



JAXA Earth Observations Addressing Water Issues

AWCI Session for the 15th AOGEO Symposium,
September 21, 2022

Riko OKI

Director,

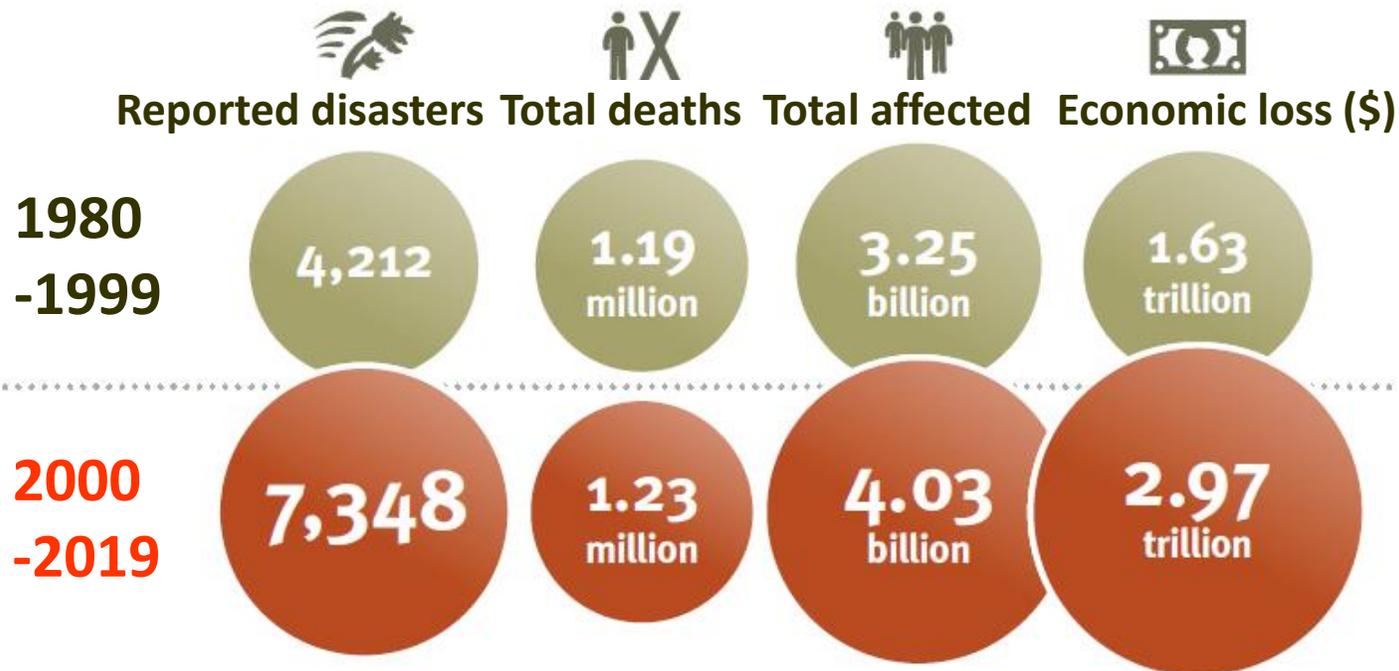
Earth Observation Research Center

Japan Aerospace Exploration Agency

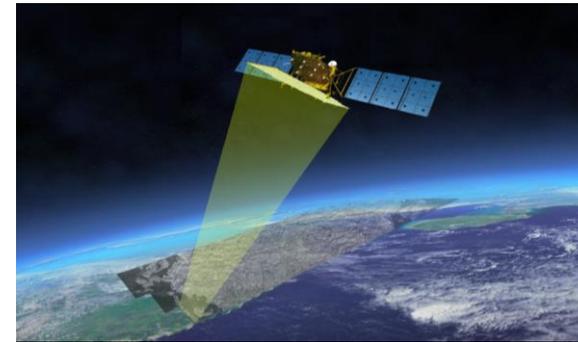
WHY Should We Strengthen Science & Technology ?

Disaster Impacts 1980-1999 vs. 2000-2019

[UNDRR, 2020]

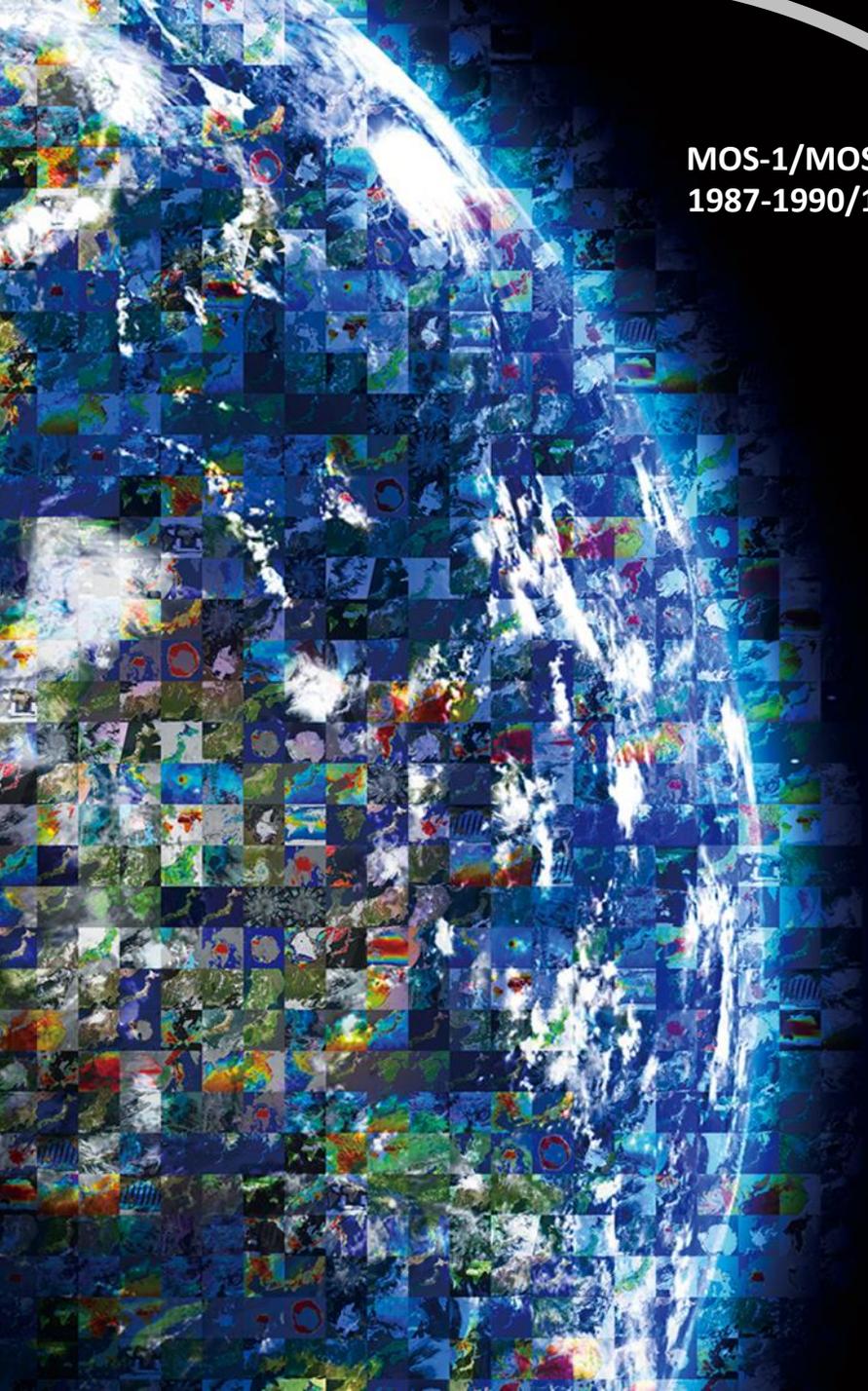


Advantages of Earth Observation Satellite



- 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-

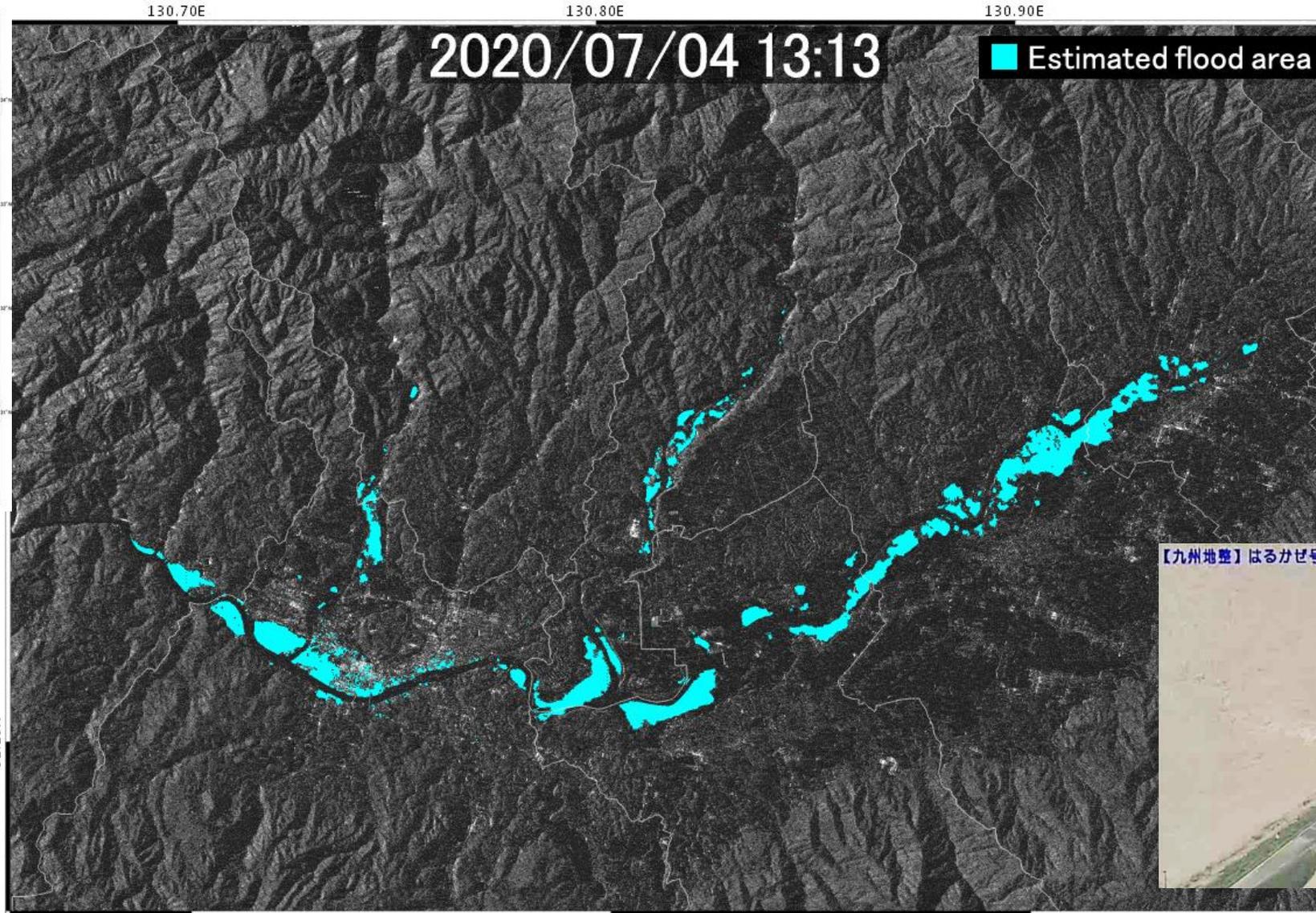
ALOS-4
2022-2023

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

Global Satellite Mapping of Precipitation (GSMaP)

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

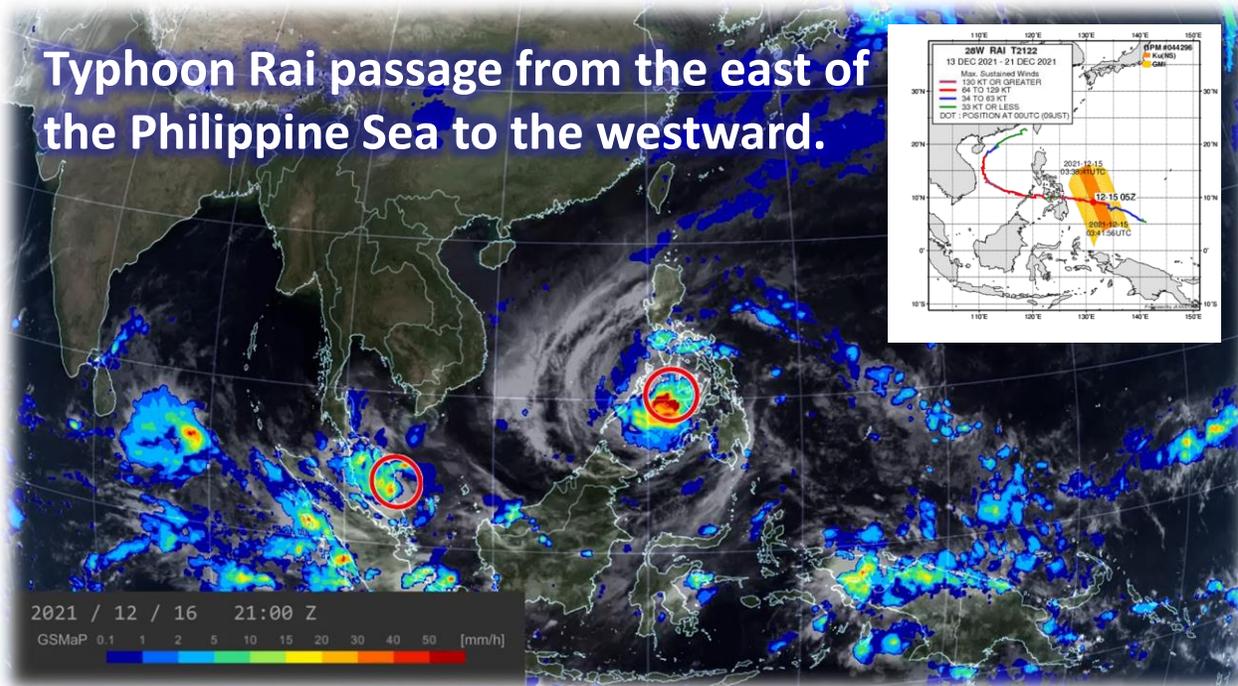
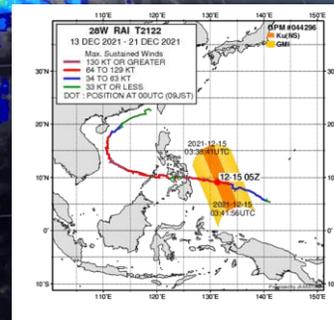


- Cyclone/Heavy rainfall monitoring as supplement to ground-based observations
- GSMaP utilization trainings for Asia pacific regions



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

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



Precipitation from December 13 to 20, 2021 based on GSMaP

- 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>

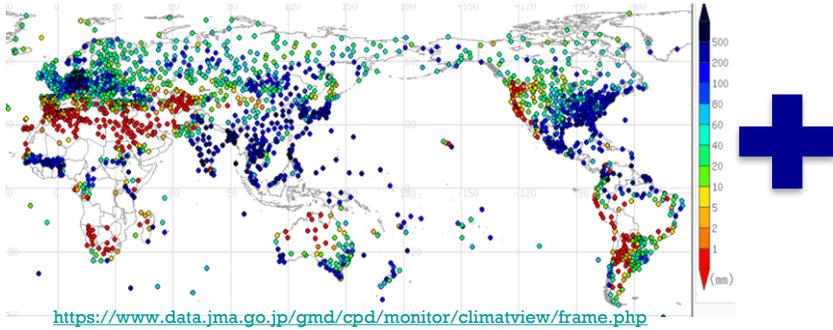
- Agro-met monitoring by Jaxa's Satellite based Monitoring Network system for FAO AMIS Market Monitor (JASMIN)

<https://suzaku.eorc.jaxa.jp/JASMIN/index.html>

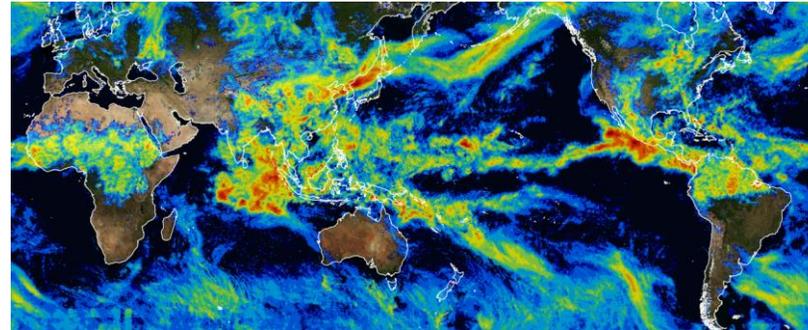
Flood Prediction Realized by Integration of GSMaP and Ground Observations



Ground observations



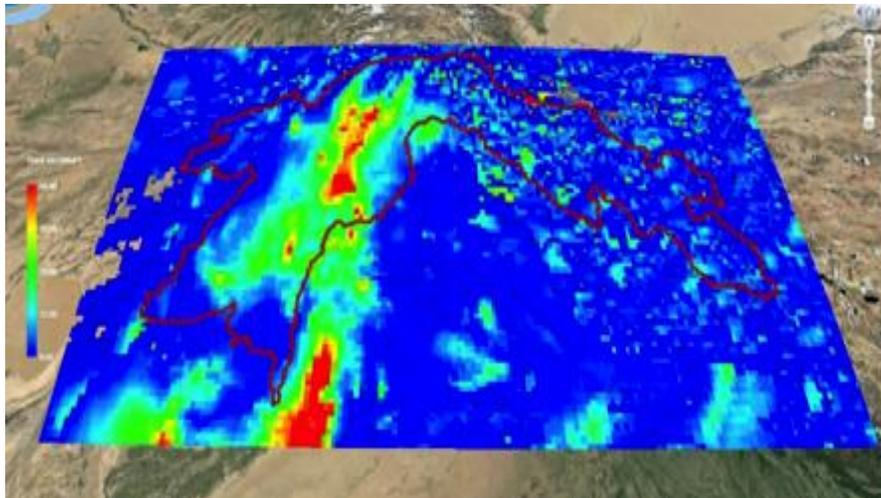
Satellite precipitation (GSMaP)



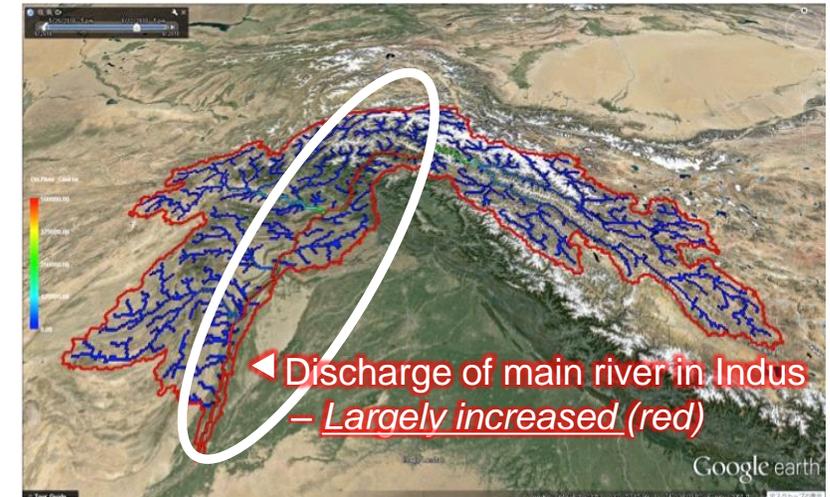
Partners



Rainfall over the river basin during flood in Pakistan



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



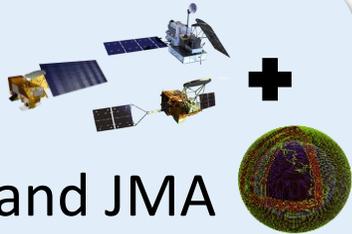
(Images provided by ICHARM)

Global Terrestrial Hydrological Simulation System: Today's Earth



Forcing Data Preparation:

Satellite obs. and JMA reanalysis/forecast data



Validation

Model Simulation:

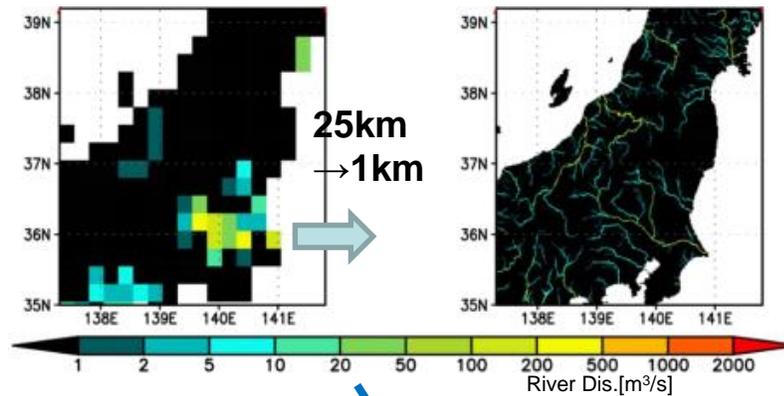
Land Surface Model + River Routing Model

Accuracy Improvement

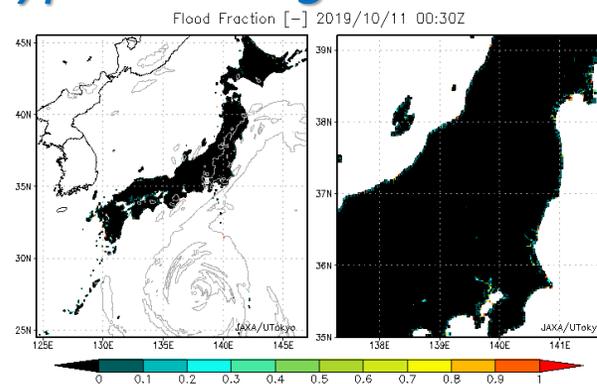
Data Provision:

Various hydrological parameters with risk indices

Development of Regional ver.



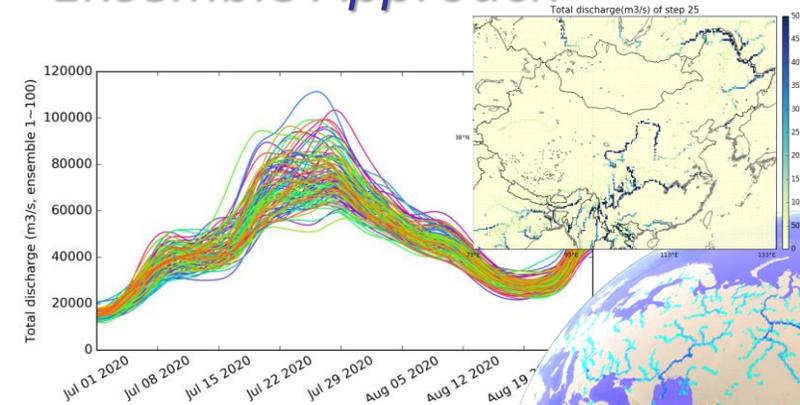
Typhoon Hagibis Forecast



Ma et al., 2021

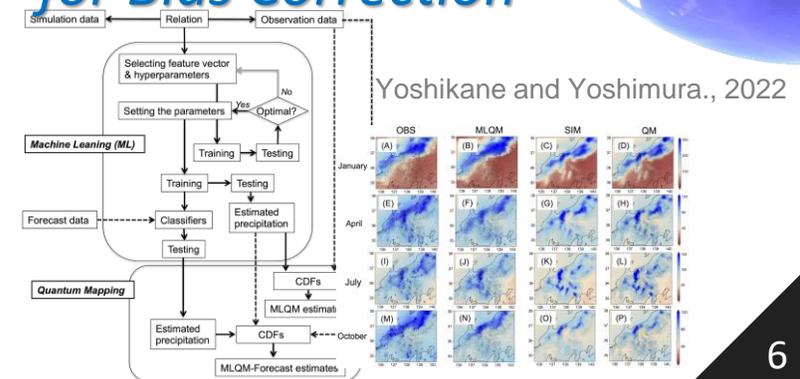
91.6% of the flooded locations are predicted!

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

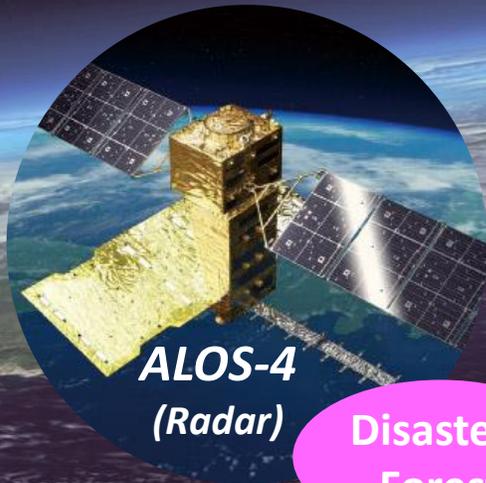
GOSAT-GW

Precipitation Measuring Mission (PMM)



ALOS-3
(Optical)

Disaster/
Mapping

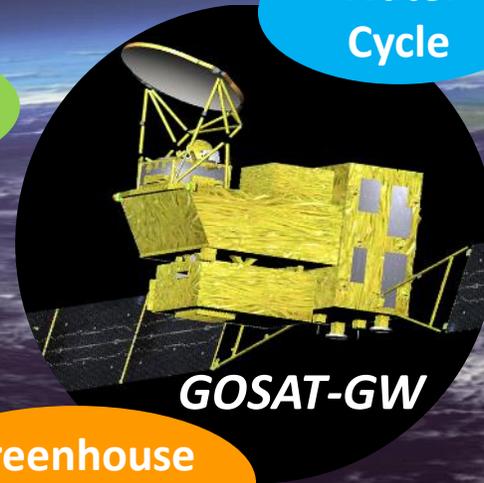


ALOS-4
(Radar)

Disaster/
Forest



Cloud/Aerosol/
Radiation Budget



(JAXA Mission)

Water
Cycle

Greenhouse
gases

(MOE Mission)



Convection

Precipitation

Precipitation
/Convection

A digital illustration of a satellite constellation. The Earth is shown in the center, partially obscured by a thick layer of white, fluffy clouds. Several satellites are depicted in various orbits around the planet. The satellites have different designs, some with large solar panels and others with more compact bodies. Blue lines represent the orbital paths of the satellites, with small blue dots indicating their positions. The background is a deep blue gradient, suggesting the vastness of space. The text "Thank you for your attention." is written in a white, italicized font with a blue outline, centered over the Earth and clouds.

Thank you for your attention.