

# Activities of ADRC in the Sentinel Asia, and the effectivity of satellite images on the Great East Japan Earthquake



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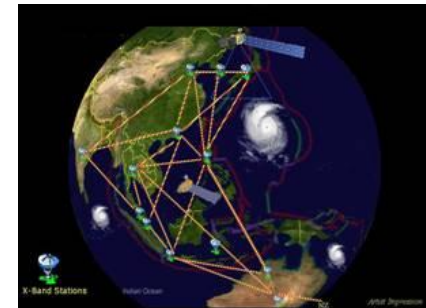
# Sentinel Asia

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In Oct 2005, APRSAF\*-12, approved the plan to initiate the **Sentinel Asia** to assist disaster management in the Asia-Pacific region and it aims to:

- >Improve safety in society by ICT and space technology
- >Improve speed and accuracy of disaster preparedness and earlywarning
- >Minimize the number of victims and social/economic losses.

\* : Asia-Pacific Regional Space Agency Forum



**Sentinel Asia Project**  
establishing Disaster Management  
Support System



*Sentinel Asia*

*Disaster Management Support System in the Asia-Pacific Region*

# Concept of Sentinel Asia

Collaboration between space agencies and disaster management agencies

## Observation

Communication Satellite

## Utilization

agencies

Space Agency

Earth Observation Satellite

Value-added Information

Disaster Information

Transmission

Disaster Management Organization

User Expansion

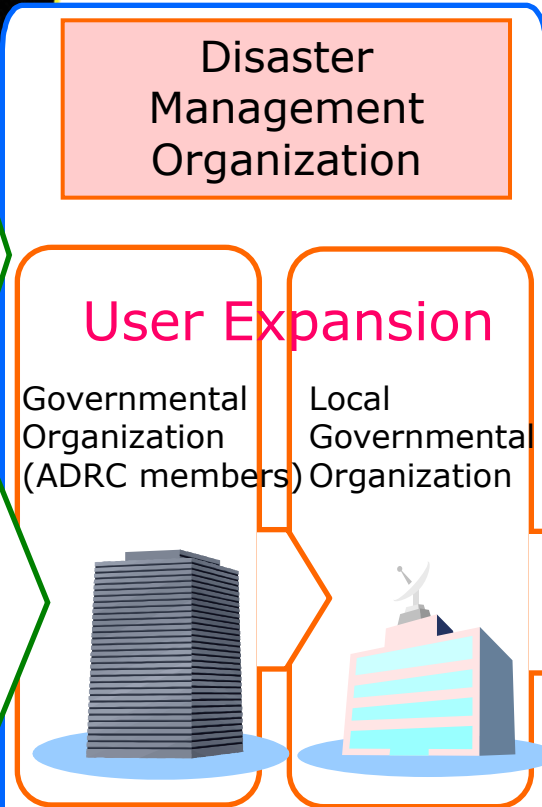
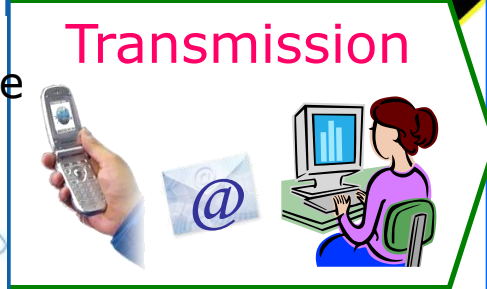
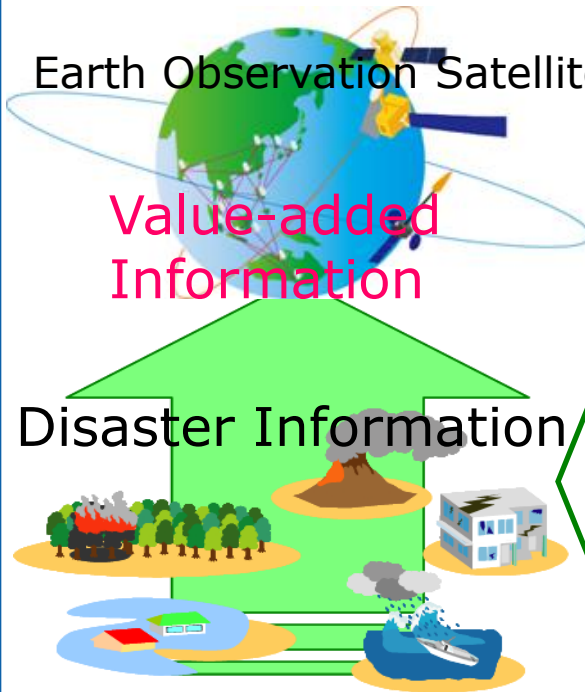
Governmental Organization (ADRC members)

Local Governmental Organization

Sharing (Web)

End User

Human Network  
Capacity Building · Outreach



# Main Activities

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## 1. Emergency observation

Member agency request **emergency observation** to data providers via ADRC

## 2. Monitoring

Provide precipitation, hotspot data for **Flood, Wildfire and GLOF**

## 3. Outreach

**Capacity building** and **human resource development** for promotion of utilization



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# Emergency Observation

## Requesting Organization (RO)

## IDC

ADRC Members  
JPT Members

Emergency Observation Request

Analyzed Products

Data Provider

Disaster Occurrence

Emergency Observation Request

ADRC

Emergency Observation Request

Node (DPN)

(JAXA)

ISRO

GISTDA

KARI

NARL

Support

Digital Camera Images  
Satellite Images & Disaster Information

Disaster Information

Feedback

Archive Images  
Images by Emergency Observation

Analyzable Data

Data Analysis Node (DAN)

AIT, ADRC  
CRISP, CAIAG  
LAPAN, SD/Sri Lanka  
MONRE, ICIMOD  
Sri Lanka MoDM, CEA

Own Data

Sentinel Asia Step 2 System

Disaster Management Agencies in Asia

JAXA Asia Branch (Bangkok)

Support



Sentinel Asia

Disaster Management Support System in the Asia-Pacific Region

# Constellation for disaster observation

WINDS (Japan)

ALOS (Japan)

IRS (India)

THEOS (Thailand)

FORMOSAT 2 (Taiwan)

KOMPSAT (Korea)

Users

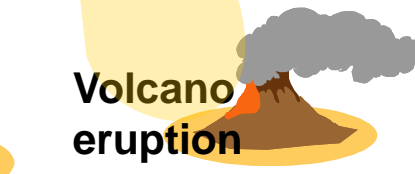
Tsunami

Earthquake

Volcano eruption

Flood

Wildfire



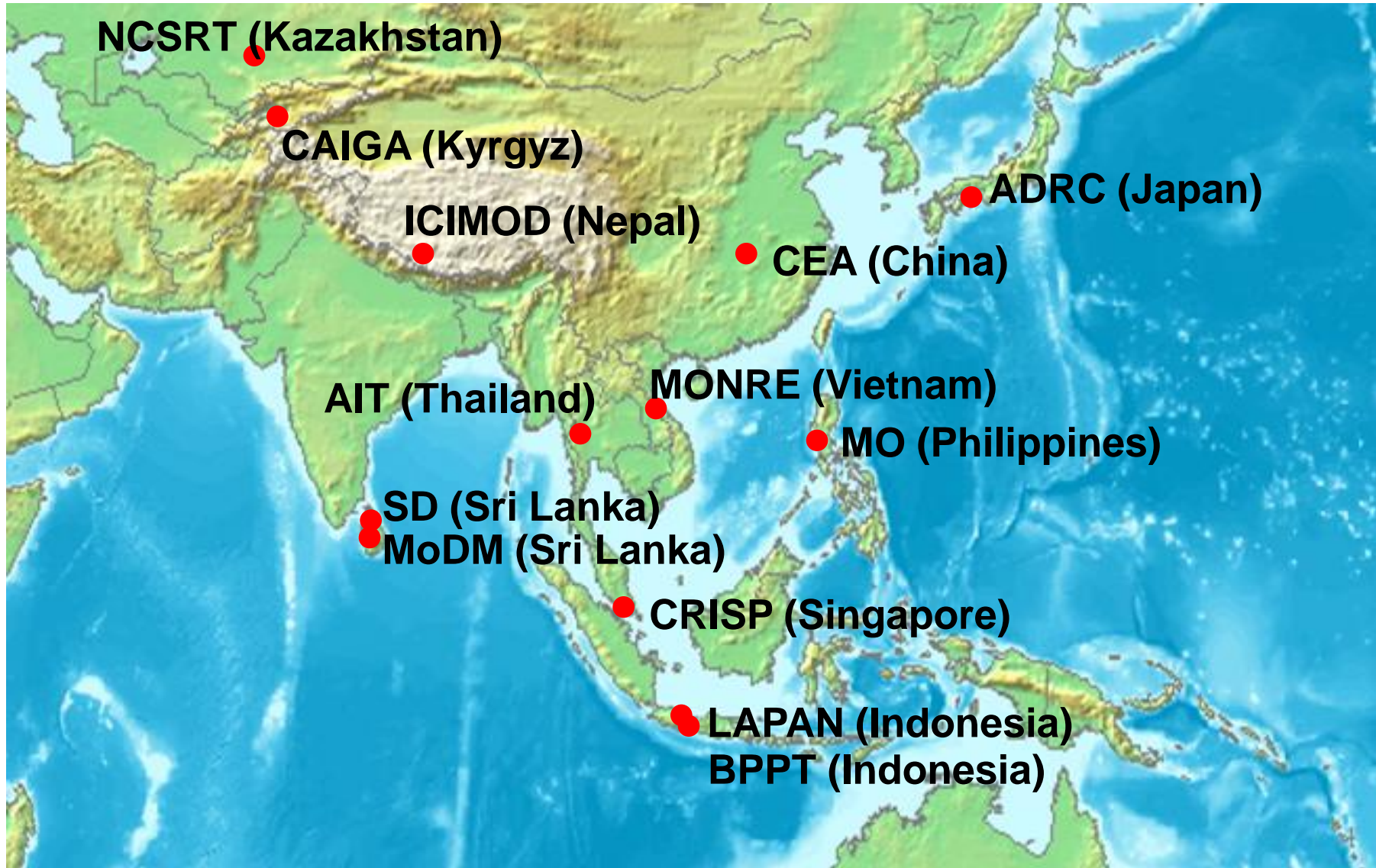
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# Data Analysis Nodes (DAN)

A framework of satellite data analysis to provide analyzed products



# System Regional Servers

Kazakhstan RS  
(with WINDS)



Kyrgyz RS  
(with WINDS)



Nepal RS  
(with WINDS)



Bangladesh RS  
(with WINDS)



Vietnam RS (with WINDS)

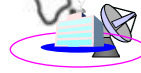


Taiwan RS



Philippines RS (with WINDS)

Thailand RS (with WINDS)



Sri Lanka RS (with WINDS)



Indonesia RS (with WINDS)



Fiji RS (with WINDS)

Mongolia RS (with WINDS)



Japan Central Server

red: to be set up in 2011  
blue: in operation

RS: Regional Server

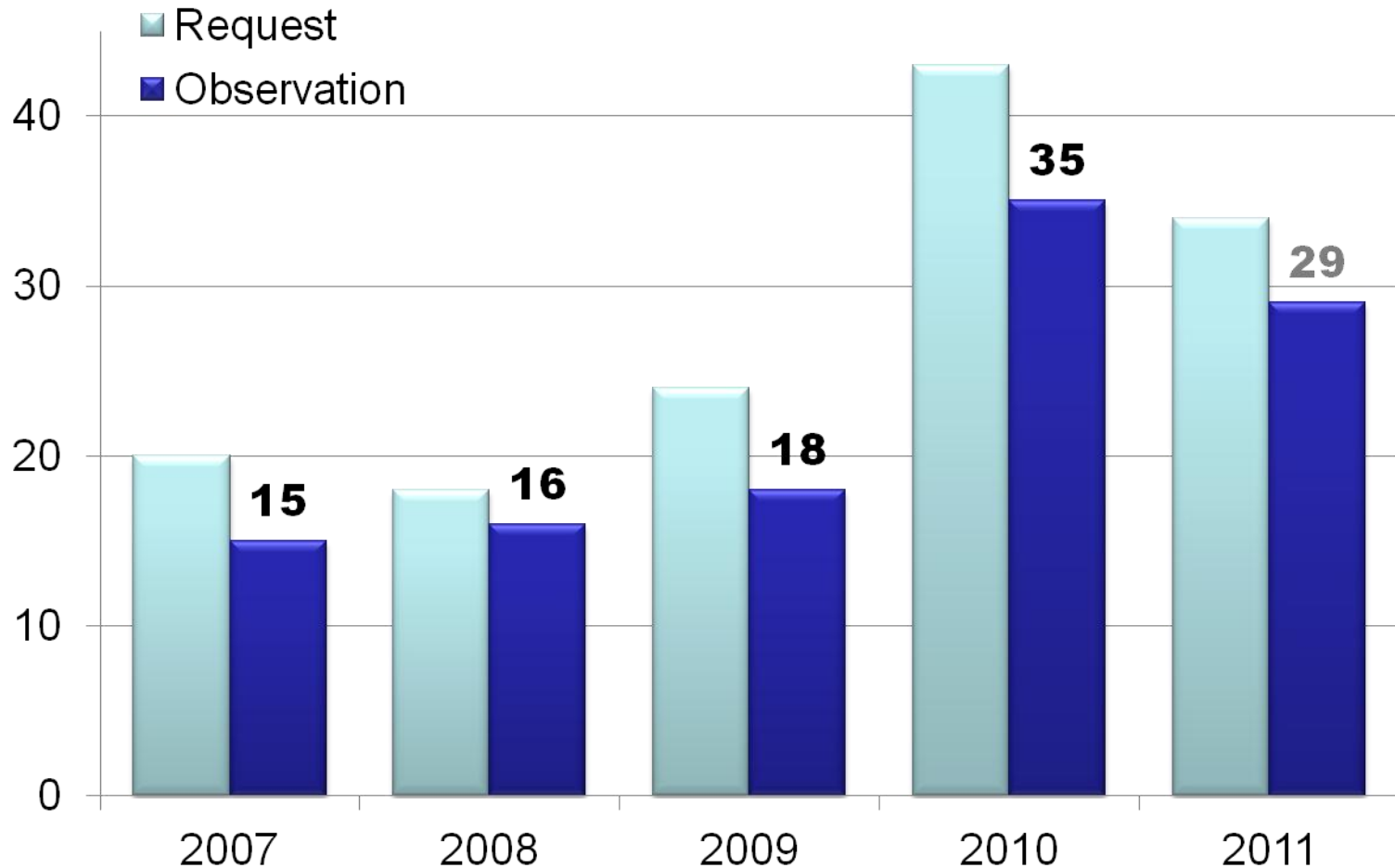


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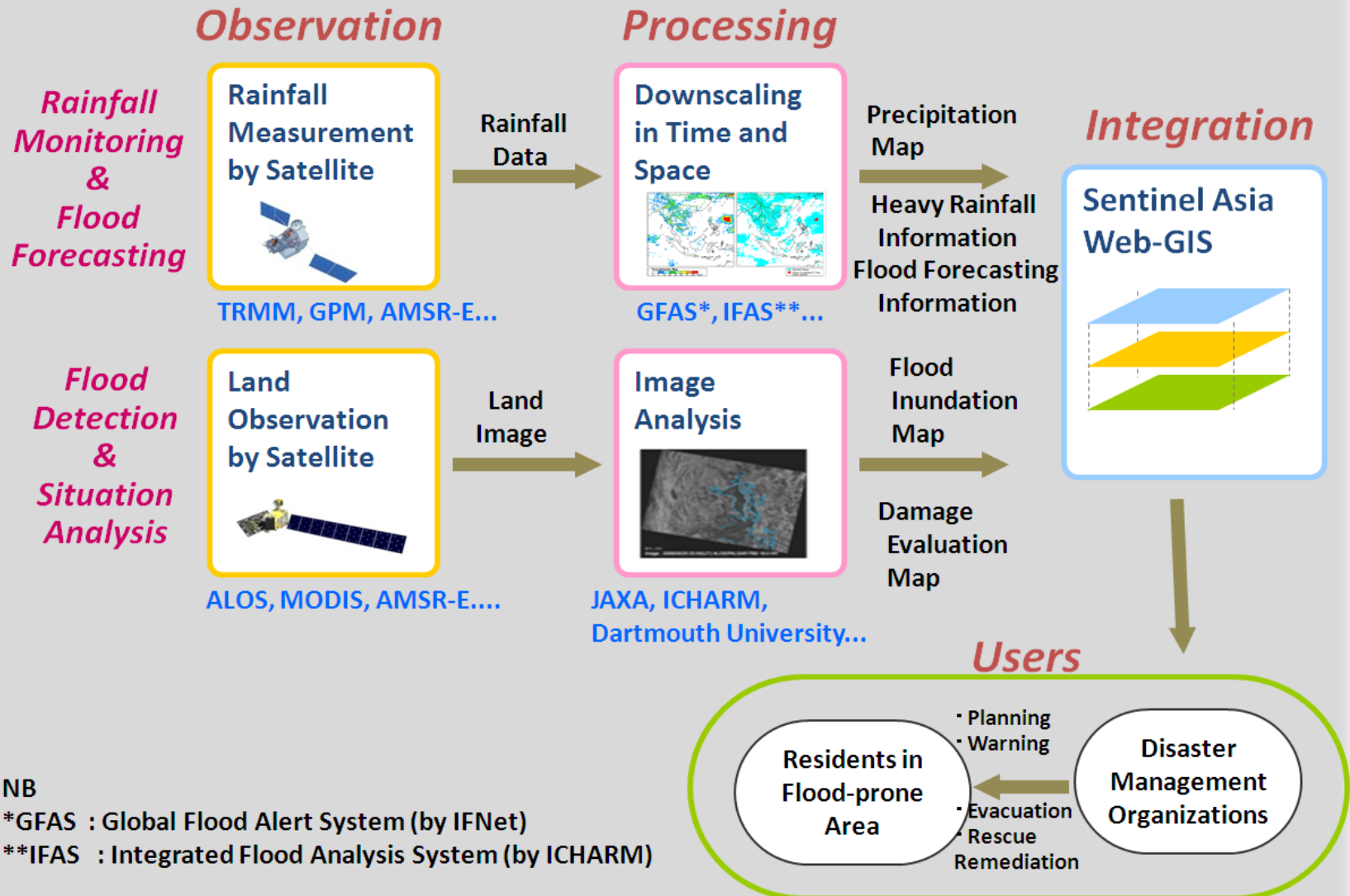
# Number of Emergency Observation



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# Flood Monitoring



NB

\*GFAS : Global Flood Alert System (by IFNet)

\*\*IFAS : Integrated Flood Analysis System (by ICHARM)



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# Capacity Building and Human Network



**Human Network**  
the most fundamental  
underpinning of  
the project

**The 5th Training by JAXA, hosted by MoDM in Sri Lanka, in February 2010**



**The 6th Training by JAXA, hosted by GISTDA in Thailand, in July 2010**



# Next Step

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- 1. Contribution remote sensing and ICT in Asia-Pacific region by APRSAF.**
- 2. Accumulating more contributions and strengthen role(function) sharing to promote Joint steering of SA project.**
- 3. To cover all phases, add pre-disaster phase and recovery phase to our range of work, in addition to emergency observation**
- 4. Promote regionally or “bi” cooperation aiming to utilize SA more deeply.**



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# the Great East Japan Earthquake

Emergency Obs. Subset - Sentinel Asia Web Site - Mozilla Firefox

ファイル(E) 編集(E) 表示(V) 履歴(S) ブックマーク(B) ツール(I) ヘルプ(H)

https://sentinel.tksc.jaxa.jp/sentinel2/emobSelect.action?subset\_name=Emergency Observation

UserID : gues9999

UserID  password  login

HOME Announce About Sentinel Asia JPT Member FAQ Contact US Links Site Policy

WEB GIS

- Emergency Observation
- Wildfire Monitoring
- Flood Monitoring
- MTSAT Imagery
- Capacity Building
- Library

Emergency Obs. Request List

Country: Japan Disaster Type: ALL Search

Emergency Obs. ID	Occurrence Date (UTC)	Country	Disaster Type	Status	Product	WEB-GIS	Detail	Disaster Inf.
ERJJPX000020	2011/09/21	Japan	Flood	Active			<a href="#">link</a>	<a href="#">ADRC</a>
ERJJPX000019	2011/09/03	Japan	Flood	Active			<a href="#">link</a>	<a href="#">ADRC</a>
ERADRC000010	2011/07/29	Japan	Flood	Active			<a href="#">link</a>	<a href="#">ADRC</a>
ERJJPX000018	2011/03/11	Japan	Earthquake	Active			<a href="#">link</a>	<a href="#">ADRC</a>
ERJJPX000014	2010/10/20	Japan	Flood	Active			<a href="#">link</a>	<a href="#">ADRC</a>
ERADRC000003	2008/07/24	Japan	Earthquake	Finish			<a href="#">link</a>	<a href="#">ADRC</a>
ERJJPX000001	2008/06/14	Japan	Earthquake	Finish			<a href="#">link</a>	<a href="#">ADRC</a>

完了

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SENTINEL ASIA

The Great East Japan Earthquake  
On March 11  
2011



# the Great East Japan Earthquake

EmergencyObservation Thumbnail - Sentinel Asia Web Site - Mozilla Firefox

ファイル(E) 編集(E) 表示(V) 履歴(S) ブックマーク(B) ツール(I) ヘルプ(H)

https://sentinel.tksj.jaxa.jp/sentinel2/thumbnailEmob.action?subset\_name=Emergency+Observation&submit.co... Google

よく見るページ 最新ニュース

Asian Disaster Reduction Cente... x Emergency Obs. Subset - Senti... x EmergencyObservation Thu... x

### Emergency Obs. Request Information

Emergency Obs. ID: ERJPJX000018  
Disaster Type: Earthquake Country: Japan  
Occurrence Date (UTC): Date: 11/03/2011 Time: 05:46 GLIDE Number: EQ-2011-000028-JPN  
ADRC URL: http://www.adrc.asia/view\_disaster\_en.php?NationCode=392&lang=en&KEY=1497

### Disaster Situation

Heavy earthquake (earthquake intensity Level 7) hit the northern-east part of Japan main Island (Miyagi, Iwate, Fukushima Province). There are serious concern to cause the serious damage & tsunami.

FS2\_PAN-3\_Senda... 16/01/2011 02:00  
FS2\_PAN-2\_Senda... 16/01/2011 02:00  
FS2\_PAN-1\_Senda... 16/01/2011 02:00  
FS2\_MS\_Sendai, ... 16/01/2011 02:00  
FS2\_PAN-4\_Iwate... 12/08/2007 02:00

FS2\_PAN-3\_Iwate... 12/08/2007 02:00  
FS2\_PAN-2\_Iwate... 12/08/2007 02:00  
FS2\_PAN-1\_Iwate... 12/08/2007 02:00  
FS2\_MS-2\_Iwate... 12/08/2007 02:00  
FS2\_MS-1\_Iwate... 12/08/2007 02:00

### Satellite Images(After Disaster)

#### ALOS(Jpeg)

ALOS AV2, P60 F... 14/03/2011 01:13  
ALOS AV2, P60 F... 14/03/2011 01:12

#### THEOS(Jpeg)

完了

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# the Great East Japan Earthquake

WEB-GIS - Sentinel Asia Web Site - Mozilla Firefox

ファイル(E) 編集(E) 表示(V) 履歴(S) ブックマーク(B) ツール(T) ヘルプ(H)

https://sentinel.tksc.jaxa.jp/sentinel2/webGISControl.action?requestId=ERJPJX000018&subsetName=Emergency

よく見るページ 最新ニュース

Asian Disaster Reduction Cente... x Emergency Obs. Subset - Senti... x WEB-GIS - Sentinel Asia We... x

**Emergency Observation**

Scale: 25000 Scale: 25000

**Images(Before Disaster)**

- 100 FS2\_PAN-4\_Iwate-Miyagi-Fukushima, Japan observed on Aug 12 2007
- 100 FS2\_PAN-3\_Iwate-Miyagi-Fukushima, Japan observed on Aug 12 2007
- 100 FS2\_PAN-2\_Iwate-Miyagi-Fukushima, Japan observed on Aug 12 2007
- 100 FS2\_PAN-1\_Iwate-Miyagi-Fukushima, Japan observed on Aug 12 2007
- 100 FS2\_MS-2\_Iwate-Miyagi-Fukushima, Japan observed on Aug 12 2007
- 100 FS2\_MS-1\_Iwate-Miyagi-Fukushima, Japan observed on Aug 12 2007
- 100 FS2\_PAN-3\_Sendai, Japan observed on Jan 16 2011
- 100 FS2\_PAN-2\_Sendai, Japan observed on Jan 16 2011
- 100 FS2\_PAN-1\_Sendai, Japan observed on Jan 16 2011
- 100 FS2\_MS\_Sendai, Japan observed on Jan 16 2011
- 100 ALOS AV2, P67 F2840-2870 A0, February 23, 2011
- 100 ALOS AV2, P67 F2800-2810 A0, November 6, 2010
- 100 ALOS AV2, P67 F2830 A0, December 16, 2008

**ALOS AVNIR2 November 6 2010**

**ALOS AVNIR2 March 14 2011**

**Floating Debris**

**Pre-Disaster**

**Post-Disaster**

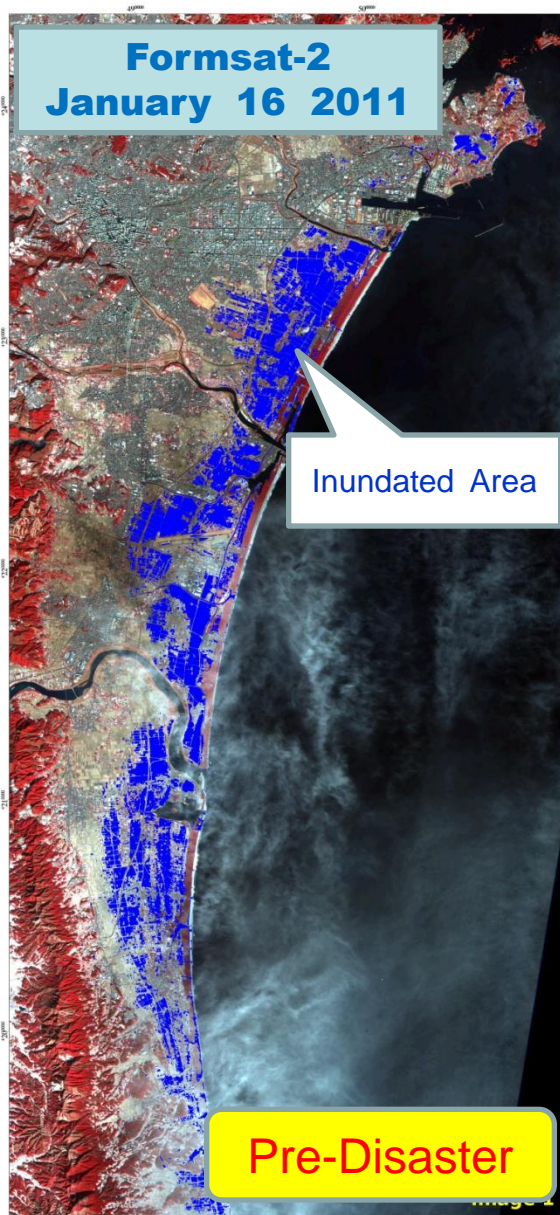
141.93854, 39.45907 141.93789, 39.45717

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# the Great East Japan Earthquake



## Tsunami Inundated Areas 2011 Sendai, Japan



### Data source

Formsat-2 multispectral images displayed in RGB  
Band combination:  
R - Near infrared, G - Red, B - Green  
Image 1 acquired on January 16, 2011 (pre-disaster)  
Image 2 acquired on March 19, 2011 (post-disaster)

Map Projection: UTM zone 54N  
Datum: WGS 84



### Legend

■ Inundated Area

### Description

The tsunami due to the Tohoku Earthquake of March 11, 2011 caused widespread inundation in the Sendai area. Here we show the inundated area in a coastal strip which extends from Sendai city to the southern end of Miyagi Prefecture.

Severely inundated areas are obtained by thresholding the NIR band in the post-disaster image, as the NIR reflectance in water is extremely low. The sea, rivers and large bodies of water are removed from the displayed inundated area as these regions are under water in both images.

The inundated area is indicated on the pre-disaster image in blue. It covers a total area of 58.03 sq km.



Situation	Condition	Location
Flood	Tideland	Sendai City (Gamo Tideland)

Pre-Disaster Feb/23/2011

Post-Disaster Apr/10/2011





Situation	Condition	Location
Changes in the ground	Land subsidence	Kesennuma City

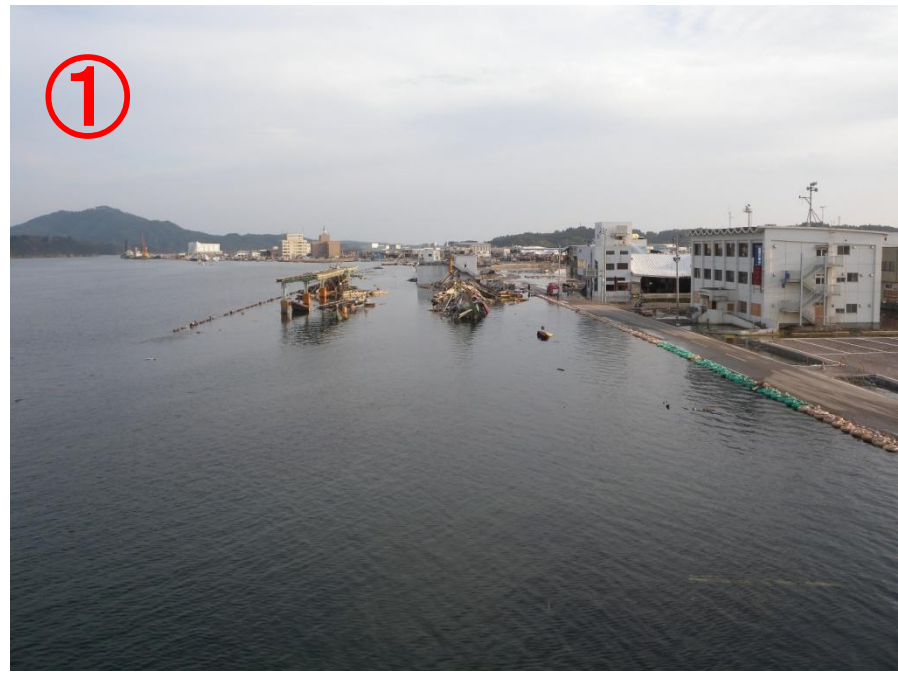
Pre-Disaster Mar/18/2009

Post-Disaster Mar/24/2011





# Field survey

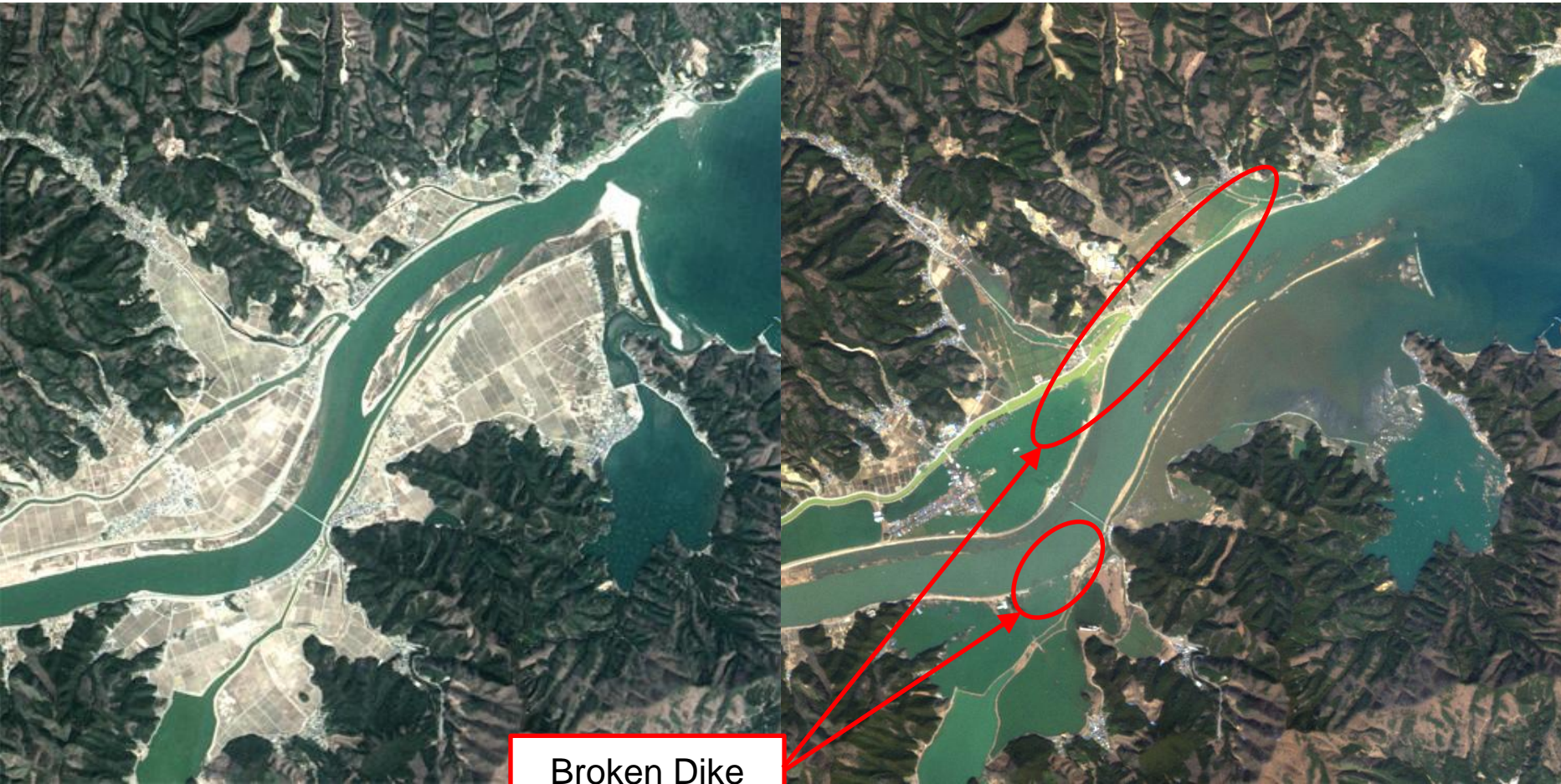




Situation	Condition	Location
Structural Damage	Flood damage by incursion	Ishinomaki City (Kitakami River)

Pre-Disaster Mar/18/2009

Post-Disaster Mar/14/2011



Broken Dike



# Field survey



**ADRC promotes disaster reduction through  
multi-national/multi-stakeholder/multi-lateral  
cooperation in the Asian region**



**Thank you for your attention**