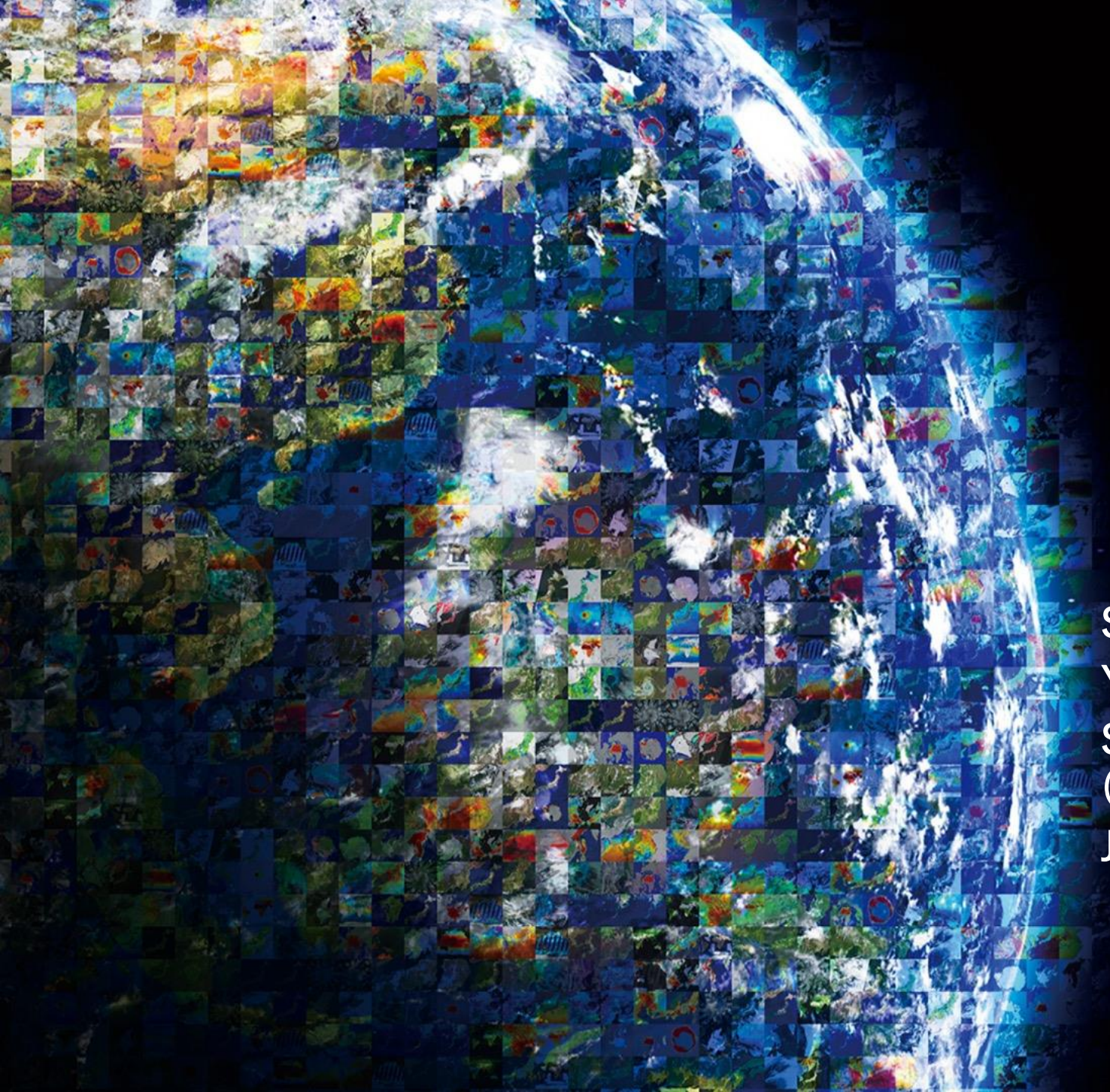
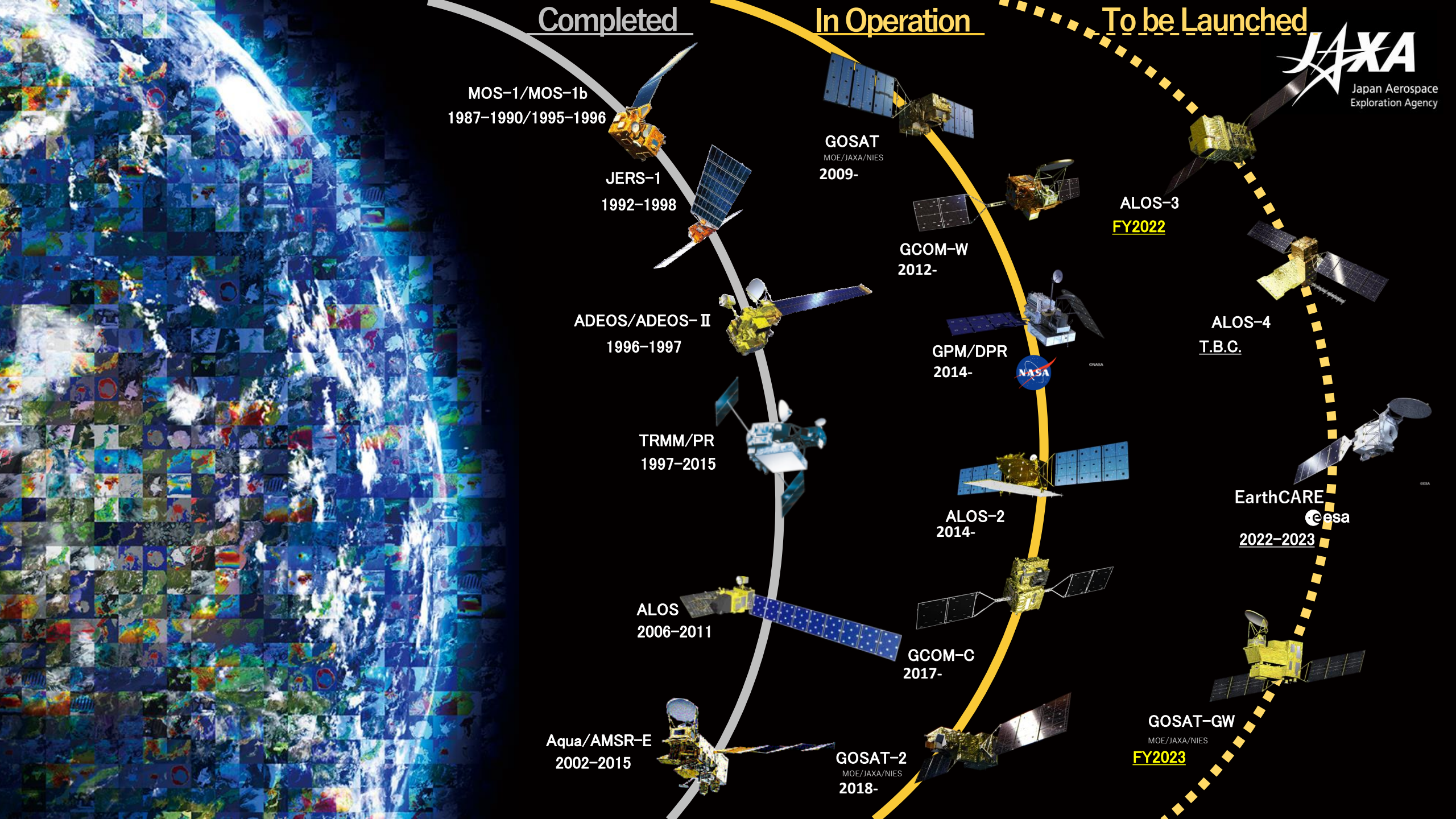


JAXA Agency Report

September 6, 2022
Yousuke Ikehata
Satellite Applications and Operations Center (SAOC)
Japan Aerospace Exploration Agency


Completed
In Operation
To be Launched
JAXA
Japan Aerospace Exploration Agency
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
GOSAT
MOE/JAXA/NIES
2009-
GCOM-W
2012-
GPM/DPR
2014-
ALOS-2
2014-
GCOM-C
2017-
GOSAT-2
MOE/JAXA/NIES
2018-
ALOS-3
FY2022
ALOS-4
T.B.C.
EarthCARE
esa
2022-2023
GOSAT-GW
MOE/JAXA/NIES
FY2023

JAXA Portals and Data Provision to Partner Portals

JAXA Portals

Thematic Portals

JASMES
Ocean

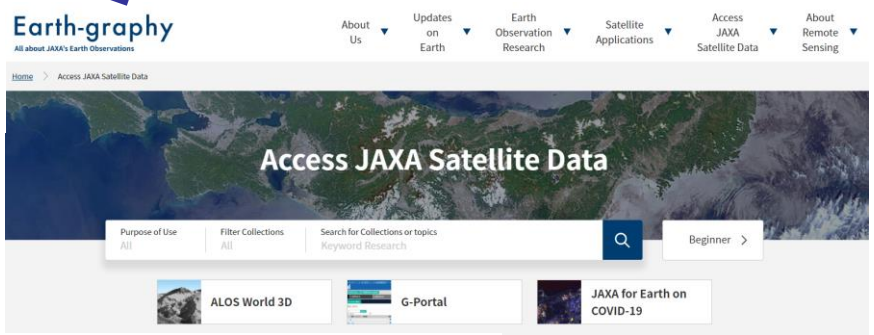
GSMaP
Precipitation

Bousai Interface
Disaster

Knowledge Hub

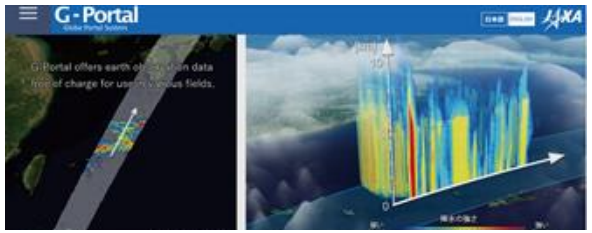
Earth-graphy
https://earth.jaxa.jp/en/

- ✓ 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

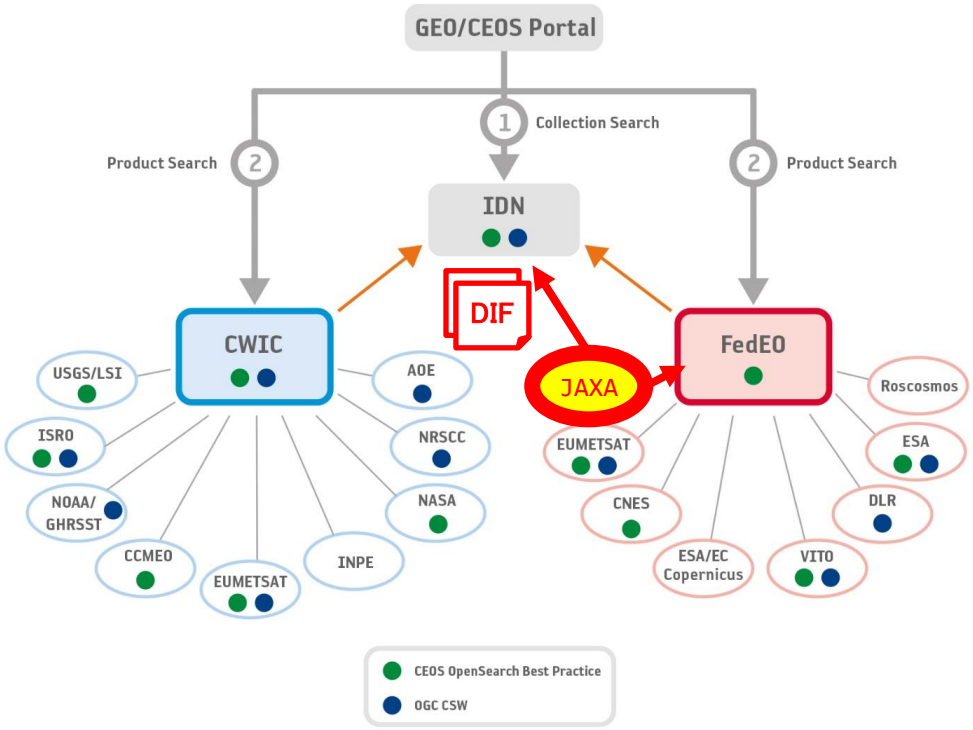
GDAS GHG

International Charter
Disaster

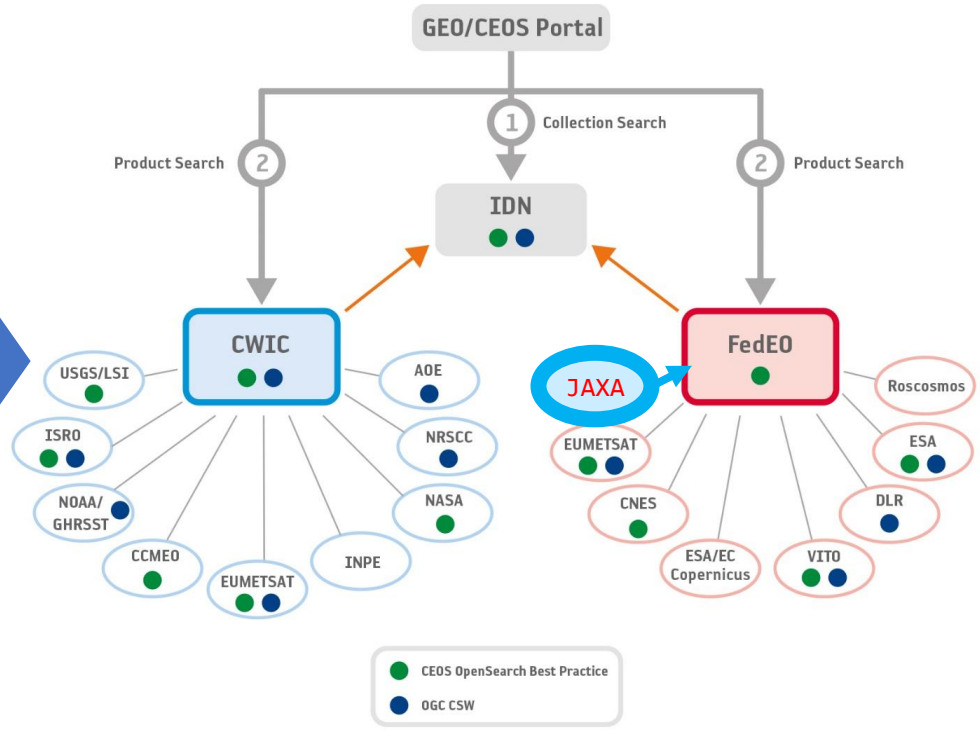
Sentinel Asia
Disaster

Catalog linkage

- Uploading by multi path/ways
  - JAXA -> IDN by DIF
  - JAXA -> FedEO by Opensearch

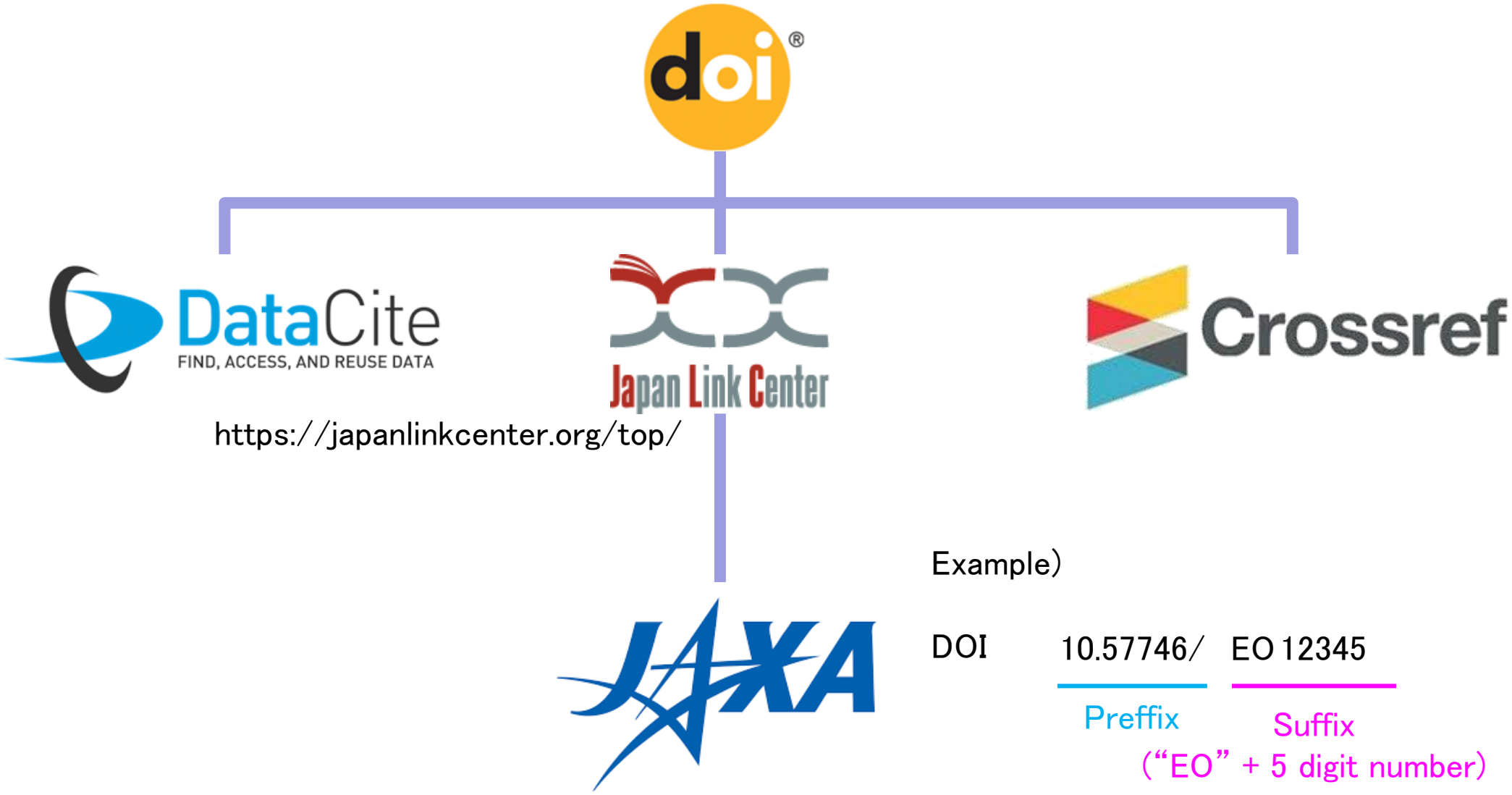


- Unified into FedEO



After Apr. 2024

Start to assign a DOI to EO dataset



Example)

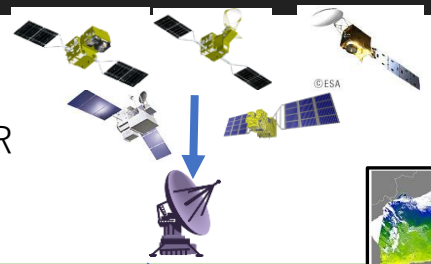
DOI 10.57746/ EO 12345

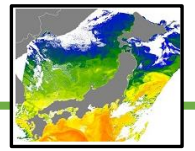
Preffix

Suffix
(“EO” + 5 digit number)

JAXA Data Dissemination System: “G-Portal”

GCOM-C
GCOM-W
GPM/DPR
CIRC
ALOS-2





Products

Catalogues

CEOS IDN, FedEO

GEOSS

Catalogues

GCOM-C MOS*1

GCOM-W MOS *1

GPM/DPR MOS *1

CIRC MOS *1

ALOS-2 EICS *1

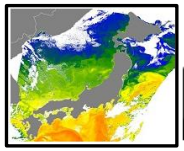
*1 Data Processing
*2 Data Dissemination

Tsukuba Space Center

G-Portal *2

Web Search

CSW Search



Products*3
HTTP(S), (S)FTP

Documents, Tools

*3 to be given DOIs

Public Users

Research Institutes

Governmental, Business Users

International Users

Tellus

Google Earth Engine

aws

Service Providers

JAXA Ground System for Earth Observation Missions

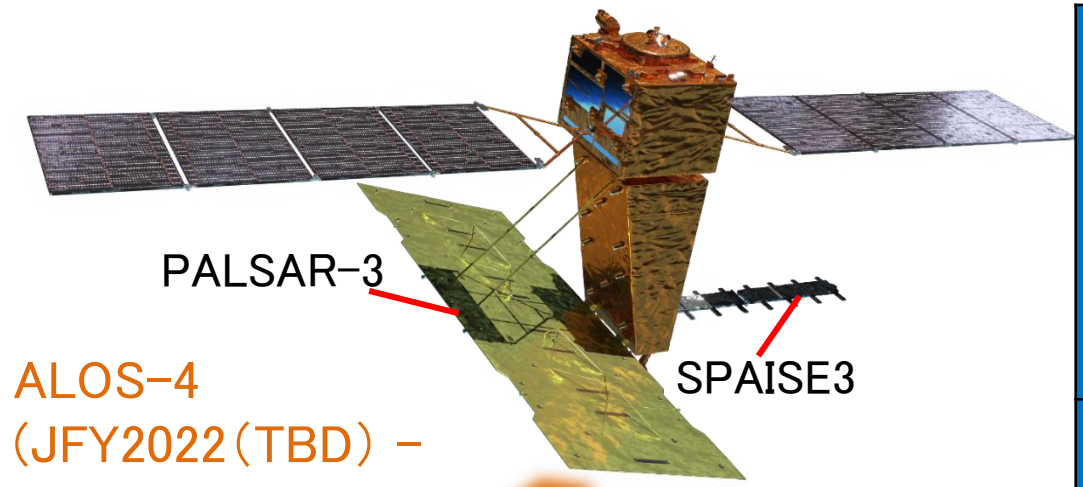
Blue : Common Facility
Green : Mission Specific Facility

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

1. ALOS-4 Overview



ALOS-4
(JFY2022(TBD) -

ALOS-2 (2014 -)

ALOS(2006 - 2011)
PALSAR, AVNIR-2, PRISM

Orbit	**Same orbit as ALOS-2** ✓ Sun-synchronous sub-recurrent orbit ✓ Altitude: 628 km ✓ Inclination angle: 97.9 degree ✓ Local sun time at descending: 12:00 ± 15 min. ✓ Revisit time: 14 day (15-3/14 rev/day)
Lifetime	**7 years**
Size	X 10.0 m x Y 20.0 m x Z 6.4 m
Satellite Mass	~2,990 kg
Downlink	**1.8/3.6 Gbps (Ka-band)**
Mission Instruments	- **PALSAR-3** (Phased Array type L-band Synthetic Aperture Radar-3) - **SPAISE3** (SPace based AIS Experiment 3)
Prime contractor	Mitsubishi Electric Corporation

Intellectual Properties - Availabilities and Constraints

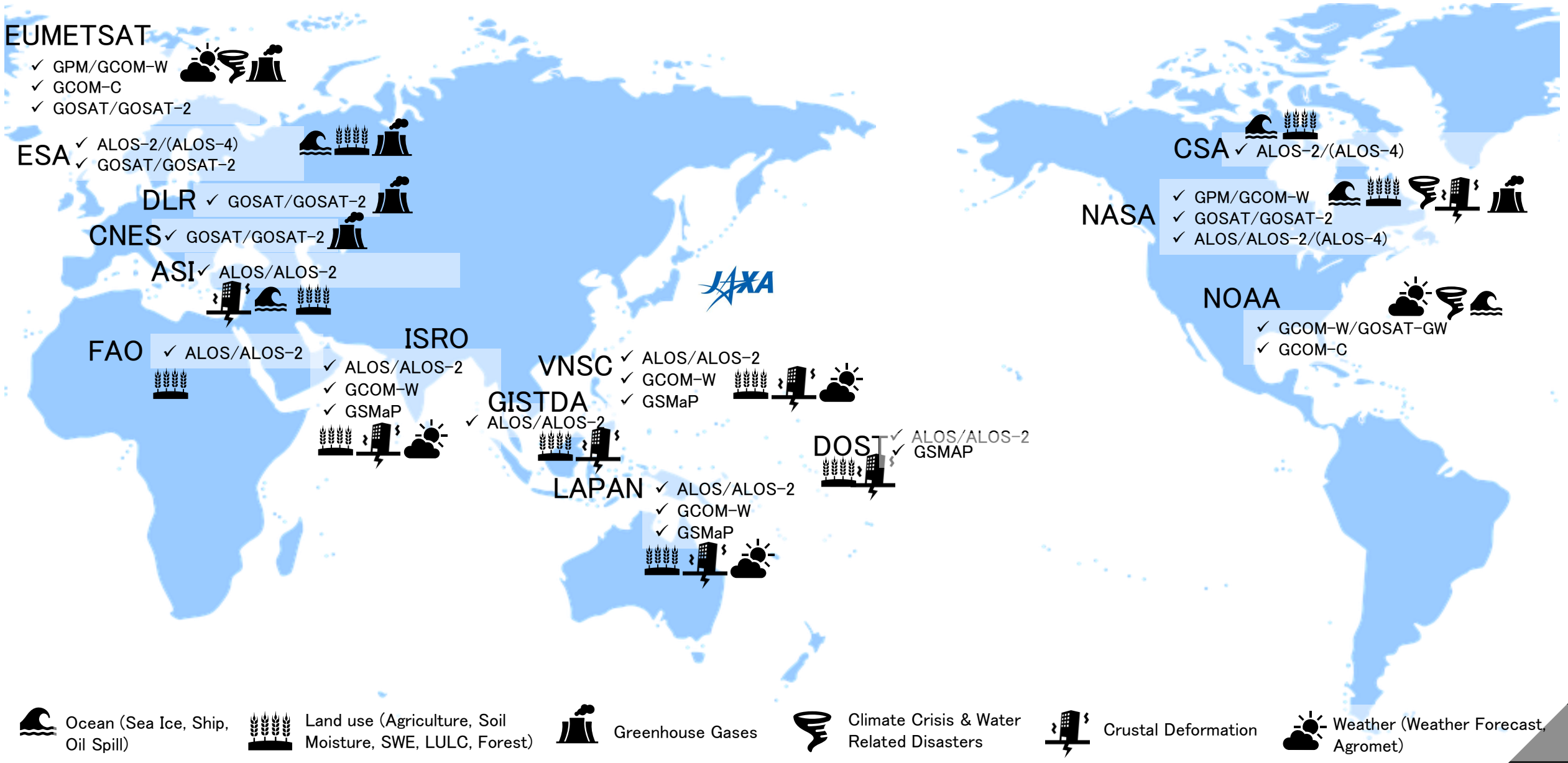
Open and Free

- 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

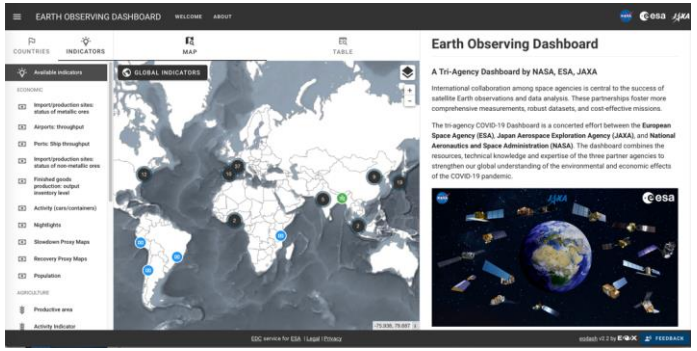


JAXA-NASA-ESA cooperation in response to COVID-19

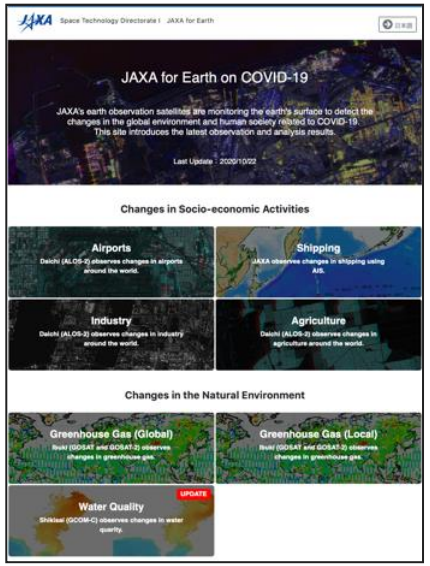
- Trilateral collaboration to analyze the changes in the global environment and socio-economic activities before and after the COVID-19 global pandemic using Earth observation satellite data from the three agencies
- Collaboration activities based on the Working Groups:

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.

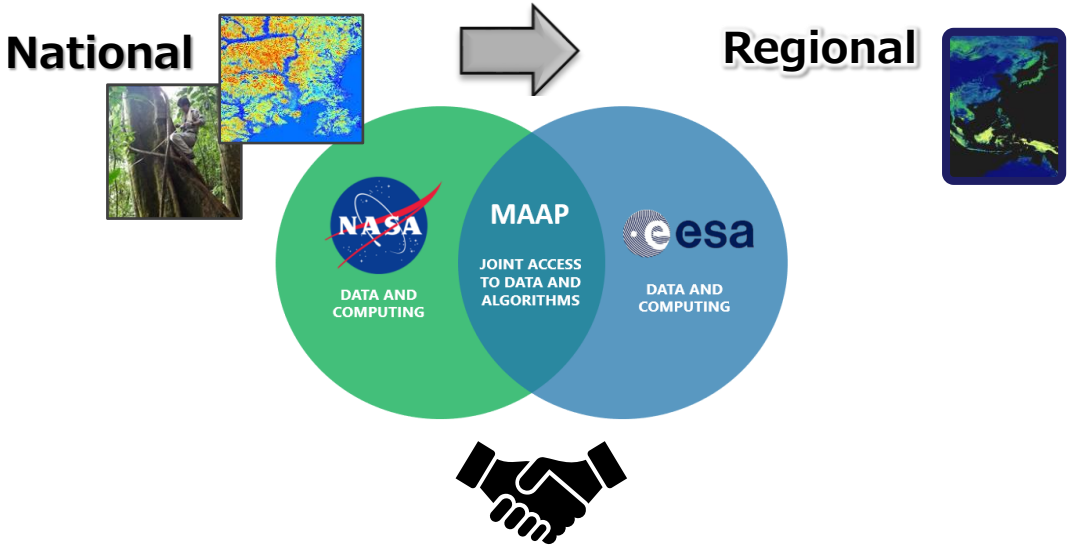


Earth Observing Dashboard
https://eodashboard.org



JAXA for Earth on COVDI-19
https://earth.jaxa.jp/covid19/

Cooperation for Development of Global Biomass Map



Forest Biomass Platform Collaboration in Japan

JASFORB

Universities (*)

- Data Provision
  - ✓ GIS data
  - ✓ Ground Truth Data
  - ✓ Airborne Lidar Data
- Data Utilization
  - ✓ Forest Biomass Map

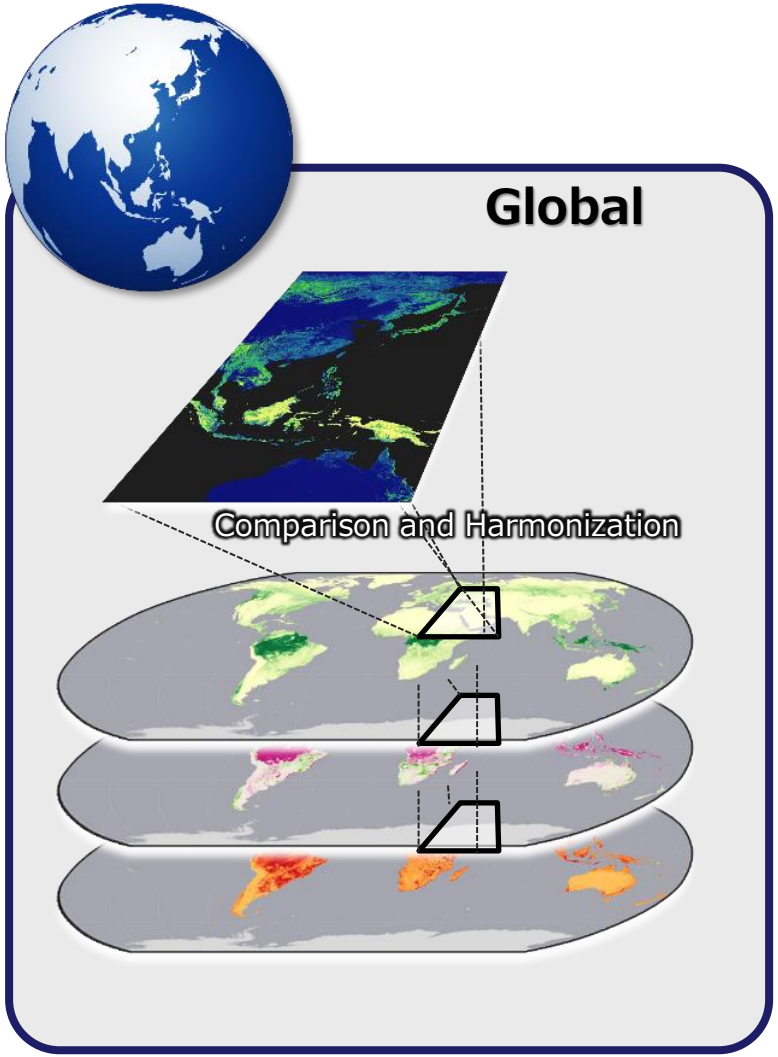
Collaborative Research

- Algorithm development
- Utilization research

JAXA–Forest Research and Management Organization

- Data Provision
  - ✓ Satellite data
- Data Utilization
  - ✓ Forest Biomass Map
- Algorithm development
  - ✓ Method to estimate forest biomass

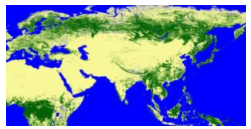
(*) An ally of universities which have forests for research



Cooperation with Google Earth Engine

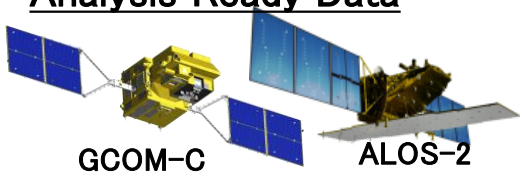
Value Added Products

GSMaP
(Precipitation)



Forest/Non-Forest Map

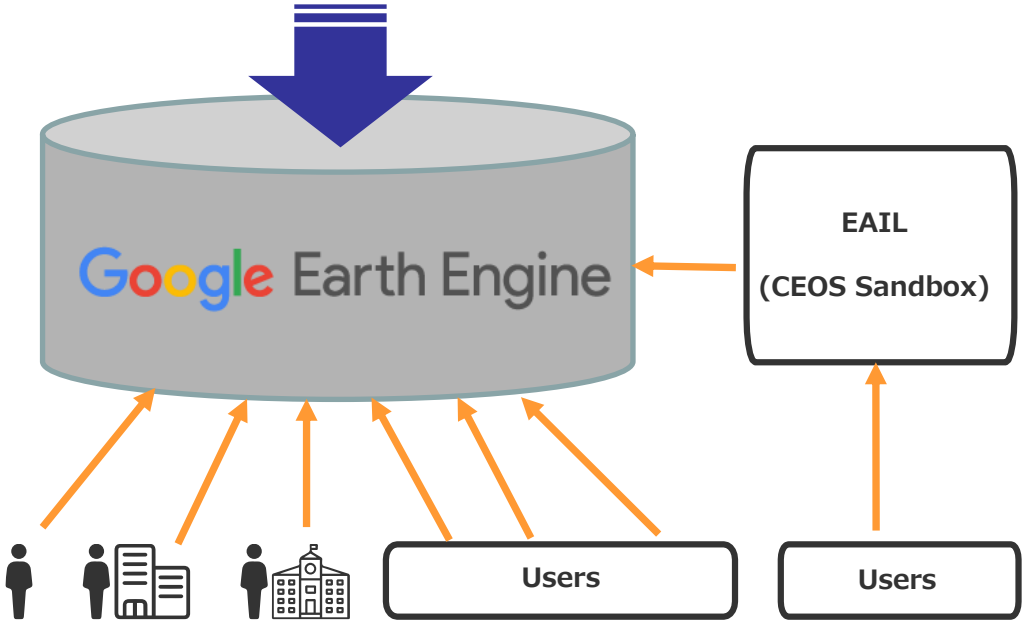
Analysis Ready Data

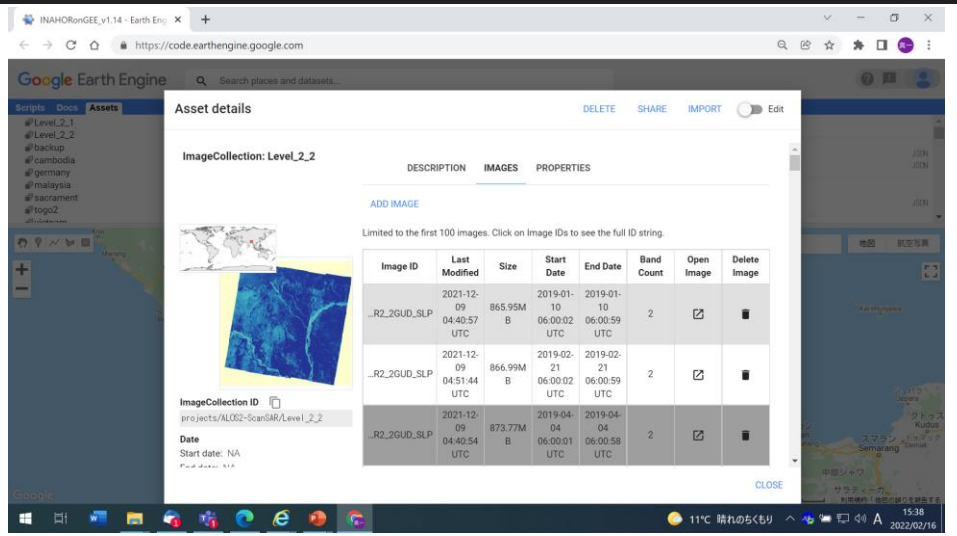


GCOM-C　　ALOS-2

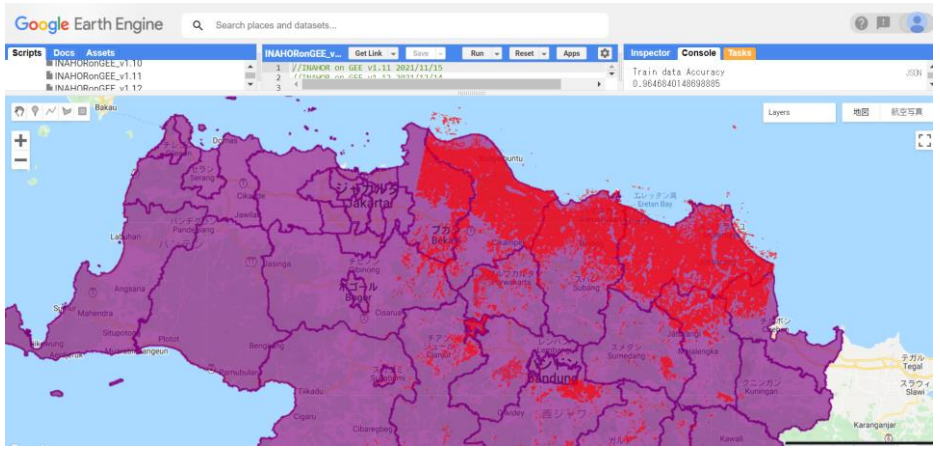
Software

INAHOR
(Rice crop monitoring S/W)





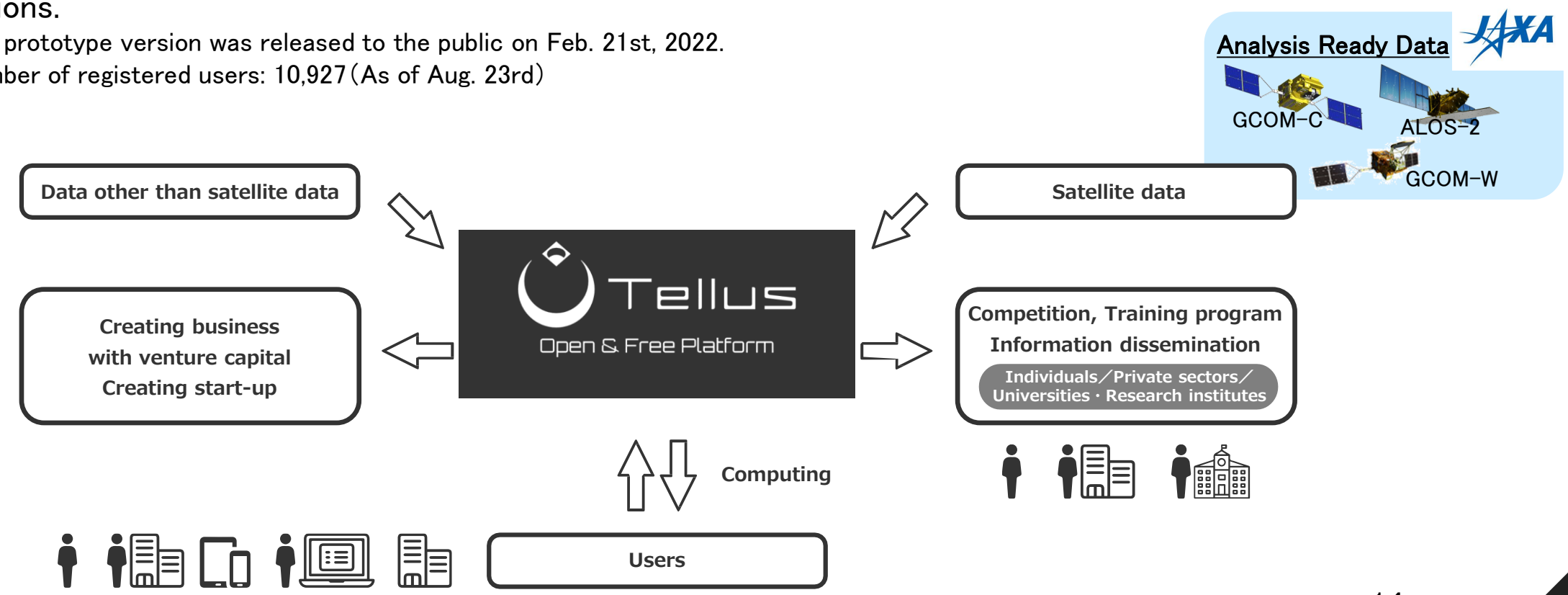
- ✓ Bangladesh ALOS-2 ScanSAR ARD is now available on GEE.
- ✓ From April 2022, more ALOS-2 ARD will be installed on GEE.



✓ 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）



Tellus website : https://www.tellusxdp.com/en-us/

Earth Observation Contributing to Humanities and Social Sciences

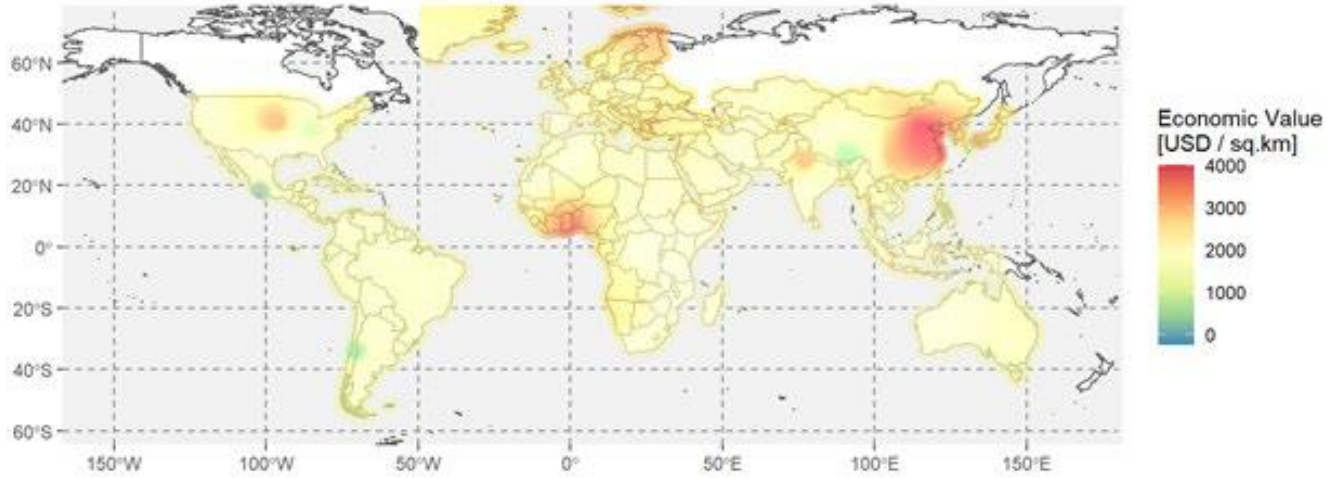
- Earth observation satellite data can be applied not only for gaining the scientific knowledge, but also for the humanities and social science study.
- JAXA is promoting utilization of satellite data in economics and social science research in universities.

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 ①crop production and ②harvest 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 byVIIRS (Visible Infrared Imaging Radiometer Suits) and weather conditions (solar radiation)

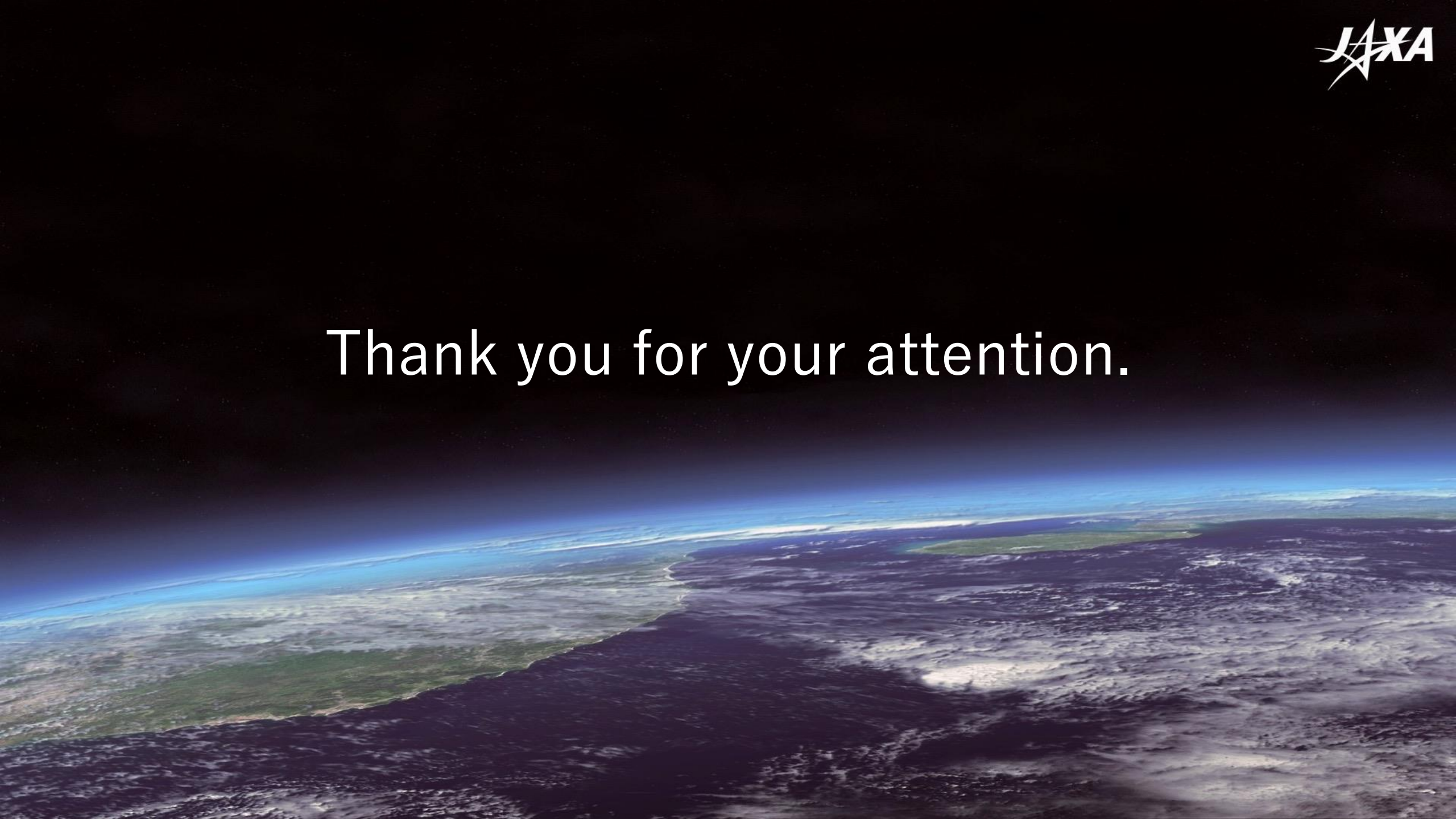
Challenges and Thoughts

- 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.