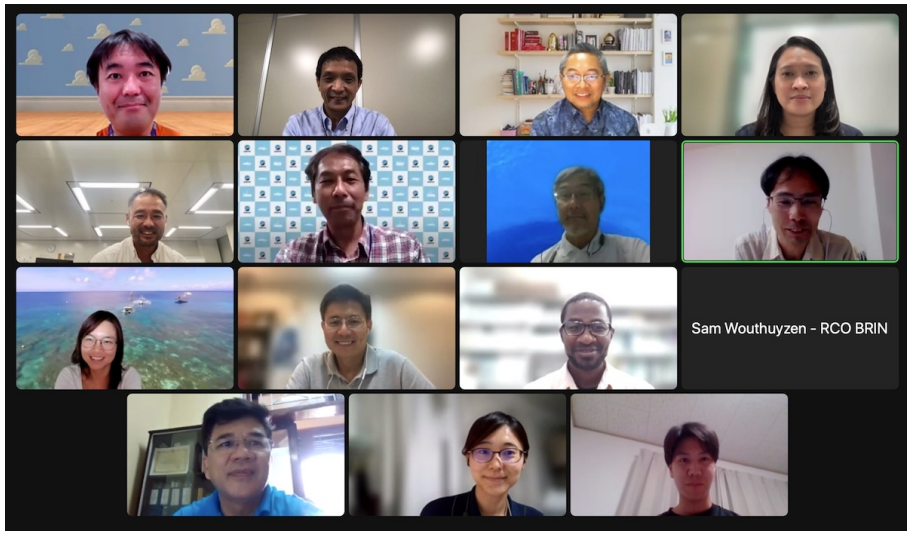
Progress report of AOGEO Task Group 4: Ocean, Coast, and Island Task



Objectives of the TG4 OCI Task (since 2017)

This task, Ocean Coast and Islands (OCI) has the following objectives:

1) To provide a regional mechanism to advance and exploit synergies among the many observational programmes devoted to islands, coasts and oceans of the Asia-Oceania region;
2) To articulate regional user needs from Earth Observations and raise awareness of the societal benefits of ocean observation;
3) To seek to address gaps in user needs in the Asia-Oceania region to evolve a comprehensive and integrated observation data or inventory system for the region;
4) To continue development of, and cooperation for, a data inventory system, and facilitate sharing of data, tools and products, and
5) To link with other GEO Initiatives (e.g. Blue Planet, GFOI, GEOGLAM and other AOGEOSS tasks) to develop regional data hub and coordinate regional activities and integrated products.

TG4-OCI breakout session for development of data portal and satellite ocean color analysis

Date: September 15th, 2022

Time: 04:00-08:30 UTC, 13:00-17:30 in Tokyo

This session will consist of two main agendas.

1. To develop a coastal in-situ ocean data portal using Geonetwork,

- further develop the geonetwork url, which was initialized in the last meeting on the Amazon Web Service supported by JAMSTEC and make the site more useful and discuss the possible parameters to be used for search.

2. to discuss utilizations of satellite ocean color data (e.g., MODIS aqua, and GCOM) to algae blooms.

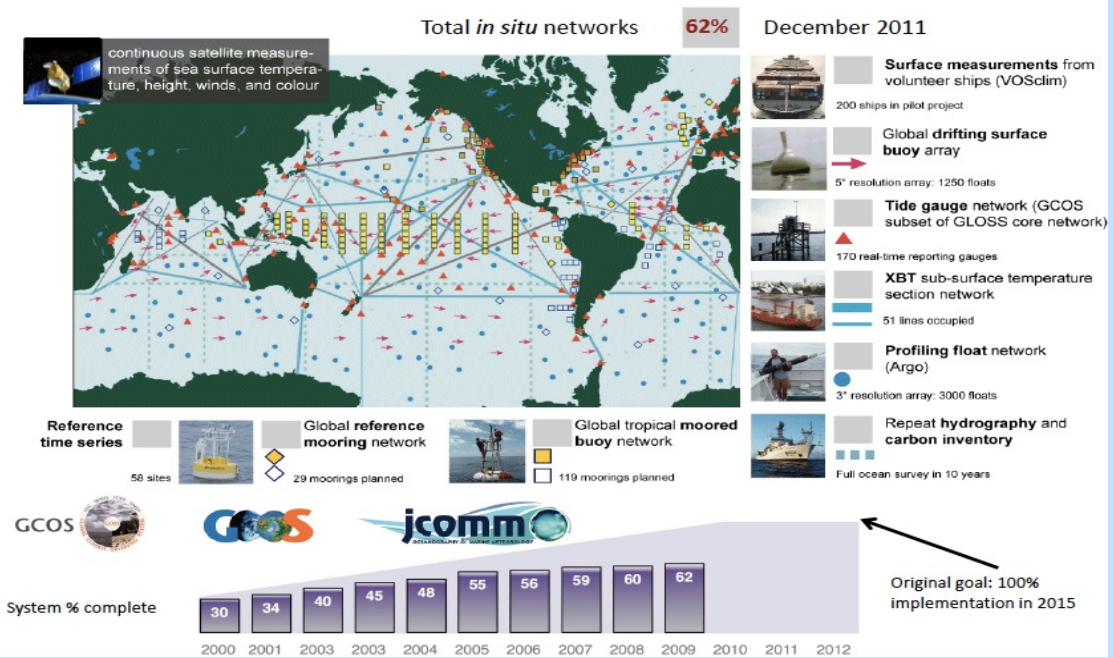
- focus on various methods of detections of algae species spatially, and on a discussion of collaborations with in-situ observations for reduction of uncertainty of detections of algae from satellite data.

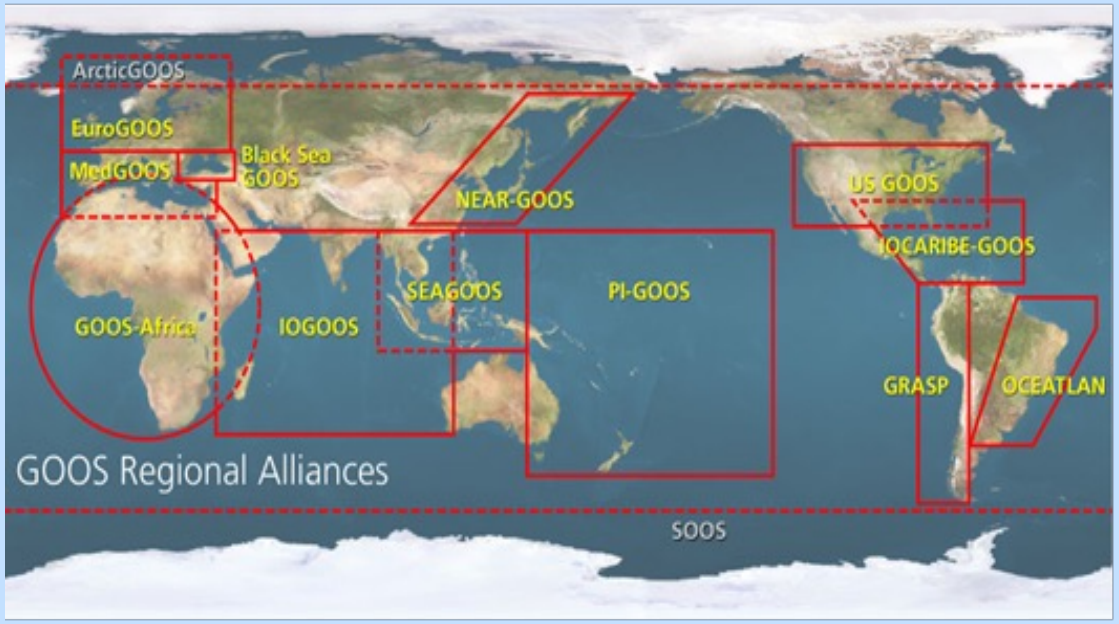
Session-1:

- Development of new coastal in-situ data portal (K. Ando)
- 2-1. Briefing what we have done after the last call in October 2021 (K. Ando)
- 2-2. New AWS site for geonetwork (F. Akazawa)
- 2-3. Practices on the new site on AWS (F. Akazawa)
- 2-4. Discussion on an alternate scheme to search data (K. Ando)

Needs of in-situ ocean data networking

GOOS (Global Ocean Observing System)





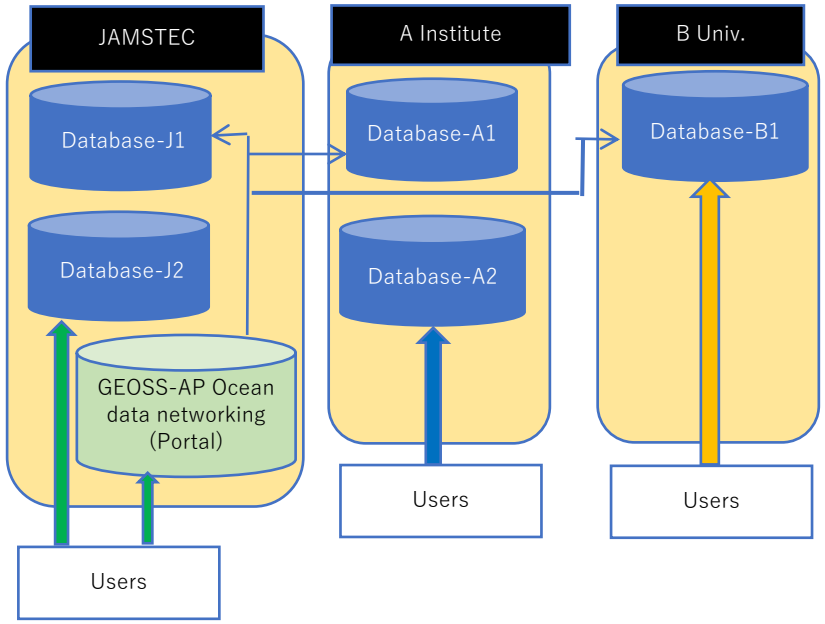
Global GOOS is implemented by several components of surface buoy array, Argo floats and hydrographic ship-based observations Data are collected by each component, shared and disseminated.

Regional GOOS is implemented by member states and participating organizations usually cooperating through GOOS Regional Alliances for coastal ocean services.

NEAR-GOOS, SEA-GOOS, IO-GOOS, and PI-GOOS are major regional GOOS in the AP region

But the data collection in the Asia Oceania region has not been well achieved, due to jurisdictional issue (= Economic Exclusive Zone), we have started from development of data inventory (portal)

(in-situ) Ocean Data Networking System Web Portal:

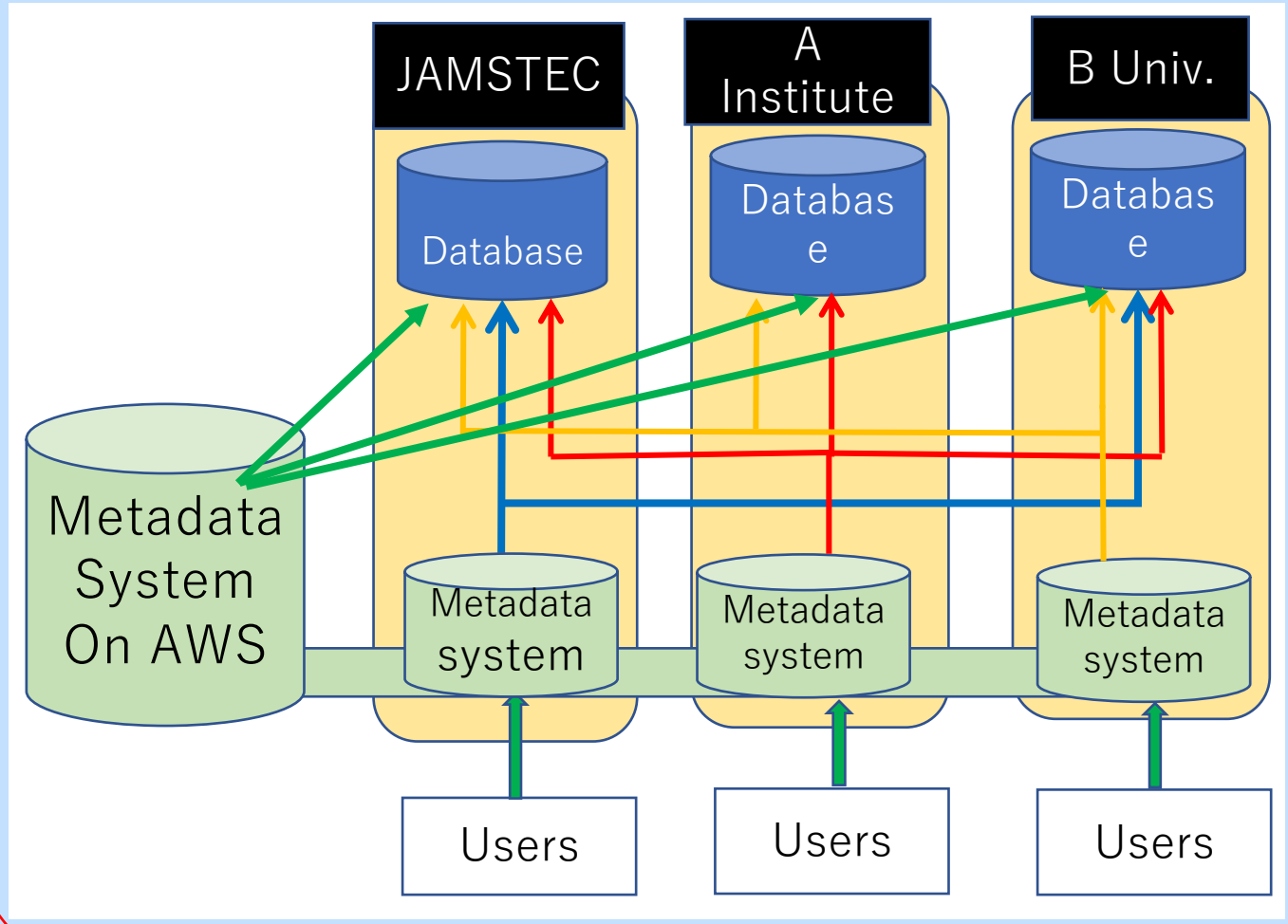


http://www.jamstec.go.jp/geossap/ (not available now)

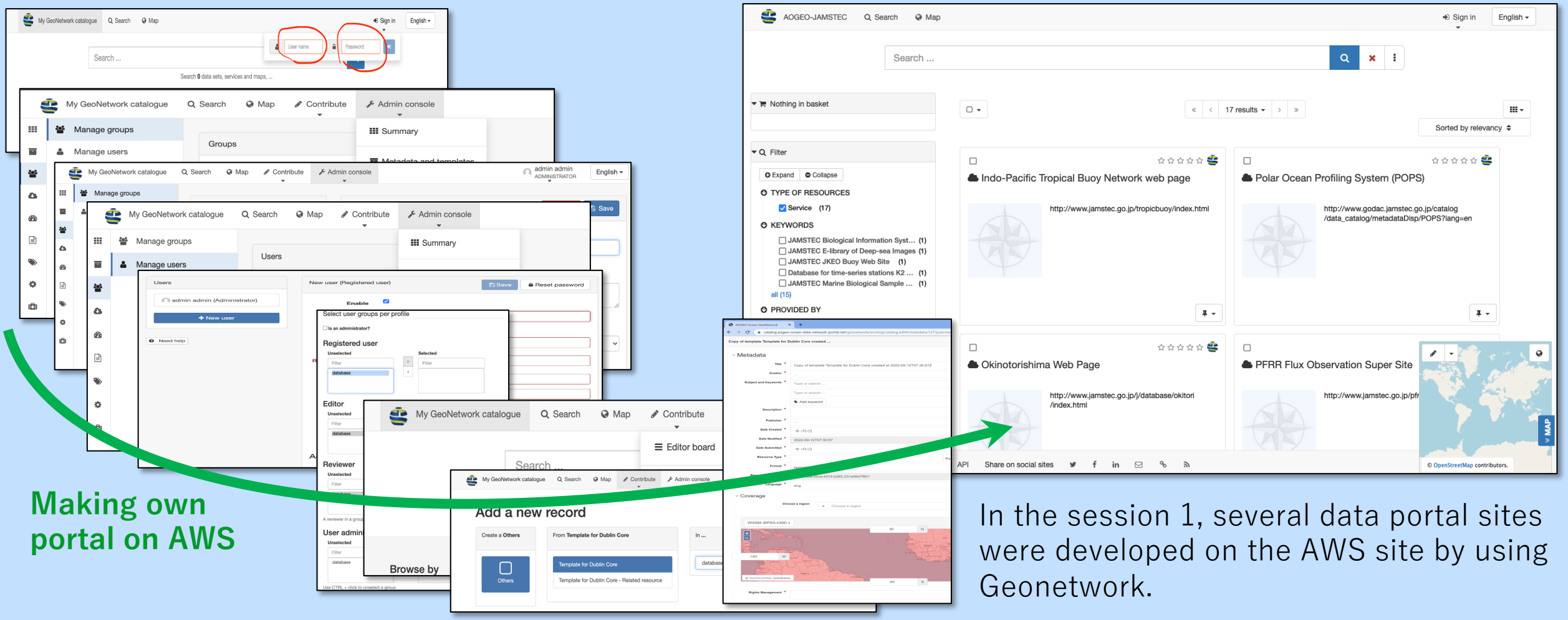
Only users accessed to JAMSTEC site can go to the others

We felt necessity to update the data networking system

Most recent version of concept of ocean data networking



Demonstration site on Amazon Web Service (AWS)



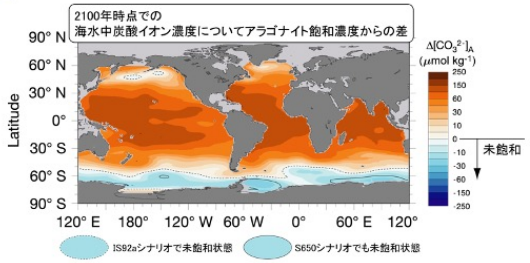
Making own portal on AWS

In the session 1, several data portal sites were developed on the AWS site by using Geonetwork.

1. Agreed to develop test sites between Malaysia and Japan to demonstrate the new XML (parameter) exchanges, and it could be done in 2022-2023
2. As a follow–up action, we plan to copy the system into the local systems in some agencies and institutes

Ocean-Coast-Island Task in January 2017 @Tokyo

- Focusing on Ocean Acidification from coast to open ocean



Ocean-Coast-Island Task in September 2017 @Hanoi

- Open Data Cube, coastal change detection, coastal priority (ES Asia, Mekong, pacific island)

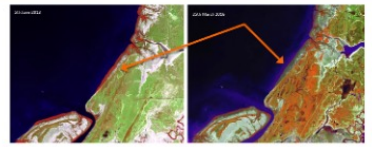
Salt water intrusion

Ecological changes

Alternative livelihood

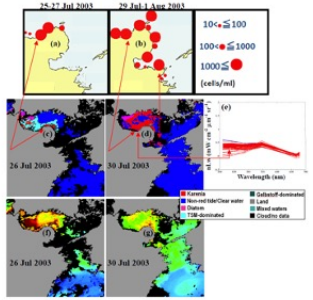
Fresh water shortage

Erosion with many questions related to natural processes and antropogenic interventions



Ocean-Coast-Island Task in October 2018 @Kyoto

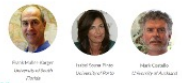
- Utilization of satellite data, in-situ M-BON, Pacific islands, Ganges-Brahmaputra-Meghna delta, statistics



Participation

- Pacific Island countries
  - Fiji, Solomon Islands, Tonga, Samoa, Cook Islands, Kiribati, PNG, New Caledonia, French Polynesia
- Regional Coordination bodies
  - FFA – PI Forum Fisheries Agency
  - SPREC – South Pacific Regional Environment Programme
  - SPC – The Pacific Community
- EO Data Providers
  - GEO, CEOS
  - GA, CSIRO
  - NZ CSST
  - CNES, EC, ESA
  - NOAA
  - Japan
  - Airbus, Digital Globe

MBON Marine Biodiversity Observation Network

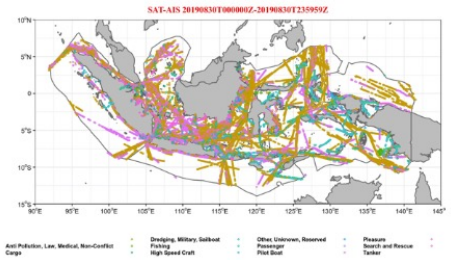


1. Developing an MBON Implementation Plan
2. Data Management
3. Developing EBVs

GOOS The Global Ocean Observing System

Ocean-Coast-Island Task in October 2019 @Canberra

Illegal, Unreported and Unregulated Fishing



Satellite tracking of AIS (and also signals from SAR)
- Non-Indonesian fishing vessels, and foreign fishing vessels operated in the Indonesian EEZ

Data inventory by Blue Planet (Marine Litter and Plastic)

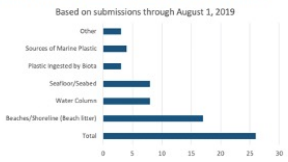
Inventory of Marine Litter Data

SUSTAINABLE DEVELOPMENT GOALS 14

Inventory of Existing Marine Litter Databases and Datasets for SDG Indicator 14.1.1

Preliminary Marine Litter Database Survey Results

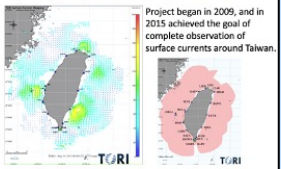
Based on submissions through August 1, 2019



TORI NARLabs

Taiwan Ocean Radar Observing System (TOROS)

providing hourly surface current maps in all weather



Project began in 2009, and in 2015 achieved the goal of complete observation of surface currents around Taiwan.

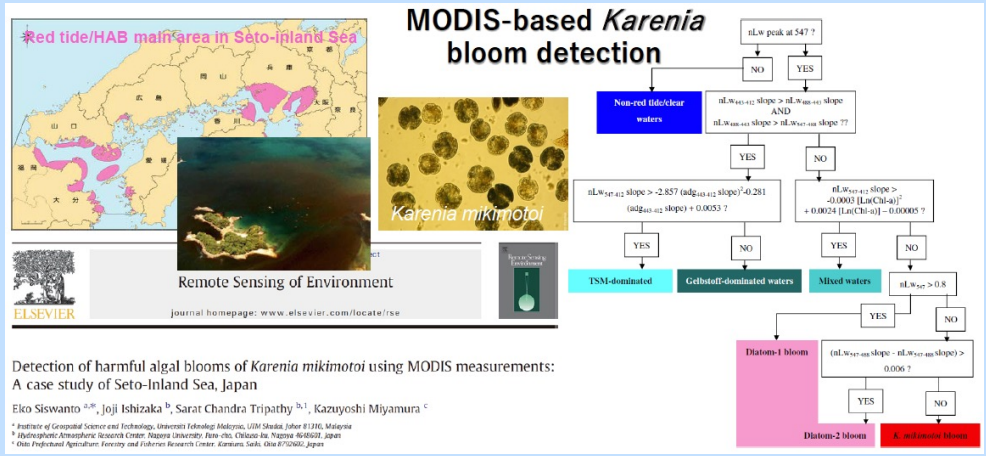
Marine HF Radar data (not satellite but remote)

Utilization of Ocean Color Satellite Data

- Keywords: Ocean Surface Plankton, Harmful Algae Bloom, Eutrophication) -

Sep 30th 2021, Hokkaido Newspaper

(From the slides of Dr. Eko Siswanto)

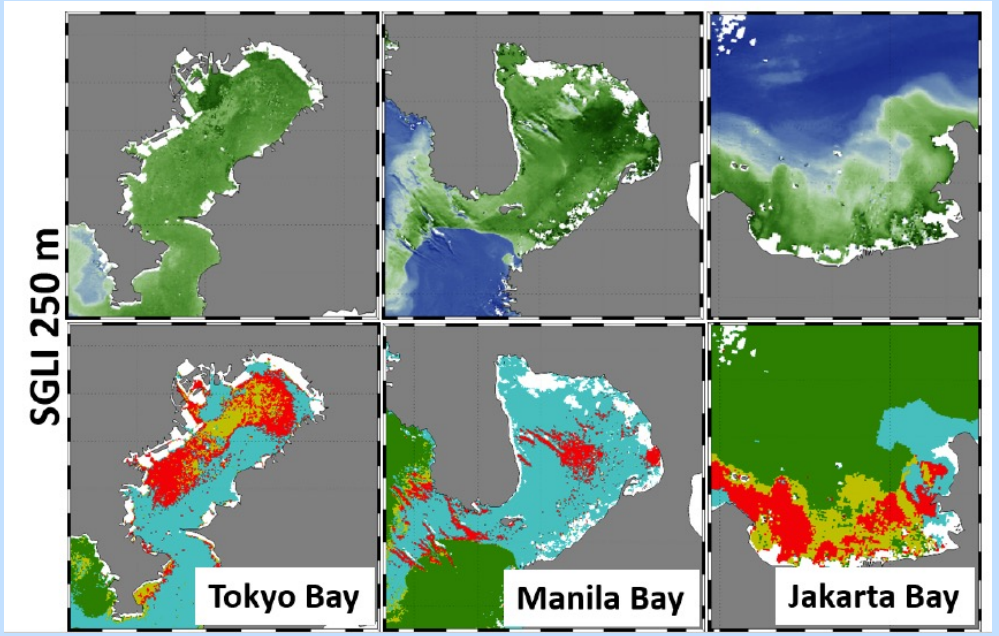


New possible case to detect phytoplankton by using MODIS data

- Case study to detect one specie of *Karenia*

Challenge to detect phytoplankton by using GCOM-C SGLI data

- Cases of Tokyo Bay, Manila Bay, and Jakarta Bay

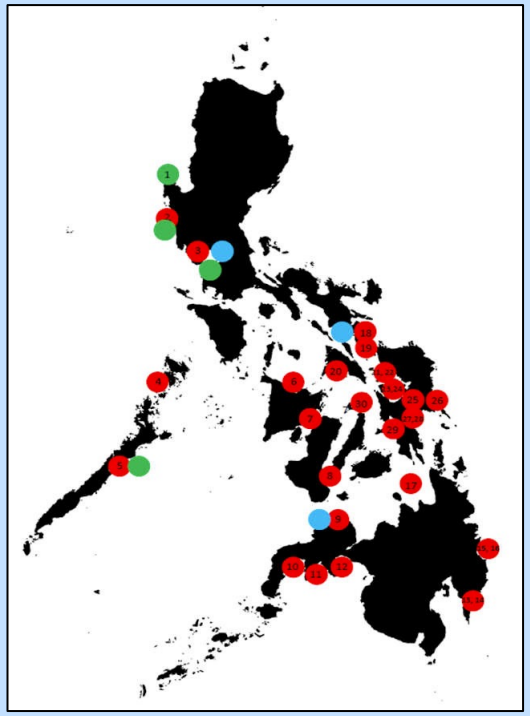


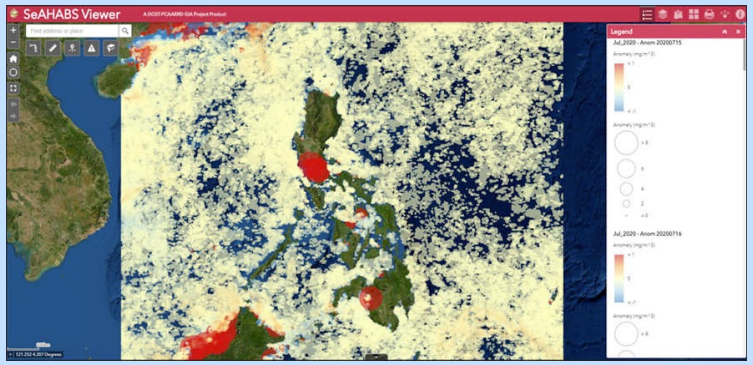
Session-2: Utilization of Satellite Ocean Color data

Session-2 Agenda:

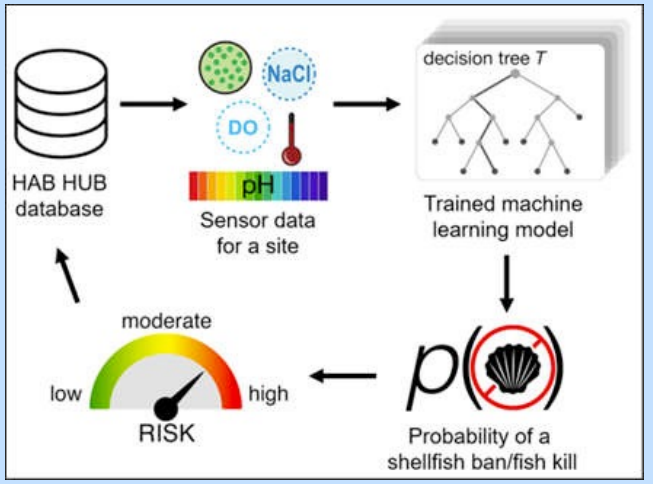
1. HAB monitoring and early-warning in the Philippines: challenges and opportunities (Aletta T. Yñiguez, University of the Philippines, Philippines)
2. Estimation of phytoplankton abundance using MODIS data for monitoring fish kill events in Jakarta Bay (Sam Wouthuyzen, National Research and Innovation Agency, Indonesia)
3. Seasonal variability of MODIS-derived algal blooms in the upper Gulf of Thailand (Jutarak Luang-on, JAMSTEC)
4. Red tide detection by SGLI/GCOM-C (Joji Ishizaka, Nagoya University)
5. Potentials of Google Earth Engine for ocean color studies: The case of the Global Eutrophication Watch (Elígio de Raús Maúre, Northwest Pacific Region Environmental Cooperation Center)
6. Discussion for collaboration (Eko Siswanto)

HAB monitoring and early-warning in the Philippines: challenges and opportunities - by Aletta T. Yniquez (University of Philippine)

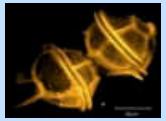




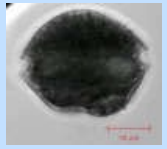
Satellite data (ocean color) for large-scale assess



Site-specific models for harmful algal blooms using machine learning and data input

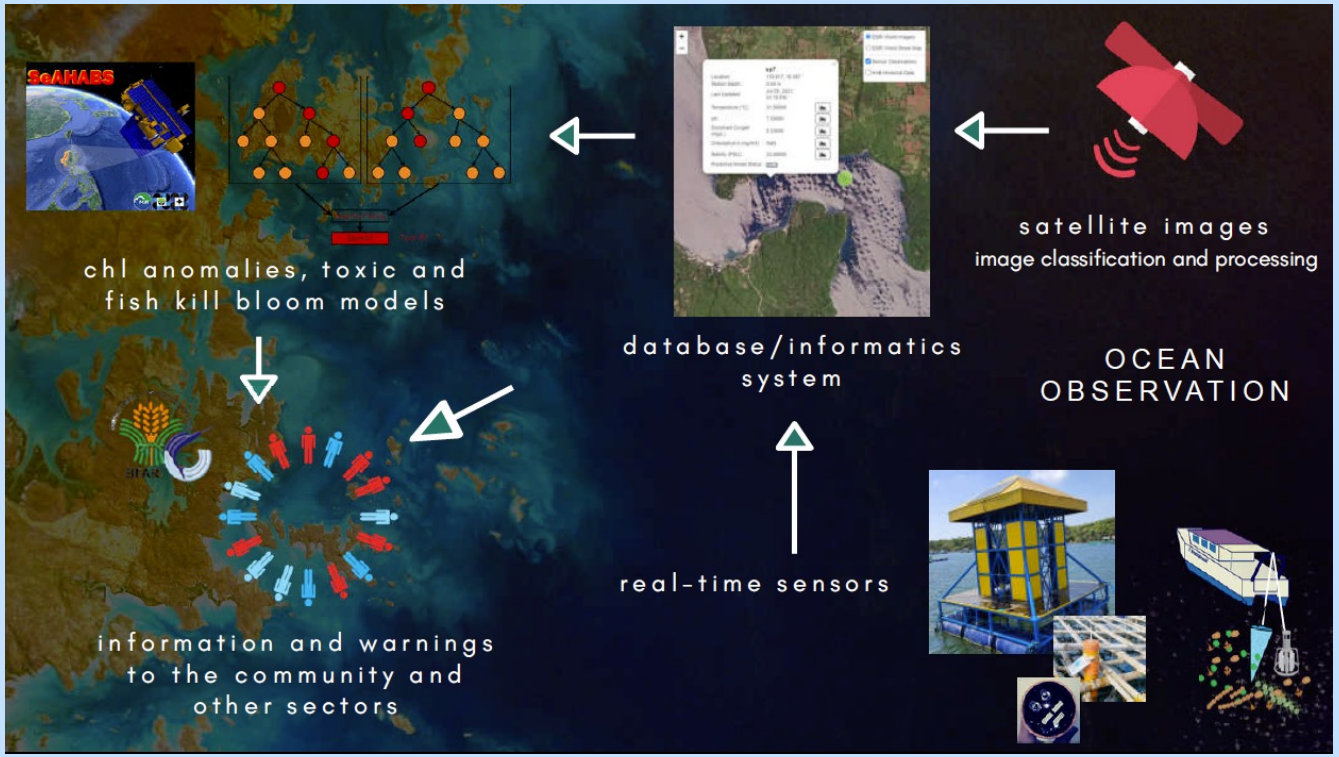


Pyrodinium bahamense



Alexandrium spp.

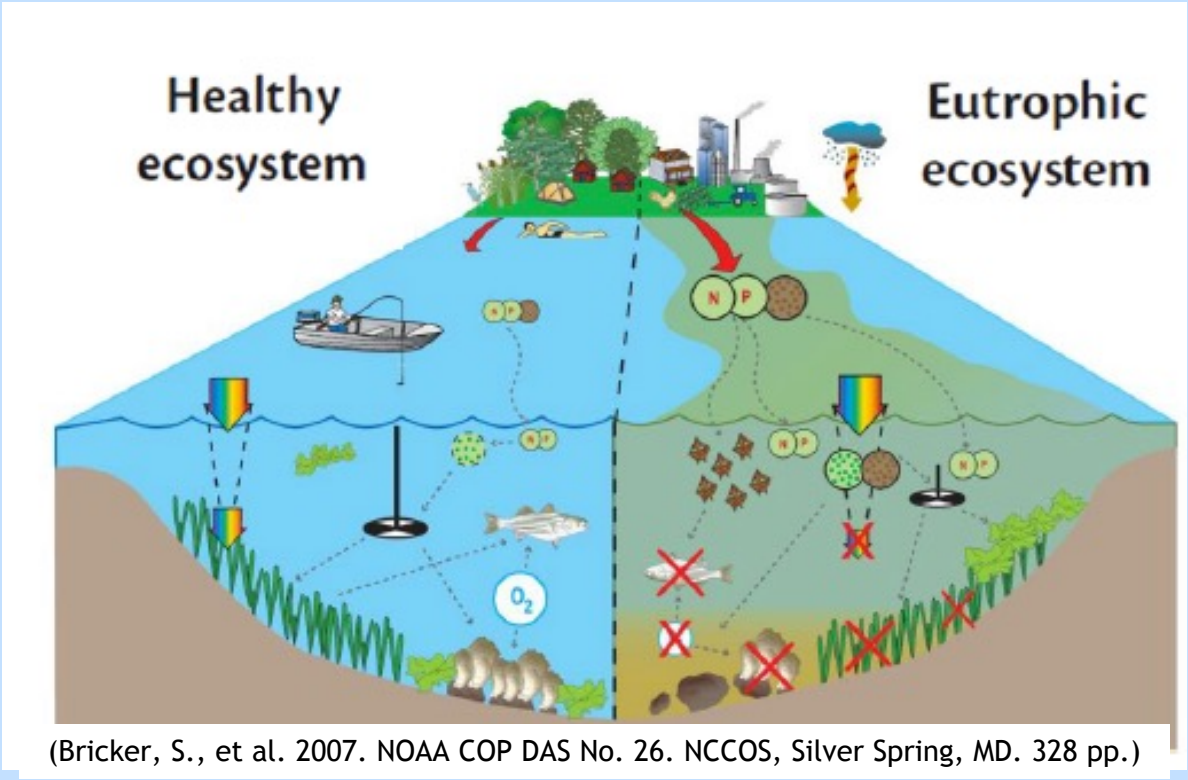
Gymnodinium catenatum



(From Prof Yniquez's PPT file)

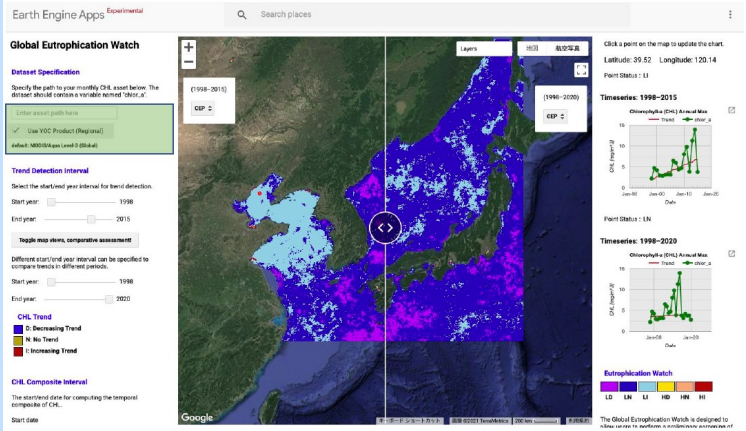
Potentials of Google Earth Engine for ocean color studies: The case of the Global Eutrophication Watch By Eligio Maure (NOWPAP/UNEP)

- Marine Environmental Watch
- Webinar for training
- Global Eutrophication Watch



(Bricker, S., et al. 2007. NOAA COP DAS No. 26. NCCOS, Silver Spring, MD. 328 pp.)

The Global Eutrophication Watch App: Regional Assessment



YOC CHL (1998-present)

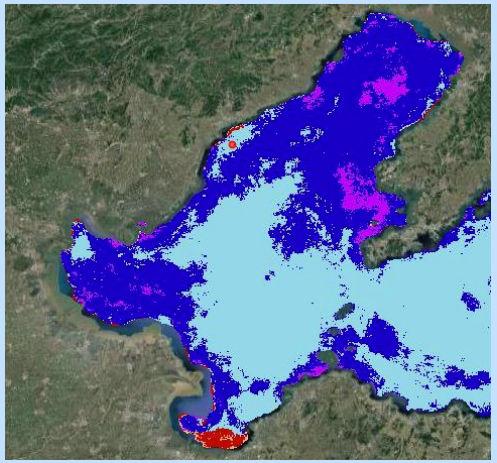
Eutrophication assessment in NOWPAP region using a regional dataset

The dataset is based on a local algorithm developed to improve CHL retrievals in coastal regions highly influenced by coloured dissolved organic matter and suspended sediments (Siswanto et al. 2011)

Google Earth Engine based App

https://eutrophicationwatch.users.earthengine.app/view/global-eutrophication-watch

(1998-2021)



HD	HN	HI
LD	LN	LI

H: High Eutrophic
L: Low
D: Decreasing
N: Neutral
I: Increasing

As eutrophic patches shrink, oligotrophic patches appear to be increasing, especially in the 1998-2021 assessment.

(From Dr Maure's PPT file)

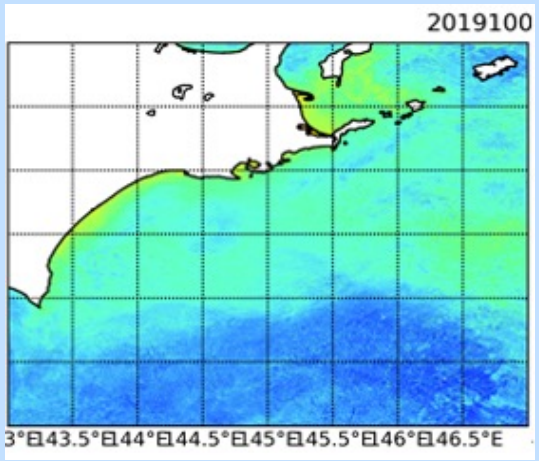
Next step: Ingestion of SGLI/GCOM data into the GEE

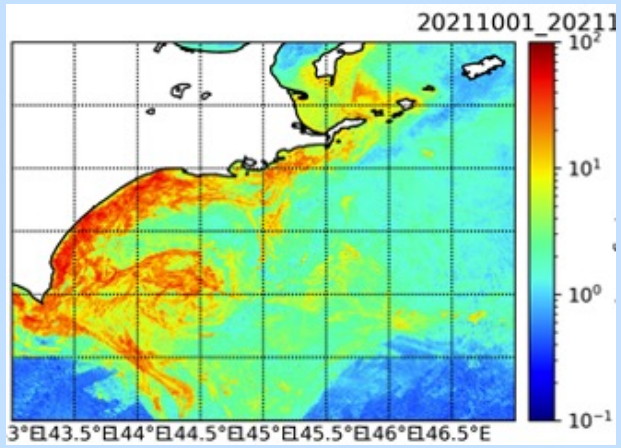
- **SGLI Level 2 mapped data (250 m resolution)**

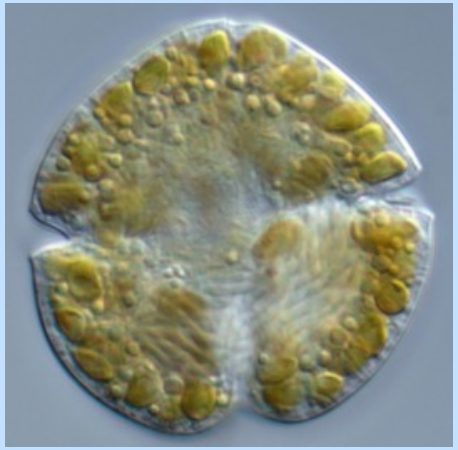
Red tide detection by SGLI/GCOM-C

By Ishizaka (Nagoya University)

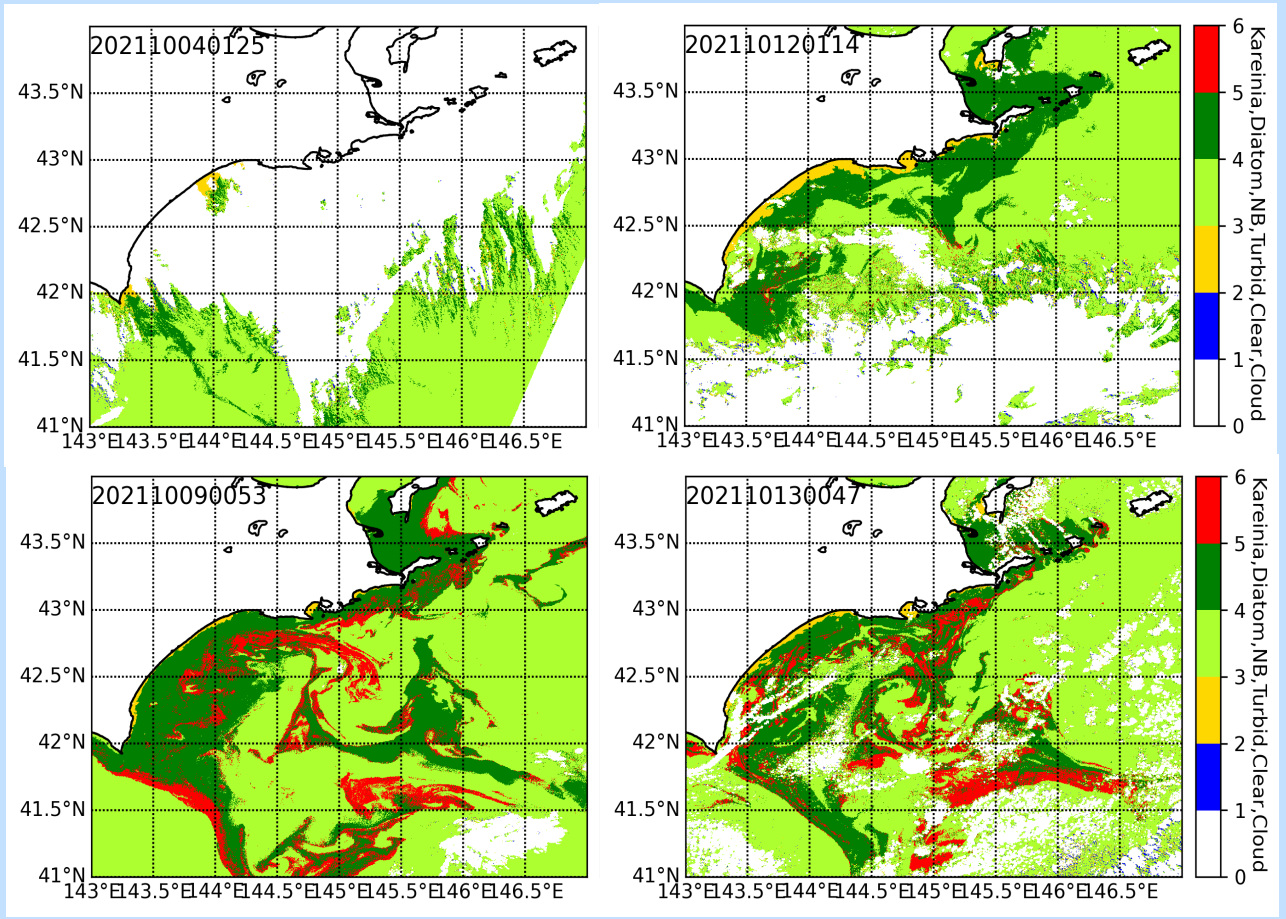
Can we discriminate *Karenia* from Diatom ?







Karenia Selliformis



☆bbp-index from SGLI data:

K/D>10 Low for same Chl-a, Higher Diatom: Higher Scattering

Some hints to improve the algorithm

☆Fall 2021: able to detect but underestimate

☆Sept., Oct. 2018－2020: a little overestimate

☆Aug. 2022:No Karenia

Useful to some degree, but further challenge is needed.

(From Prof Ishizaka's PPT file)

Future Direction

- Develop more reliable datasets/maps of ocean color-based phytoplankton (discriminate species as much as possible), chlorophyl, and eutrophication area, as a system
- Collaborate with *in-situ* data providers of phytoplankton, biology, biogeochemical oceanography etc.
- Develop links and/or portal among data systems including in-situ data systems
- Articulate regional user needs from ocean color related data and raise awareness of the societal benefits of ocean observation
- Address gaps in user needs in the Asia-Oceania region
- Get feedbacks for improving systems