



JAXA Earth Observations Addressing Water Issues

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WHY Should We Strengthen Science & Technology ?

Disaster Impacts 1980-1999 vs. 2000-2019

[UNDRR, 2020]



Reported disasters



Total deaths



Total affected



Economic loss (\$)

1980
-1999

4,212

1.19
million

3.25
billion

1.63
trillion

2000
-2019

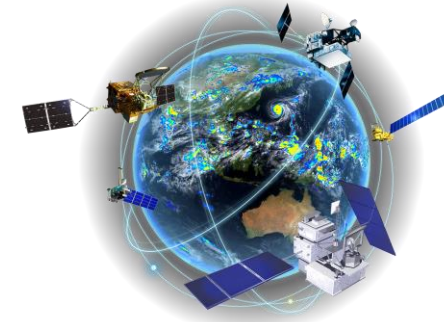
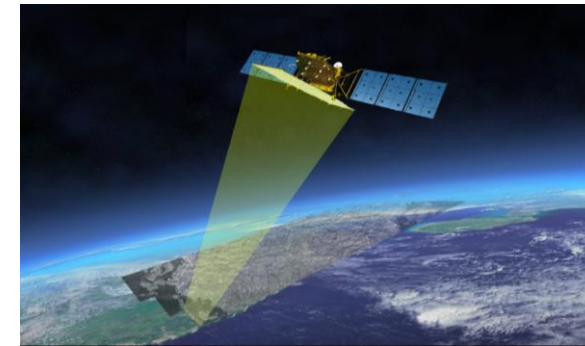
7,348

1.23
million

4.03
billion

2.97
trillion

Advantages of Earth Observation Satellite



- ☐ Wide Coverage
- ☐ Globally Consistent
- ☐ Borderless
- ☐ Not affected by disasters





Completed

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

JERS-1
1992-1998

ADEOS 1996-1997
ADEOS-II 2002-2003

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

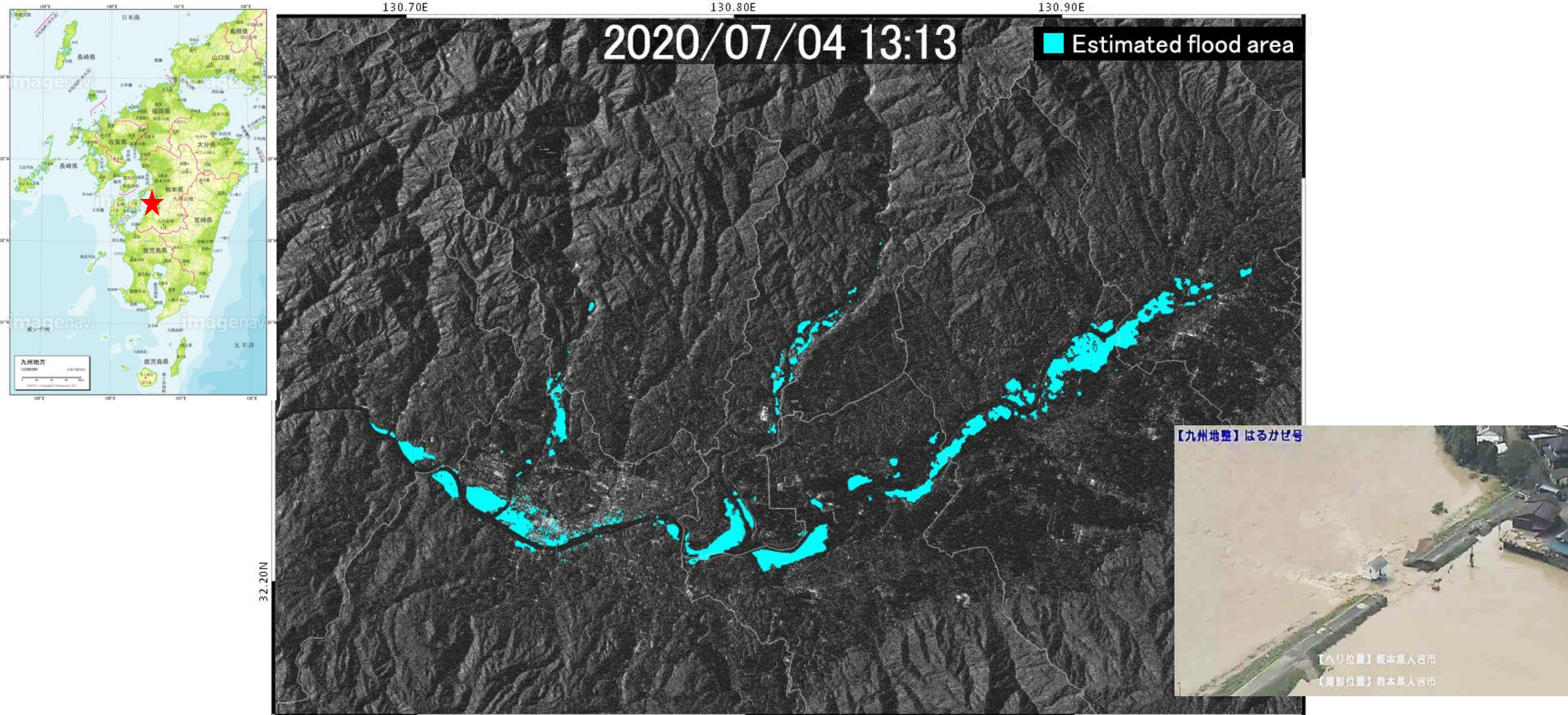
ALOS-3
2022-

ALOS-4
2022-2023

EarthCARE
esa
2023-2024

GOSAT-GW
MOE/JAXA/NIES
2023-2024

Assessing the disaster situation by “DAICHI-2” (ALOS-2) observation



Inundated area around the Kuma river (July 2020)

Photo by Ministry of Land, Infrastructure, Transport and Tourism, Kyusyu Regional Development Bureau

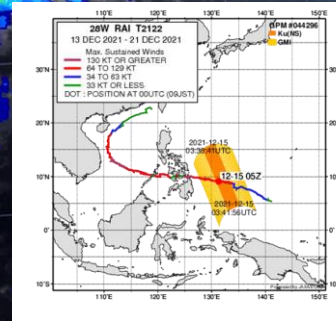
GSMaP and Short-term and Long-term Applications for disaster prevention

Global Satellite Mapping of Precipitation (GSMaP)

- Space-based global rainfall map
- 11 x 11km spatial resolution
- Hourly rainfall data for 22 years (since 2000)



Typhoon Rai passage from the east of the Philippine Sea to the westward.



2021 / 12 / 16 21:00 Z
GSMaP 0.1 1 2 5 10 15 20 30 40 50 [mm/h]

Precipitation from December 13 to 20, 2021 based on GSMaP

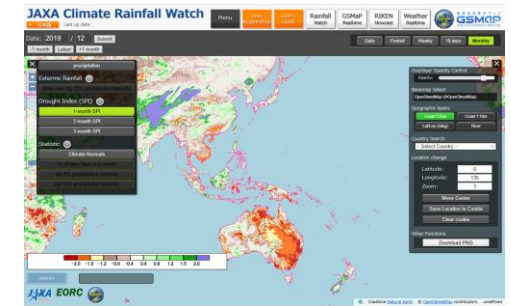
- Cyclone/Heavy rainfall monitoring as supplement to ground-based observations
- GSMaP utilization trainings for Asia pacific regions



- No need to set up any computer specially
- Free to use
- Everyone can view the Website via internet access

- Drought monitoring by JAXA Climate Rainfall Watch

https://sharaku.eorc.jaxa.jp/GSMaP_CLM/

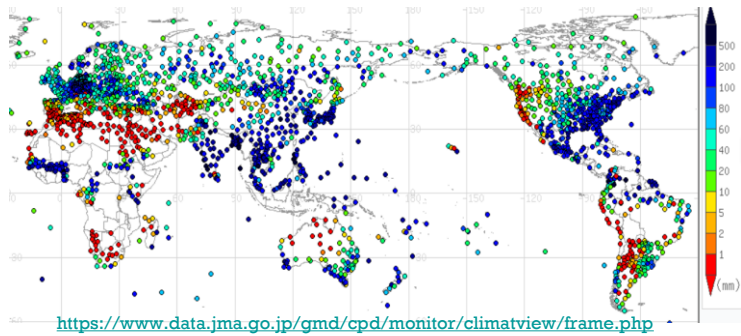


- Contribution to the WMO's Space-based Weather and Climate Extremes Monitoring (SWCEM)
<https://public.wmo.int/en/programmes/wmo-space-programme/swcem>
- Agro-met monitoring by Jaxa's Satellite based Monitoring Network system for FAO AMIS Market Monitor (JASMIN)
<https://suzaku.eorc.jaxa.jp/JASMIN/index.html>

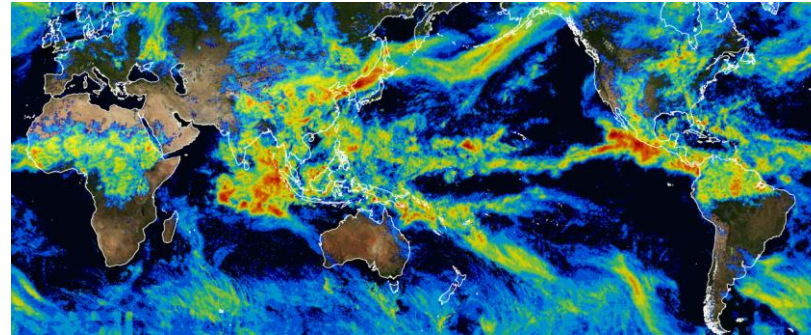
Flood Prediction Realized by Integration of GSMaP and Ground Observations



Ground observations



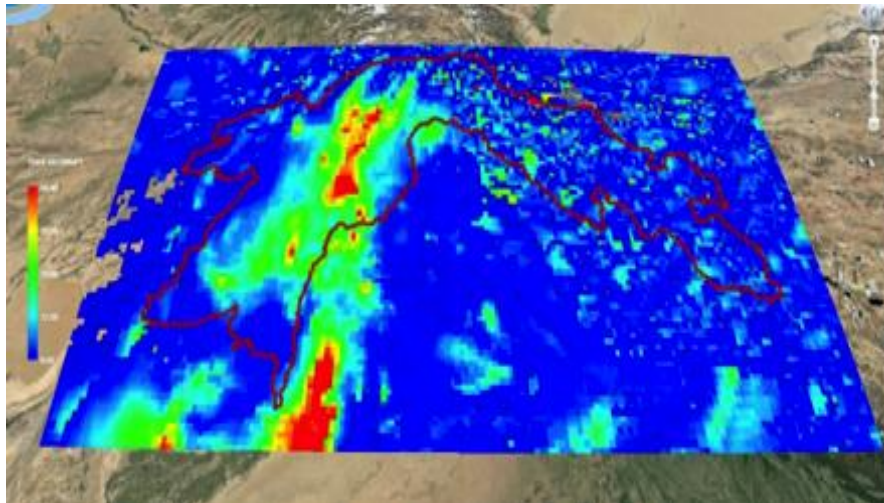
Satellite precipitation (GSMaP)



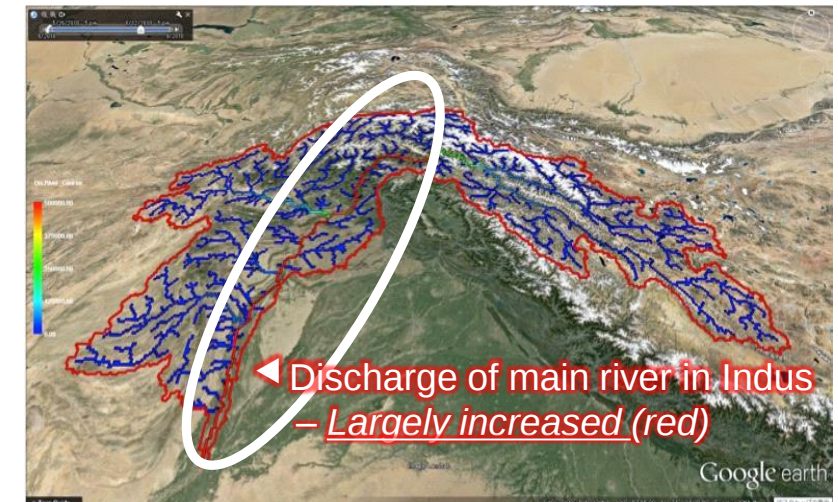
Partners



Rainfall over the river basin
during flood in Pakistan



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



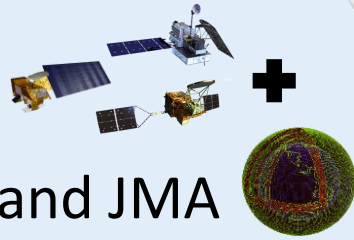
(Images provided by ICHARM)

Global Terrestrial Hydrological Simulation System: Today's Earth



Forcing Data Preparation:

Satellite obs. and JMA
reanalysis/forecast data



Validation

Model Simulation:

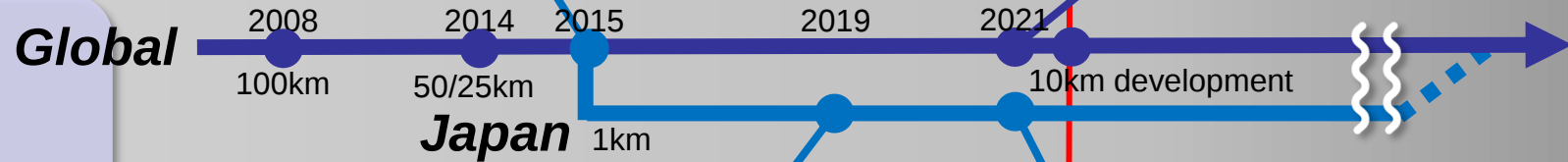
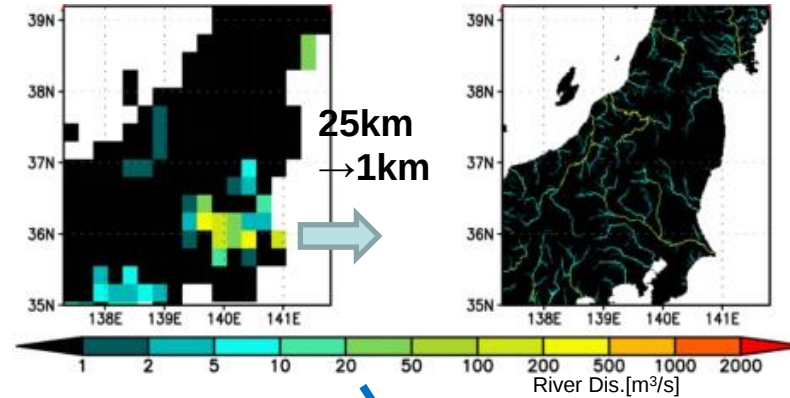
Land Surface Model +
River Routing Model

Accuracy
Improvement

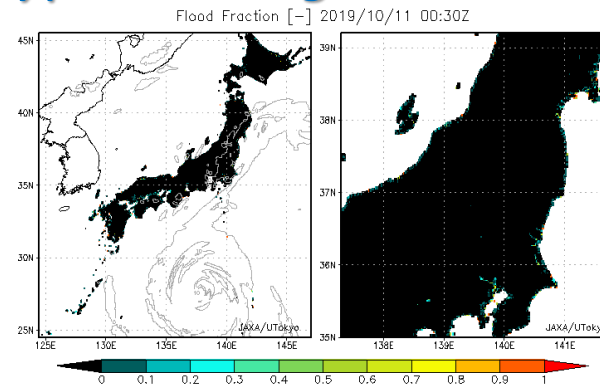
Data Provision:

Various hydrological
parameters with risk
indices

Development of Regional ver.



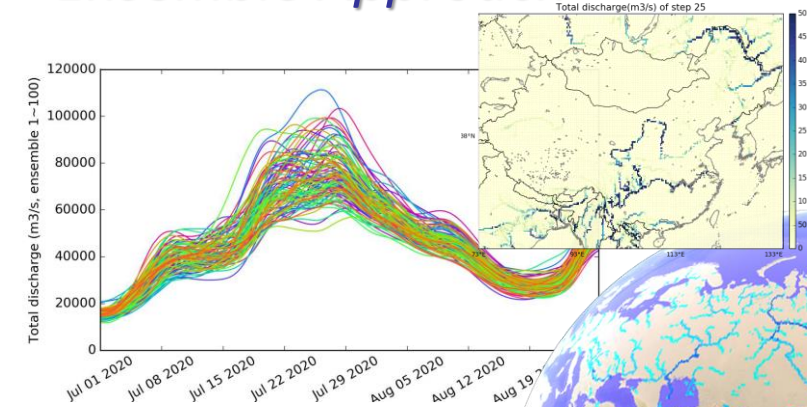
Typhoon Hagibis Forecast



Ma et al., 2021

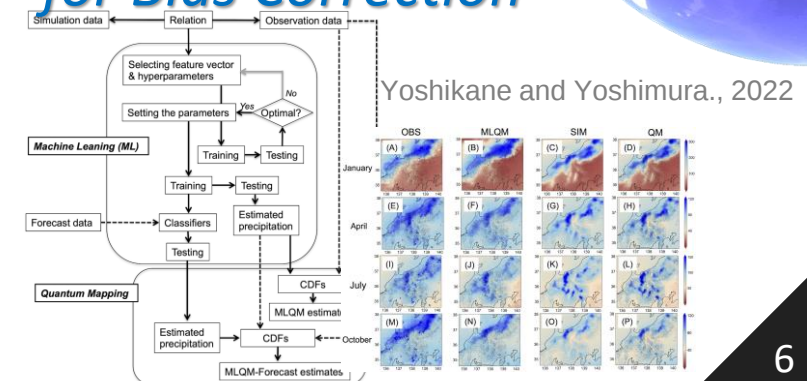
91.6% of the flooded locations are predicted!

Ensemble Approach



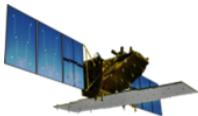
**Super High-Resolution
model (1km)**

Machine Learning for Bias Correction



Yoshikane and Yoshimura., 2022

Readiness of Free and Open – ALOS-2 and ALOS data

		CY 2022				CY 2023			
		1Q Jan Mar	2Q Apr Jun	3Q Jul Sept	4Q Oct Dec	1Q Jan Mar	2Q Apr Jun	3Q Jul Sept	4Q Oct Dec
 ALOS	AVNIR-2 (10 m)					Data Distribution (Open and Free) on less than 30% cloud on G-Portal and Google Earth Engine (GEE)			
	PALSAR FBS/D(10 m), WD(100m)					Process all AVNIR-2 1B2			
						Open and Free on G-Portal			
 ALOS-2	PALSAR-2 ScanSAR (100m)	Process CARD4L (L2.2) Asia & Africa				GEO2022 week			
		Process L1.1 Asia and Africa				Open and Free on G-Portal. GEE and open repository on AWS			
						Process L1.1 and L2.2 America and other area			

JAXA G-portal: <https://gportal.jaxa.jp/gpr/?lang=en>

AVNIR-2 EORC HP(Japan area): https://www.eorc.jaxa.jp/ALOS/en/dataset/ori_e.htm

Future Earth Observation Missions in JAXA



2022-

2022-2023

2023-2024

2023-2024

Future

ALOS-3

ALOS-4

EarthCARE

GOSAT-GW

Precipitation
Measuring Mission
(PMM)



ALOS-3
(Optical)

Disaster/
Mapping



ALOS-4
(Radar)

Disaster/
Forest



Cloud/Aerosol/
Radiation Budget



(JAXA Mission)

Water
Cycle

Greenhouse
gases

(MOE Mission)



Convection

Precipitation

Precipitation
/Convection

A composite image showing a satellite constellation orbiting the Earth. The Earth is depicted with green landmasses and white clouds, set against a deep blue background. Several satellites, each with solar panels and antennas, are shown in various orbits around the planet. Thin blue lines connect the satellites, illustrating their network. The text "Thank you for your attention." is overlaid in the center in a stylized, italicized font with a blue outline.

Thank you for your attention.