



JAXA Earth Observations Addressing Water Issues

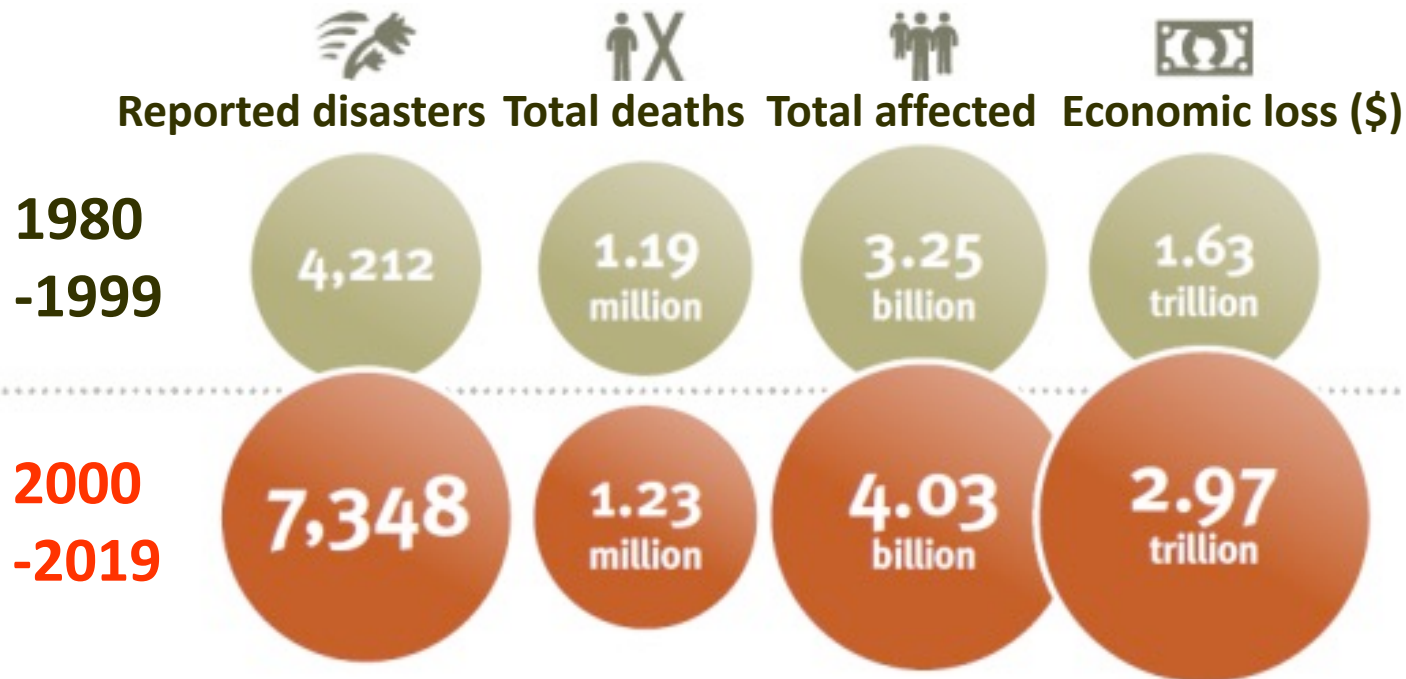
Special session 5,
15th Asia-Oceania Group on Earth Observations Symposium
Hybrid Event, September 30 2022

Riko OKI
Director,
Earth Observation Research Center
Japan Aerospace Exploration Agency

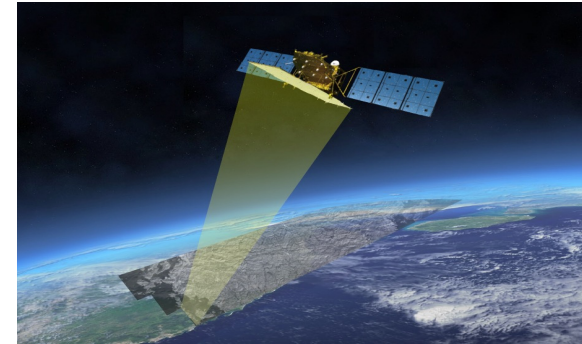
WHY Should We Strengthen Science & Technology ?

Disaster Impacts 1980-1999 vs. 2000-2019

[UNDRR, 2020]



Advantages of Earth Observation Satellite



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





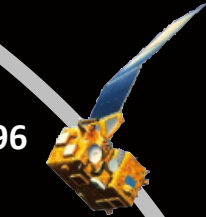
Completed

In Operation

To be Launched



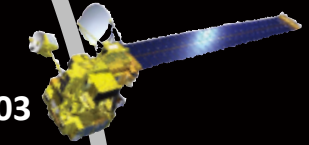
MOS-1/MOS-1b
1987-1990/1995-1996



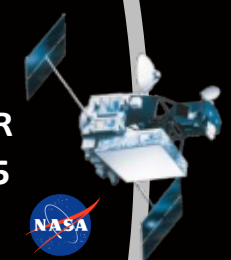
JERS-1
1992-1998



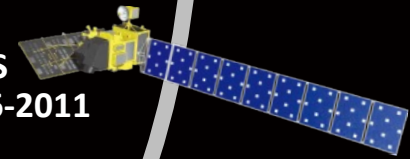
ADEOS 1996-1997
ADEOS-II 2002-2003



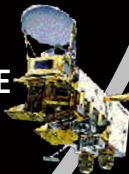
TRMM/PR
1997-2015



ALOS
2006-2011



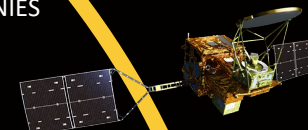
Aqua/AMSR-E
2002-2015



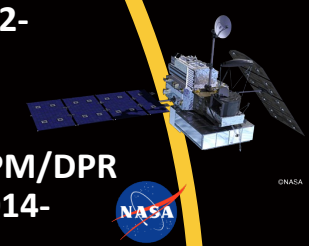
GOSAT
MOE/JAXA/NIES
2009-



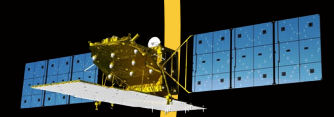
GCOM-W
2012-



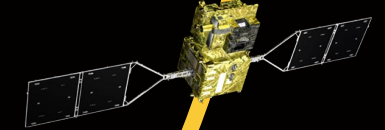
GPM/DPR
2014-



ALOS-2
2014-



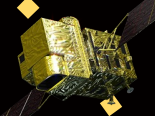
GCOM-C
2017-



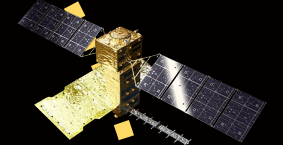
GOSAT-2
MOE/JAXA/NIES
2018-



ALOS-3
2022-



ALOS-4
2022-2023



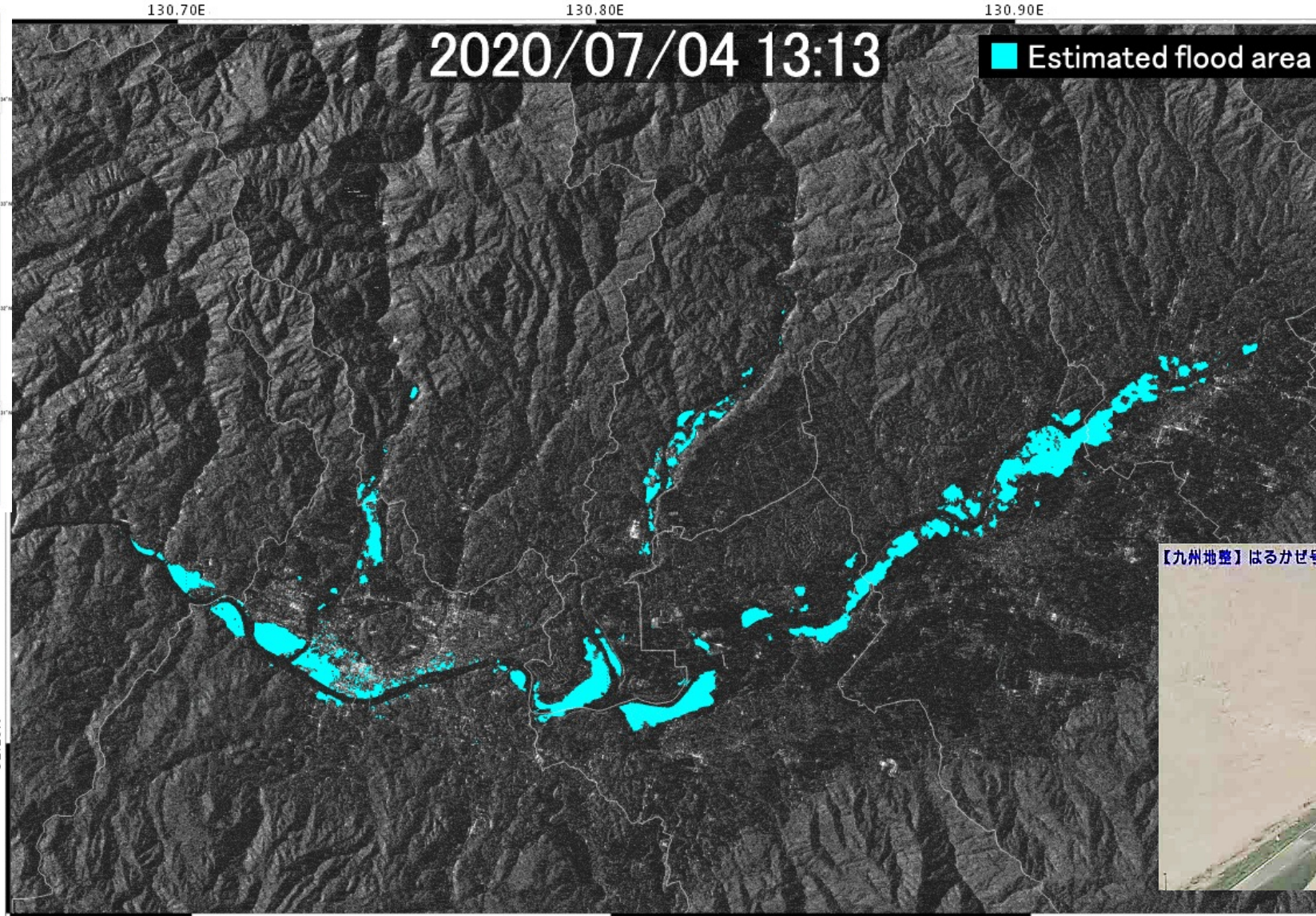
EarthCARE
esa
2023-2024



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)

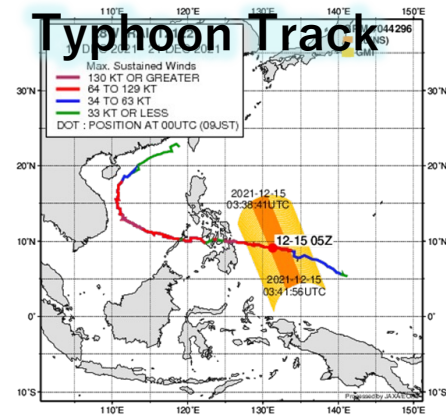
Photo by Ministry of Land, Infrastructure, Transport and Tourism, Kyusyu Regional Development Bureau

Contribution to Disaster Risk Reduction & Water Resource Management:

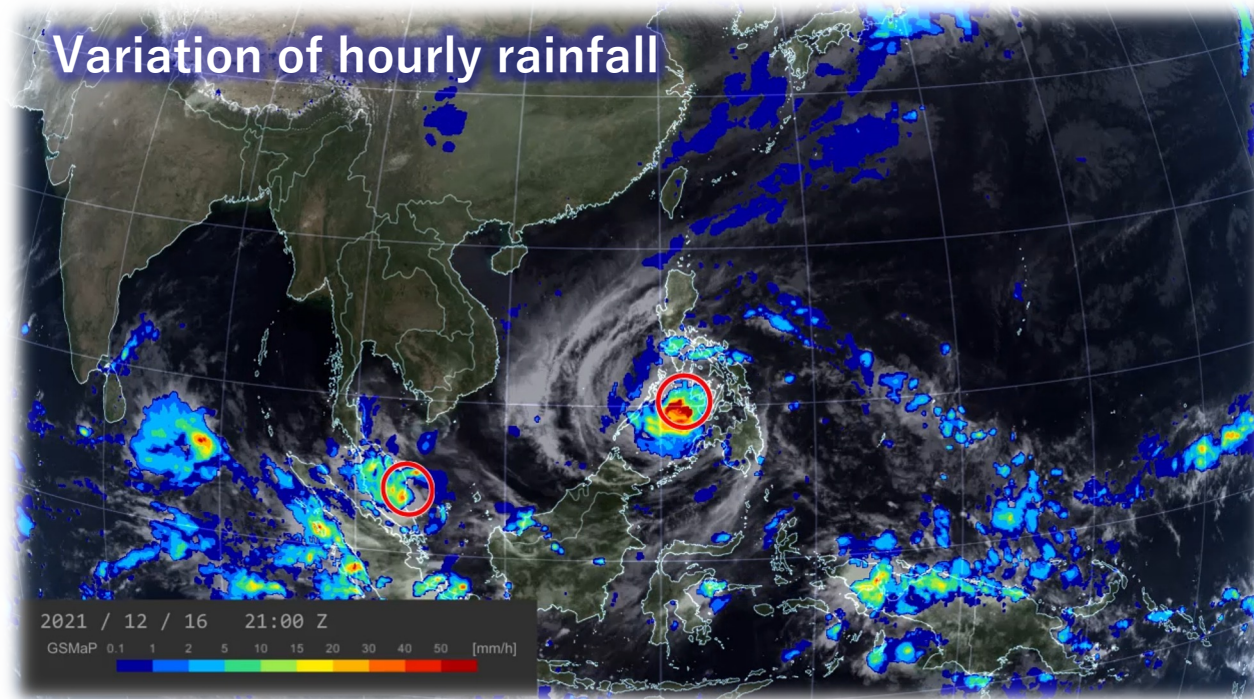
Global Satellite Mapping of Precipitation (GSMaP)



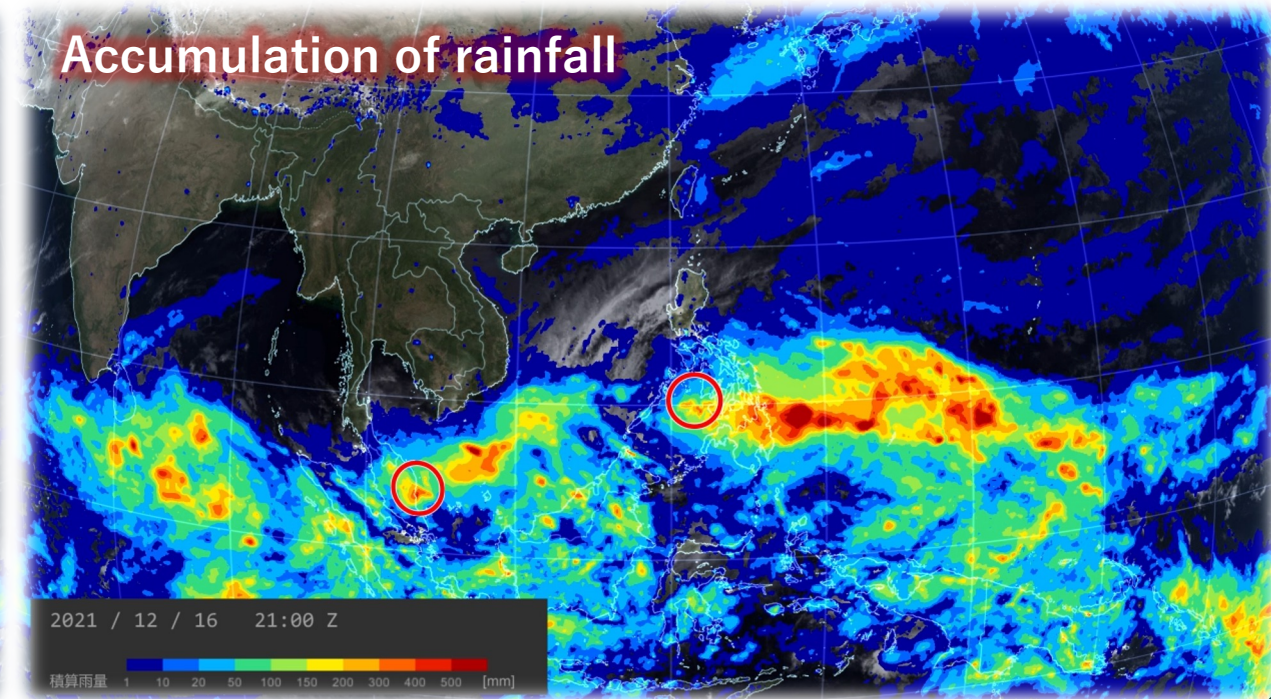
GSMaP captures the Typhoon Rai passage from the east of the Philippine Sea to the westward.



Variation of hourly rainfall



Accumulation of rainfall



Precipitation from December 13 to 20, 2021 based on GSMaP

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

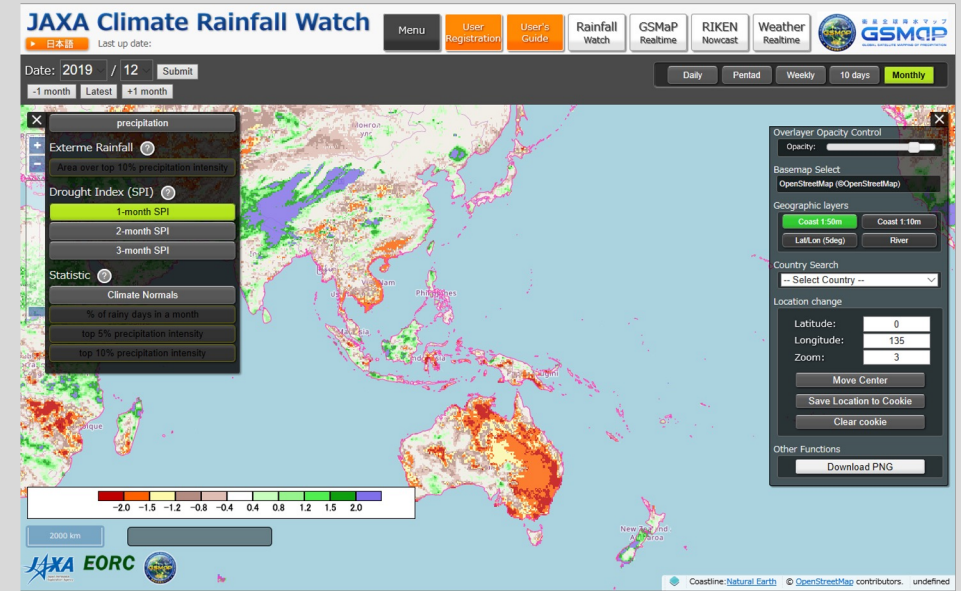


- Cyclone/Heavy rainfall monitoring as supplement to ground-based observations
- GSMaP utilization trainings for Asia pacific regions

Palau met. Chuuk Micronesia met. Kosrae Micronesia resource management Marshall met. Solomon met. Vanuatu met. Hawaii Australia Fiji met. Tonga met.

- 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/



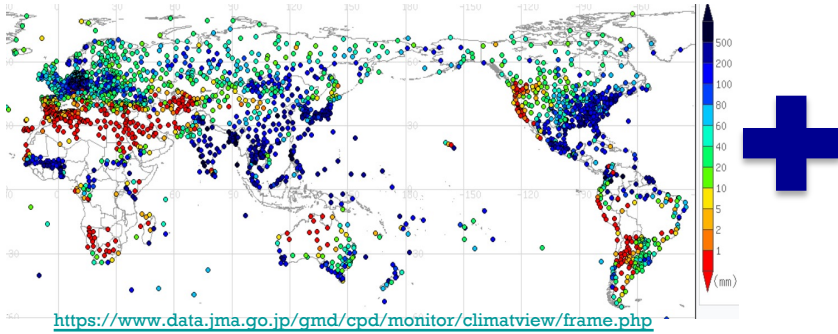
- Contribution to the WMO's Space-based Weather and Climate Extremes Monitoring (SWCEM) <https://public.wmo.int/en/programmes/wmo-space-programme/swcem>

- 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>
- Rice Growth Outlook for ASEAN countries is provided monthly to contribute to food security

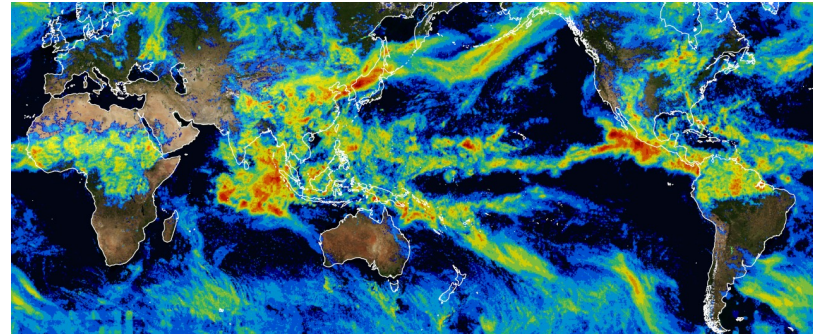
Flood Prediction Realized by Integration of GSMaP and Ground Observations



Ground observations



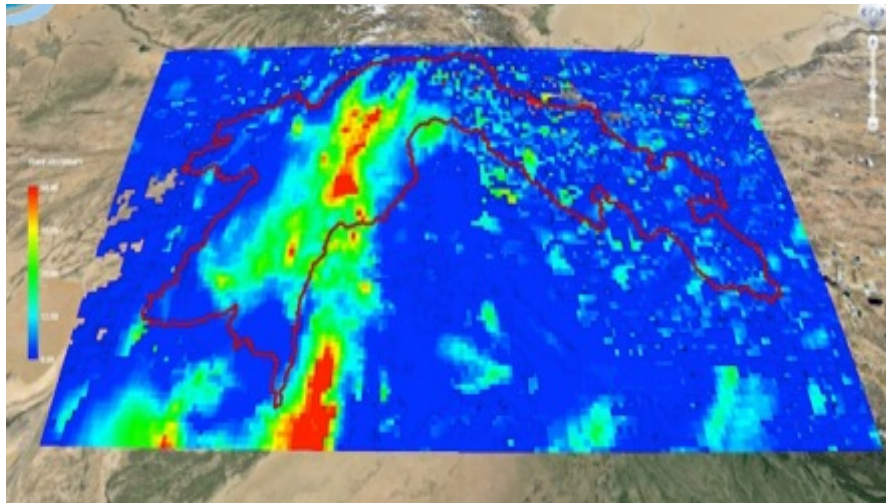
Satellite precipitation (GSMaP)



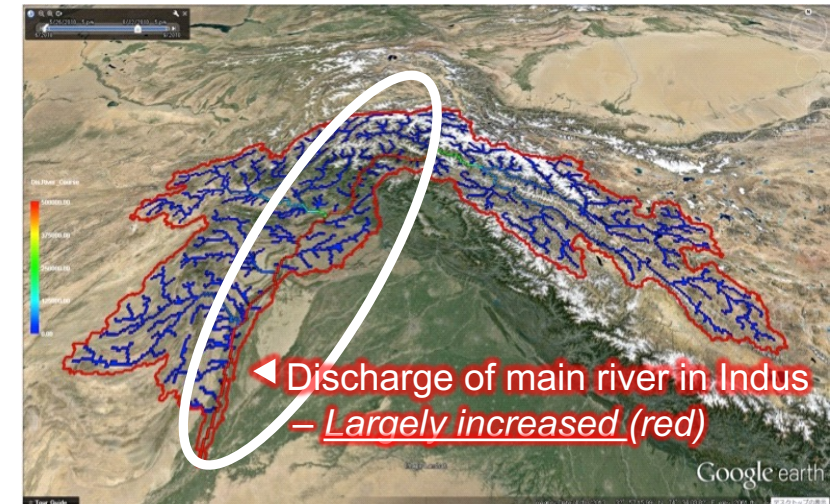
Partners



Rainfall over the river basin during flood in Pakistan



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



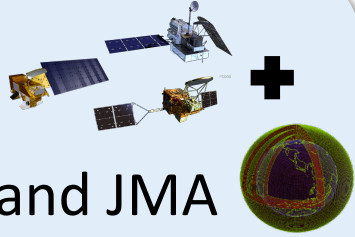
(Images provided by ICHARM)

Global Terrestrial Hydrological Simulation System: Today's Earth



Forcing Data Preparation:

Satellite obs. and JMA reanalysis/forecast data



Validation

Model Simulation:

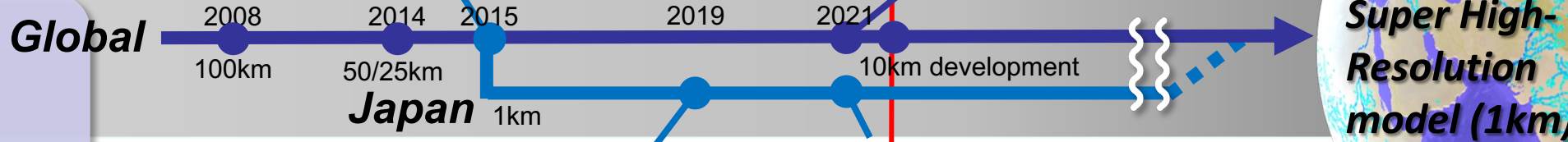
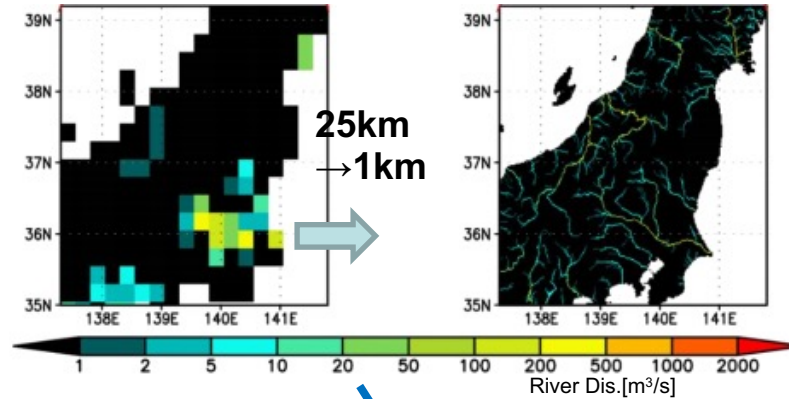
Land Surface Model + River Routing Model

Accuracy Improvement

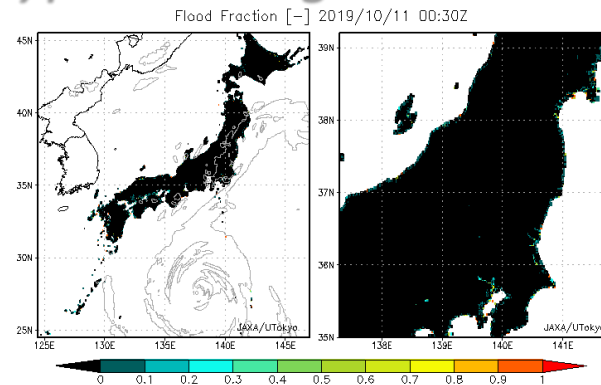
Data Provision:

Various hydrological parameters with risk indices

Development of Regional ver.



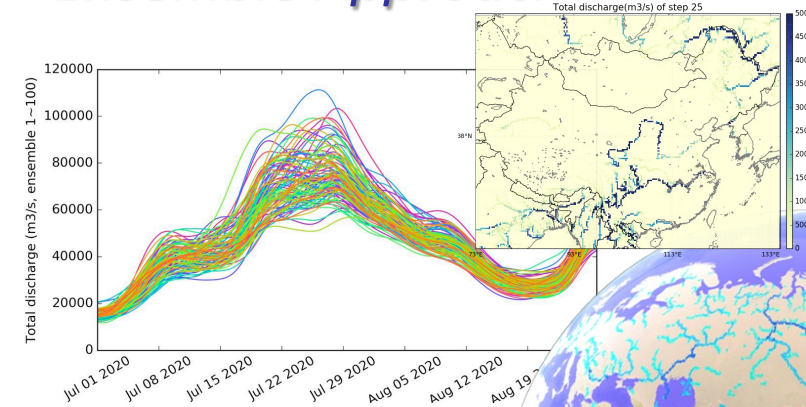
Typhoon Hagibis Forecast



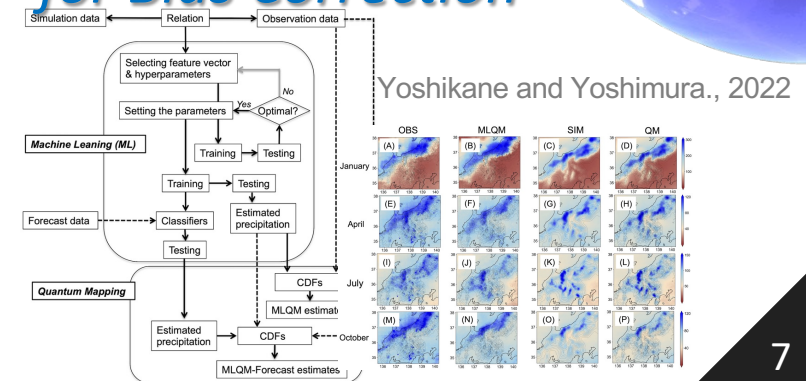
Ma et al., 2021

91.6% of the flooded locations are predicted!

Ensemble Approach



Machine Learning for Bias Correction



Yoshikane and Yoshimura., 2022

Future Earth Observation Missions in JAXA



2022-

2022-2023

2023-2024

2023-2024

Future

ALOS-3

ALOS-4

EarthCARE

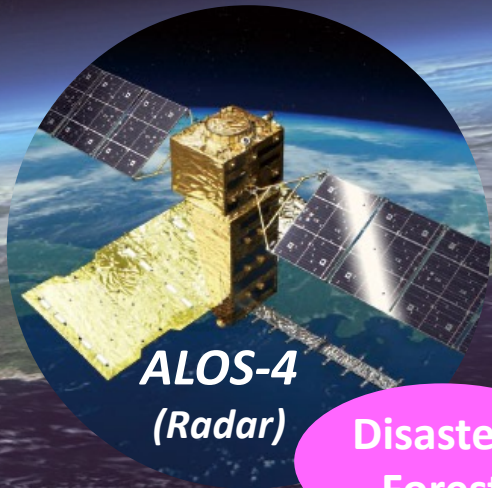
GOSAT-GW

Precipitation Measuring Mission (PMM)



ALOS-3
(Optical)

Disaster/
Mapping

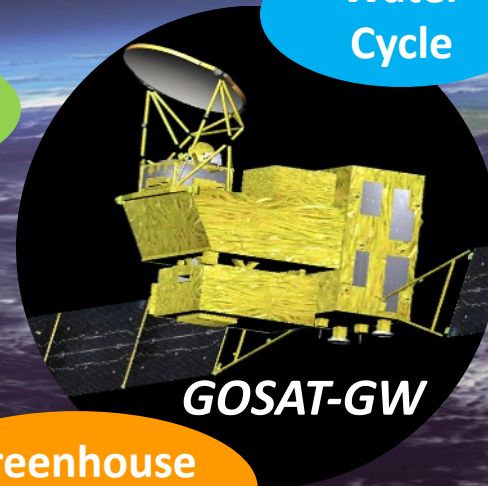


ALOS-4
(Radar)

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 orbiting the Earth. The Earth is shown in the center, partially covered by white clouds, with green landmasses and blue oceans. Several satellites are depicted in various orbits around the planet, connected by glowing blue lines that represent communication or data links. The satellites vary in design, some with large solar panels and others with more compact bodies. The background is a deep blue gradient, suggesting the vastness of space. The text "Thank you for your attention." is overlaid in the center in a white, italicized font with a blue outline.

Thank you for your attention.