



**APRSAF**

ASIA-PACIFIC REGIONAL  
SPACE AGENCY FORUM

# **- Sentinel Asia -**

## **Supporting Disaster Management and Enhancing Cooperation through APRSAF**

The 59<sup>th</sup> session of the Committee on the Peaceful Uses of Outer Space , COPUOS, 14 June 2016

Akiko Suzuki

Deputy Director, International Relations and Research Department  
Japan Aerospace Exploration Agency (JAXA)

# Earthquake in Kumamoto Magnitude 7.3 (April 2016)



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source: Worldatlas, Prefecture of K  
<http://www.worldatlas.com/as/jp/4/prefecture-japan.html>

source: NHK News, <http://www3.nhk.or.jp/news/liveblog/kumamoto/>

**49 deaths, over 1,600 injured, 9,000 evacuees**



# Emergency Observations by Multiple Agencies



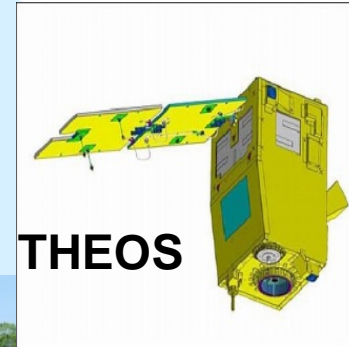
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**ISRO**

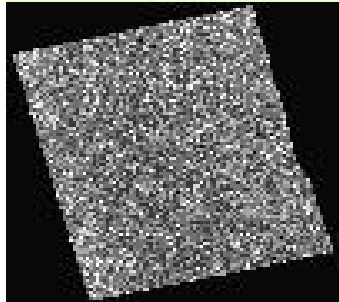
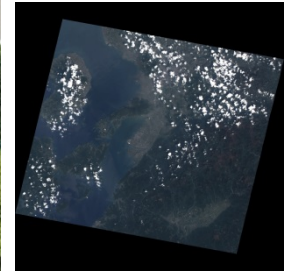


**IRS**

**GISTDA**



**THEOS**



国土地理院・熊本市

# Emergency Observations by Multiple Agencies



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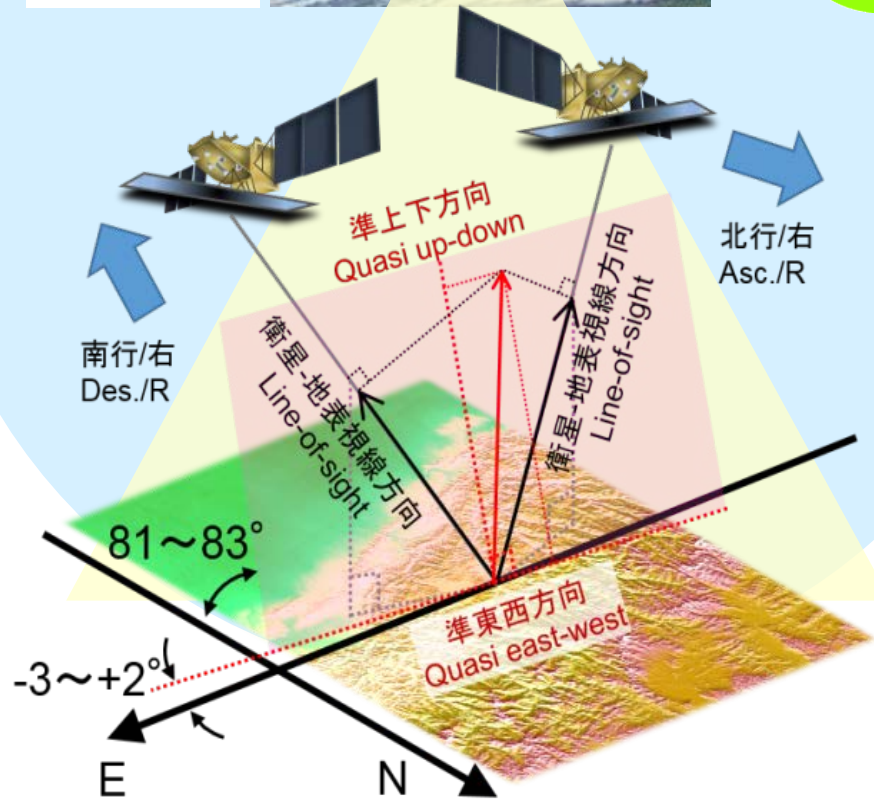
**JAXA**



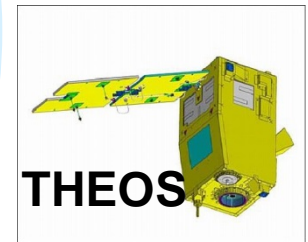
Geospatial Information  
Authority of Japan



**ISRO**



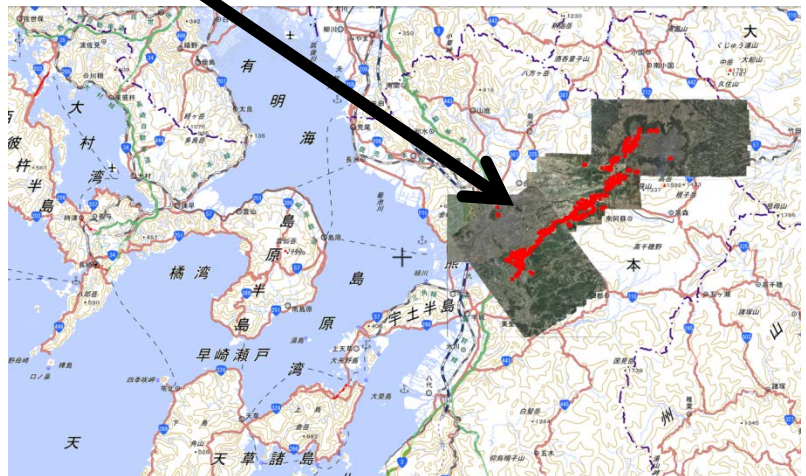
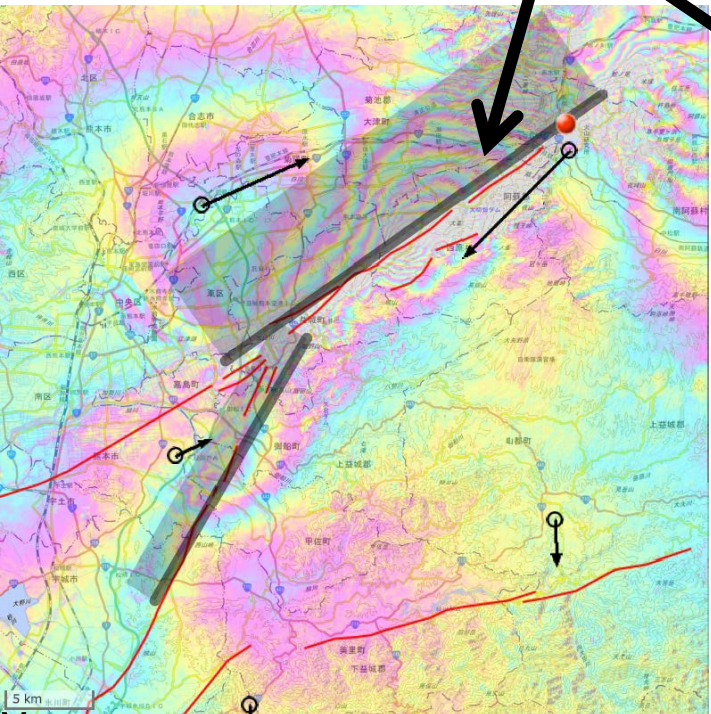
**GISTDA**





# Analysis from Advanced Land Observing Satellite (ALOS-2) raw data

## Futagawa Fault



key:  
Black arrow/line - crustal deformation  
red circle – fault zone  
<http://www.gsi.go.jp/common/000140159.pdf>

# What is Sentinel Asia?

Asia-Pacific  
Regional Space  
Agency Forum

## Started in APRSAF,

Sentinel Asia is an international collaboration to support disaster management in the Asia-Pacific region.



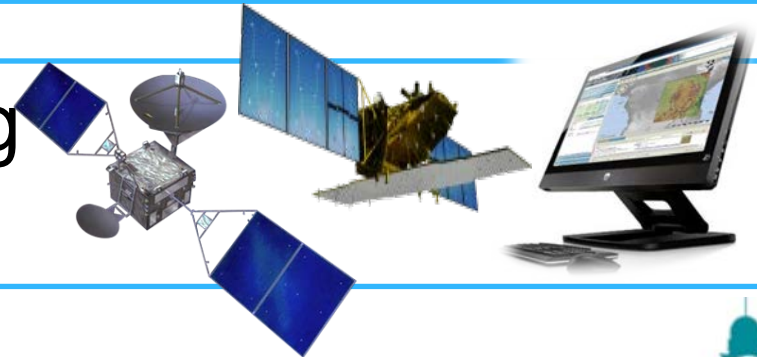
Sentinel Asia

Participants

- Space agencies, disaster management agencies, international organizations...

Technology

- Remote sensing
- Web-GIS





# Sentinel Asia Member Status

(As of May 20, 2016)



## Space Community

**APRSAF**

Satellite Image

Promotion of Utilization

Capacity Building

**SENTINEL ASIA**

**86 organizations** from  
**26 countries & regions** and  
**15 international organizations**  
In total: **101\*** organizations

**ADRC**  
**Member Countries**  
(30 member countries)

Disaster Information

Utilization (User)

\* 7 Data Provider Nodes

**Joint Project Team (JPT)**

## International Community

UNESCAP, UNOOSA, ASEAN, AIT and  
International Disaster Charter, etc.

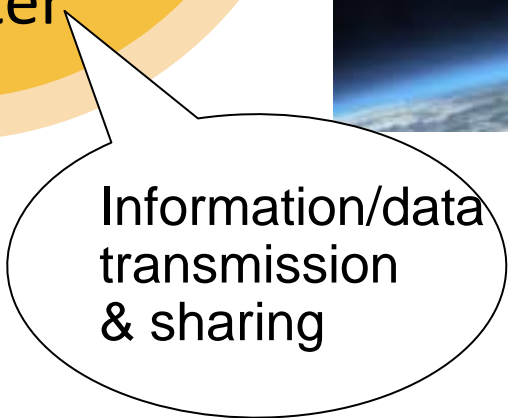
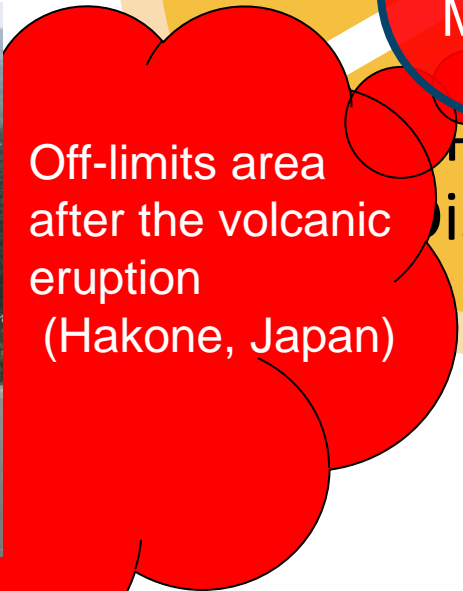
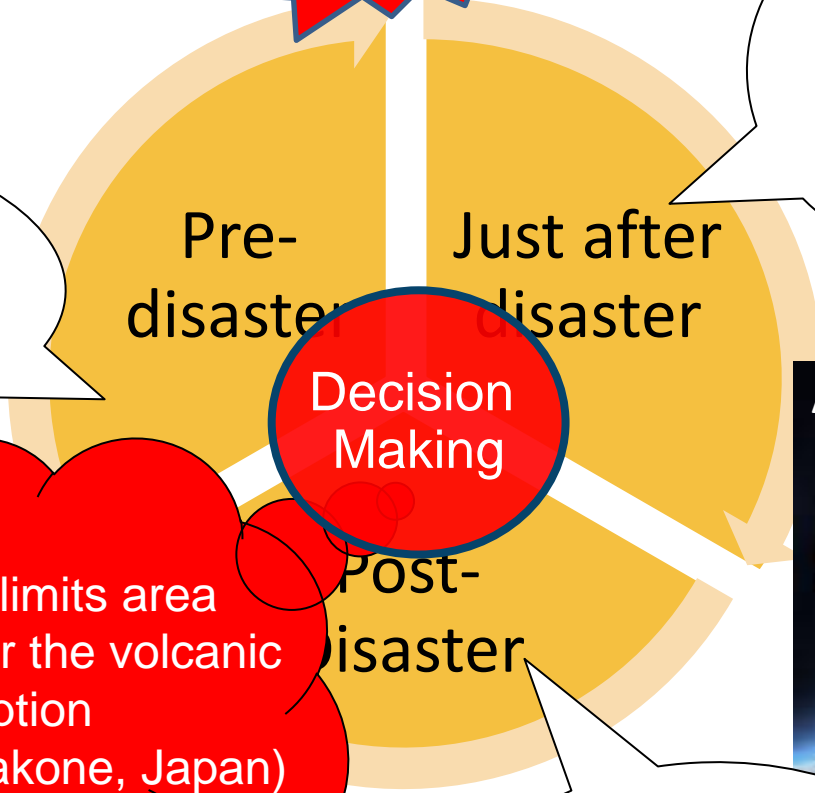
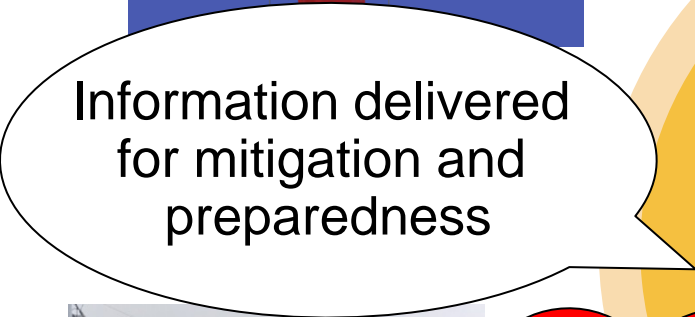
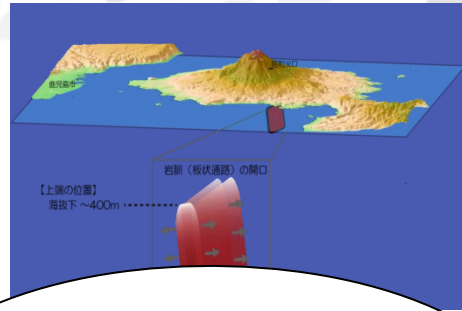
International Cooperation



# Managing Disaster in Every Phase



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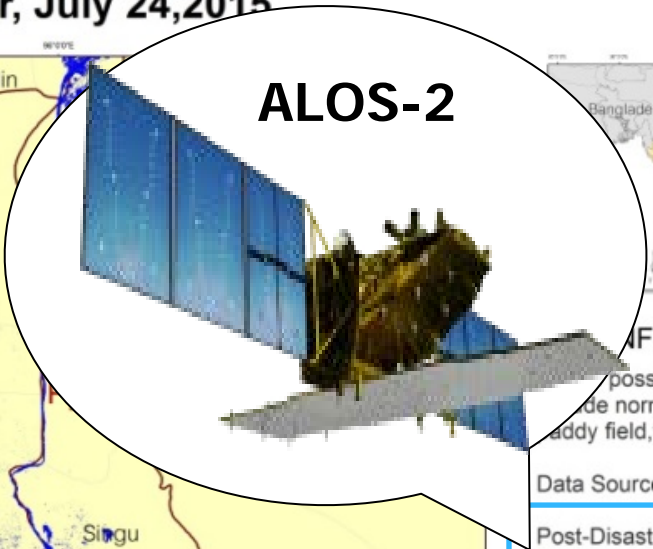
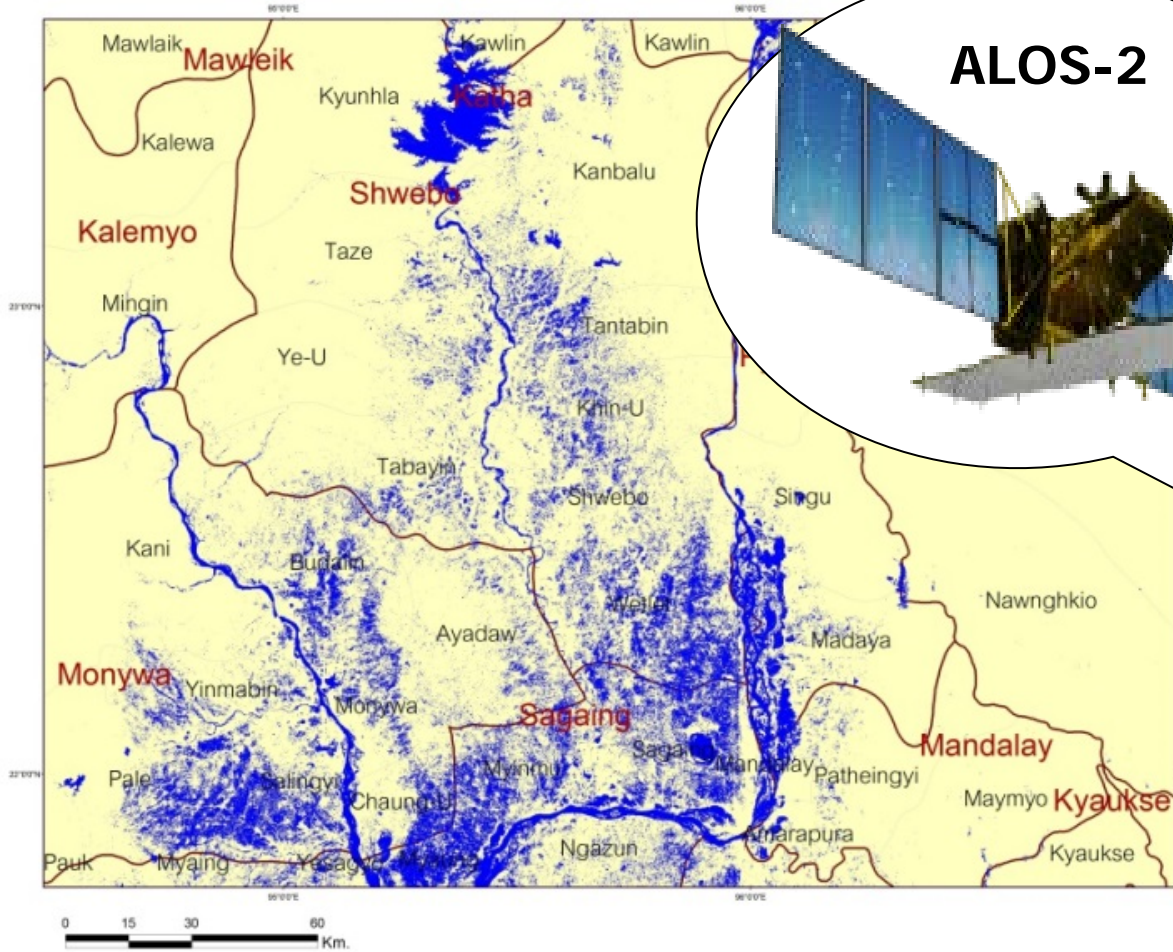


# Recent Contribution of Sentinel Asia Flood in Myanmar (July 2015)



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SPACE AGENCY FORUM

## FLOOD DETECTION BY ALOS-2/PALSAR-2 Myanmar, July 24, 2015



**ALOS-2**

Information  
possible water area  
wide normal water extent,  
faddy field, flood area, or others.

Data Source:  
Post-Disaster image  
ALOS-2/ PALSAR-2  
Acquired on 24 July 2015  
Copyright: JAXA

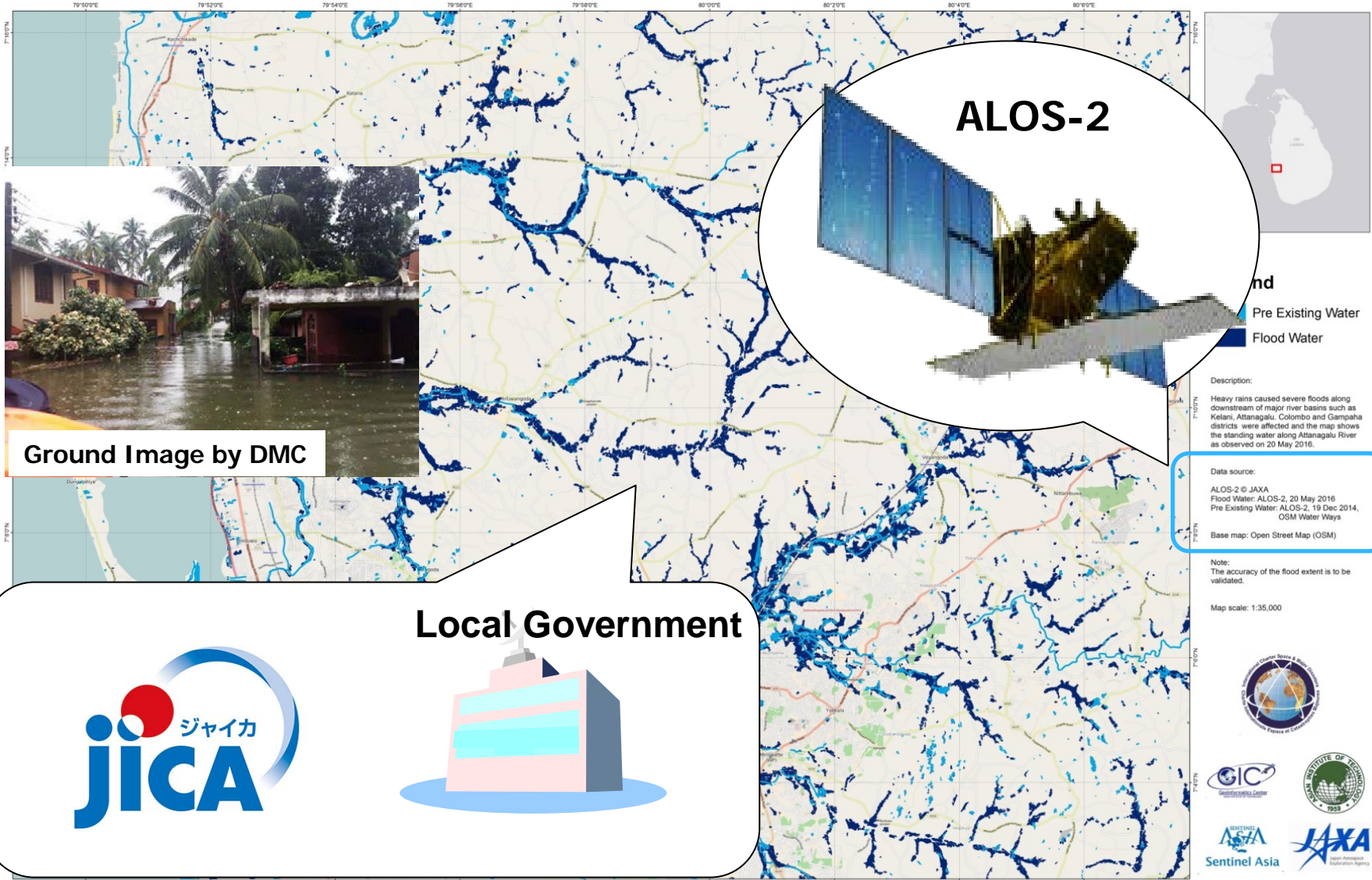
Map Produced by:  
The University of Tokyo and  
Asian institute of Technology



# Recent Contribution of Sentinel Asia Flood in Sri Lanka (May 2016)



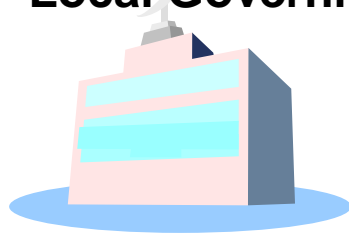
Detected water in Gampaha districts along Attanagalu River as Observed by ALOS-2 Data on 20 May 2016



Ground Image by DMC

ALOS-2

Local Government



Legend  
 Pre Existing Water  
 Flood Water

Description:  
 Heavy rains caused severe floods along downstream of major river basins such as Kelani, Attanagalu, Colombo and Gampaha districts were affected and the map shows the standing water along Attanagalu River as observed on 20 May 2016.

Data source:  
 ALOS-2 © JAXA  
 Flood Water: ALOS-2, 20 May 2016  
 Pre Existing Water: ALOS-2, 19 Dec 2014,  
 OSM Water Ways  
 Base map: Open Street Map (OSM)

Note:  
 The accuracy of the flood extent is to be validated.

Map scale: 1:35,000





# Flood Warning System

Bangladesh, the Philippines, and Viet Nam

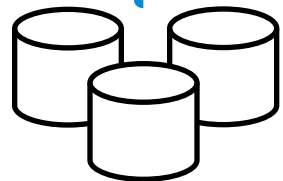
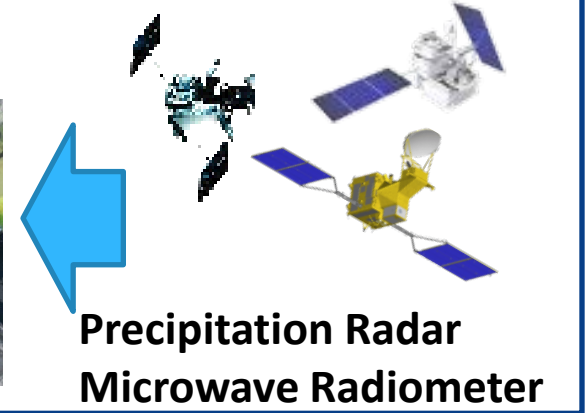
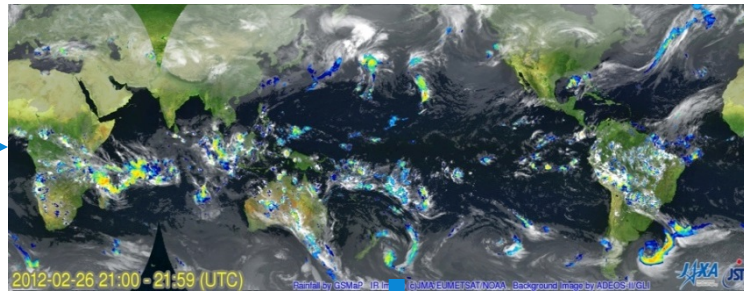


APRSAR

ASIAN REGIONAL  
POVERTY FORUM



## GSMaP

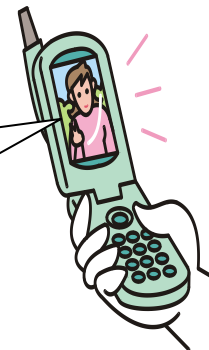


Rain Gauges

Flood Forecasting System

**Flood Warning!**

Information sent to cell phones,  
5 days before the flood





# Sentinel Asia Evolution over 10 Years



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feedback

feedback

feedback

## Step 1

(2006-2007)

- Pilot Project

## Step 2

(2008-2012)

- new technologies
- new satellites

## Step 3

(2013-2020)

- Better technical equipment
- strategic management



2020 onward

- Steering Member driven

affordable,  
sustainable,  
autonomous

Local Frameworks  
Capacity Building

# Technical Advancement for the Better Land Observation

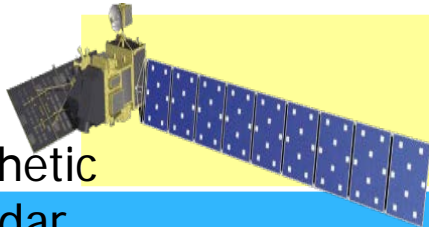


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2006-2011

2014-2019

Coming Soon!



High temporal and spatial resolution

Advanced Radar Satellite

Planned

L-band Synthetic Aperture Radar (L-SAR)

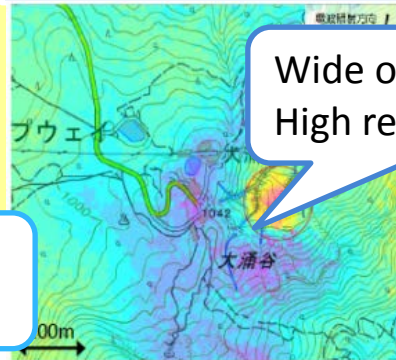
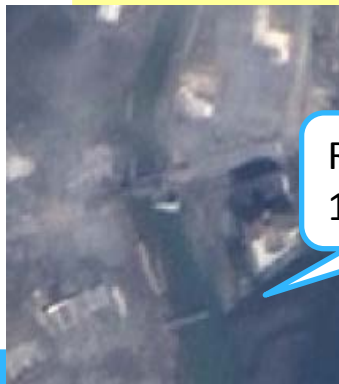
ALOS

ALOS2

Wide observation  
High resolution

Resolution  
10 m

Wider observation  
Higher Resolution  
(Less than 1.0 m)



Advanced Optical Satellite

Approved

Optical System

ALOS

## ■ **APRSAF (Asia-Pacific Regional Space Agency Forum)**

Regional Cooperation Framework for Space Activities

- ✓ Established in 1993, in response to the 1992 Asia-Pacific International Space Year Conference (APIC)
- ✓ Largest space community in the Asia-Pacific region
- ✓ Contributing to socio-economic benefits in the region

## ■ **Objectives**

Promotion and expansion of space activities and applications for socio-economic development in the region

## ■ **Participants**

Space agencies, governmental bodies, international organizations, universities, research institutions, private entities

## ■ **Organizers**

Japan (MEXT, JAXA) and local host entities



# APRSAF Structure



APRSAF

APRSAF Executive Committee (ExCom)

**SA WG** Space Applications Working Group

**ASIA Sentinel Asia**  
Sentinel Asia:  
Aiming at contributing to  
disaster reduction

**SAFE**  
SAFE:  
Space Applications For  
Environment

**Climate R3**  
Climate R3:  
Regional Readiness  
Review for Key Climate  
Missions [Completed]

**SEU WG** Space Environment Utilization Working Group

**KIBO-ABC**  
KIBO-ABC:  
Asian Beneficial  
Collaboration through  
Kibo Utilization

**ST WG** Space Technology Working Group

**SE WG** Space Education Working Group

Poster Contest

Water Rocket Event

## Annual Meeting

Plenary Session

- WG activity reports
- Country reports
- Adopt Recommendations to be addressed

### Relationship with participants



Participants

**UNIFORM**  
UNiversity International  
FORMATION Mission  
(UNIFORM)  
[Completed]

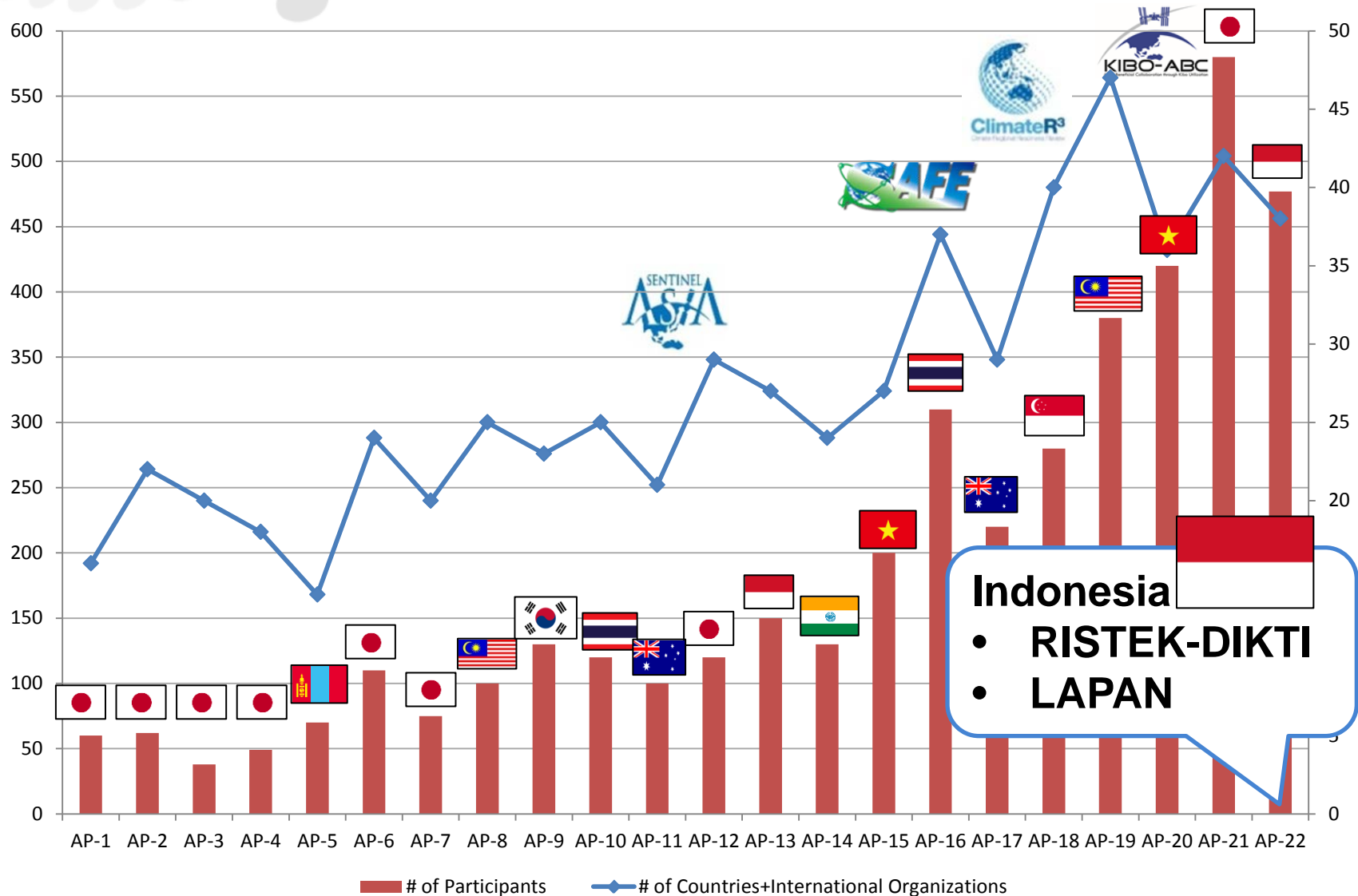
**MGA**  
Multi-GNSS Asia (MGA)

# APRSAF Development

## Growing number of participants



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**Indonesia**

- RISTEK-DIKTI
- LAPAN





MEXT



**23RD**  
**APRSARF**  
ASIA-PACIFIC REGIONAL  
SPACE AGENCY FORUM  
PHILIPPINES

# THE 23RD SESSION OF THE ASIA-PACIFIC REGIONAL SPACE AGENCY FORUM

BUILDING A FUTURE THROUGH SPACE SCIENCE, TECHNOLOGY, AND INNOVATION

**NOVEMBER 15-18, 2016**  
**SOFITEL, MANILA**  
**PHILIPPINES**

CO-ORGANIZED BY THE DEPARTMENT OF  
SCIENCE AND TECHNOLOGY (DOST),  
DEPARTMENT OF FOREIGN AFFAIRS (DFA),  
MINISTRY OF EDUCATION, CULTURE, SPORTS,  
SCIENCE AND TECHNOLOGY OF JAPAN (MEXT), AND  
JAPAN AEROSPACE EXPLORATION AGENCY (JAXA).

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MANILA