



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

# SENTINEL ASIA



Asia-Pacific Regional Space Agency Forum  
**APRSAF**

**ACDR 2008**  
**November 12 – 14, 2008**  
**Bali, Indonesia**

**Atsushi ONO**  
Secretariat, Sentinel Asia Project  
JAXA



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

## What is Sentinel Asia

The Sentinel Asia initiative is a collaboration between **Space agencies** and **Disaster management agencies**, applying remote sensing and Web-GIS technologies 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 early warning
- > Minimize the number of victims and social/economic losses.

Sentinel Asia is leading by the APRSAF (Asia-Pacific Regional Space Agency Forum) to share **Disaster information** in the Asia-Pacific region by the Sentinel Asia System and to make the best use of **Space Technology** such as **Earth Observation Satellites data** for disaster responses in the Asia-Pacific region.

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## What is APRSAF

Established in 1993 after the Asia-Pacific International Space Year Conference (APIC) in 1992  
Enhance the development of space programs in the Asia-Pacific region and promote regional cooperation in the field of space technology and its applications.

**[Participation]** Space agencies, related governments, regional and international organizations, institutions responsible for applying space technology.

**[Organizers]** MEXT, JAXA and co-host organizations

➤ Past co-organizers: Government entities of Mongolia, Malaysia, The Republic of Korea, Thailand, Australia, Indonesia, India.

**Working Groups**

- Earth Observation
- Communication Satellite Applications
- ISS
- Space Education & Awareness

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

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## Contribution from Space Infrastructure

500km~

13km

4.6km

- Wide Coverage
- 24h Observation
- All Weather
- Borderless

**Optical Imagery**

2006/4/29 (same date)

**Radar Imagery**

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### Current Participating EO Satellites

 <p><b>ALOS</b></p> <p>PRISM: 2.5m Pan AVNIR-1: 10m Multi PALSAR: 10-100m L-Band</p>	<p>Coming soon...</p>  <p><b>THEOS</b></p> <p>PAN: 2m Multi: 15m</p>
 <p><b>ResOURCESAT-1</b></p> <p>LISS-4: 5.8m Pan LISS-3: 23.5m Multi AWiFS: 56m Multi</p>	
	 <p><b>KOMPSAT-1</b></p> <p>EOC: 6.6m OSMI: 1km</p>

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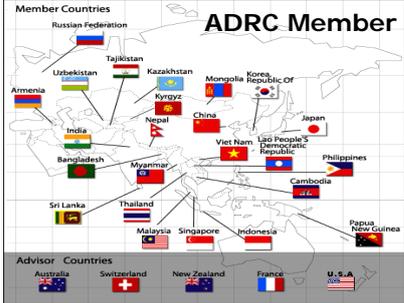
### History of Sentinel Asia

- **Oct 2004:** APRSAF-11, Canberra, Australia, Sentinel Asia project proposed and conceptualized
- **Oct 2005:** APRSAF-12, in Kitakyushu, Japan, approved the plan to initiate the pilot project.
- **Feb 2006:** Joint Project Team (JPT) was organized and implementation of Sentinel Asia was initiated in the meeting in Hanoi, Vietnam
- **Oct 2006:** Operations of Sentinel Asia commenced by opening its Web site. JAXA also started to provide ALOS data and accept ALOS observation requests.
- **Nov 2007:** APRSAF-14, Bangalore, India, it was confirmed that:
  - >STEP1 achieved its overall goals as a good demonstrator project
  - >STEP2 was agreed and initiated STEP2 activities
  - >ISRO joined Emergency Observation
- **Dec 2008:** APRSAF-15, Hanoi, Vietnam
  - >To be reported the latest status of Step-2.

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## Members of Sentinel Asia

Sentinel Asia organize Joint Project Team (JPT), and JPT consists **59 organizations** and including **51 agencies** from **20 countries** and **8 international organizations**. Also, Sentinel Asia cooperate with ADRC and their members (27 Member Countries, 5 Advisor Countries, 1 Observer) closely, and they are also member of Sentinel Asia as well.

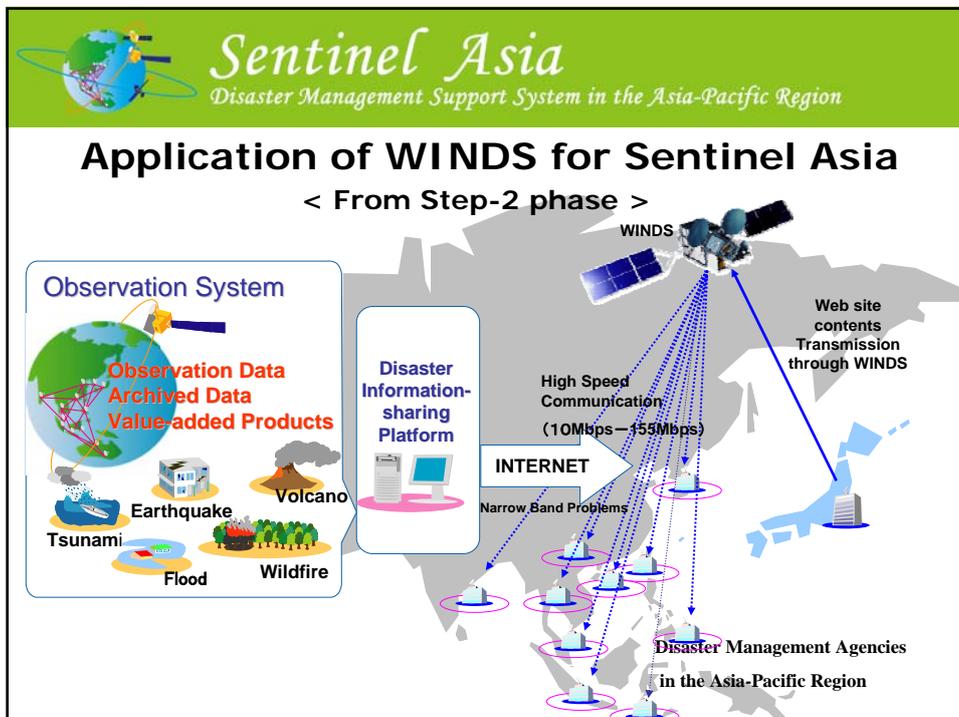
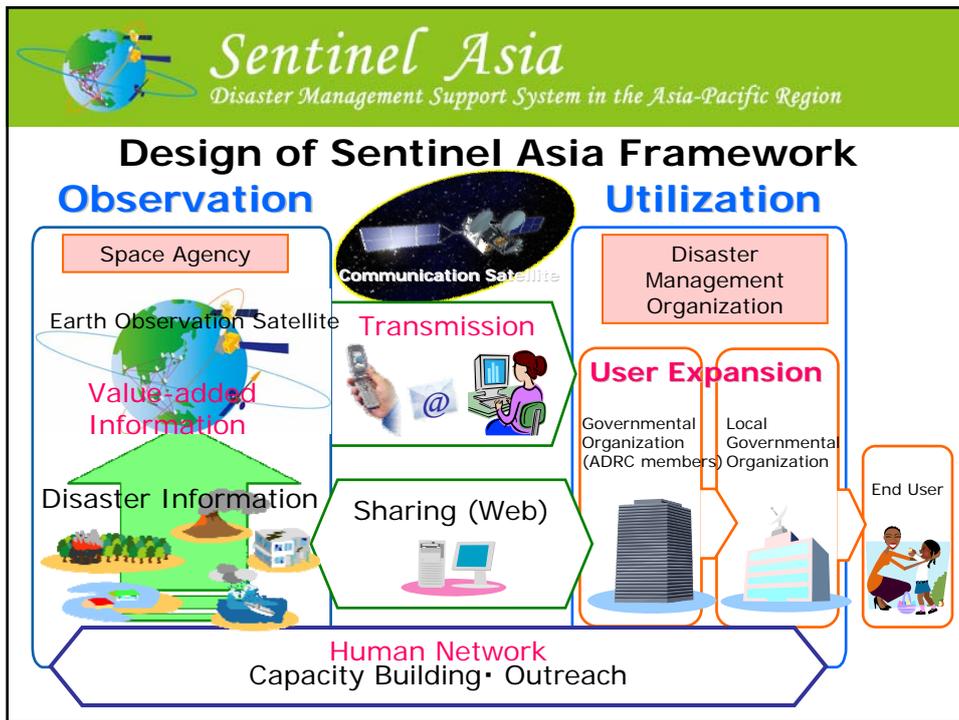
**JPT** +  **members**

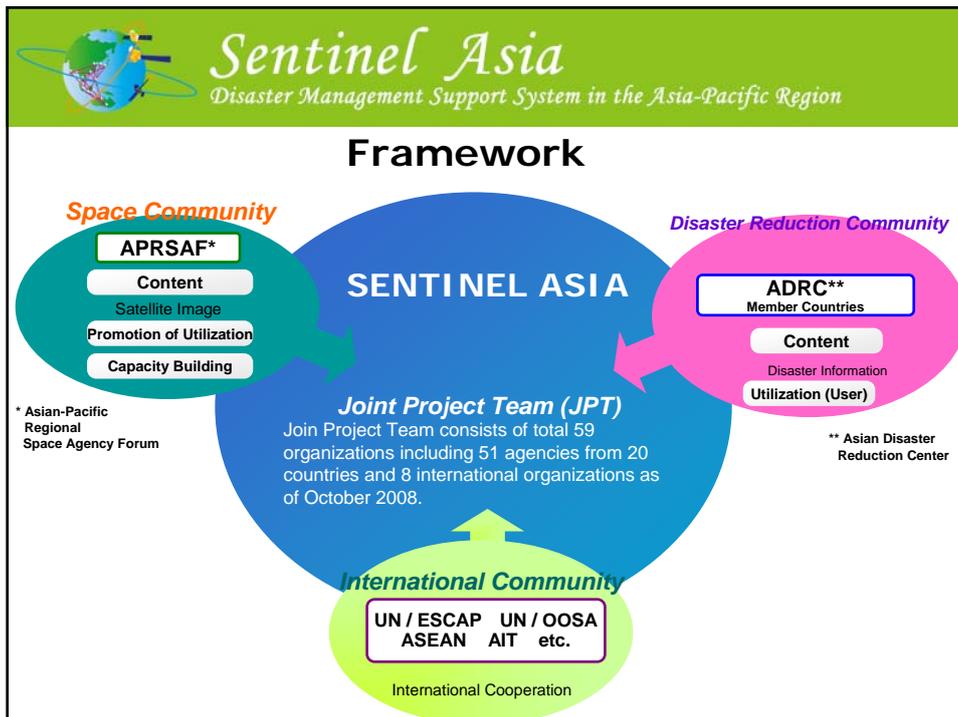
The map shows ADRC Member Countries (27) and Advisor Countries (5). Member Countries include: Russian Federation, Tajikistan, Kazakhstan, Mongolia, Korea Republic of, China, Nepal, Viet Nam, Lao People's Democratic Republic, Philippines, Cambodia, Myanmar, Bangladesh, India, Armenia, Uzbekistan, Sri Lanka, Thailand, Malaysia, Singapore, Indonesia, and Papua New Guinea. Advisor Countries include: Australia, Switzerland, New Zealand, France, and U.S.A.

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## Concept of Sentinel Asia

- Contribution from space community (APRSAF) to the disaster management in the Asia-Pacific region
- To promote utilization of disaster-related information obtained by space and remote sensing technology in order to mitigate and prevent damages caused by natural disasters
- To succeed and strengthen Step 1 considering findings and achievements of Step 1 and user's needs
- Voluntary initiative through the new Joint Project Team for Step-2
- 5 year project start from 2008 through to 2012





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## Enhancement and Expansion in Step 2

1° Participation of Various Satellites

- EO satellites: ALOS (JAXA), MTSAT-1R (JMA), IRS (ISRO)
- *-----near future-----*
- KOMPSAT (KARI), THEOS (GISTDA), etc.
- Communications satellites: WINDS (JAXA) etc.

2° Improvement of Accessibility to Information

- From data sharing (Step 1) to data sharing and transmission
- Facilitate access to disaster-related information through various means including satellite communication using WINDS



## Sentinel Asia

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### Enhancement and Expansion in Step 2

3° **Value-added Data**

- To provide analyzed images and easily comprehensible interpretations from images
- To organize framework of data analysis node

4° **Expansion of Disaster Scope**

- To extend STEP1's focus on Wildfires and Floods
- To include monitoring during signs before disasters happen and environmental change
- For new WG, some activities were proposed in the 1<sup>st</sup> JPTM: Glacier and Glacial Lake Monitoring, Capacity Building, Irrigation, etc.

5° **User Expansion**

- To expand users to local disaster authority in cooperation with UNESCAP



## Sentinel Asia

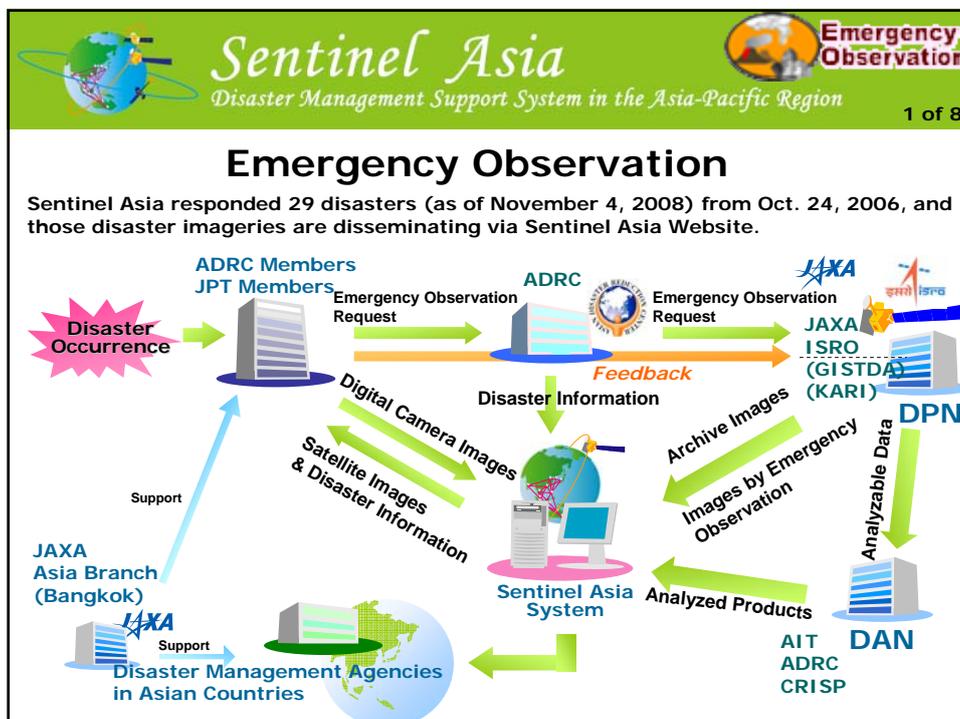
*Disaster Management Support System in the Asia-Pacific Region*

### Information Sharing

Disaster information shared by "Sentinel Asia Website", and activities and contents mainly consist as follows;

- (1)Emergency Observation
- (2)Wildfire Working Group
- (3)Flood Working Group
- (4)Capacity Building
- (5)Web Forum
- (6)Emergency Observation Request





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**Emergency Observation**  
2 of 8

**Emergency Observation**

**Wildfire Monitoring**

**Flood Monitoring**

**MTSAT Imagery**

**Capacity Building**

**Web Forum**

**Emergency Observation Request**

### Emergency Observation

Date	Country	Event	Image	Product	GIS	GoogleEarth	Photo	Disaster Information
2008/08/18	Nepal	Flood		JAXA/SAPC1 JAXA/SAPC1 JAXA/SAPC2 JAXA/SAPC3 JAXA/SAPC4				ADRC
2008/08/10	Lao P.D.R.	Flood		AIT1 <a href="#">Link</a> AIT2 <a href="#">Link</a> AIT3 <a href="#">Link</a> WREA1 <a href="#">Link</a>				ADRC
2008/07/24	Japan	Earthquake						ADRC
2008/06/21	Philippines	Typhoon						ADRC
2008/06/14	Japan	Earthquake		JAXA/EORC1 <a href="#">Link</a> JAXA/EORC2 <a href="#">Link</a> JAXA/EORC3 <a href="#">Link</a> JAXA/EORC4 <a href="#">Link</a> JAXA/EORC5 <a href="#">Link</a>				ADRC
2008/06/04	Indonesia	Storm Surge		JAXA/EORC1 <a href="#">Link</a> JAXA/EORC2 <a href="#">Link</a> JAXA/EORC3 <a href="#">Link</a> JAXA/EORC4 <a href="#">Link</a>				ADRC

This page is updated on:  
08/25/2008 22:30:06

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**Emergency Observation**  
3 of 8

Satellite Image

Lat: 16d 12m 8.3s N, Lon: 94d 57m 53.579s E  
Copyright (C) METL JAXA

**Displayed and Overlaid Data**

**Map Data**

DCW (Vmap02)

GSI DM25000 (Japan only)

**Satellite Image (After Disaster)**

ALOS PALSAR/2008/05/06 03:58)

ALOS PALSAR/2008/05/06 03:58)

ALOS PALSAR/2008/05/06 03:58)

ALOS PALSAR/2008/05/06 03:58)

IRS-P6 LISS - III/2008/05/07 14:00

IRS-P6 LISS - III/2008/05/07 14:00

IRS-P6 AwiFS/2008/05/07 14:00)

**Satellite Image (Before Disaster)**

LANDSAT/2003/01/01 00:00)

LANDSAT/2005/01/01 00:00)

ALOS PALSAR/2008/03/28 16:17)

ALOS PALSAR/2008/03/28 16:17)

IRS P6 AwiFS/2008/04/18 14:17)

**Other Information**

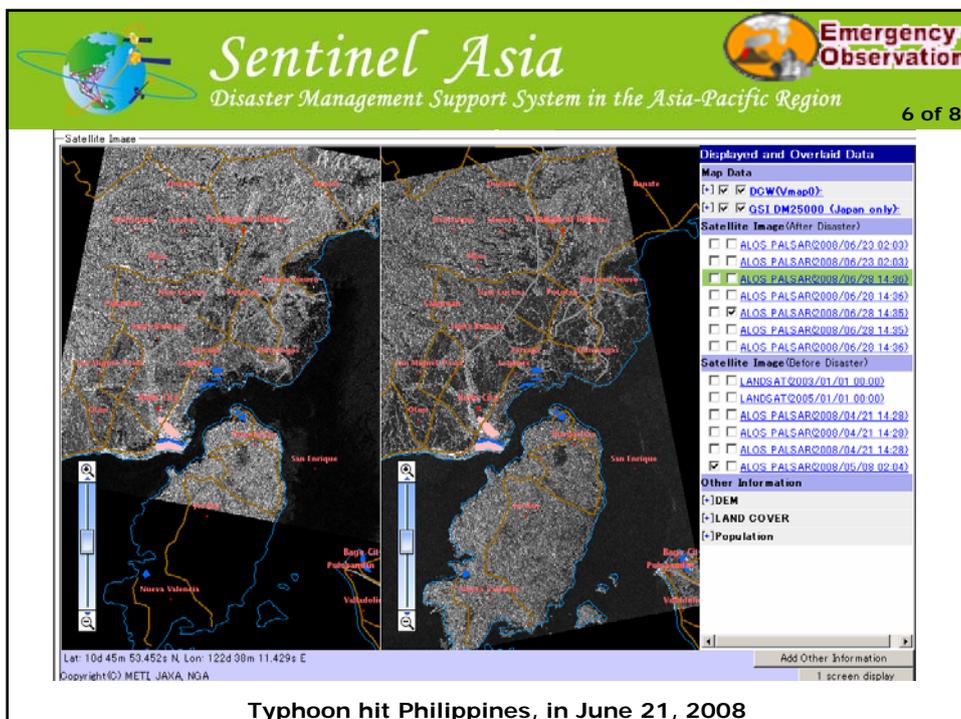
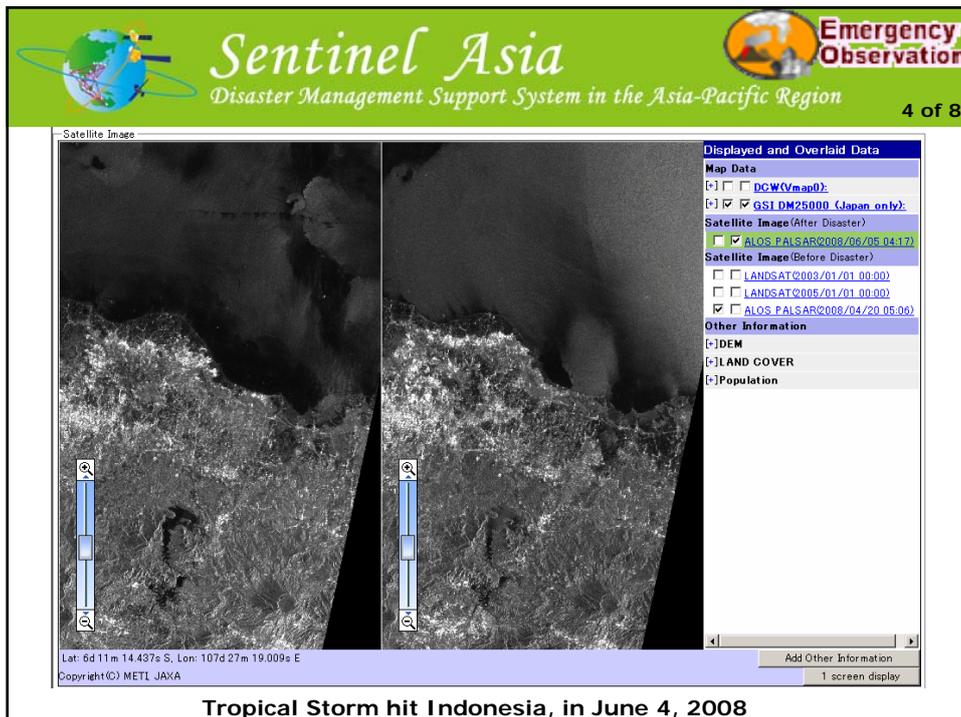
DEM

LAND COVER

Population

Add Other Information  
1 screen display

**Cyclone Nargis hit Myanmar in May 2, 2008**



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**Emergency Observation**

5 of 8

Satellite Image

Displayed and Overlaid Data

Map Data

- DCW(Vmap0)
- GSI DM25000 (Japan only)

Satellite Image(After Disaster)

- ALOS PALSAR2008/06/23 02:09
- ALOS PALSAR2008/06/23 02:09
- ALOS PALSAR2008/06/28 14:36

Satellite Image(Before Disaster)

- LANDSAT2003/01/01 00:00
- LANDSAT2005/01/01 00:00
- ALOS PALSAR2008/04/21 14:28
- ALOS PALSAR2008/04/21 14:28
- ALOS PALSAR2008/04/21 14:28
- ALOS PALSAR2008/05/08 02:04

Other Information

- DEM
- LAND COVER
- Population

Lat: 10d 51m 55.35s N, Lon: 122d 40m 40.051s E

Copyright (C) METI, JAXA, RESTEC, NGA

Add Other Information  
View in Google Earth  
2 screen display

**Typhoon hit Philippines, June 21, 2008**

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**Emergency Observation**

7 of 8

Satellite Image

Displayed and Overlaid Data

Map Data

- DCW(Vmap0)
- GSI DM25000 (Japan only)

Satellite Image(After Disaster)

- ALOS PALSAR2008/08/15 03:30
- ALOS PALSAR2008/08/15 03:30
- ALOS PALSAR2008/08/15 03:29
- Resourcesat-1 AWIFS2008/08/17
- ALOS PALSAR2008/08/20 03:36
- ALOS PALSAR2008/08/20 03:36

Satellite Image(Before Disaster)

- LANDSAT2003/01/01 00:00
- LANDSAT2005/01/01 00:00
- ALOS PALSAR2007/08/18 03:39
- ALOS PALSAR2008/07/19 15:44
- ALOS PALSAR2008/07/19 15:44
- ALOS PALSAR2008/07/19 15:44

Other Information

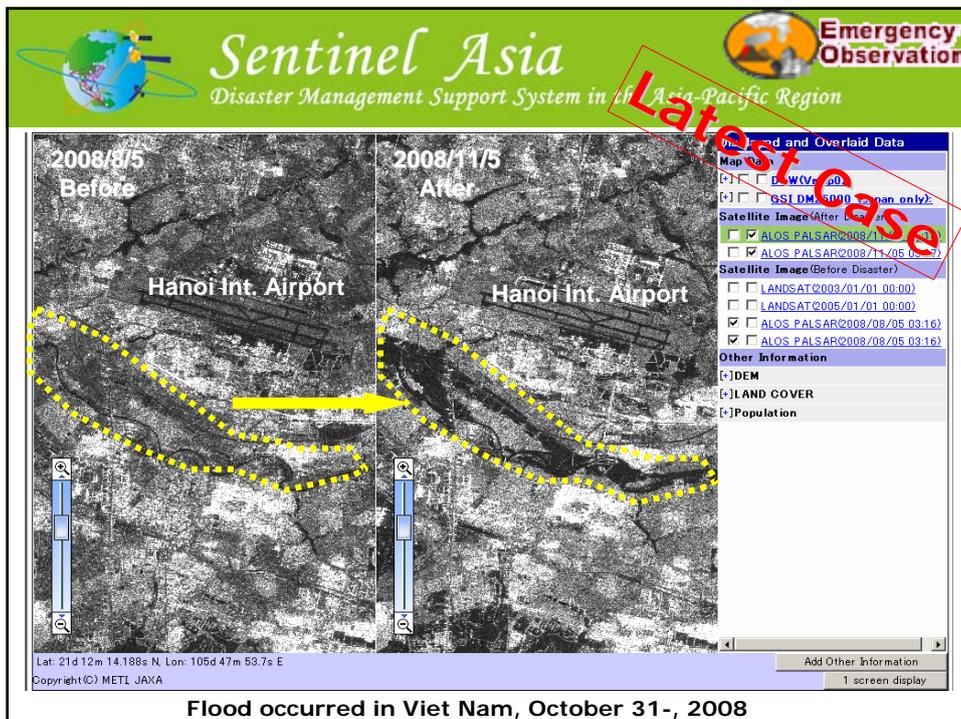
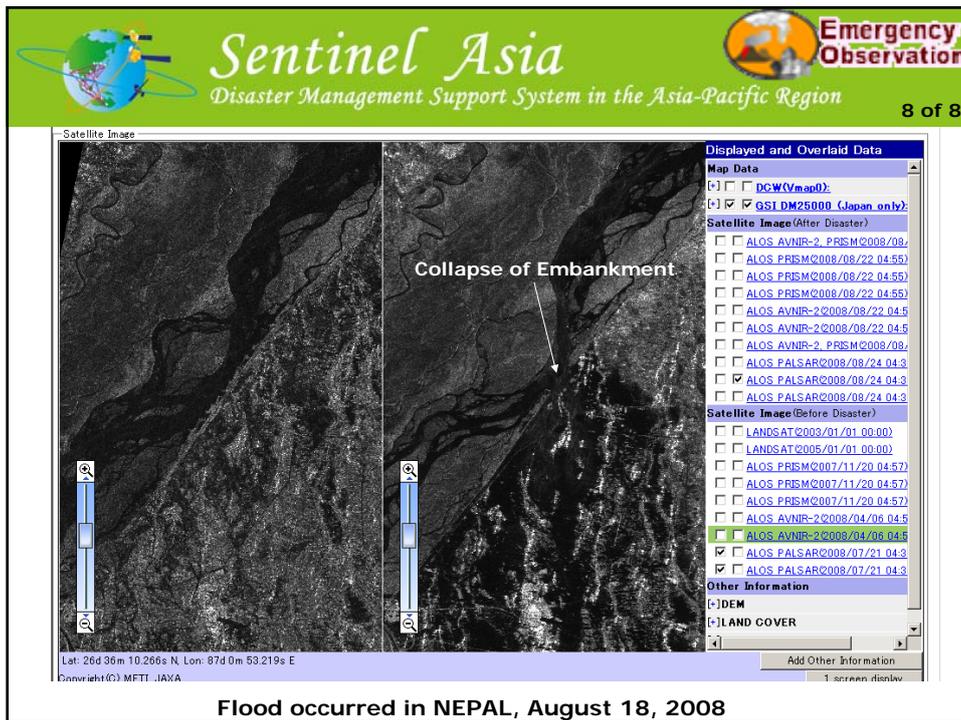
- DEM
- LAND COVER
- Population

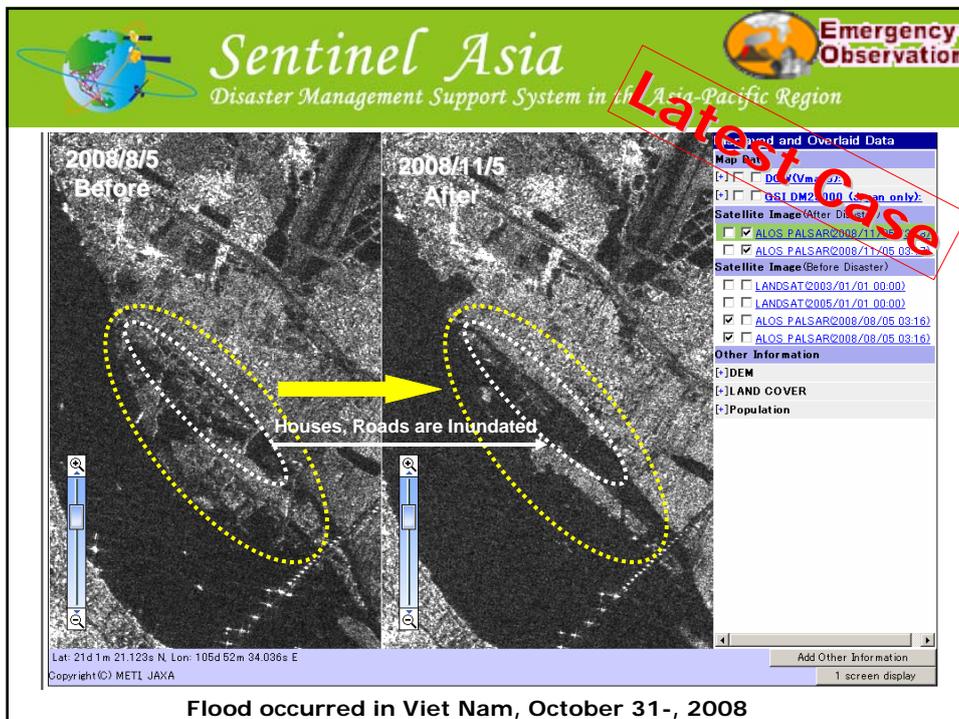
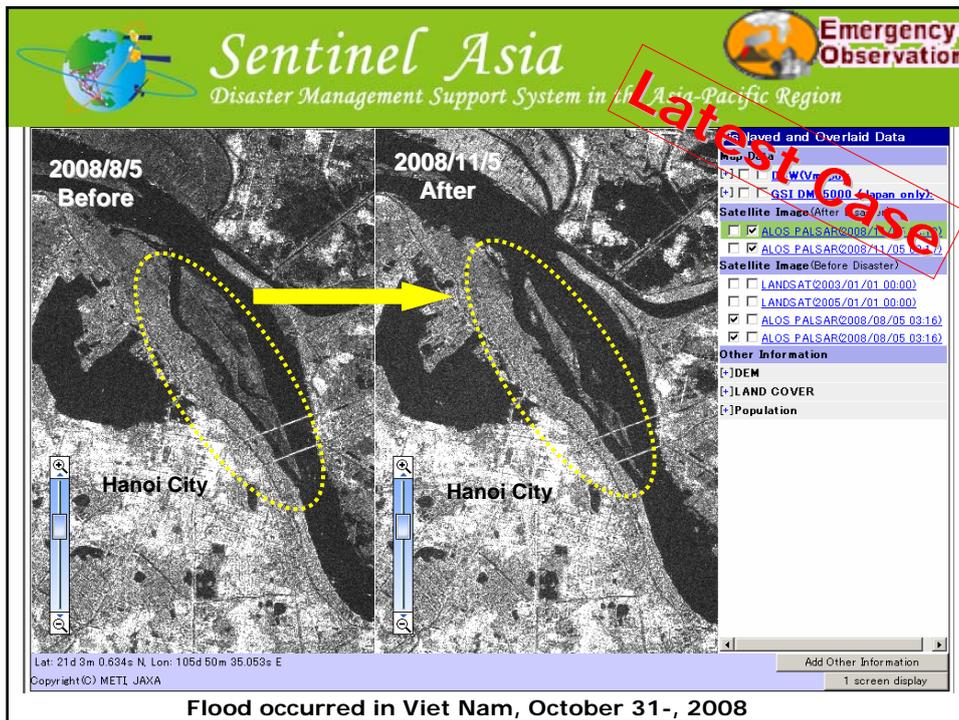
Lat: 17d 55m 16.799s N, Lon: 102d 37m 31.828s E

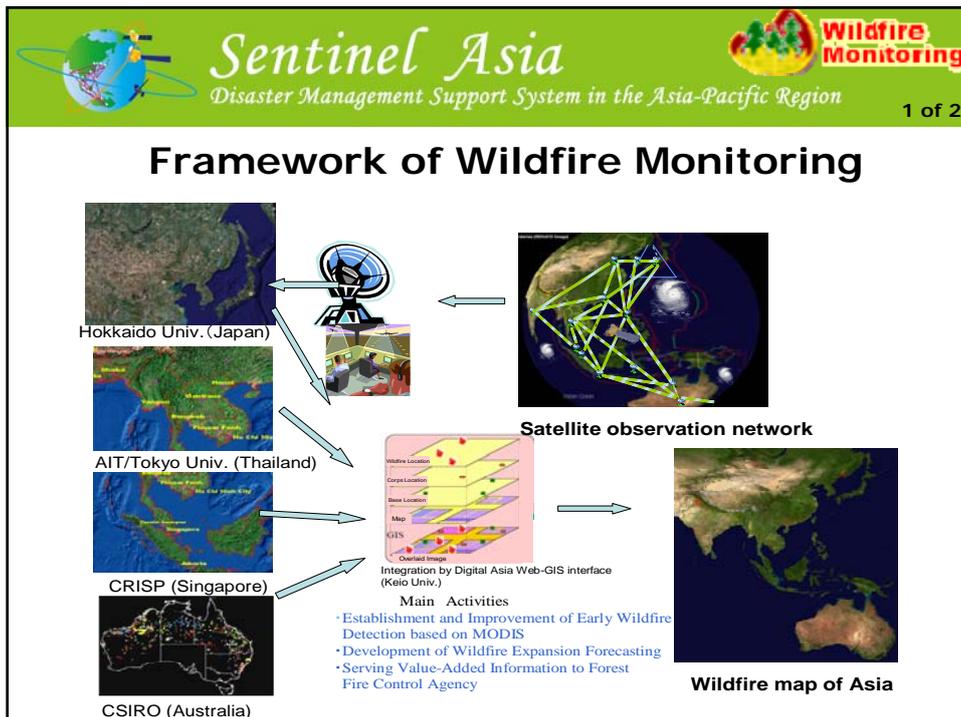
Copyright (C) METI, JAXA, RESTEC, METI, JAXA

Add Other Information  
1 screen display

**Flood occurred in LAO, August 10, 2008**







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**Wildfire Monitoring**  
2 of 2

http://arrs.adrc.or.jp - Sentinel Asia - Wildfire Monitoring - Microsoft Internet Explorer

**WildfireMonitoring** About This Page **Sentinel Asia**

**Display Data**  
Time Span (Unit)  
 Today  
 Yesterday  
 By Date (Last 3 Weeks)  
 From: \_\_\_\_\_ To: \_\_\_\_\_

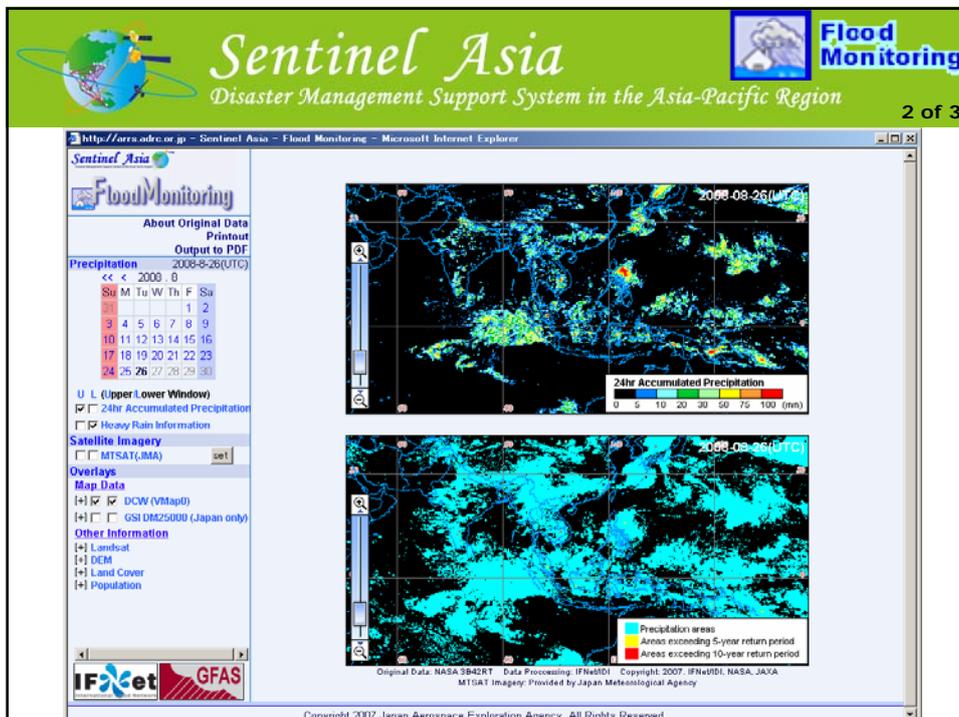
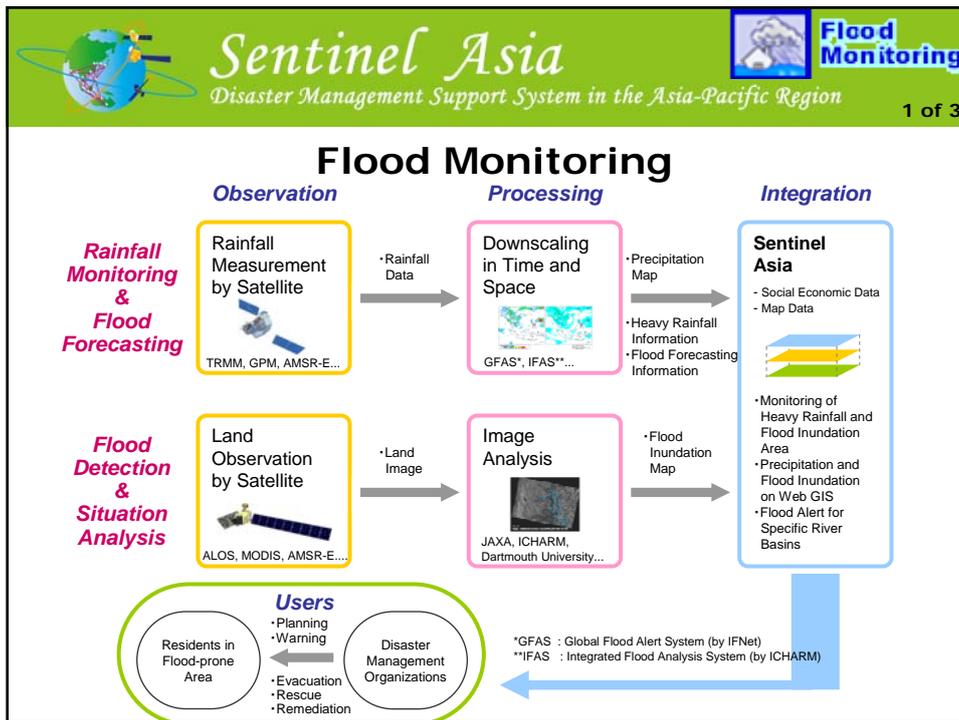
**MODIS Hotspots**  
 Hokkaido Univ. (Japan)  
 NB.U-Tokyo (Japan)  
 CRISP (Singapore)  
 LAPAN (Indonesia)  
 CSIRO/OSA (Australia)  
 AIT (Thailand)

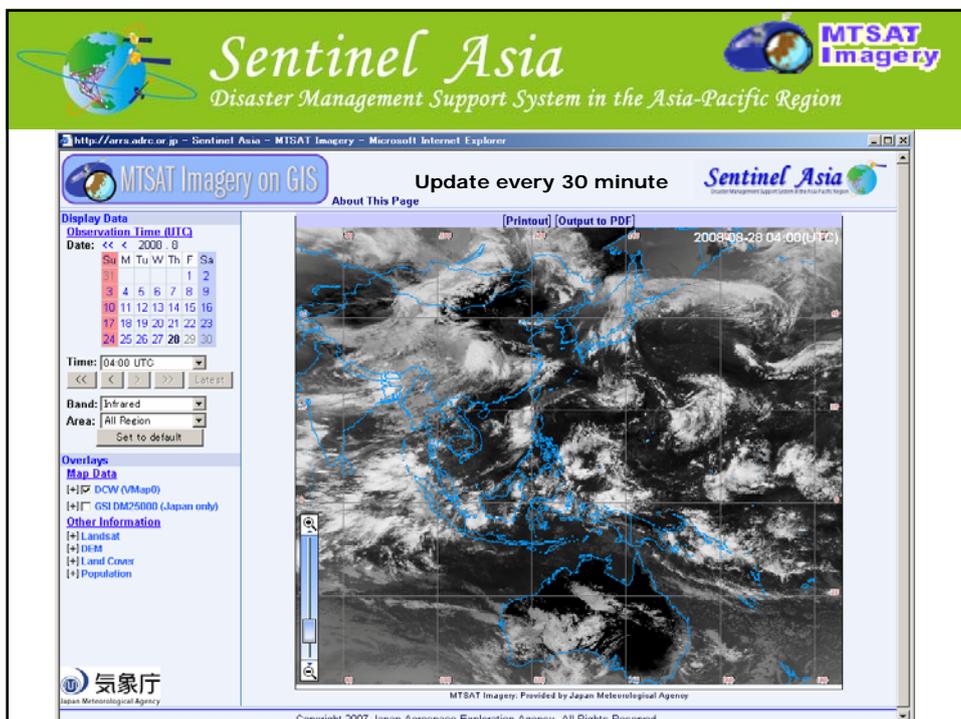
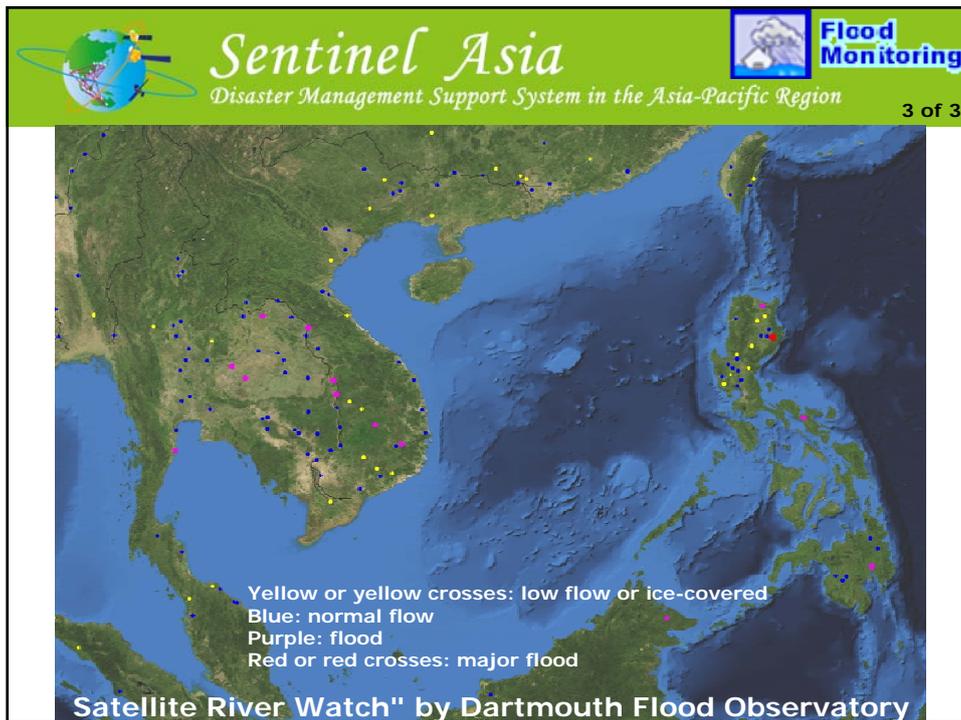
**Satellite Images / Date**  
 MTSAT/AMV set  
 24hr Accumulated Precipitation (FNet) set

**Overlays**  
**Map Data**  
 DCW (VMapIt)  
 GSI DM25000 (Japan only)  
**Other Information**  
 Landsat  
 DEM  
 Land Cover  
 Population

Original Data: Data Processing: Copyright 2007 JAXA  
 MTSAT Imagery Provided by Japan Meteorological Agency  
 Original Data: NASA 3B42RT Data Processing: IFNVI01 Copyright 2007 IFNVI01, NASA, JAXA

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**Capacity Building**

1 of 2

## Capacity Building

To enable utilization of earth observation images which provided under the Sentinel Asia, we are providing several capacity building opportunities in terms of building capacity for interpretation of earth observation images and how to operate Sentinel Asia System as well.

**(1) Capacity Building Announcement**

**Several capacity building announcement release on this page**

- Sentinel Asia System (SAS) Operation Training Guideline for Applications
- Announcement about Mini-Projects (GIC/JAXA)

**(2) Dissemination of Capacity Building Materials**

- Achievement of Mini Project JFY2007
- Sentinel Asia System Operation Training Textbook
- Sentinel Asia Project Outline
- Overview of Sentinel Asia System
- Activities of Asia Branch
- Continue Increase of Disaster Risk and Activities of ADRC
- Utilization of Information for Disaster Risk Management
- Practical Data Use for Disaster Management in Thailand
- Examples of ALOS Disaster Observation



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**Capacity Building**

2 of 2

## Capacity Building

**(1) Sentinel Asia System Operation Training (3 days)**

- > Organize 2 times / Year at South East Asia
- > Around 20 trainees invited per course
- > SA System Operation hands on training
- > R/S data handling hands on training

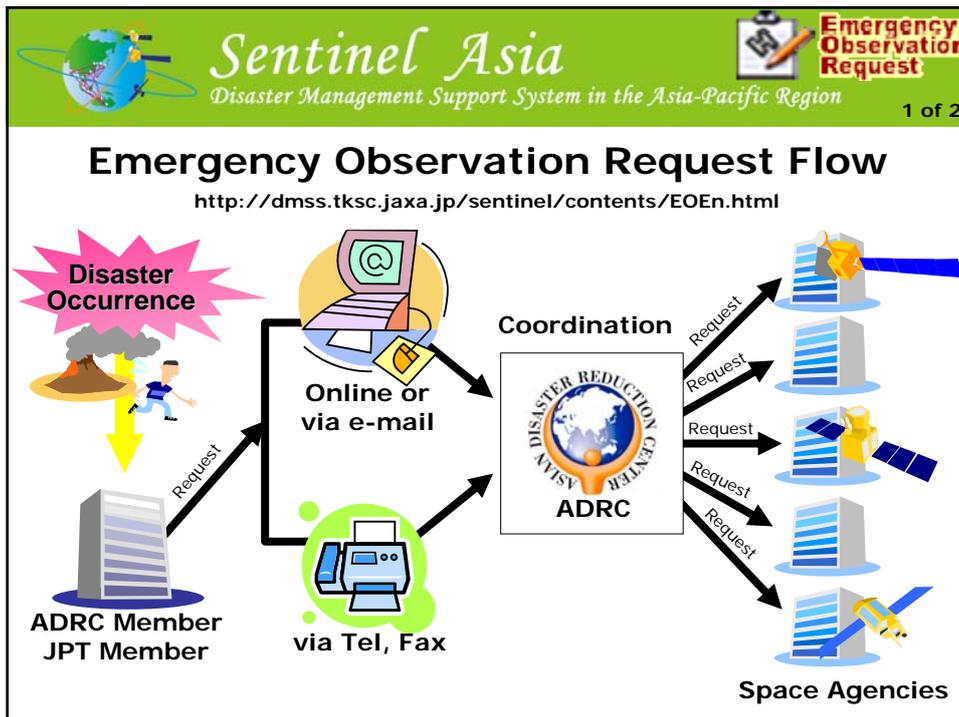
**\*ADRC Member have been attended.**

**(2) R/S Application Mini Project for Disaster (2 month)**

- > Organize a times / Year at Asia Institute of Technology (AIT)
- > Around 20 trainees invited per course
- > R/S data handling hands on training
- > R/S data analysis hands on training
- > Consultation for development of thematic map

**\*ADRC Member have been attended.**

**\*Basic R/S knowledge is required.**



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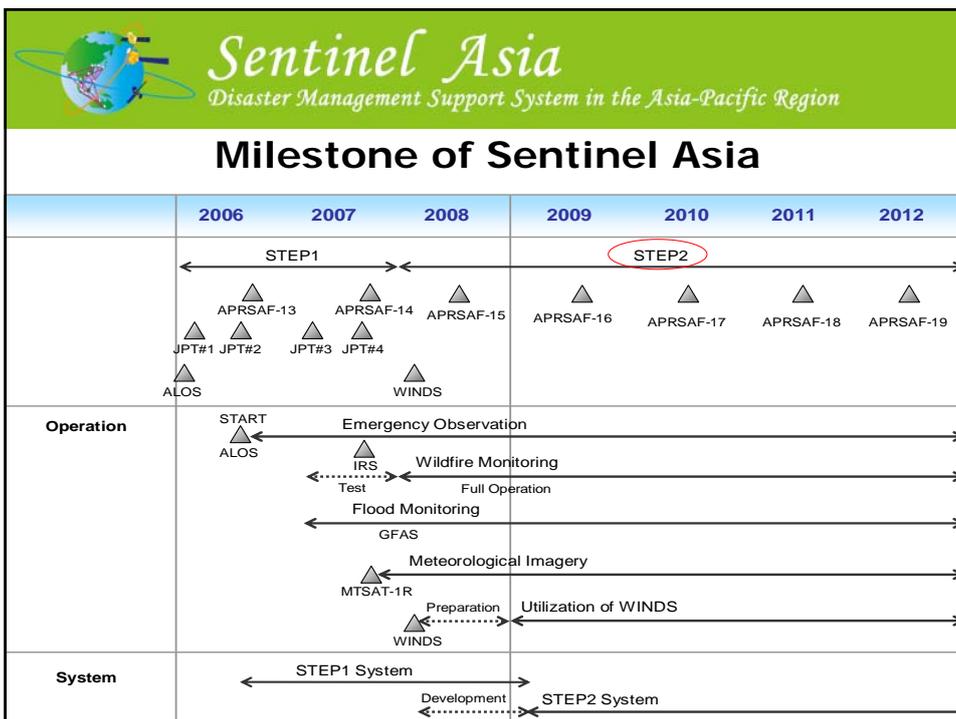
**Emergency Observation Request**

2 of 2

### Feed Back from users

We secretariat ask details of utilization as a "Feed Back Survey" when Sentinel Asia responded, and feed back from users are quite important for improvement of service and system update in future. Also, secretariat ask to support field survey over the affected area for build up better understanding between satellite imageries and actual situation.

The diagram shows a cycle of improvement. On the left is a globe with satellite orbits. A plus sign (+) is followed by an icon of a rolled-up document with a pencil, labeled 'User Feed Back'. An equals sign (=) follows, leading to a globe with satellite orbits and a yellow plus sign (+) in the top right corner, labeled 'Next Generation'.



Please visit Sentinel Asia at  
<http://dmss.tksc.jaxa.jp/sentinel/>

**Secretariat, Sentinel Asia Project Office**  
 E-mail : sentinel.asia@jaxa.jp

Disaster Management Support System Office  
 Space Applications and Promotion Center  
 Japan Aerospace Exploration Agency