

JAXA's Earth Observation Data and Applications for Protect Earth

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Japan Aerospace
Exploration Agency

World Space Forum 2022



JAXA Earth Observation Missions Addressing Global Challenges

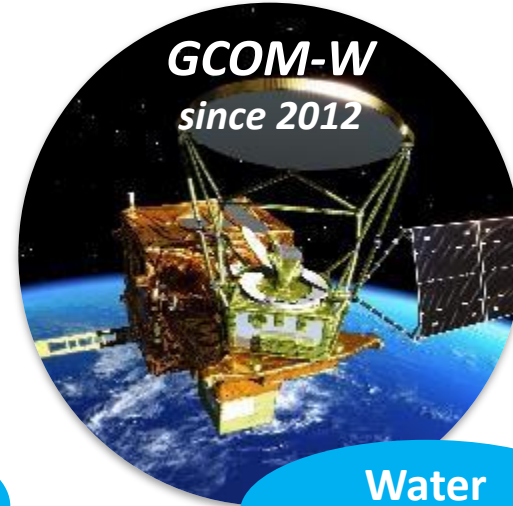


Disaster/
Forest



(NASA-JAXA
joint mission)

Precipitation



Water
Cycle



Cloud/
Aerosols/
Vegetation



Greenhouse
gases
(CO₂, CH₄)



Greenhouse
gases
(CO₂, CH₄, CO)



UN World Conference on
Disaster Risk Reduction
2015 Sendai Japan



SDGs



PARIS2015
UN CLIMATE CHANGE CONFERENCE
COP21-CMP11



Save Tropical Forest

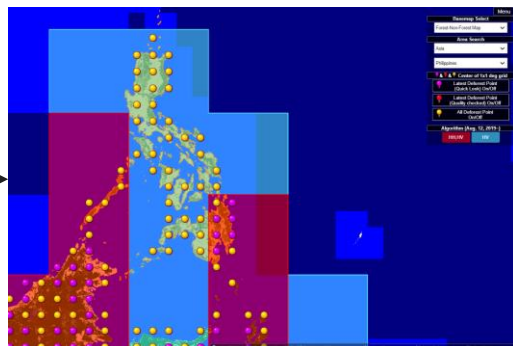
- Monitoring Forest Changes for More Than 25 Years
- Broad Ground Surface Observation by Radar Capable of Penetrating Clouds
- Contributing to the sustainable forest management using satellite data of forest changes

JICA-JAXA Forest Early Warning System in the Tropics (JJ-FAST)

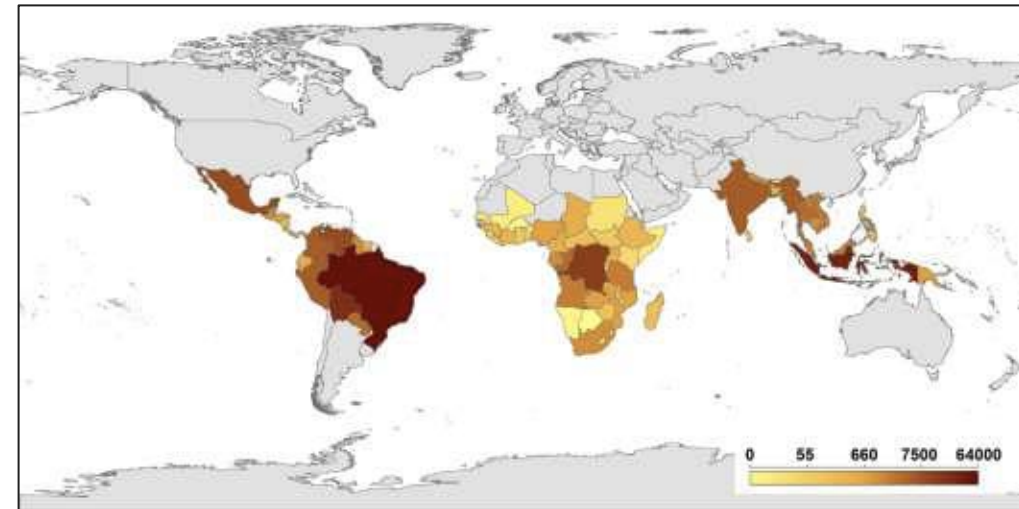
- JJ-FAST has been operated as a deforestation monitoring tool under the JICA-JAXA collaboration project since November 2016
- JJ-FAST covers **77 tropical countries** and disseminates deforestation areas detected by **ALOS-2** for every **1.5 months**



Deforestation polygon



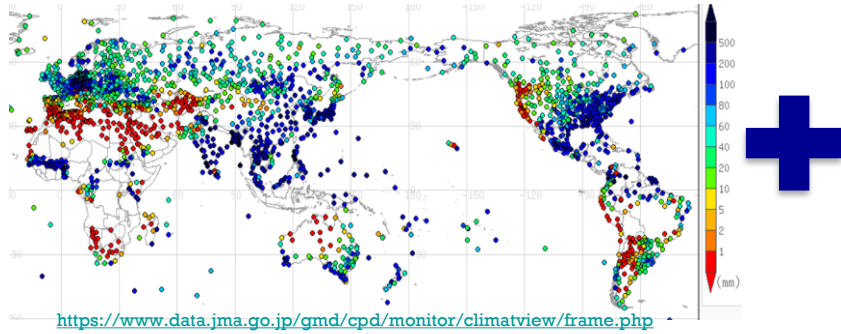
Red indicates the latest Deforest Point
Yellow indicates all Deforest Point



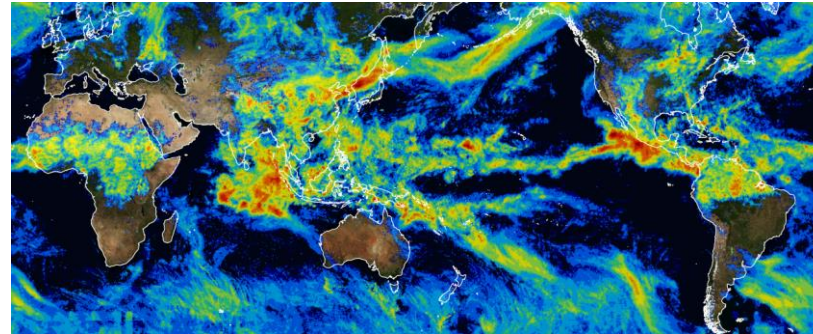
Total detected number: 308,353 points as of April, 2020
(92,787 points were detected in Brazil)

Flood Prediction Realized by Integration of GSMaP and Ground Observations

Ground observations



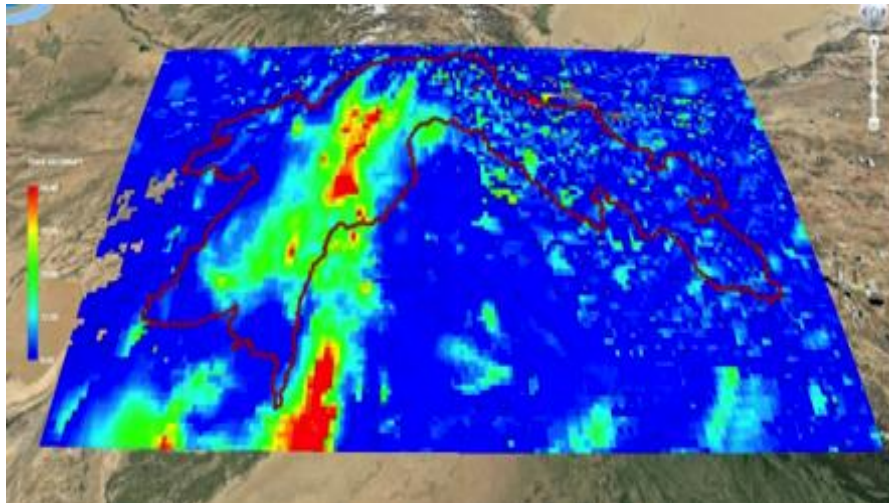
Satellite precipitation (GSMaP)



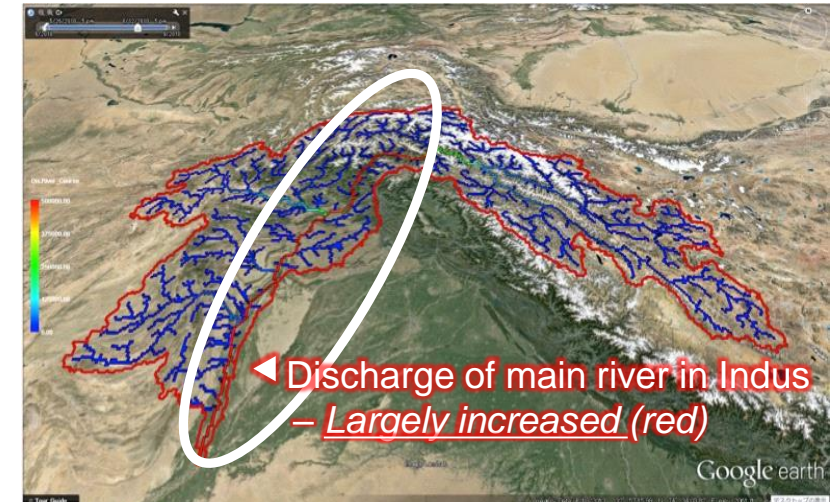
Partners



Rainfall over the river basin during flood in Pakistan



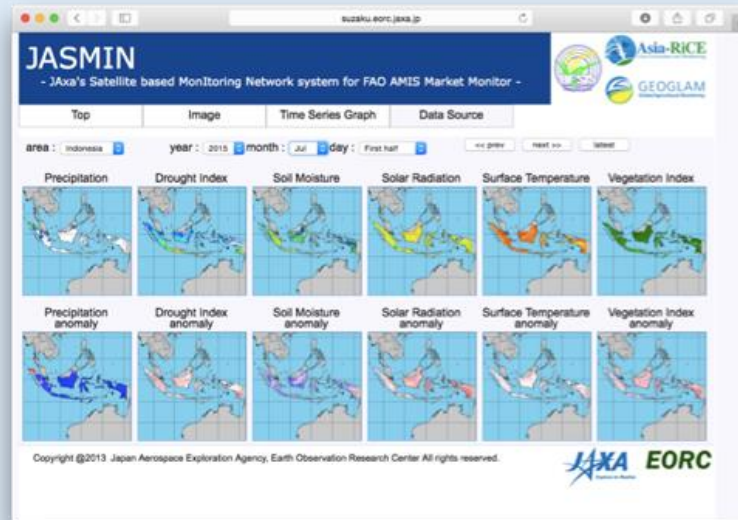
River discharge using GSMaP by Integrated Flood Analysis System (IFAS)



(Images provided by ICHARM)

◆ Utilization for rice crop estimation in Southeast Asia

- **Rice Growing Report is released monthly in cooperation with AFSIS(ASEAN +3 Food Security Information System) and countries in Southeast Asia** using JASMIN providing agricultural meteorological information (precipitation/soil moisture/temperature) from satellite observation data
- Rice crop information is provided to AMIS (the Agricultural Market Information System) operated by FAO through **GEOGLAM(the Group on Earth Observations Global Agricultural Monitoring Initiative, lunched at the summit/the G20 Agriculture Ministers in 2011)**



JASMIN: JAXA's Satellite based Monitoring Network system (JAXA)

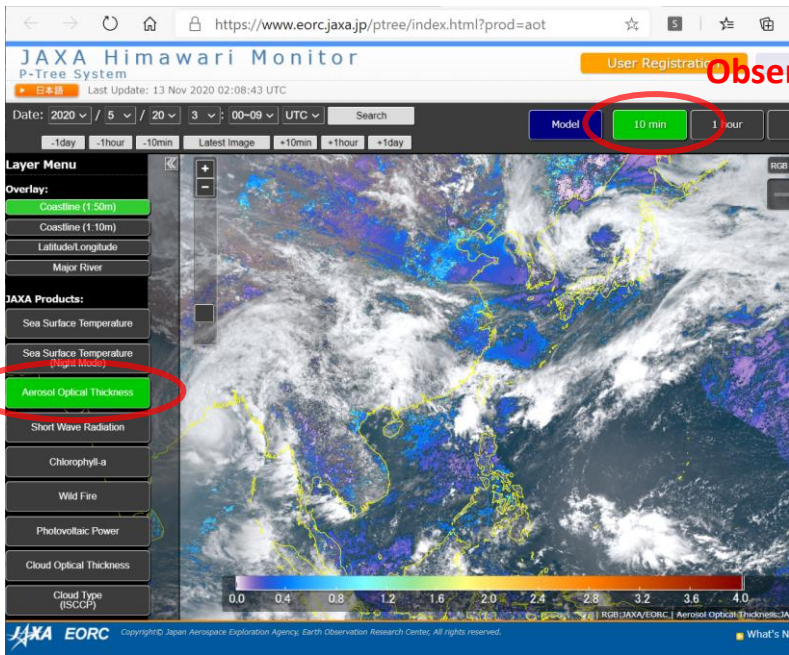


Rice Growing Outlook Report (released monthly by AFSIS)



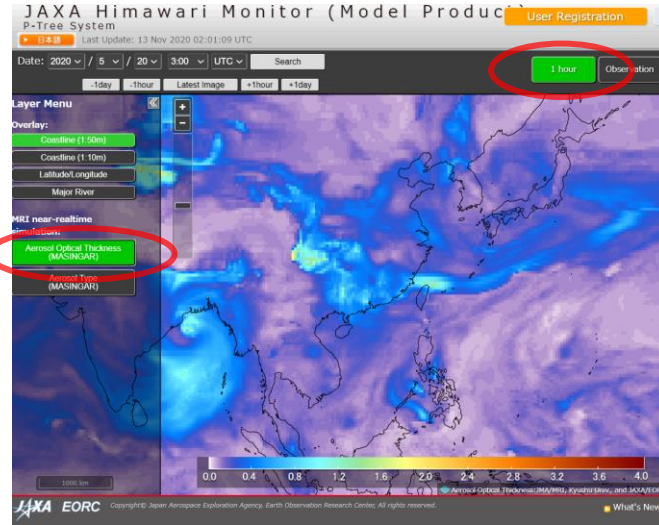
Market Monitor (released monthly by AMIS)

Support Health from Atmospheric Pollution

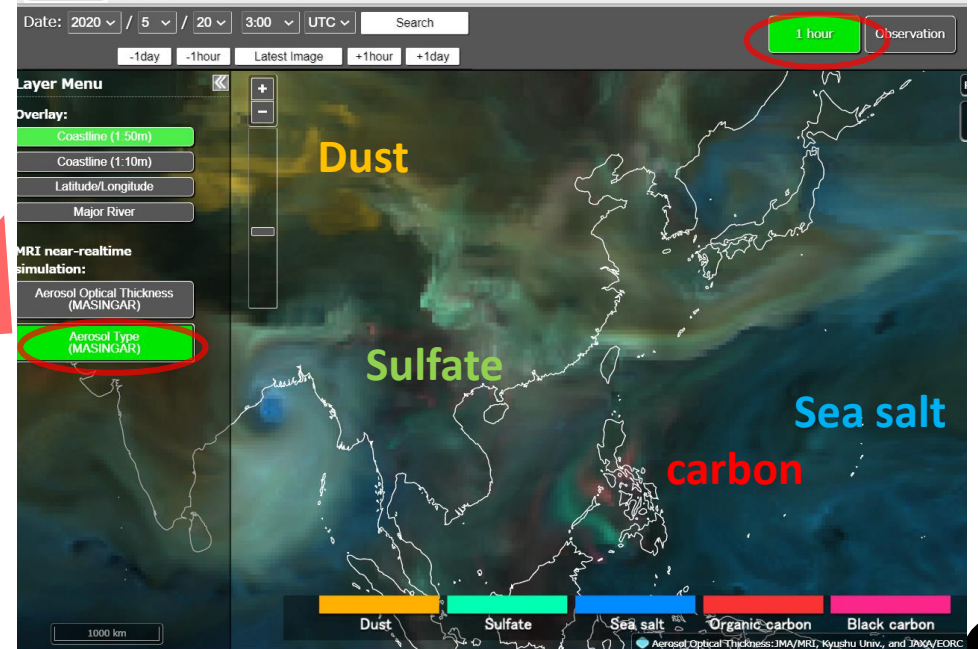


Observation or model

Aerosol optical thickness by model assimilation



Aerosol type by model assimilation



Select aerosol

Satellite aerosol estimation

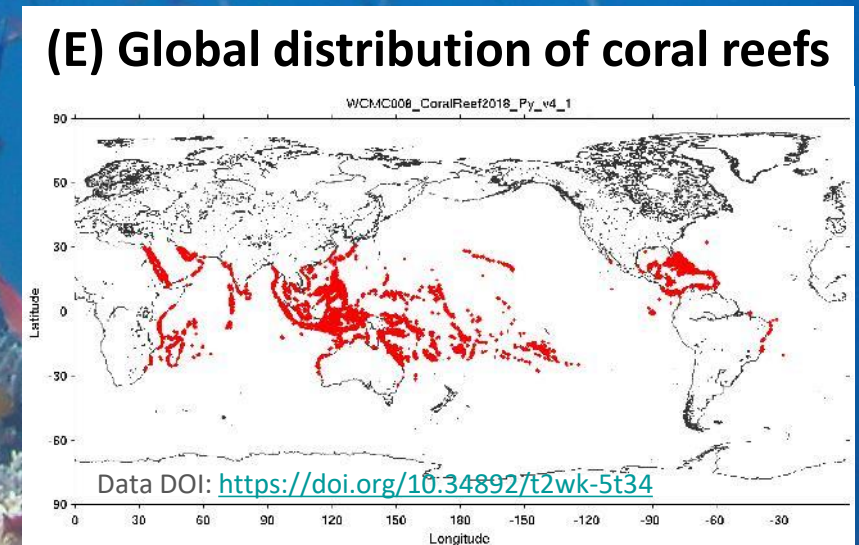
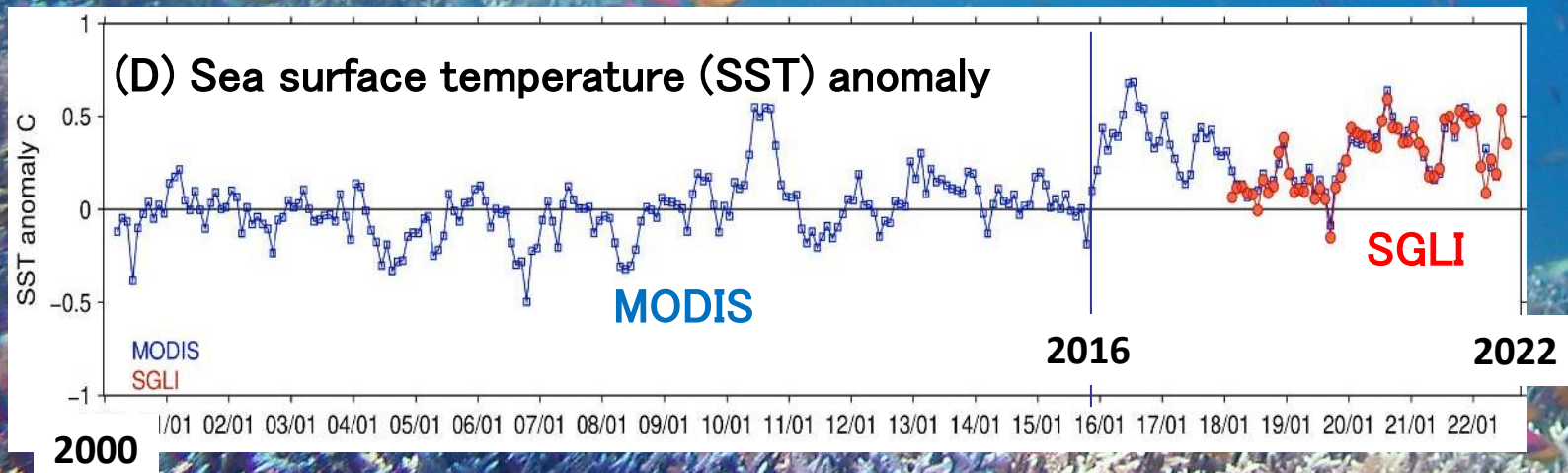
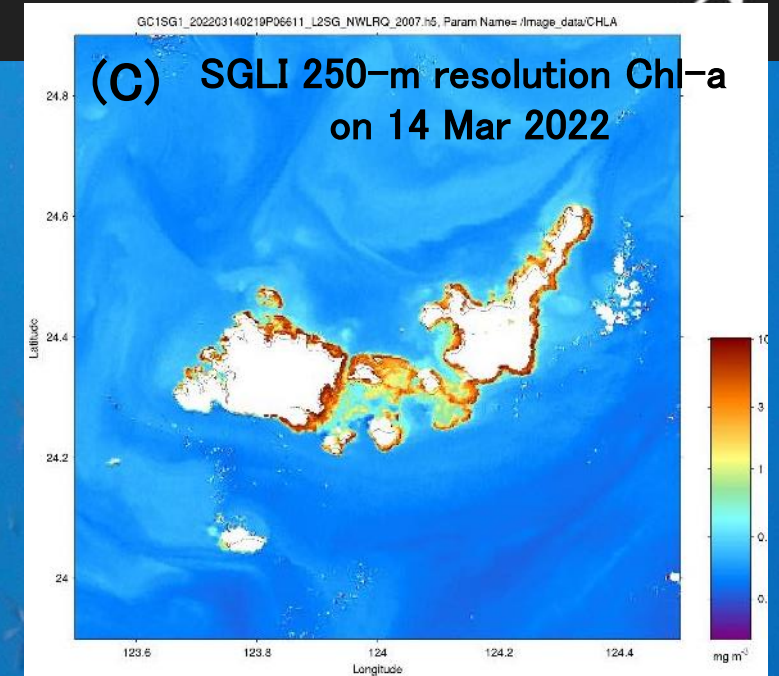
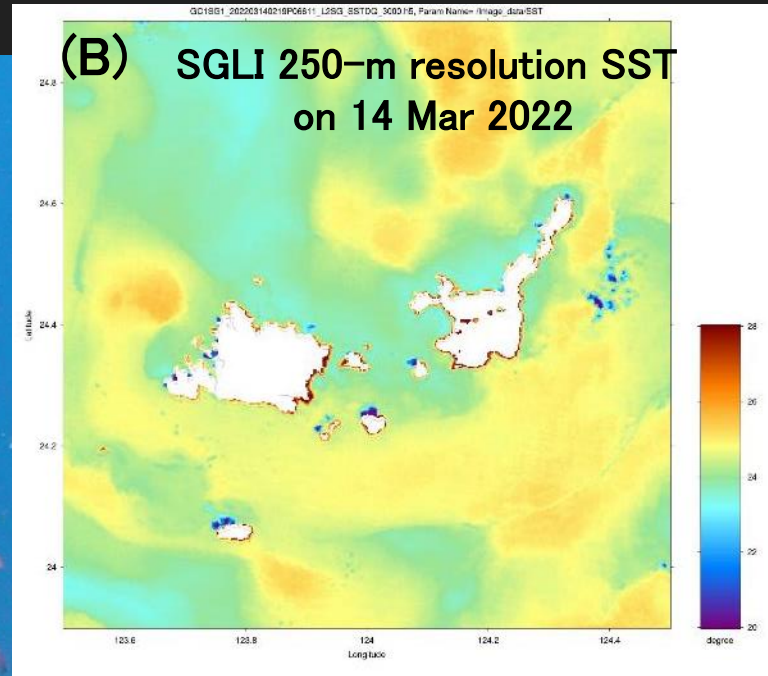
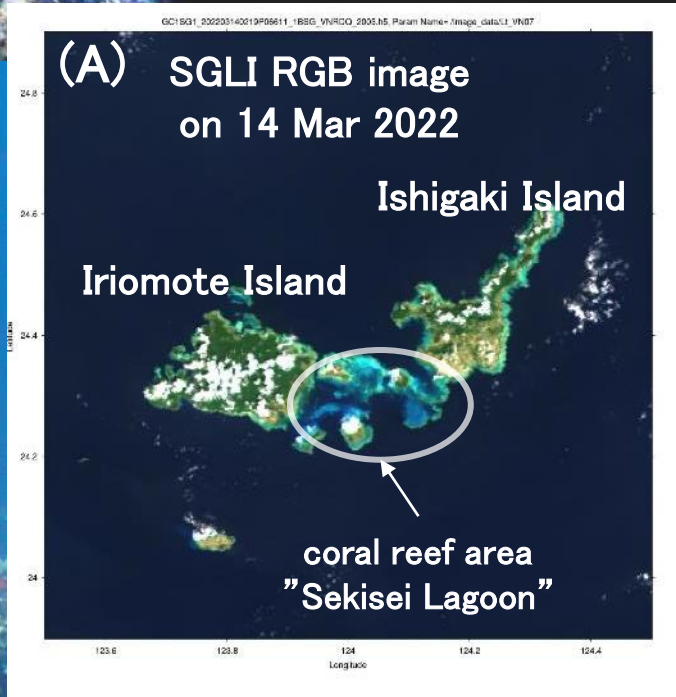
NetCDF data files are open by FTP after simple registration:

- Temporal resolution: 1-hour
- Data: Aerosol optical thickness at 550 nm (Sulfate, BC, Organic Aerosol, Sea Salt, Dust), PM2.5 surface conc., PM10 surface conc.
- This product is the forecast (every one hour) of aerosol properties by the MRI/JMA global aerosol model called Model of Aerosol Species IN the Global AtmospheRe (MASINGAR).

https://www.eorc.jaxa.jp/ptree/aerosol_model/index.html

This information can help to monitor the current aerosol amount and types

Monitoring Ecosystem by GCOM-C/SGLI - Coral Reefs - JAXA

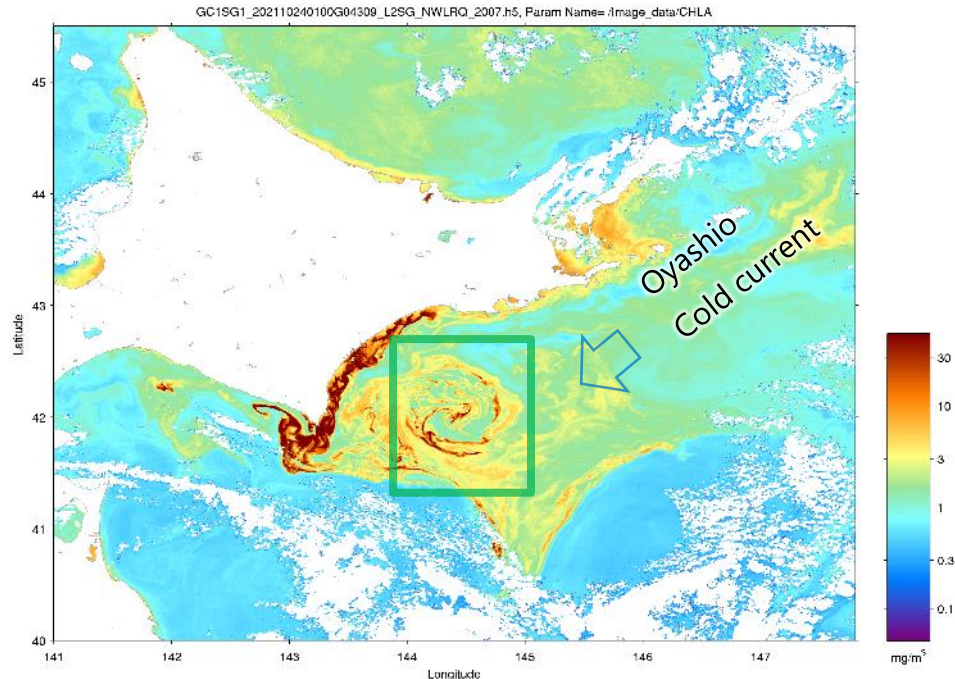


Ecosystems vulnerable to climate change

Monitoring Ecosystem by GCOM-C - Marine environment -

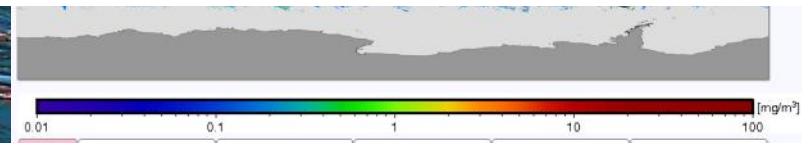
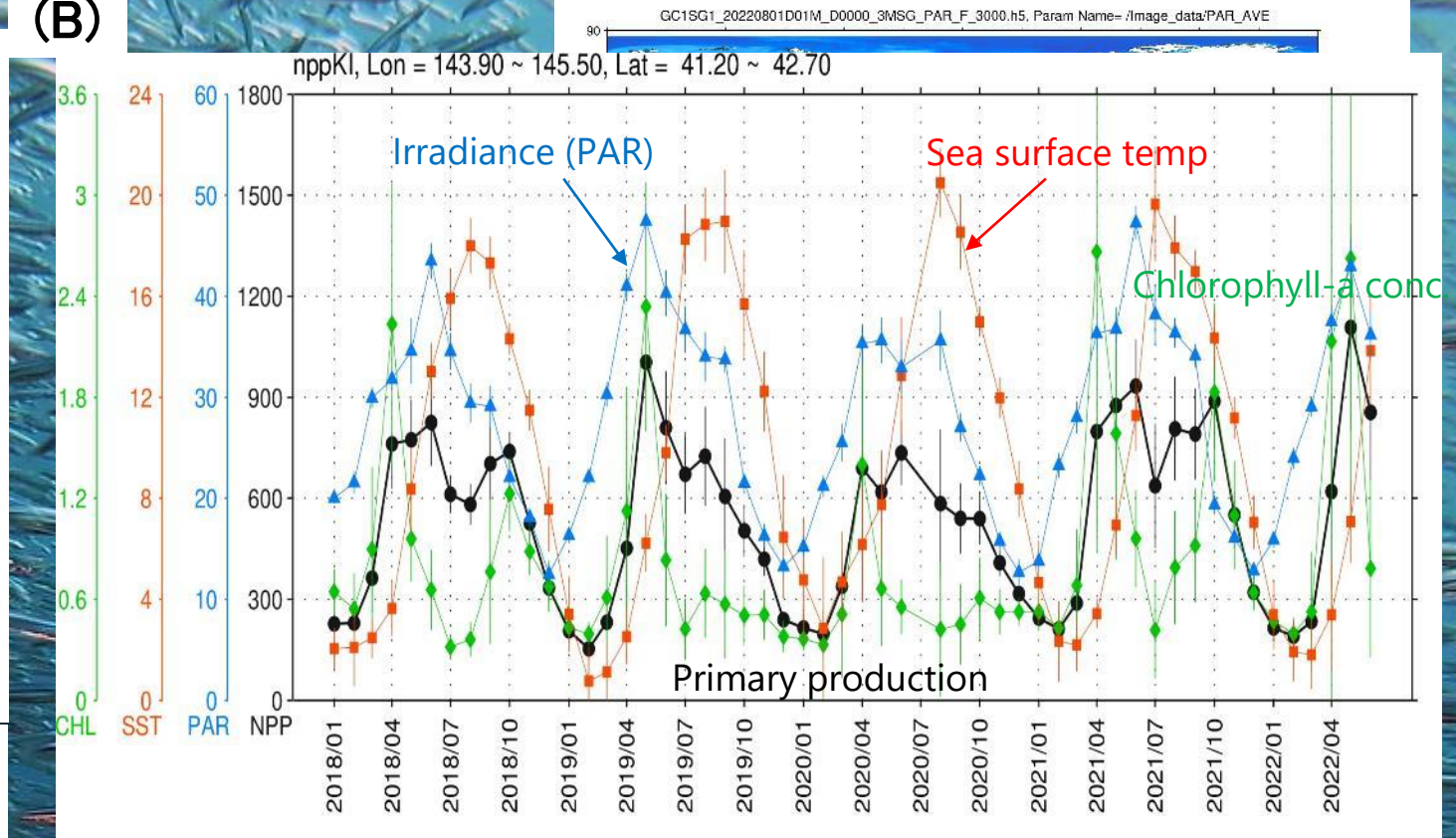


(A)



Chlorophyll-a concentration on 24 Oct. 2021 derived by GCOM-C/SGLI
Sep-Nov 2021, red tide appeared in this area

(B)



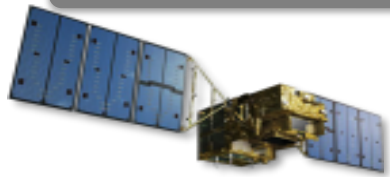


Contributing the UNFCCC Global Stocktake



Domestic Ministries and institutions.

Monitoring Sources of GHG



GOSAT
CO₂, Methane



GOSAT-2
CO₂, Methane, CO

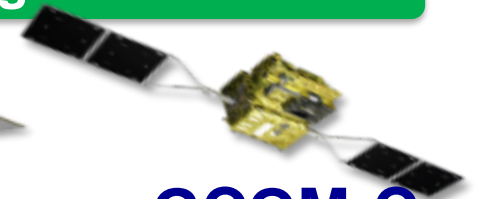
Partnership with UN entities and relevant organizations



Monitoring Sink of GHG



ALOS-2
Forest cover, Disaster management, etc...



GCOM-C
Land surface, Atmosphere, Ocean

➤ Collaborate with relevant domestic and international organizations and international frameworks to ensure that satellite data-based emissions measurement by GOSAT and other means contributes to GST.

➤ Contribute to GST by elucidating the terrestrial carbon budget in combination with L-Band SAR, optical satellite and lidar technologies for GHG estimation in agriculture, forests, and other land uses (AFOLU).



Over 10 years of CO₂ and CH₄ observation by GOSAT and GOSAT-2



2009

2018

2019

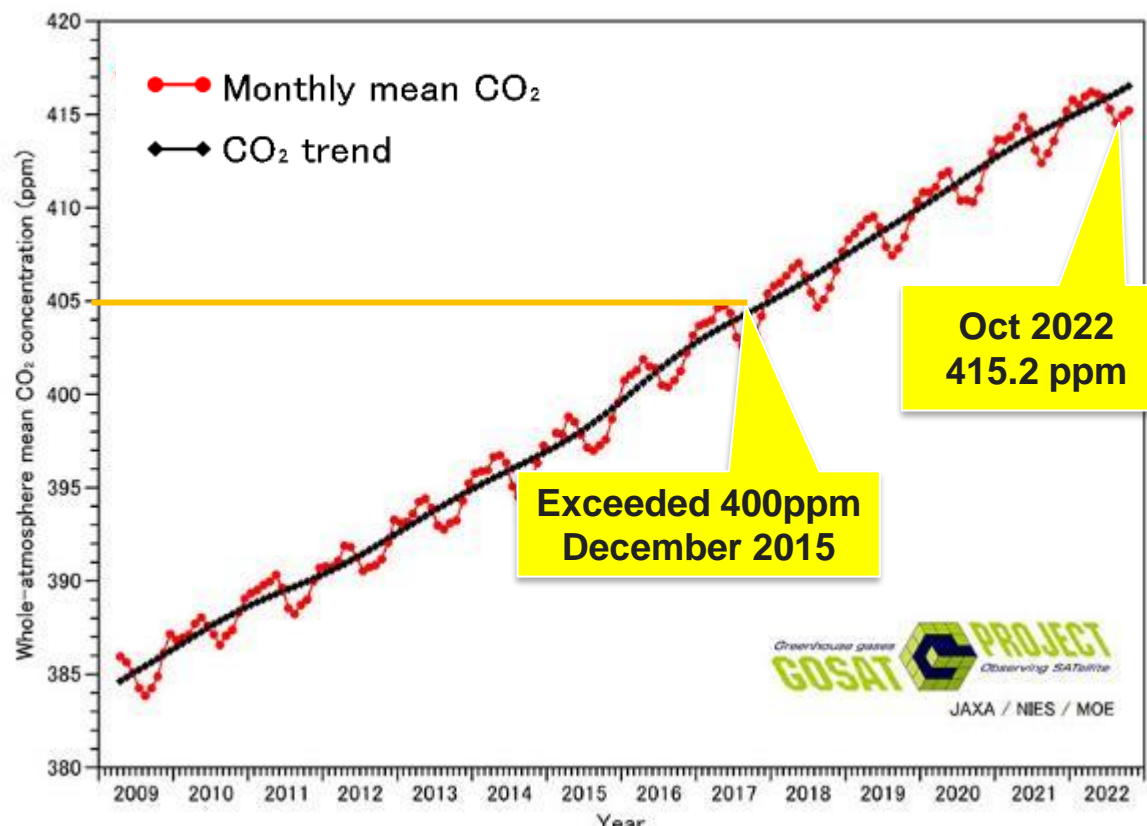
2022



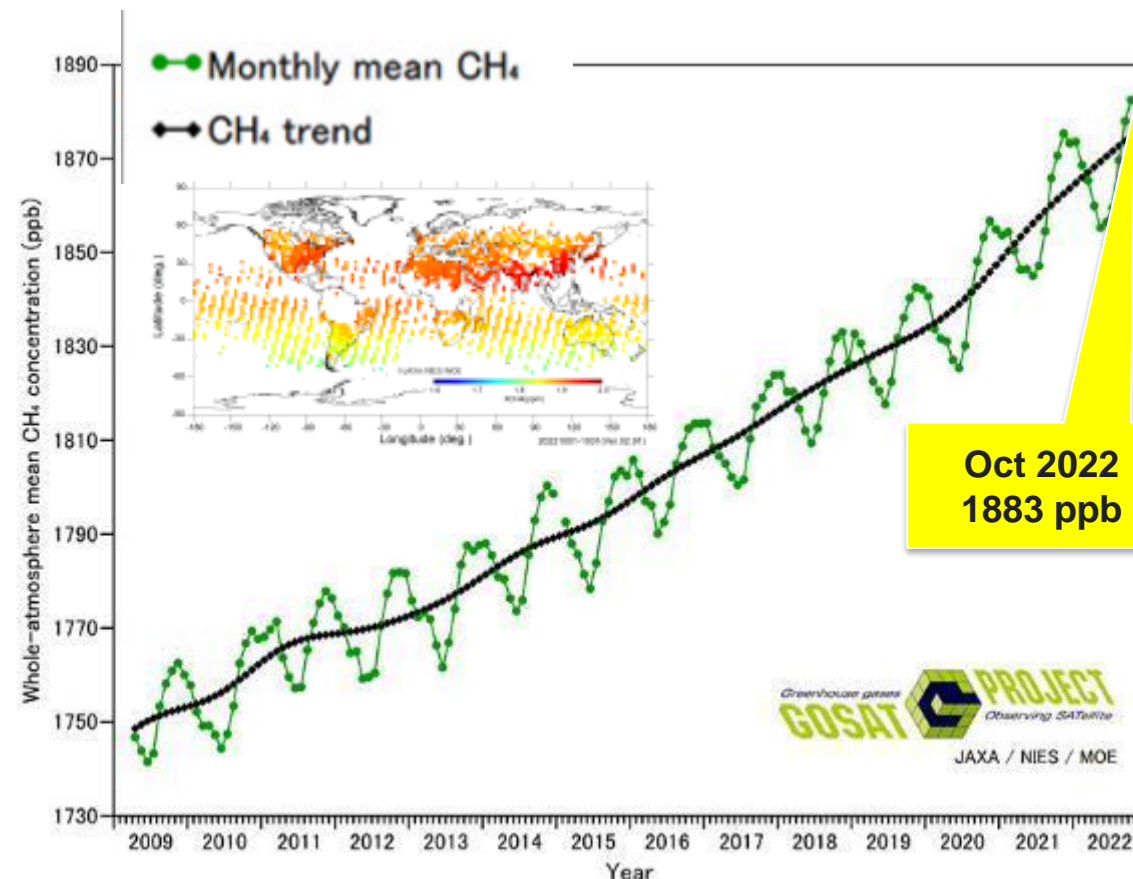
GOSAT



GOSAT-2



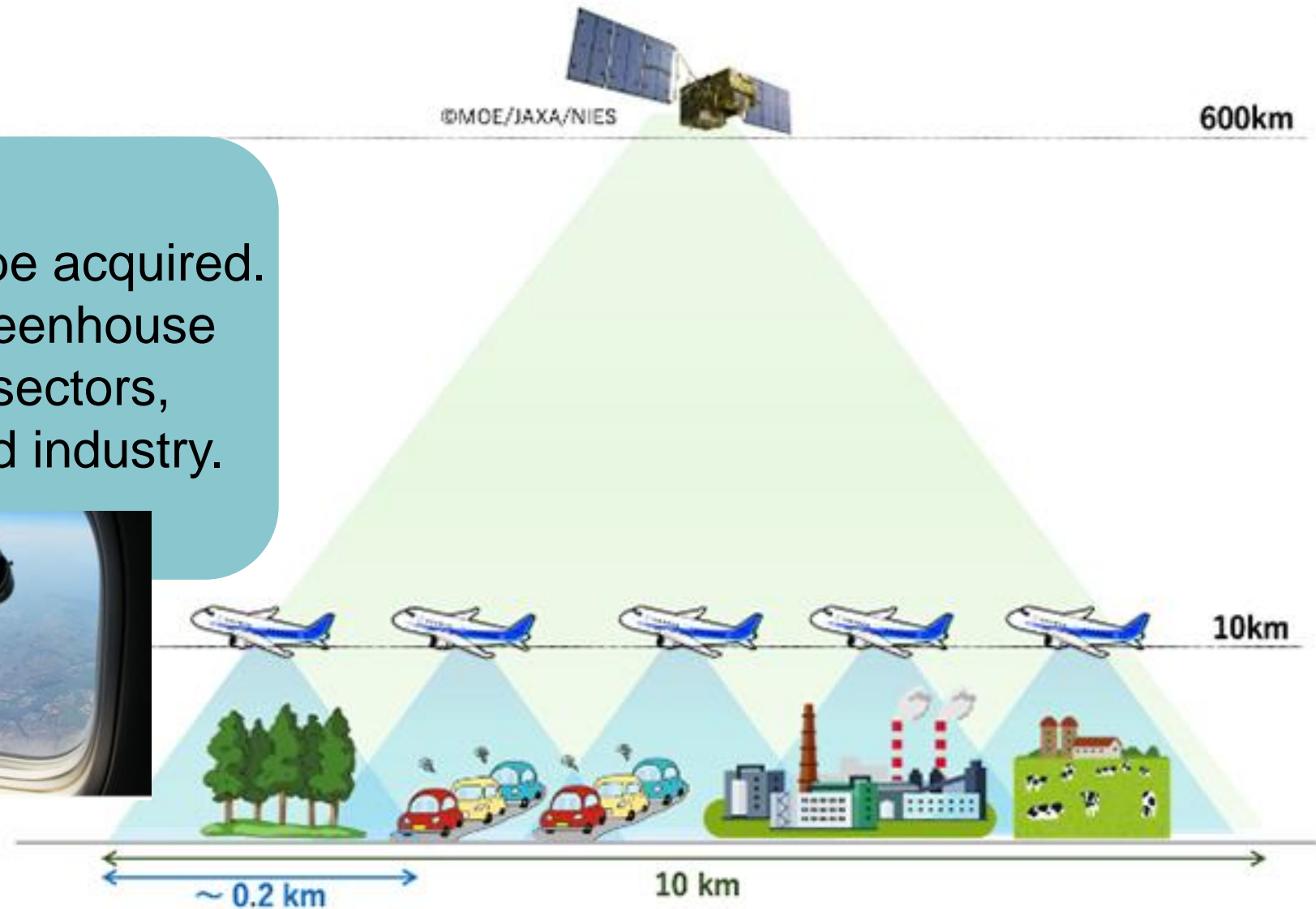
GOSAT Whole-atmosphere Mean CO₂ April 2009 – October 2022



Year

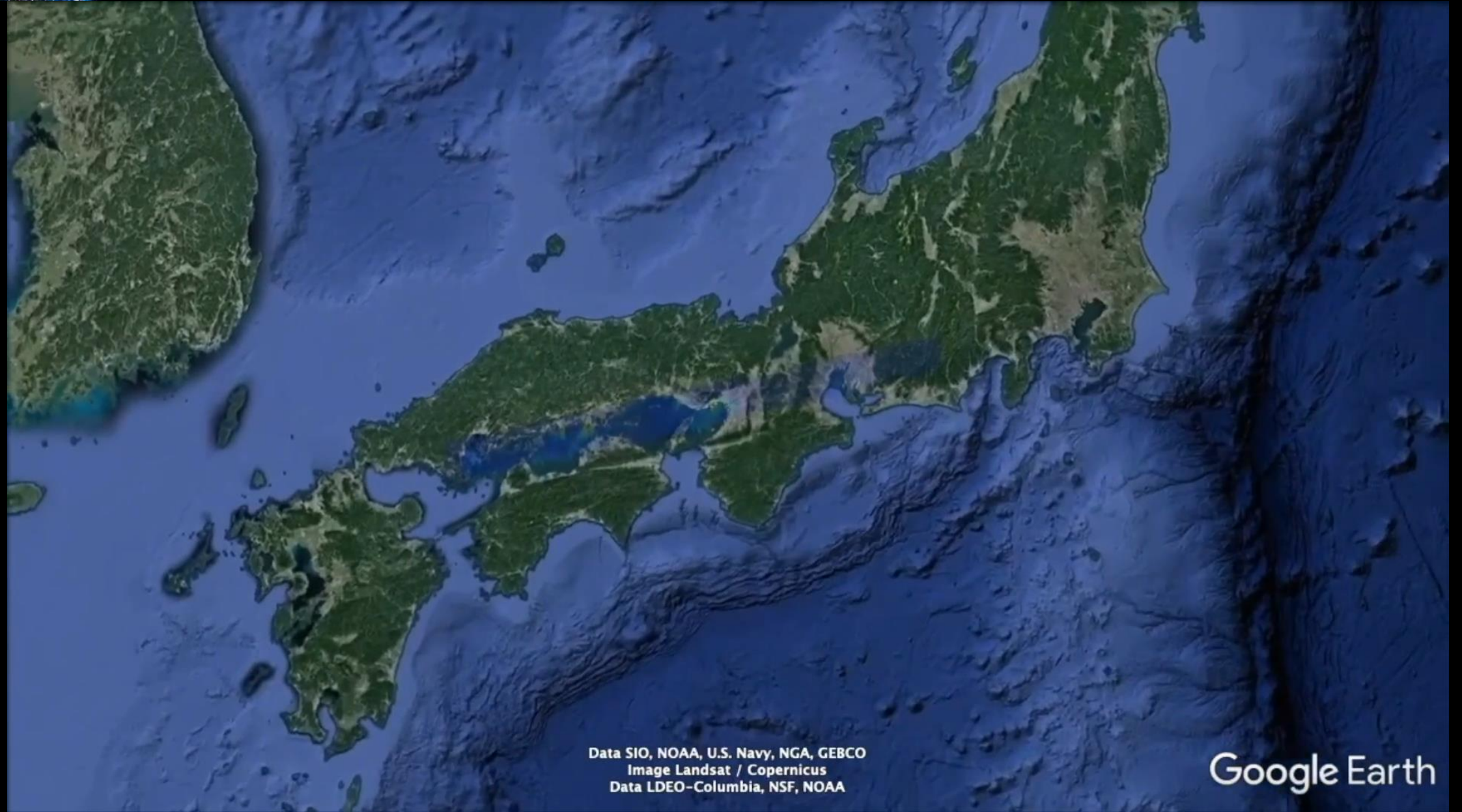
The Greenhouse gas Observations of Biospheric and Local Emissions from the Upper sky (GOBLEU)

- ✓ High resolution data can be acquired.
- ✓ The goal is to estimate greenhouse gas emissions by source sectors, such as transportation and industry.





GOBLEU Observation Result – Osaka-



Data SIO, NOAA, U.S. Navy, NGA, GEBCO
Image Landsat / Copernicus
Data LDEO-Columbia, NSF, NOAA

Google Earth

- Growing EO based data and services for SDGs, Paris, Sendai, etc
- Engaging users and stakeholders
- Global, Regional, National and Local
- Partnerships are essential to realize

- Some thoughts…
 - International “Catalyst” may be useful to reduce burden of coordination efforts with various stakeholders in individual implementing agency (like JAXA)
 - Expectation to new horizon – more space-based services and applications to be involved into Post 2030 Sustainable Agenda

Please visit JAXA website for more information :
<https://www.satnavi.jaxa.jp/ja/index.html>
<https://earth.jaxa.jp/ja/>



JAXA Tanegashima Space center