</li> </ul>
(B) GCOM-C	① Algorithm Development ② Calibration/Validation	③ Earth Observation Research Program (Applied Research)		<ul style="list-style-type: none"> <li>① Observation of GHG concentration distribution in the earth's atmosphere and estimation of CO<sub>2</sub> absorption, O<sub>2</sub> and CH<sub>4</sub> emissions by air and ocean contribution toward SST</li> <li>② Monitoring to state to assess the present global warming and slowing down the process of sea level rise, radiative forcing</li> <li>③ Monitoring and predicting water cycle variations</li> <li>④ Adaptation to variation of water resources</li> </ul>
(C) GPM & PMM	① Algorithm Development ② Calibration/Validation	③ Earth Observation Research Program (Applied Research)		<ul style="list-style-type: none"> <li>① Management of forests as CO<sub>2</sub> sinks, and carbon budget</li> <li>② Understanding and predicting biodiversity and its environment</li> <li>③ Understanding and predicting of terrestrial hydrology and cryosphere</li> </ul>
(D) EarthCARE	① Algorithm Development ② Calibration/Validation	③ Earth Observation Research Program (Applied Research)		<ul style="list-style-type: none"> <li>① Ocean carbon budget and cycle</li> <li>② Monitoring/prediction and conservation of the ocean environments</li> <li>③ Marine biosource management</li> <li>④ Understanding and predicting environment changes in the polar oceans</li> </ul>
(E) ALOS-2/ ALOS-4	① Algorithm Development ② Calibration/Validation	③ Earth Observation Research Program (Applied Research)		<ul style="list-style-type: none"> <li>① Contribution to socio-economic benefits related to carbon neutrality</li> <li>② Strengthening food security</li> <li>③ Smart agriculture, forestry and fishery</li> <li>④ Acquisition and use of environmental information related to public health</li> <li>⑤ Creation of environmental information related to atmospheric environment</li> <li>⑥ Creation of information for decision-making through combined use of satellite and socio-economic data</li> <li>⑦ Providing information to secure natural resources and energy</li> <li>⑧ Contributing to climate change solutions through ESG Investments</li> <li>⑨ Education in remote sensing</li> </ul>
(F) MOLI	① Algorithm Development ② Calibration/Validation	N/A		
(G) Multi-satellite utilization	N/A	③ Earth Observation Research Program (Applied Research)		

**APN** Asia-Pacific Network for Global Change Research

APN Secretariat, East Building 4F, 1-5-2 Wakinojima Kaigan Dori, Chuo-ku, Kobe 651-0073, Japan.  
Phone: +81-(0)78-230-8017 Fax: +81-(0)78-230-8018 Email: info@apn-gcr.org Website: www.apn-gcr.org

Portal development & in situ obs.

COLLABORATIVE REGIONAL RESEARCH PROGRAMME (CRRP)  
AWARD LETTER

5 August 2024

**Project Leader:** Dr Eko Siswanto  
**Project Reference:** CRRP2024-05MY-Siswanto  
**Project Title:** Harnessing Earth Observation (EO) to Enhance Decision-Making for Eutrophication and Harmful Algal Bloom (EuHAB) Impact Mitigation and Adaptation

In situ observstions

**MERF** Marine Environment and Resources Foundation, Inc.

The Marine Science Institute  
Velasquez St., U.P. Diliman,  
Quezon City, 1101 Philippines

E-mail : admin@merf.org.ph  
info@merf.org.ph  
Telephone : (632) 3433 3645  
Mobile : +63 920 681 5175  
Website : www.merf.org.ph

**BRIN**  
Indonesia National Research & Innovation Agency

**lpdp**  
Indonesia Endowment Fund for Education

**WPI TOHOKU UNIVERSITY & JAMSTEC AIMEC**

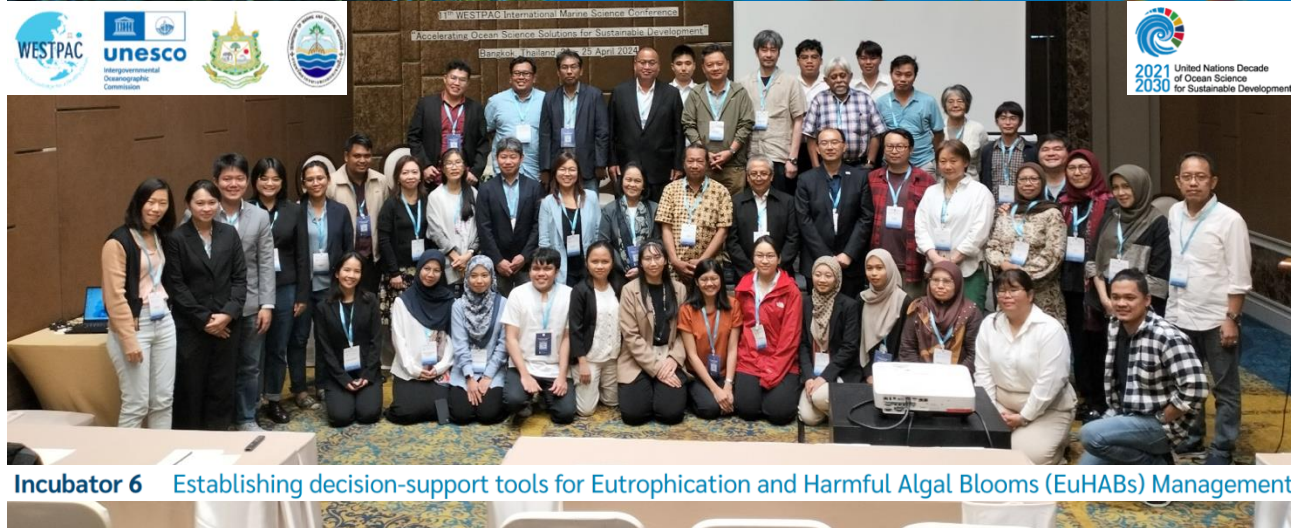
**wpi**

Tohoku University & JAMSTEC  
Advanced Institute for Marine Ecosystem Change (WPI-AIMEC)

Hiring early-career scientist

# Improving regional research capacity in Earth Observation

2<sup>nd</sup> UN Ocean Decade Regional Conference &  
11<sup>th</sup> WESTPAC International Marine Science Conference  
“Accelerating Ocean Science Solutions for Sustainable Development”  
Bangkok, Thailand, 22 – 25 April 2024



The IMBeR logo, featuring a stylized white wave inside a circle, is positioned in the upper left corner. The background is a vibrant underwater scene with clear blue water, sunlight filtering through, and various marine life including colorful fish and coral reefs. The text below the logo reads: 'The workshop of the Expanding EO data usage to address climatic changes in the marine biosphere of the northwest Pacific and Indo-Pacific regional seas (EO-WPI) project'.



## Upcoming event

11<sup>th</sup> Asian / 21<sup>st</sup> Korea-Japan  
Workshop on Ocean Color 2024  
October 21 ~ 25, 2024 (In-person)  
Sudirman Campus, Udayana University  
Bali, Indonesia

A row of logos for the participating organizations is located at the bottom of the event banner. From left to right, they include: UNESCO, a circular logo with a globe, a green circular logo, a circular logo with a tree, a circular logo with a sun, a red circular logo, a blue circular logo, and the JAXA logo. The NDEC logo is also visible at the bottom right.



# Current status & the way forward

- Task Group 4 (TG4) has redefined strategy to develop new Earth Observation-based platform, the Asian Coastal Ocean Portal (A-COP), aiming at providing data and information to the community to address environmental issues in Asian coastal oceans
- A-COP is currently in development phase. Initially, it will provide optical/ocean color products, with future plan to include other common biogeophysical variables. A-COP is expected to be launched within 2024
- Improving regional research capacity and early career scientist engagement
- The research and development of models/algorithms, along with A-COP improvement, and their implementation for socioeconomic benefits, will be the focus of the TG4's strategy post-2025