



March 24, 2022

Yosuke Ikehata

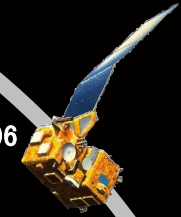
Satellite Applications and Operations Center
(SAOC)

Japan Aerospace Exploration Agency



Completed

MOS-1/MOS-1b
1987-1990/1995-1996



JERS-1
1992-1998



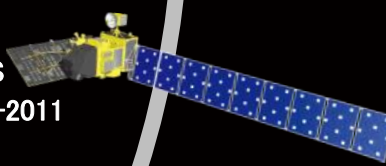
ADEOS/ADEOS-II
1996-1997



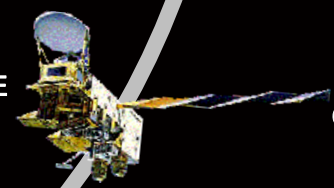
TRMM/PR
1997-2015



ALOS
2006-2011



Aqua/AMSR-E
2002-2015

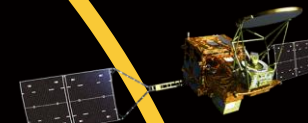


In Operation

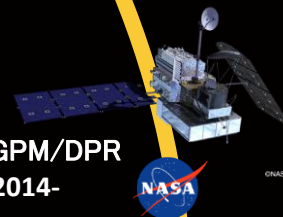
GOSAT
MOE/JAXA/NIES
2009-



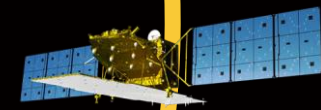
GCOM-W
2012-



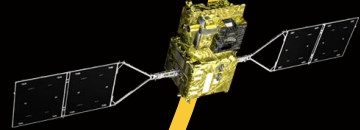
GPM/DPR
2014-



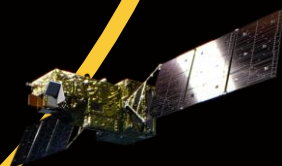
ALOS-2
2014-



GCOM-C
2017-



GOSAT-2
MOE/JAXA/NIES
2018-

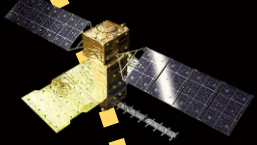


To be Launched

ALOS-3
T.B.C.



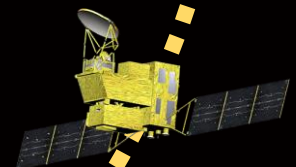
ALOS-4
T.B.C.



EarthCARE
Cesa
2022-2023



GOSAT-GW
MOE/JAXA/NIES
2023-2024



JAXA Portals and Data Provision to Partner Portals



JAXA Portals

Thematic
Portals



JASMES
Ocean



GSMaP
Precipitation



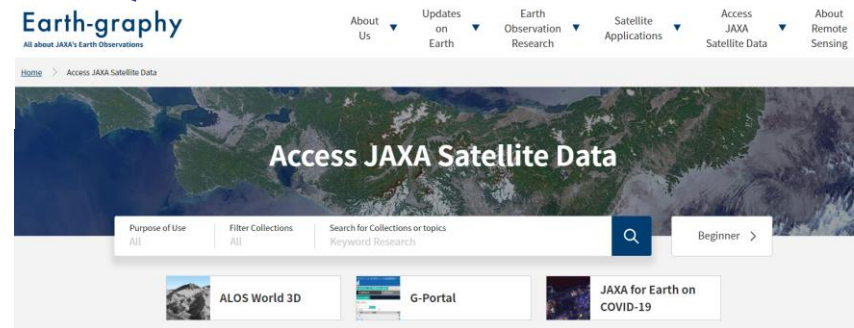
Bousai Interface
Disaster

Knowledge
Hub

Earth-graphy

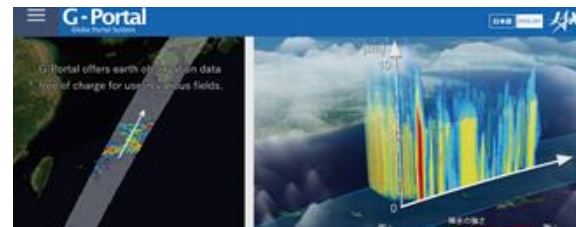
<https://earth.jaxa.jp/en/>

- ✓ Web Portal
- ✓ Knowledge Hub
- ✓ Portal Search (*)



* Associate 21 portals are findable via Earth-graphy.

Data
Provision



G-Portal

Search & Data Provision for JAXA Standard Products

Partner Portals



GDAS GHG

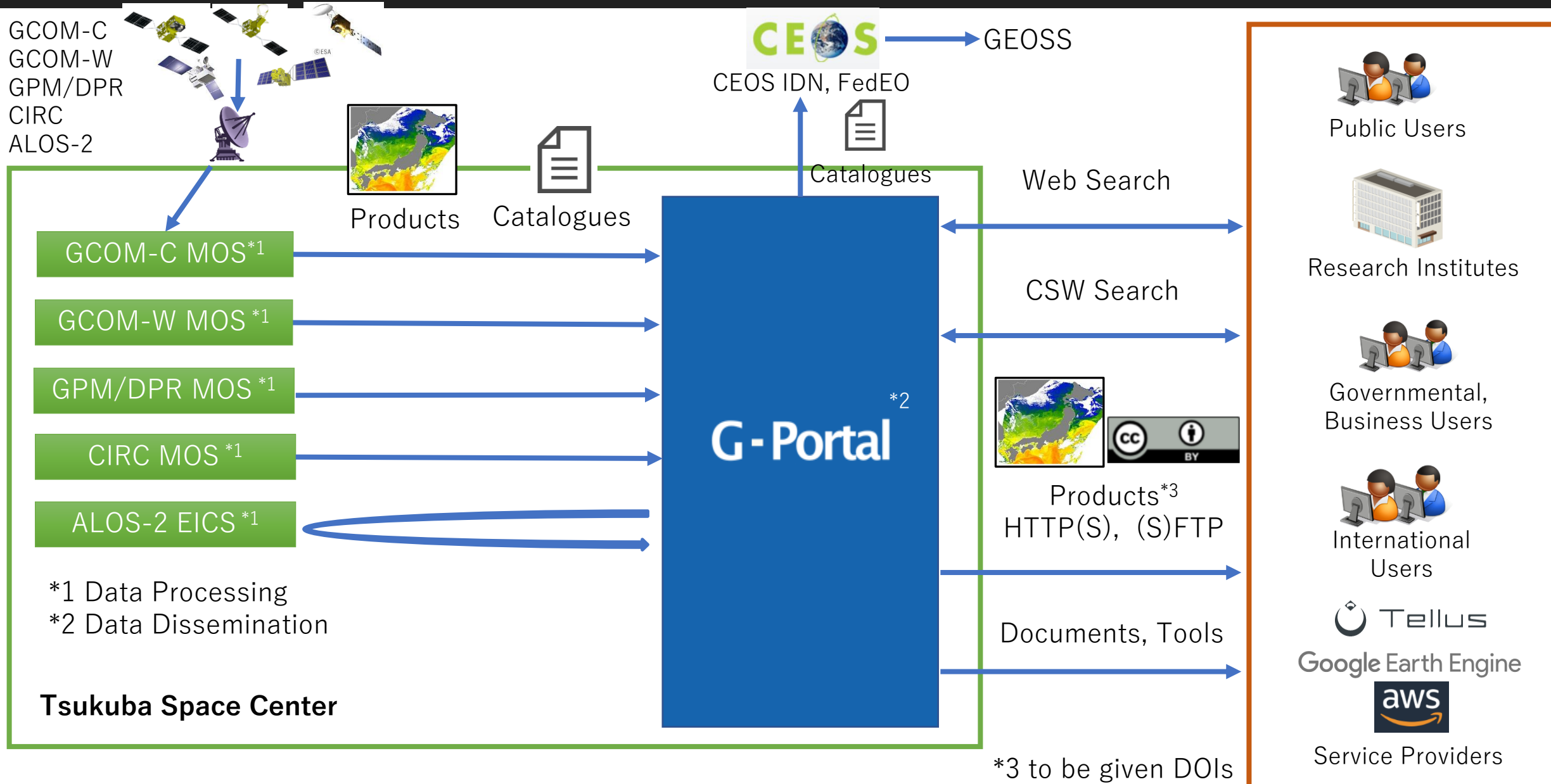


International Charter
Disaster

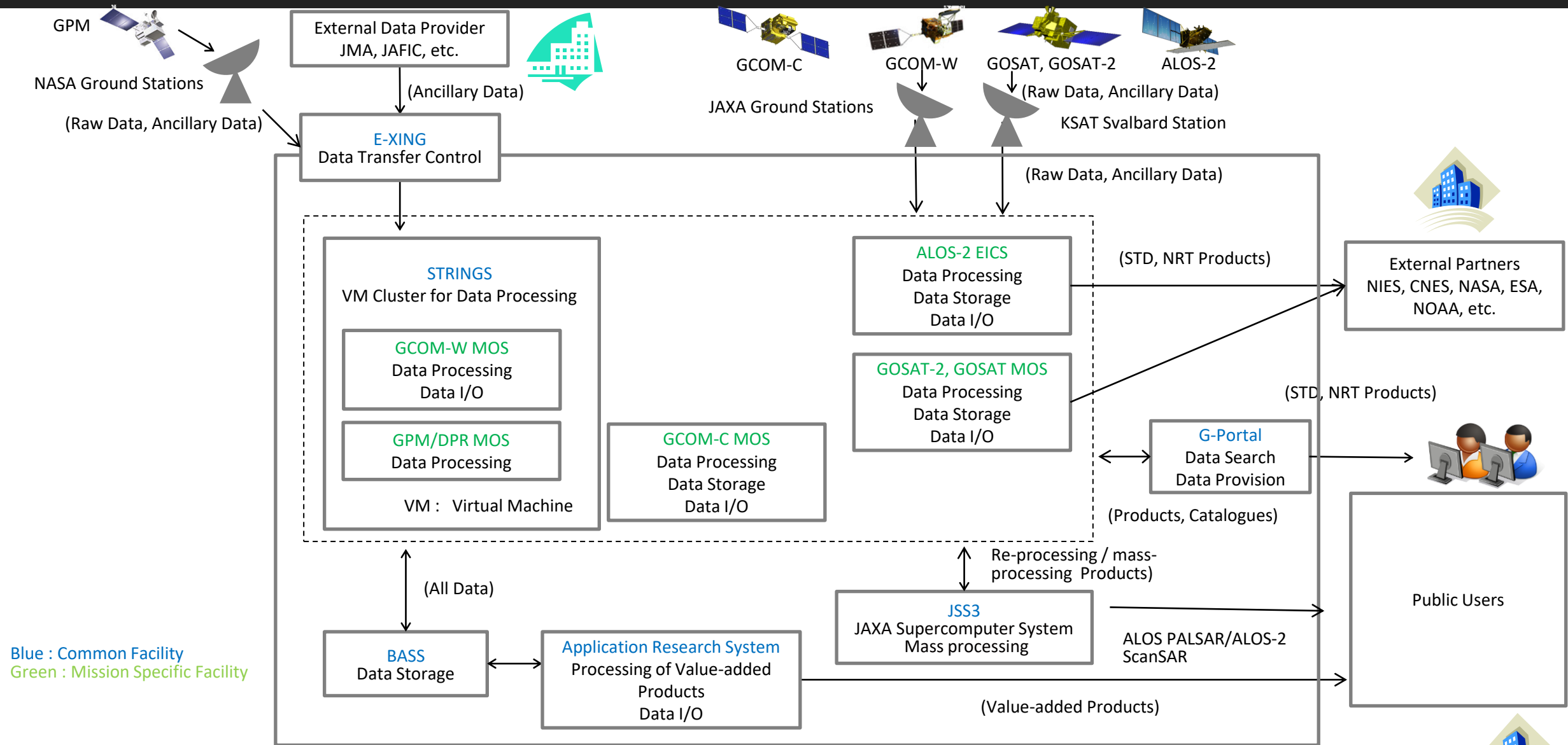


Sentinel Asia
Disaster

JAXA Data Dissemination System: “G-Portal”



JAXA Ground System for Earth Observation Missions



JMA : Japan Meteorological Agency
JAFIC : Japan Fisheries Information Service Center

MOS : Mission Operation System
Processing of Standard Products, Catalogues, Near Real Time data, Products, etc.

STD : Standard
NRT : Near Real Time



Intellectual Properties - Availabilities and Constraints

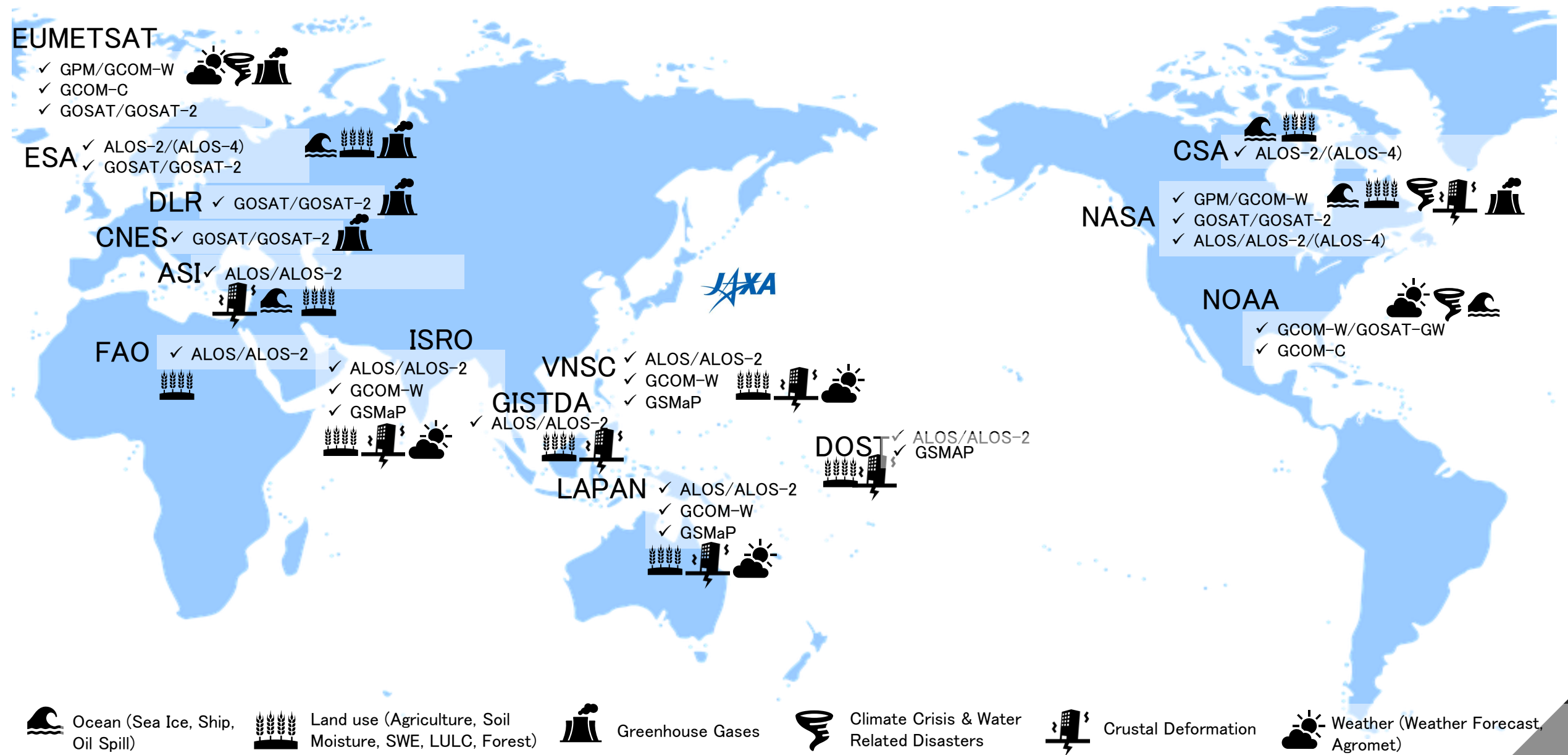
Open and Free

- Mid to Low Resolution Data (including ALOS-2 Scan SAR) and Value Added Products: 5m or lower than 5m resolution
 - Appropriate **citation, acknowledgement** and/or **attribution** of the products is necessary.
 - Any users can access to the products **without limitation on modification or redistribution** to the third party.
 - *Constraints may be applied to some products when the third party's IPs are used.*
- Documents (i.e. ATBD, format description, etc.), libraries, tools and sample programs to handle JAXA products are available to the public.

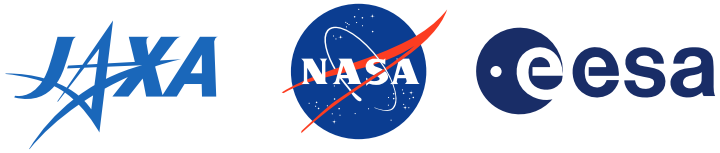
Protected or Licensed

- High Resolution Data: Higher than 5m resolution (For ALOS-2, higher than 10m resolution)
 - Provided for researchers and partner agencies with research/cooperation agreements.
 - For public use, licensees distribute at a market price.
 - Handling further higher resolution data are required to comply with Japanese remote sensing act.
- Some processing software and analysis tools are protected and require license agreements.
- Calibration and validation data are provided for researchers licensed by research agreements.

Science and Applications through Cooperation with International Partners



JAXA-NASA-ESA cooperation in response to COVID-19



- Trilateral collaboration to analyze the changes in the global environment and socio-economic activities before and after the COVID-19 global pandemic using Earth observation satellite data from the three agencies
- Collaboration activities based on the Working Groups:

Air quality and Climate

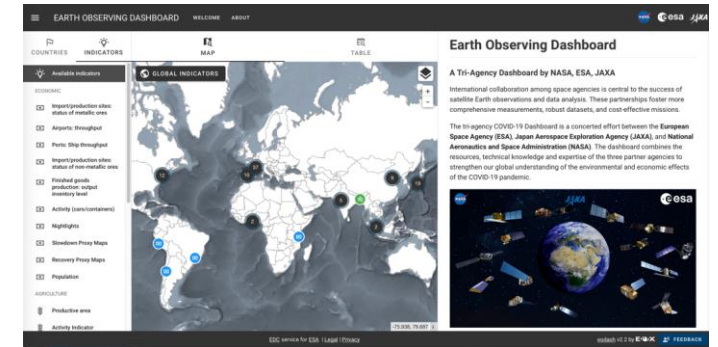
Economic activity

Water quality

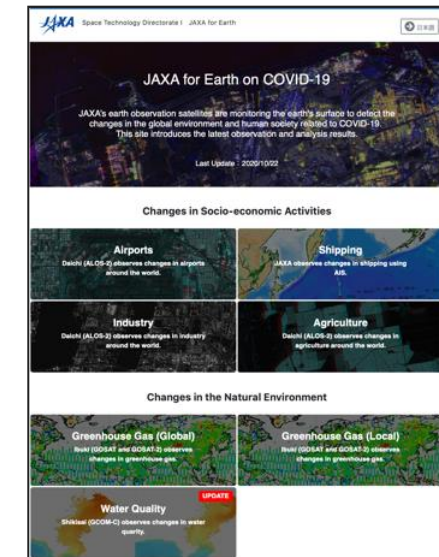
Agriculture

Dashboard

- The three agencies launched “**Earth Observing Dashboard**” on 25 June, 2020. (<https://eodashboard.org>)
- JAXA also launched “**JAXA for Earth on COVID-19**”, a special web page introducing analysis results of JAXA’s Earth observation data on COVID-19, on 25 June, 2020.

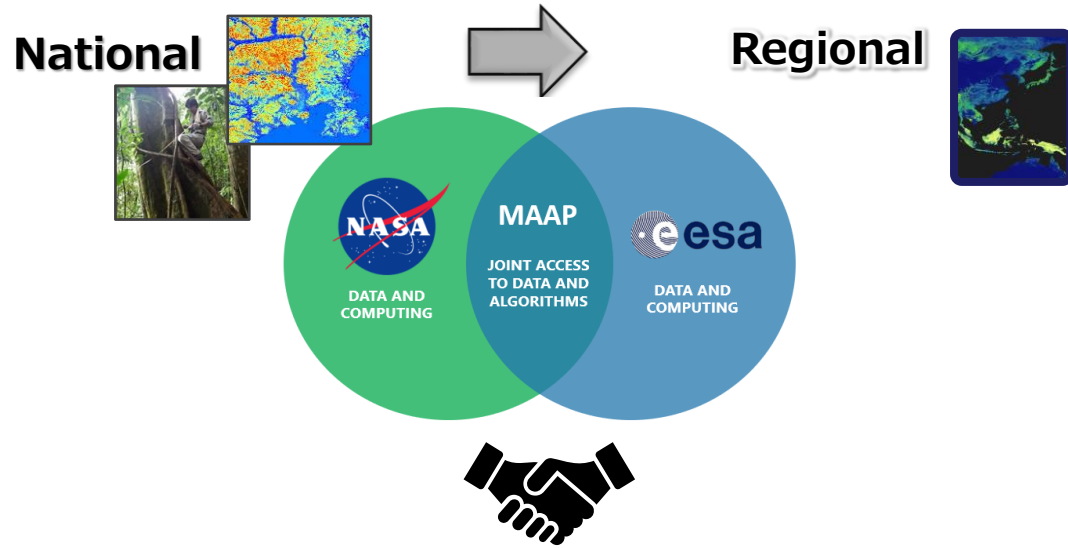


Earth Observing Dashboard
<https://eodashboard.org>

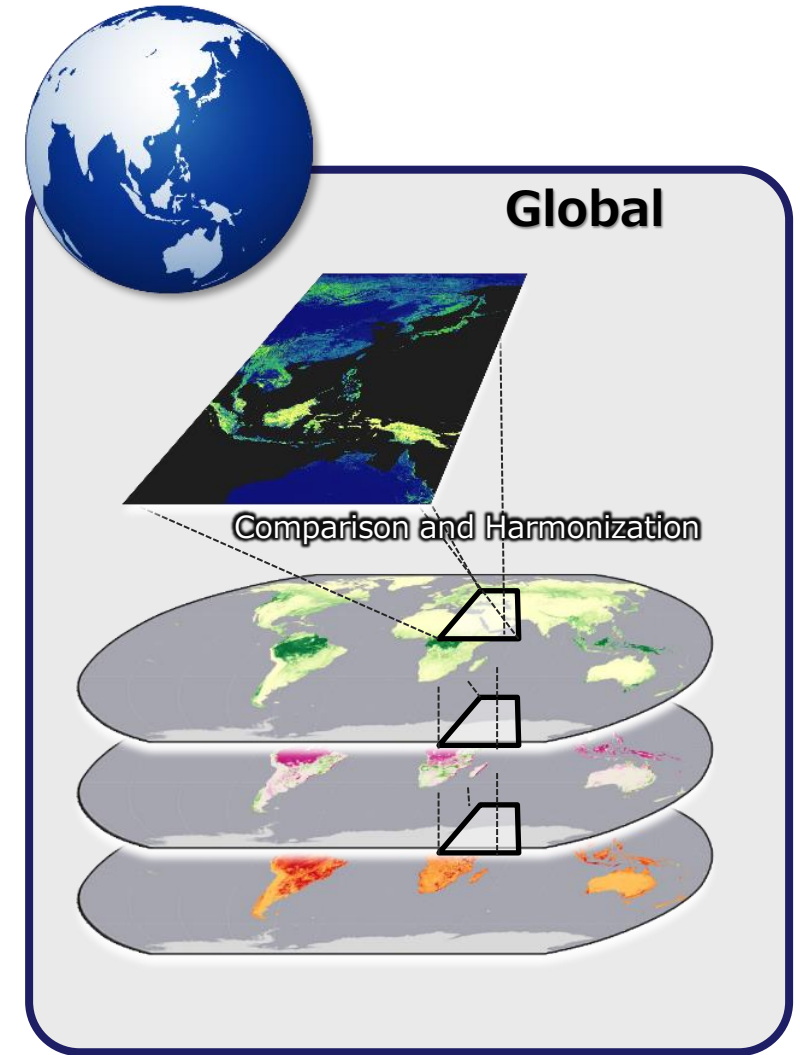
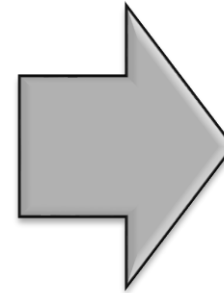
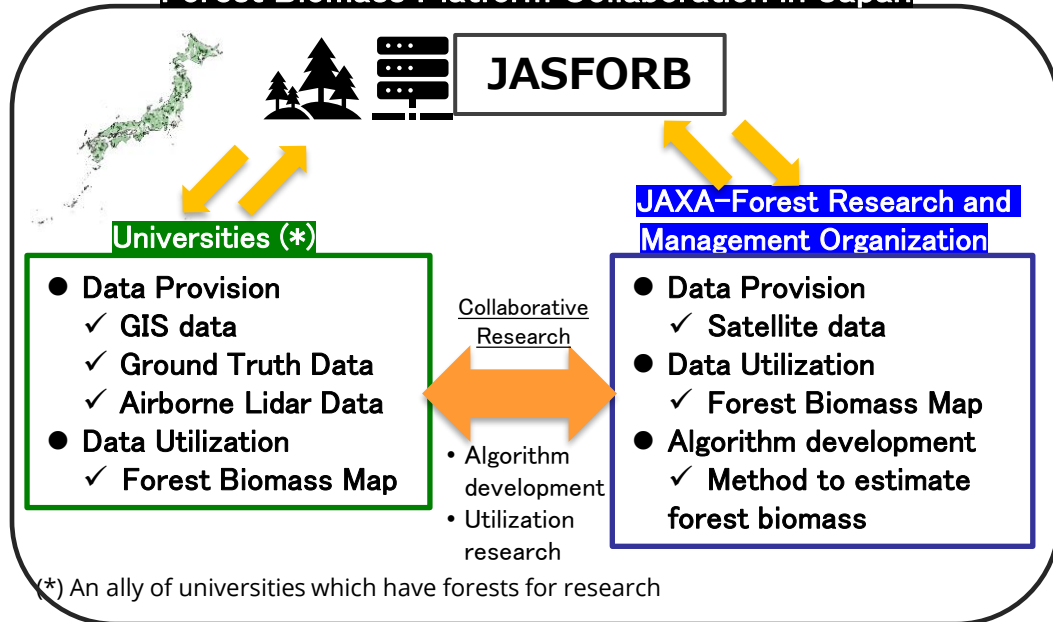


JAXA for Earth on COVID-19
<https://earth.jaxa.jp/covid19/>

Cooperation for Development of Global Biomass Map



Forest Biomass Platform Collaboration in Japan



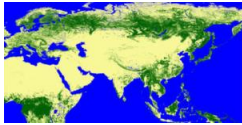
Cooperation with Google Earth Engine



Value Added Products

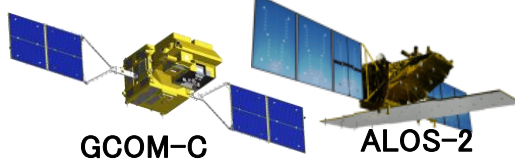


GSMaP
(Precipitation)



Forest/Non-Forest Map

Analysis Ready Data



GCOM-C

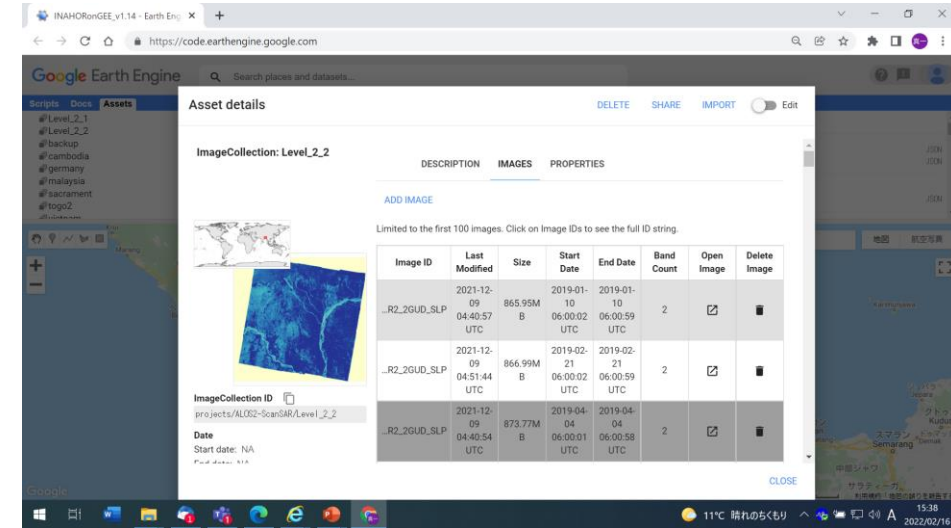
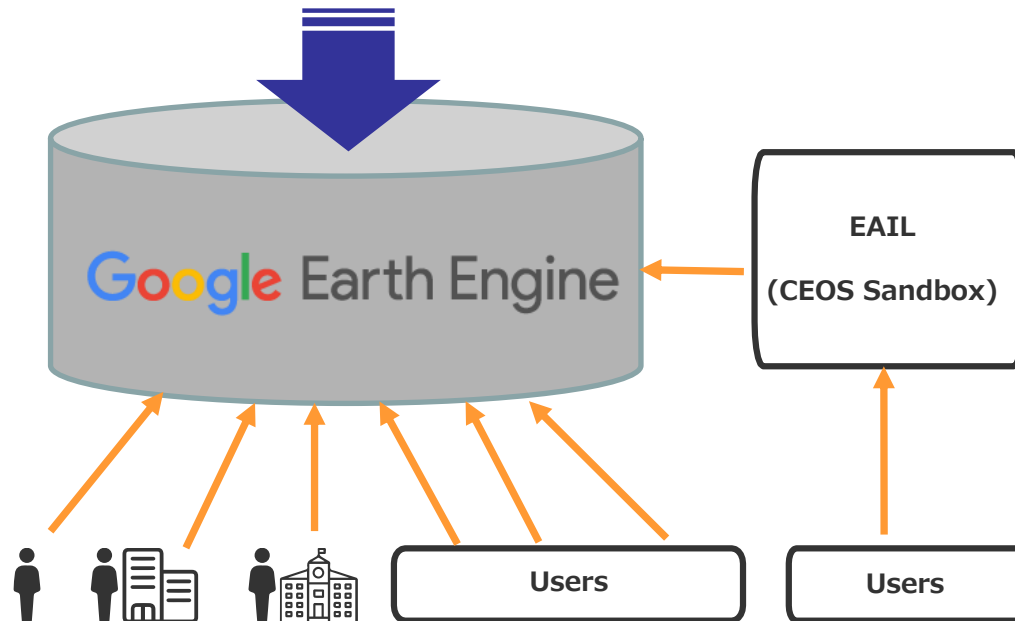
ALOS-2

Software

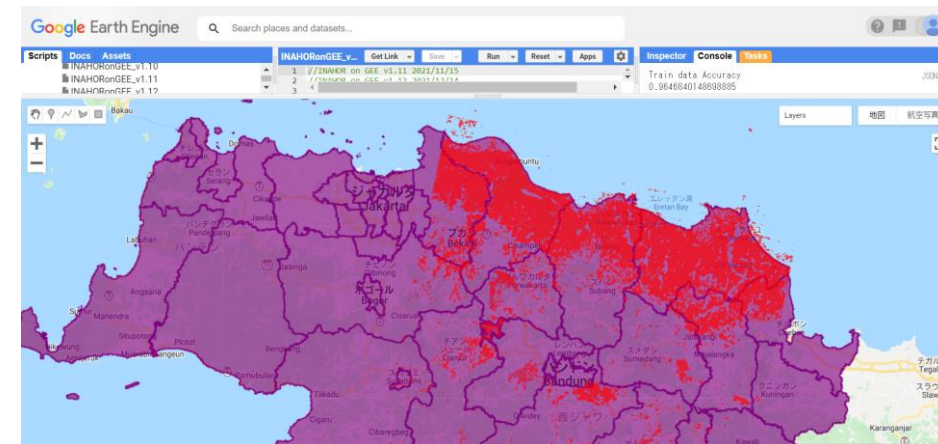


INAHOR

(Rice crop monitoring S/W)



- ✓ Bangladesh ALOS-2 ScanSAR ARD is now available on GEE.
- ✓ From April 2022, more ALOS-2 ARD will be installed on GEE.

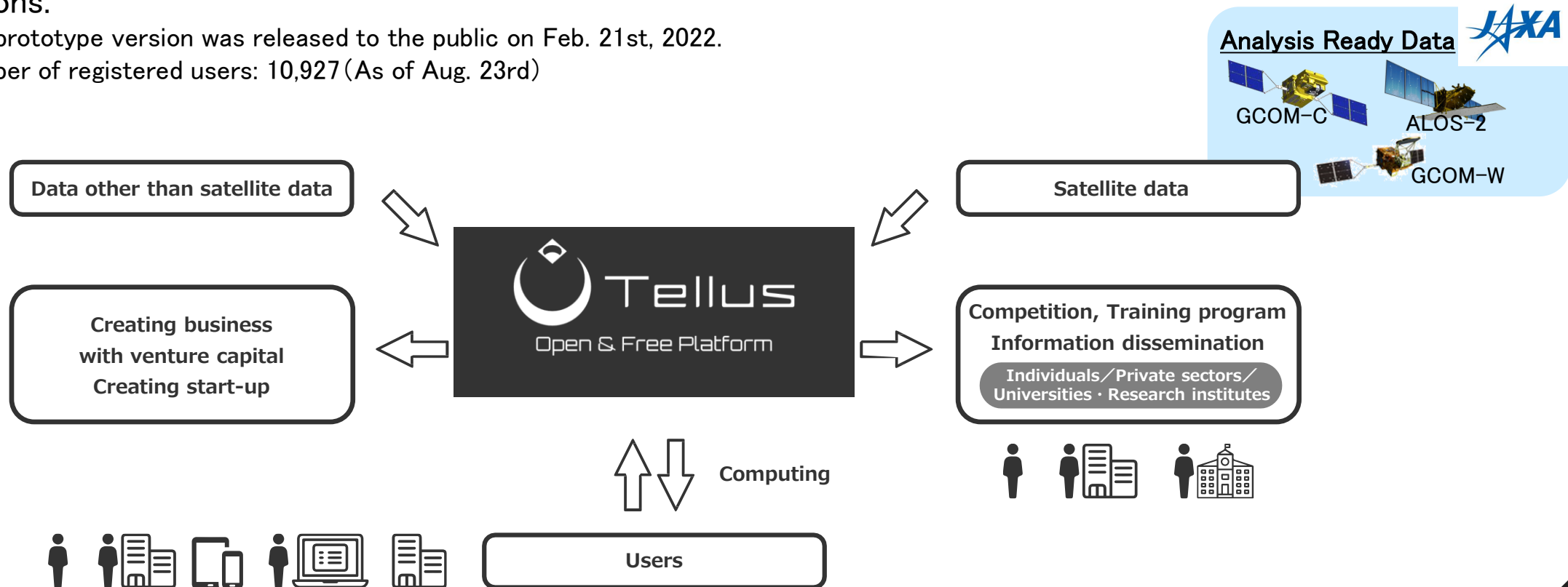


- ✓ Rice crop estimation for Indonesia processed with INAHOR.

Japanese national satellite data platform “Tellus”



- ❑ “Tellus” is a development and maintenance of data platform aimed for enhancement of satellite data utilization for business purposes launched by Ministry of Economy, Trade and Industry of Japan (METI).
- ❑ Followings are available for free of charge in principle:
 - ✓ Space-based data
 - ✓ AI and software to analyze images
- ❑ Computing Resources are available on the Cloud together with user-friendly environment for development and applications.
 - ✓ The prototype version was released to the public on Feb. 21st, 2022.
 - ✓ Number of registered users: 10,927 (As of Aug. 23rd)



Earth Observation Contributing to Humanities and Social Sciences



- Earth observation satellite data can be applied not only for gaining the scientific knowledge, but also for **the humanities and social science study**.
- JAXA is promoting utilization of satellite data in **economics and social science research** in universities.

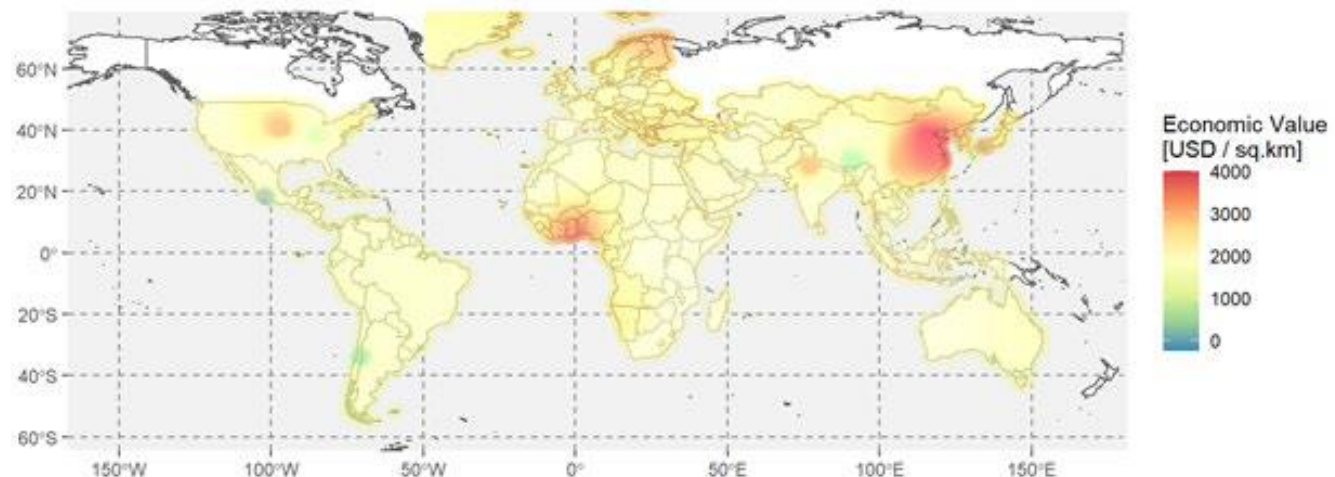
A) Dr. MANAGI Shunsuke, Distinguished Professor

Urban Institute Departments of Urban and Environmental Engineering, School of Engineering, Kyushu University

“Socio-economic analysis using Satellite Data: Measuring intangible assets”

Economic value assessment related to COVID-19 and the short-term reduction in CO₂ emissions utilizing GOSAT data

Global Benefits of CO₂.
Higher value (red areas) indicate higher estimated benefits associated with CO₂ reduction. Low values (blue areas) indicate low estimated benefits associated with CO₂. According to the calculations, the benefits of cities in Europe and China are higher than that in other regions.



Earth Observation Contributing to Humanities and Social Sciences



B) Dr. KURATA Masamitsu, Associate Professor
Department of Economics, Faculty of Economics, Sophia University

“COVID-19 pandemic impact on Boro harvest in Bangladesh”

Verification of the impact on ① crop production and ② harvest time during the dry season rice crop (Boro) in Bangladesh due to the spread of COVID-19 and associated lockdown

C) Dr. TOJO Bumpei, World Language and Society Education Centre, Tokyo University of Foreign Studies
(At the time of writing: School of Tropical Medicine and Global Health, Nagasaki University)

“Public health assessment of Earth observation satellite data related to COVID-19 – Time series comparing nighttime lights (VIIRS) and solar radiation (SGLI) with changes in the number of newly infected people in Japan –”

Analysis of relationship between COVID-19 spread and social activity level with night lights detected by VIIRS (Visible Infrared Imaging Radiometer Suits) and weather conditions (solar radiation)

Challenges and Thoughts



- JAXA is gradually addressing to open-source science and has started with modification or improvement of data dissemination system. JAXA has also started cooperation with various partners including service providers to promote open science.
- **Conditions of intellectual properties**, particularly software and tools, **vary** each satellite mission and many software and tools are **not** intended to **open to the public**. **Cost of processing** of huge volume satellite data, i.e. ALOS-2, is also a challenge to have them available with open and free condition.
- **Partnership is indispensable** for enhancement of further scientific researches and downstream applications for next generation.
 - JAXA's IT resources and capabilities are limited to address to integration of bigdata and AI.
 - In order to have satellite observation install into the society, promoting applications for economics and social sciences is indispensable.
- JAXA is **interested in NASA's open-source science initiative** as an opportunity to promote scientific researches and applications for next generation.

Thank you for your attention.