

# Sentinel Asia

Disaster Management Support System in the Asia-Pacific Region

# SENTINEL ASIA

*-Enhancing disaster management support capability from space -*



**COPUOS-STSC, Vienna**  
**Feb 12, 2009**

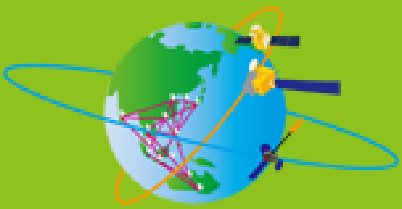
**Chu Ishida**  
**Director, Space Cooperation Office for Asia Pacific Region**  
**JAXA**



Space agencies and  
disaster management organizations are  
working together...







# Sentinel Asia

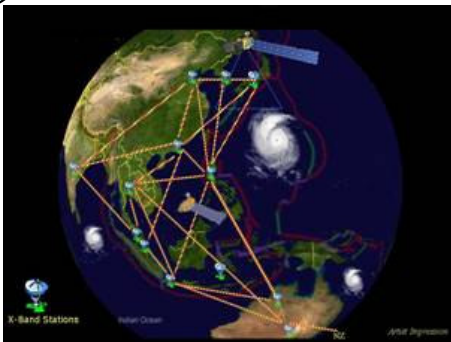
*Disaster Management Support System in the Asia-Pacific Region*

## APRSAF: Asia Pacific Space Agency Froum

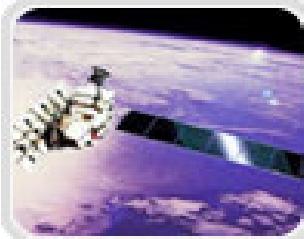
Established in 1993 after the International Space Year  
Promote regional cooperation for space technology and its applications  
**[Participation]** Space agencies, related governments, regional and international organizations, institutions responsible for applying space technology.

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

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



### Working Groups



Earth  
Observation



Communication Satellite  
Applications

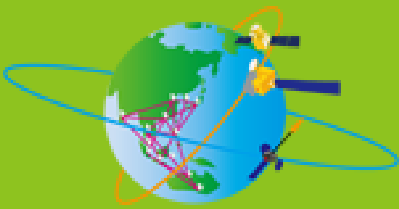


ISS



Space Education &  
Awareness

Sentinel Asia Project



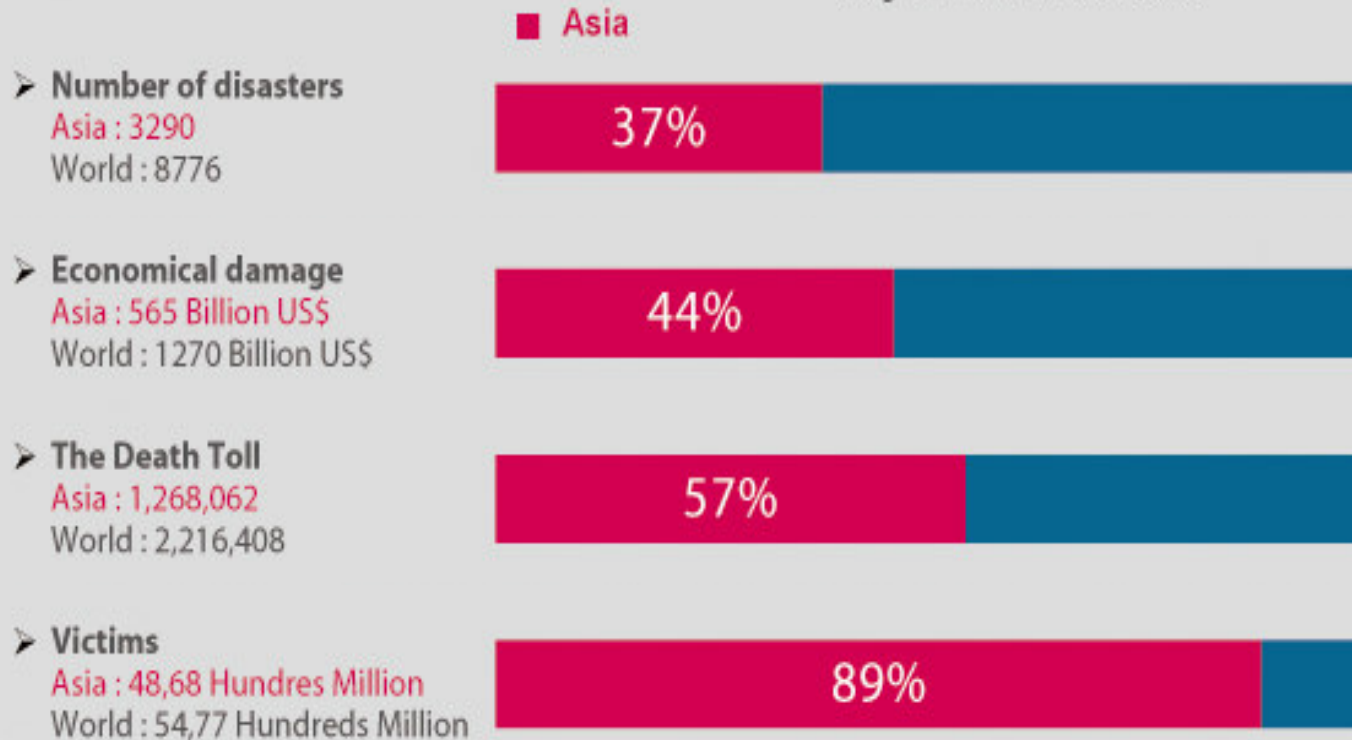
# Sentinel Asia

Disaster Management Support System in the Asia-Pacific Region

## Background of Sentinel Asia

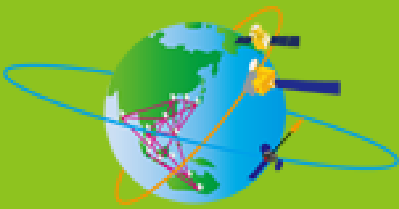
### Natural disaster damages in Asia, 1975-2006

Total number during 1975-2006 quotes from 'ADRC-Nature Disasters Data Book-2006' original in CRED-EMDAT, 2006



The Asia region has been seriously damaged by natural disasters over the last 30 years.



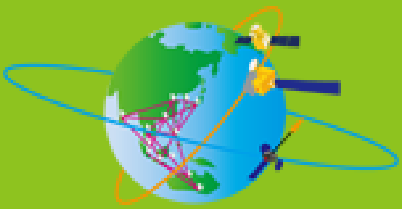


# Sentinel Asia

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

## History of Sentinel Asia

- **Oct 2004:** APRSAF-11, Canberra, Australia, Sentinel Asia project proposed
- **Oct 2005:** APRSAF-12, in Kitakyushu, Japan, approved 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 started. JAXA also started ALOS emergency observations
- **Nov 2007:** APRSAF-14, Bangalore, India,
  - confirmed that STEP1 achieved its overall goals
  - approved and initiate STEP2
  - ISRO joined Emergency Observation
- **Dec 2008:** APRSAF-15, Hanoi, Vietnam, reported the status of Step-2.



# Sentinel Asia

Disaster Management Support System in the Asia-Pacific Region

## Sentinel Asia Concept

### Observation

Space Agency

Earth Observation Satellite

Value-added Information

Disaster Information



Communication Satellite

Transmission



Sharing (Web)



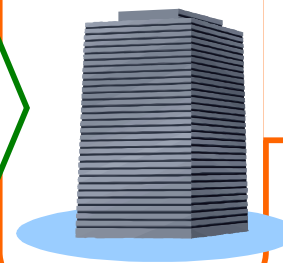
### Utilization

Disaster Management Organization

User Expansion

Governmental Organization (ADRC members)

Local Governmental Organization



End User



Human Network  
Capacity Building · Outreach



# Sentinel Asia

Disaster Management Support System in the Asia-Pacific Region

## Framework

### Space Community

**APRSAF\***

Content

Satellite Image

Promotion of Utilization

Capacity Building

### Disaster Reduction Community

**ADRC\*\***  
Member Countries

Content

Disaster Information

Utilization (User)

## SENTINEL ASIA



### Joint Project Team (JPT)

Total 59 organizations including 51 agencies from 20 countries and 8 international organizations as of October 2008.

### International Community

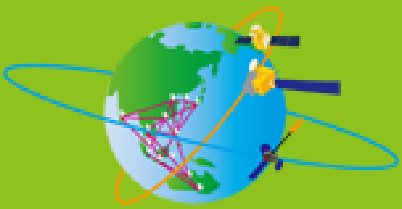
UN / ESCAP   UN / OOSA  
ASEAN   AIT   etc.

International Cooperation

\* Asian-Pacific  
Regional  
Space Agency Forum

\*\* Asian Disaster  
Reduction Center





*Sentinel Asia*

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

## **Enhancement for Step 2 (since 2008)**

1. Increase of contributing satellites
2. Improvement of accessibility to information, including use of WINDS
3. More value-added data and information services
4. Expansion of disaster scope from response to pre-event monitoring
5. User expansion in cooperation with UNESCAP



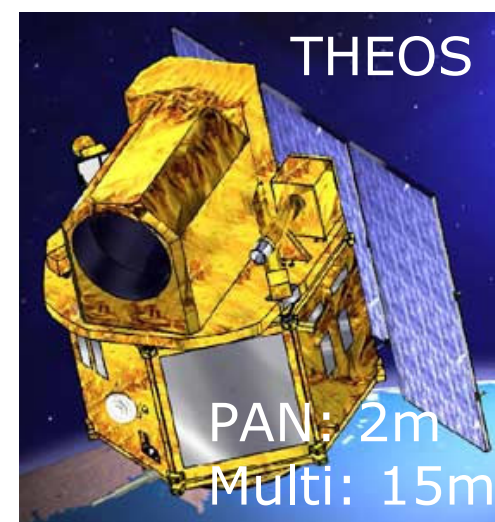
# Sentinel Asia

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

## Contributing EO Satellites



Coming soon...



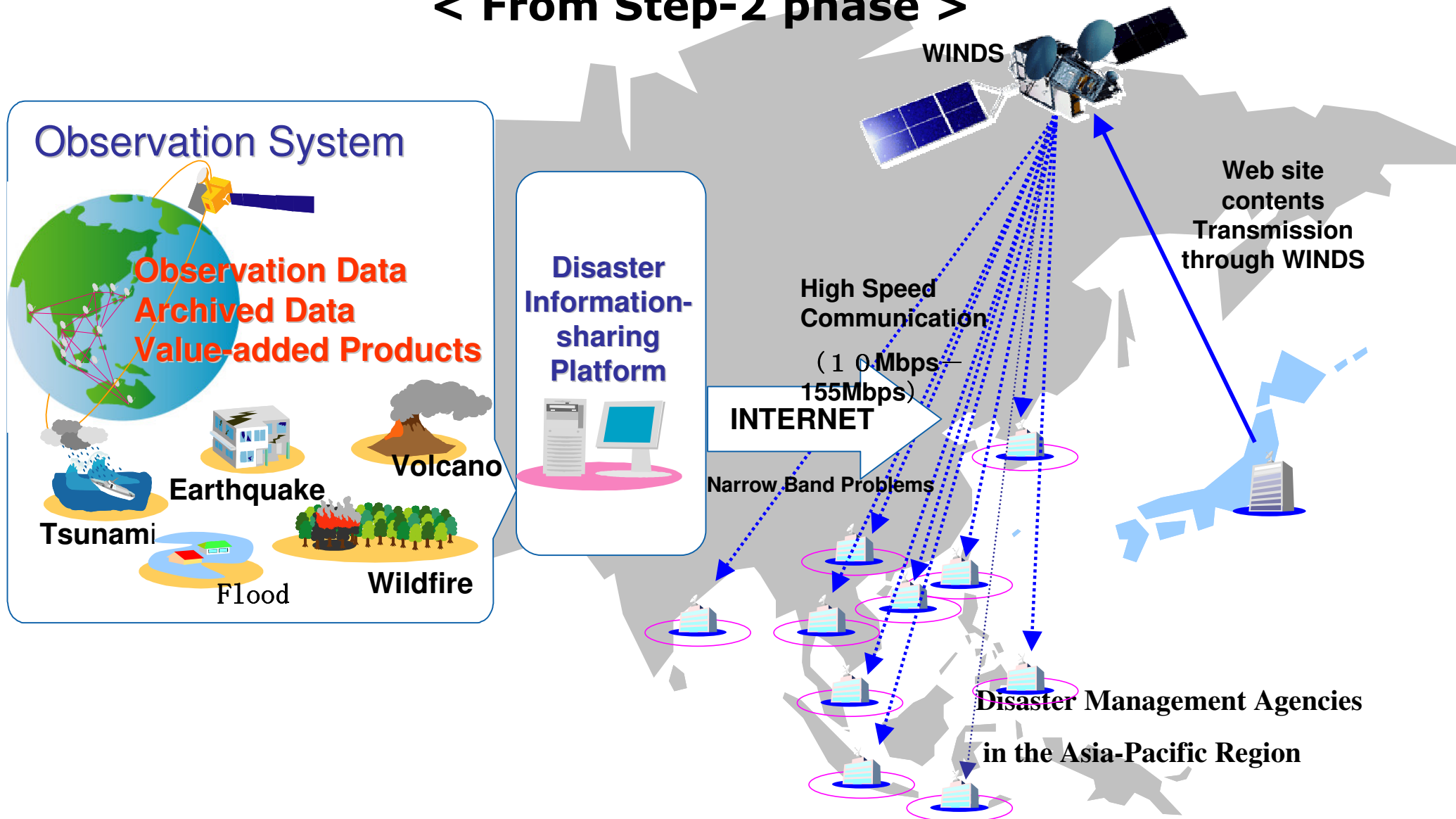


# Sentinel Asia

Disaster Management Support System in the Asia-Pacific Region

## Application of WINDS for Sentinel Asia

< From Step-2 phase >





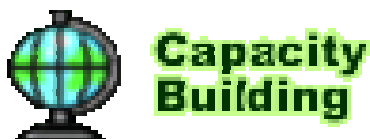


# Sentinel Asia

Disaster Management Support System in the Asia-Pacific Region

## Information Sharing

Disaster information is shared by "Sentinel Asia Website"



The screenshot shows the Sentinel Asia website in a Microsoft Internet Explorer browser window. The address bar displays the URL [http://dmss.tksc.jaxa.jp/sentinel\\_test/index.html](http://dmss.tksc.jaxa.jp/sentinel_test/index.html). The website header features the Sentinel Asia logo and the text "Disaster Management Support System in the Asia-Pacific Region". A navigation menu includes links for Home, About Sentinel Asia, JPT Members, Library, FAQ, and Contact Us. The main content area is titled "Welcome to Sentinel Asia Web Site" and contains introductory text about the system's purpose and capabilities. A sidebar on the left lists various services: Emergency Observation, Wildfire Monitoring, Flood Monitoring, MTSAT Imagery, Capacity Building, Web Forum, and Emergency Observation Request. Below the main text, there is a "Current Topics" section with a list of recent news items, including announcements about training and data availability. The footer of the website displays logos for partner organizations, including JAXA, CSIRO, Geoscience Australia, and the Australian Government Bureau of Meteorology, along with the Asian Institute of Technology (AIT) and other regional institutions.

<http://dmss.tksc.jaxa.jp/sentinel/>



# Sentinel Asia

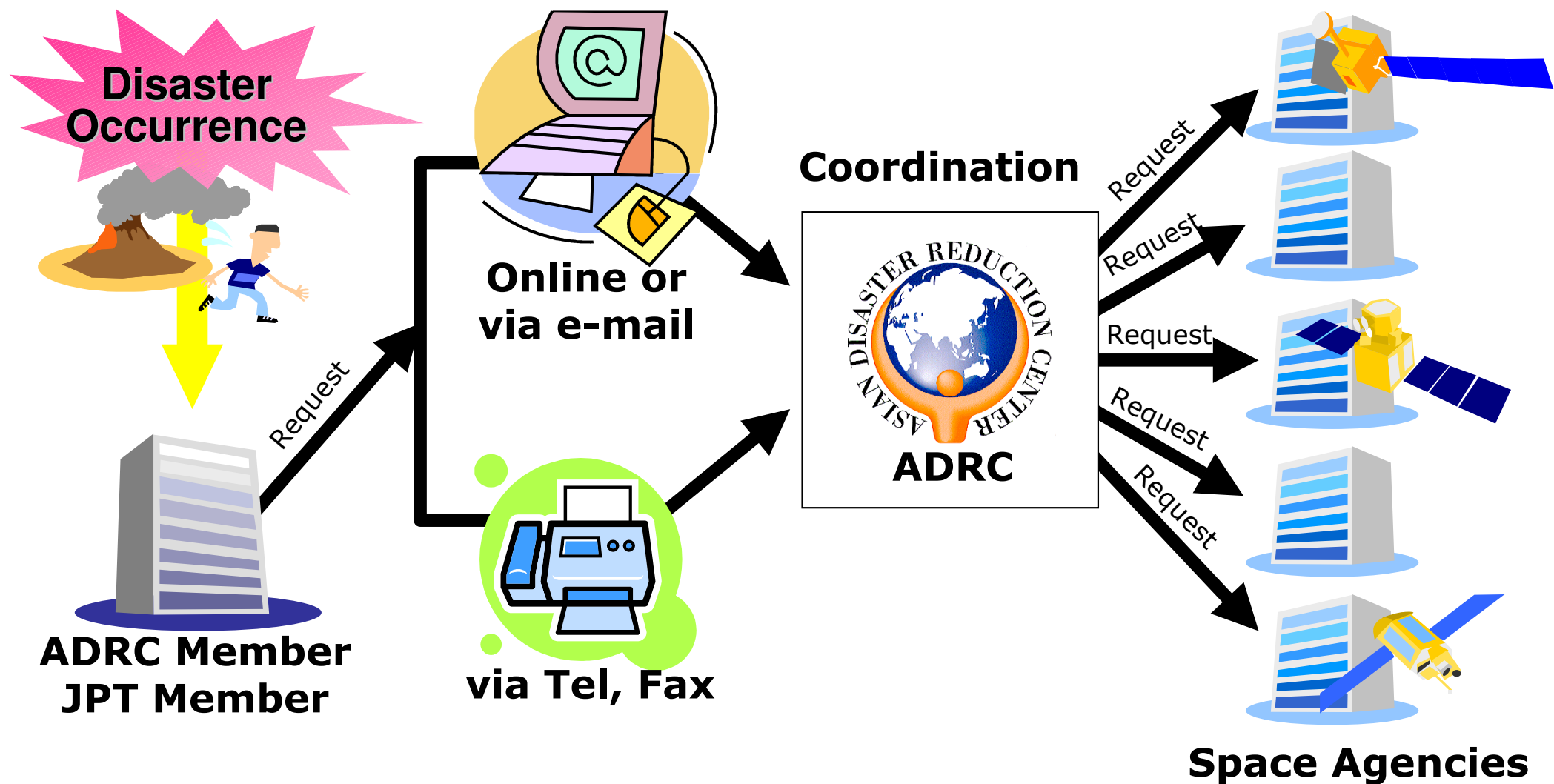
Disaster Management Support System in the Asia-Pacific Region



## Emergency Observation Request

# Emergency Observation

<http://dmss.tksc.jaxa.jp/sentinel/contents/EOEn.html>





# Sentinel Asia

Disaster Management Support System in the Asia-Pacific Region



Emergency  
Observation



## Australia wildfire

**ALOS/AVNIR2  
Feb10, 2009**





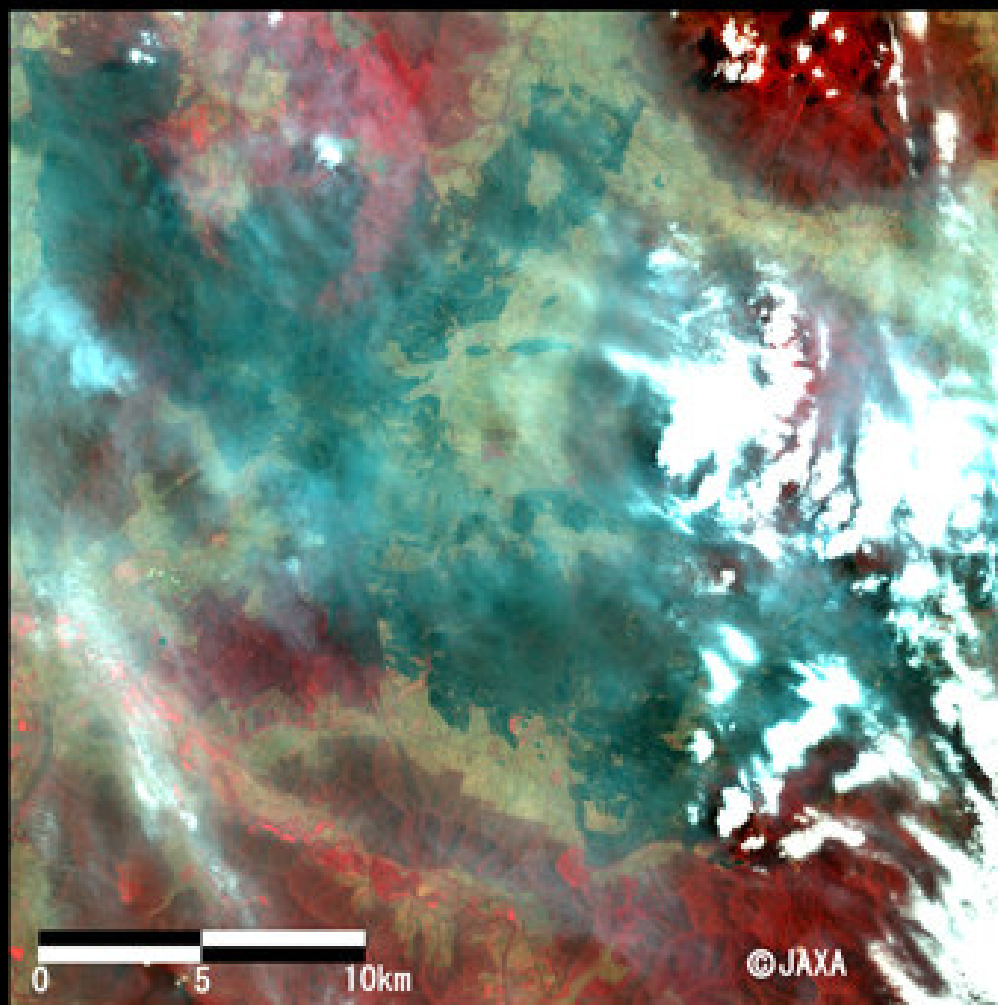
# Sentinel Asia

Disaster Management Support System in the Asia-Pacific Region

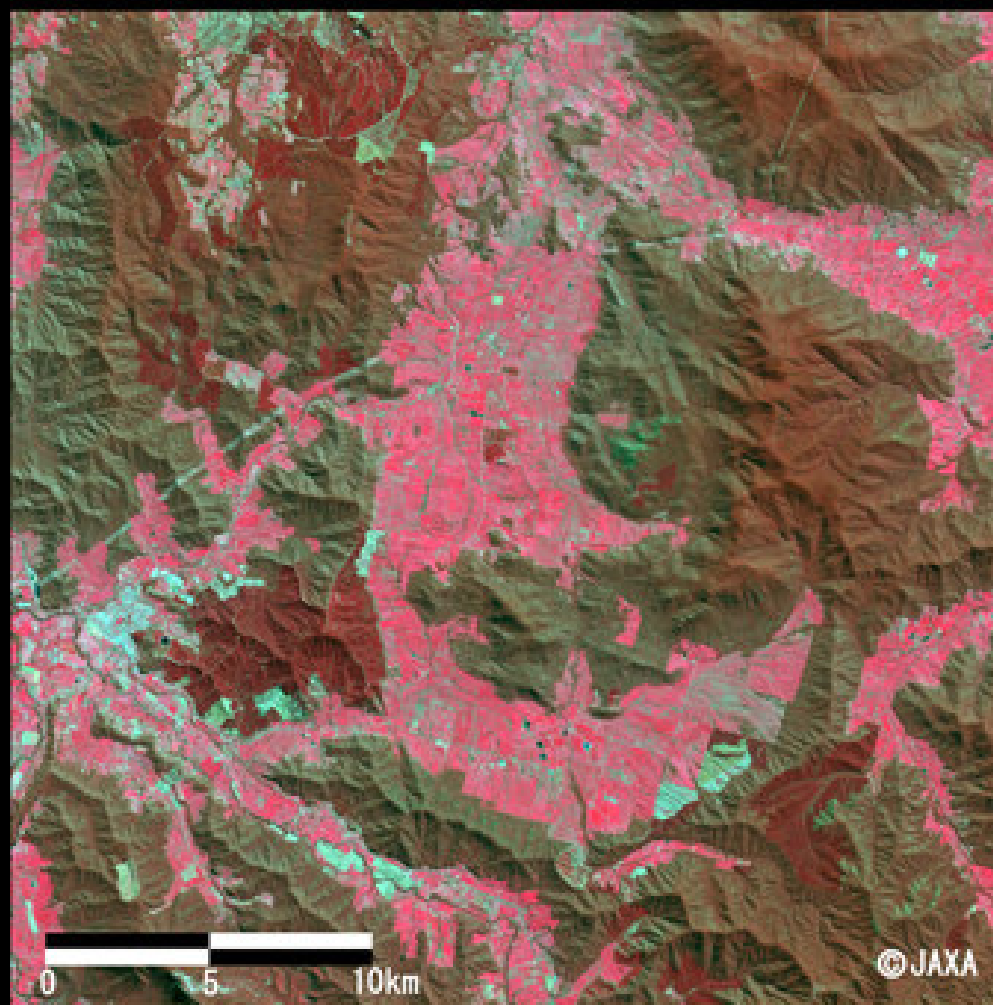


Emergency  
Observation

## Australia Wildfire, ALOS AVNIR2, Feb 10, 2009



2009/2/10



2006/9/15



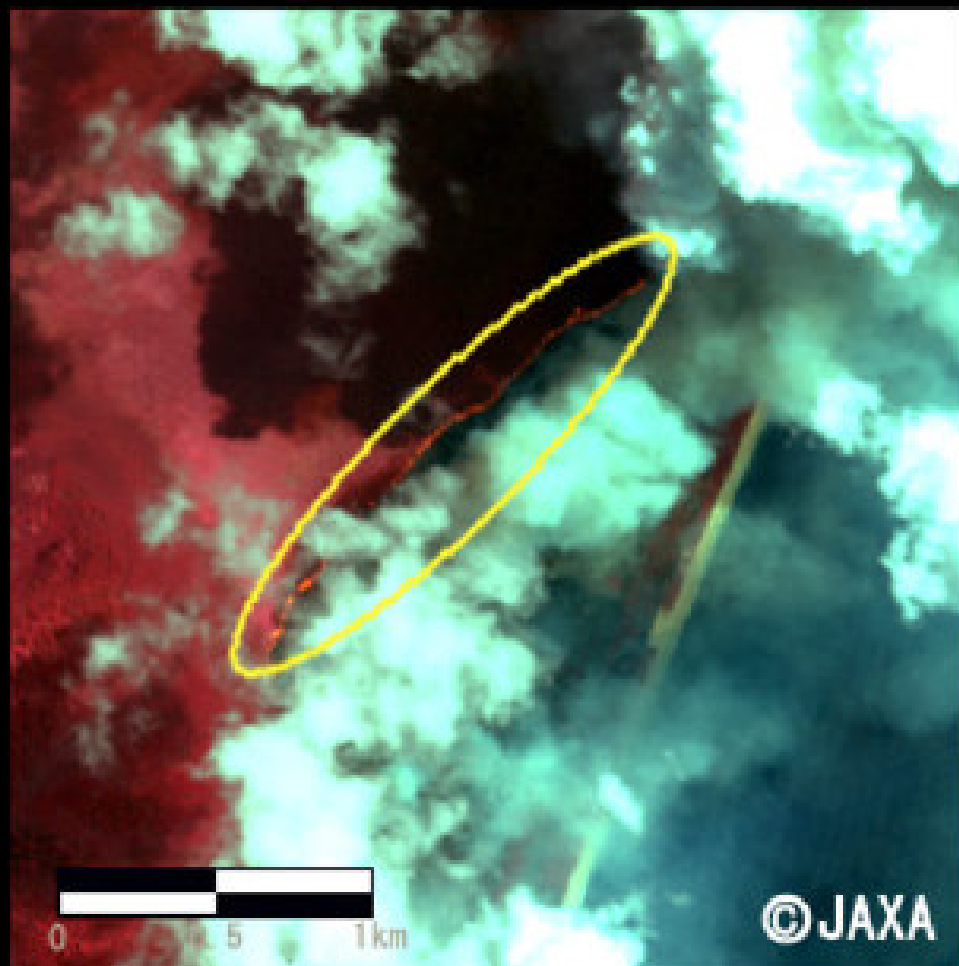
# Sentinel Asia

Disaster Management Support System in the Asia-Pacific Region

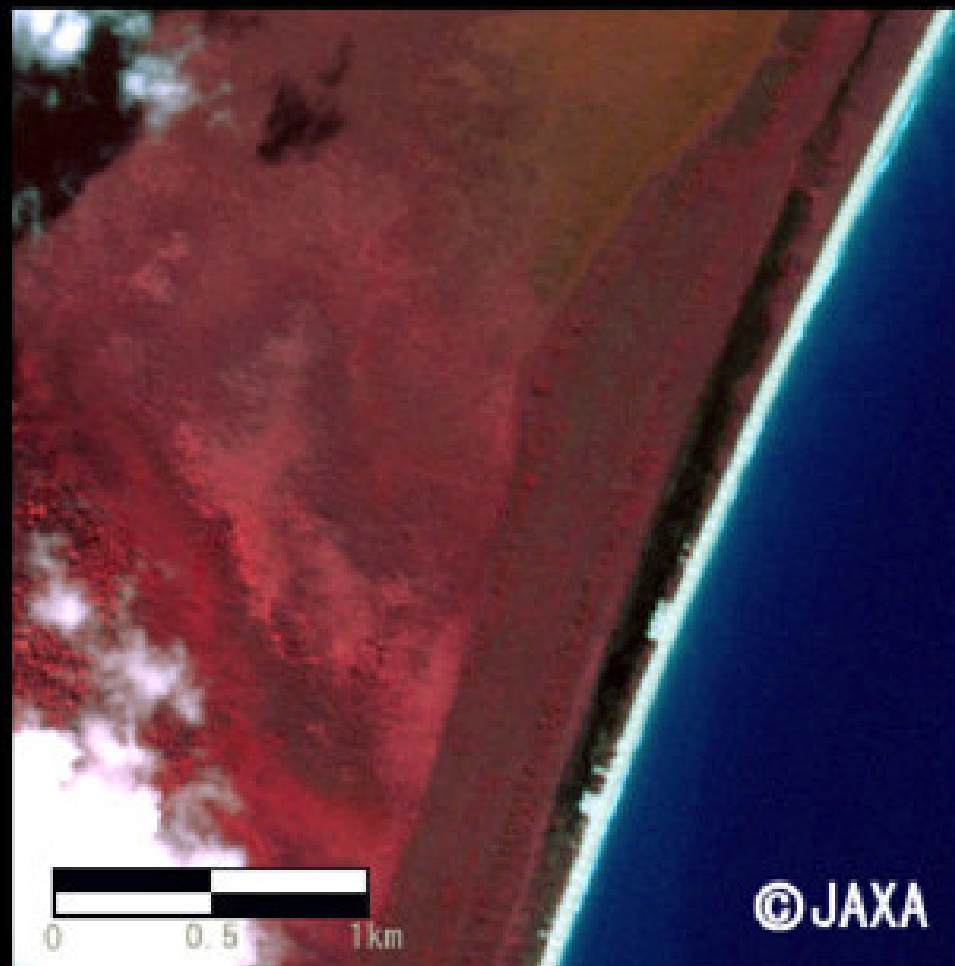


Emergency  
Observation

## Australia Wildfire, ALOS AVNIR2, Feb 10, 2009



2009/2/10



2008/8/5





# Sentinel Asia

Disaster Management Support System in the Asia-Pacific Region



Emergency  
Observation  
Request

## ALOS/PALSAR Imagery of Hanoi, 5 Nov 2008

http://arrs.adrc.or.jp - Sentinel-Asia Project - Disaster Management Support System - Microsoft Internet Explorer

Displayed and Overlaid Data

Map Data

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

Satellite Image (After Disaster)

- ALOS PALSAR@2008/11/05 03:18)
- ALOS PALSAR@2008/11/05 03:17)
- ALOS PALSAR@2008/11/05 03:17)
- ALOS PALSAR@2008/11/07 15:32)
- ALOS PALSAR@2008/11/07 15:32)
- ALOS PALSAR@2008/11/07 15:32)
- ALOS PALSAR@2008/11/07 15:32)

Satellite Image (Before Disaster)

- LANDSAT@2003/01/01 00:00)
- LANDSAT@2005/01/01 00:00)
- ALOS PALSAR@2008/08/05 03:16)
- ALOS PALSAR@2008/08/05 03:16)
- ALOS PALSAR@2008/09/22 15:31)
- ALOS PALSAR@2008/09/22 15:31)

Other Information

- DEM
  - GTOP030
  - ETOPO2
  - SRTM
- LAND COVER
- Population

Lat: 19d 41m 48.789s N, Lon: 106d 39m 24.228s E

Copyright (C) METI, JAXA, ICEDS, NGA

Add Other Information  
View in Google Earth





# Sentinel Asia

Disaster Management Support System in the Asia-Pacific Region



**Emergency  
Observation  
Request**

## Flash Flood around Hanoi, ALOS/PALSAR on 5 Nov 2008

http://arrs.adrc.or.jp - Sentinel-Asia Project - Disaster Management Support System - Microsoft Internet Explorer

Satellite Image Details

Satellite Image

Displayed and Overlaid Data

Map Data

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

Satellite Image (After Disaster)

- ALOS PALSAR@2008/11/05 03:18)
- ALOS PALSAR@2008/11/05 03:17)
- ALOS PALSAR@2008/11/05 03:18)
- ALOS PALSAR@2008/11/05 03:17)
- ALOS PALSAR@2008/11/07 15:32)
- ALOS PALSAR@2008/11/07 15:32)
- ALOS PALSAR@2008/11/07 15:32)

Satellite Image (Before Disaster)

- LANDSAT@2003/01/01 00:00)
- LANDSAT@2005/01/01 00:00)
- ALOS PALSAR@2008/08/05 03:16)
- ALOS PALSAR@2008/08/05 03:16)
- ALOS PALSAR@2008/09/22 15:31)
- ALOS PALSAR@2008/09/22 15:31)

Other Information

- DEM
- LAND COVER
- Population

Lat: 21d 3m 38.722s N, Lon: 105d 58m 40.744s E

Add Other Information  
View in Google Earth





# Sentinel Asia

Disaster Management Support System in the Asia-Pacific Region



Emergency  
Observation  
Request

## Flood in Nepal in Aug. 2008

http://arrs.adrc.or.jp - Sentinel-Asia Project - Disaster Management Support System - Microsoft Internet Explorer  
Satellite Image Details

Displayed and Overlaid Data

Map Data

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

Satellite Image (After Disaster)

- ALOS PRISM@2008/08/22 04:55)
- ALOS PRISM@2008/08/22 04:55)
- ALOS PRISM@2008/08/22 04:55)
- ALOS AVNIR-2@2008/08/22 04:55)
- ALOS AVNIR-2\_PRISM@2008/08/22
- ALOS AVNIR-2\_PRISM@2008/08/22
- ALOS PRISM@2008/08/22 04:55)
- ALOS PRISM@2008/08/22 04:55)
- ALOS PRISM@2008/08/22 04:55)
- ALOS AVNIR-2@2008/08/22 04:55)
- ALOS AVNIR-2@2008/08/22 04:55)
- ALOS AVNIR-2\_PRISM@2008/08/22
- Resourcesat-1 AWIFS@2008/08/23
- ALOS PALSAR@2008/08/24 04:39)
- ALOS PALSAR@2008/08/24 04:38)
- ALOS PALSAR@2008/08/24 04:38)
- ALOS PALSAR@2008/08/24 04:38)

Satellite Image (Before Disaster)

- LANDSAT@2003/01/01 00:00)
- LANDSAT@2005/01/01 00:00)
- ALOS PRISM@2007/11/20 04:57)
- ALOS PRISM@2007/11/20 04:57)
- ALOS PRISM@2007/11/20 04:57)
- ALOS AVNIR-2@2008/04/06 04:56)
- ALOS AVNIR-2@2008/04/06 04:56)
- ALOS PALSAR@2008/07/21 04:33)
- ALOS PALSAR@2008/07/21 04:33)

Other Information

- DEM
  - GTOPO30
  - ETOPO2
  - SRTM
- LAND COVER
- Population
  - 2000 (GPWv3)

Lat: 25d 55m 7.592s N, Lon: 87d 3m 52.839s E  
Copyright (C) METI/JAXA, METI/JAXA, ICEDS, NGA

Close

画像 http://arrs.adrc.or.jp/arrs/servlet/INetGISWMS?REQUEST=GetMap&VERSION=1.1.0&LAYERS=10000002,10000003,10000004,10000006,10000

一般 インターネット





# Sentinel Asia

Disaster Management Support System in the Asia-Pacific Region



**Emergency  
Observation  
Request**

## LANDSAT Image and ALOS/PALSAR Image on SRTM

http://arrs.adrc.or.jp - Sentinel-Asia Project - Disaster Management Support System - Microsoft Internet Explorer

Satellite Image Details

Displayed and Overlaid Data

Map Data

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

Satellite Image (After Disaster)

- ALOS PRISM@2008/08/22 04:55
- ALOS PRISM@2008/08/22 04:55
- ALOS PRISM@2008/08/22 04:55
- ALOS AVNIR-2@2008/08/22 04:55
- ALOS AVNIR-2, PRISM@2008/08/22
- ALOS PRISM@2008/08/22 04:55
- ALOS PRISM@2008/08/22 04:55
- ALOS PRISM@2008/08/22 04:55
- ALOS AVNIR-2@2008/08/22 04:55
- ALOS AVNIR-2@2008/08/22 04:55
- ALOS AVNIR-2, PRISM@2008/08/22
- Resourcesat-1 AWiFS@2008/08/23
- ALOS PALSAR@2008/08/24 04:39
- ALOS PALSAR@2008/08/24 04:38
- ALOS PALSAR@2008/08/24 04:38
- ALOS PALSAR@2008/08/24 04:38

Satellite Image (Before Disaster)

- LANDSAT@2003/01/01 00:00
- LANDSAT@2005/01/01 00:00
- ALOS PRISM@2007/11/20 04:57
- ALOS PRISM@2007/11/20 04:57
- ALOS PRISM@2007/11/20 04:57
- ALOS AVNIR-2@2008/04/06 04:56
- ALOS AVNIR-2@2008/04/06 04:56
- ALOS PALSAR@2008/07/21 04:33
- ALOS PALSAR@2008/07/21 04:33

Other Information

[+] DEM

- GTOPO30
- ETOPO2
- SRTM

[+] LAND COVER

[+] Population

Lat: 26d 22m 33.089s N, Lon: 86d 58m 17.049s E

Copyright (C) METI, JAXA, METI, JAXA, Courtesy NASA/JPL-Caltech., ICEDS, NGA

Add Other Information

1 screen display





# Sentinel Asia

Disaster Management Support System in the Asia-Pacific Region



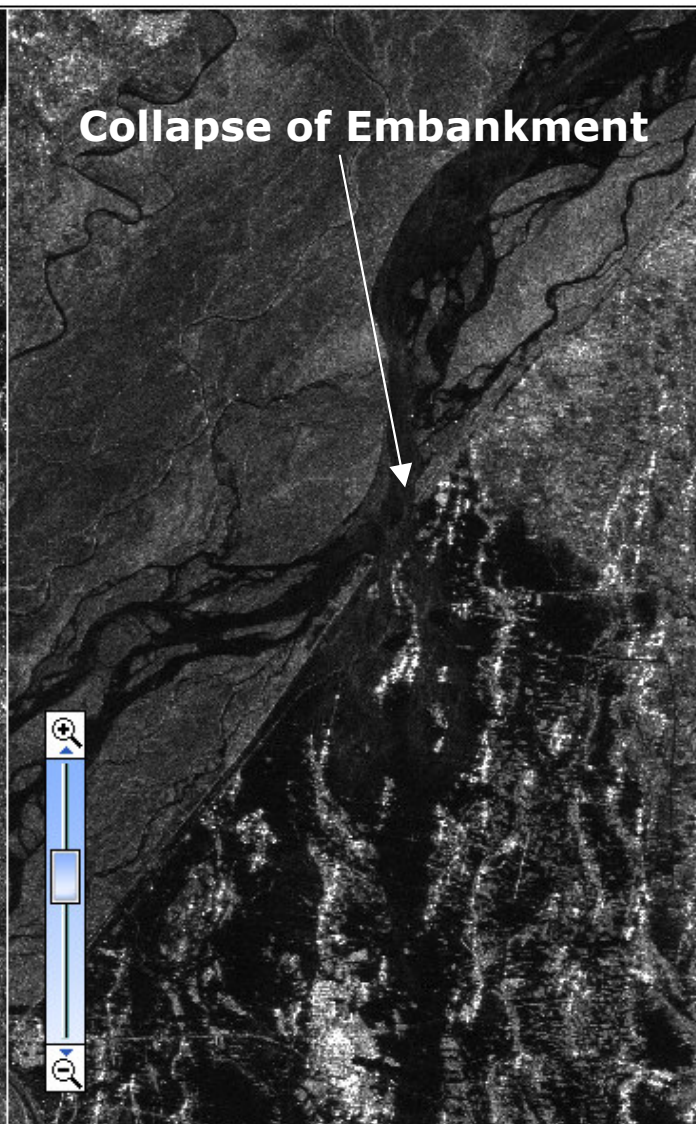
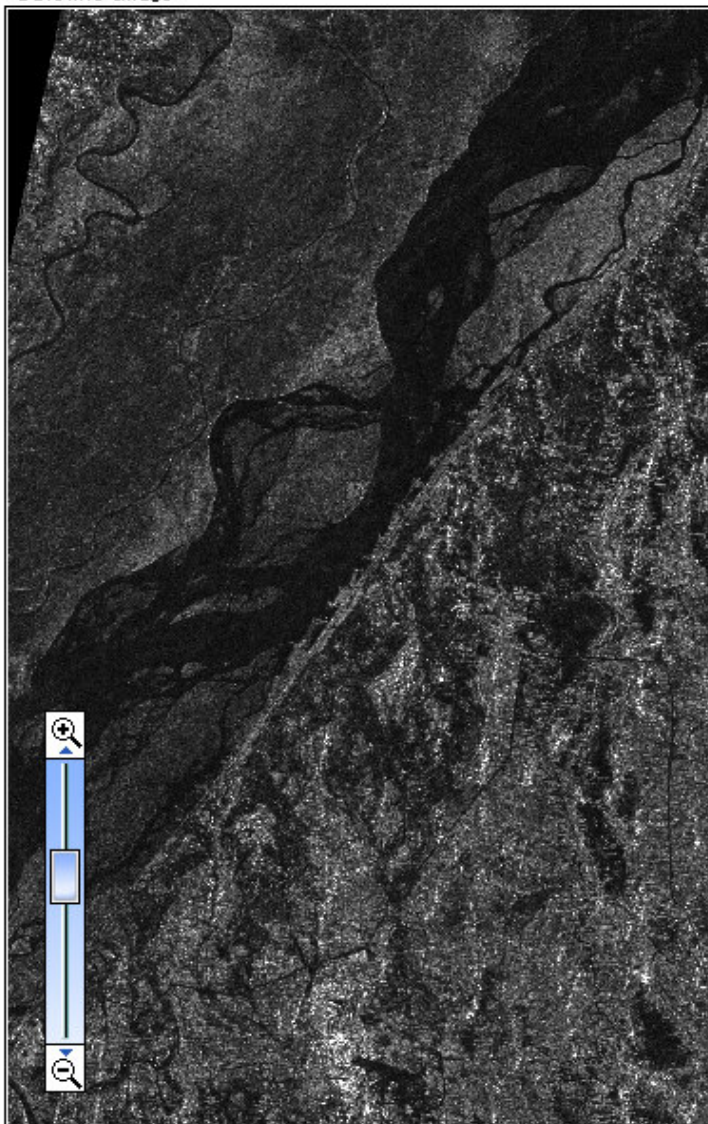
**Emergency  
Observation  
Request**

## Flood in Nepal in August 18, 2008

http://arrs.adrc.or.jp - Sentinel-Asia Project - Disaster Management Support System - Microsoft Internet Explorer

### Satellite Image Details

Satellite Image



#### Displayed and Overlaid Data

##### Map Data

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

##### Satellite Image (After Disaster)

- ALOS AVNIR-2, PRISM(2008/08/22 04:55)
- ALOS PRISM(2008/08/22 04:55)
- ALOS PRISM(2008/08/22 04:55)
- ALOS PRISM(2008/08/22 04:55)
- ALOS AVNIR-2(2008/08/22 04:55)
- ALOS AVNIR-2(2008/08/22 04:55)
- ALOS AVNIR-2, PRISM(2008/08/22 04:55)
- ALOS PALSAR(2008/08/24 04:30)
- ALOS PALSAR(2008/08/24 04:30)
- ALOS PALSAR(2008/08/24 04:30)

##### Satellite Image (Before Disaster)

- LANDSAT(2003/01/01 00:00)
- LANDSAT(2005/01/01 00:00)
- ALOS PRISM(2007/11/20 04:57)
- ALOS PRISM(2007/11/20 04:57)
- ALOS PRISM(2007/11/20 04:57)
- ALOS AVNIR-2(2008/04/06 04:55)
- ALOS AVNIR-2(2008/04/06 04:55)
- ALOS PALSAR(2008/07/21 04:30)
- ALOS PALSAR(2008/07/21 04:30)

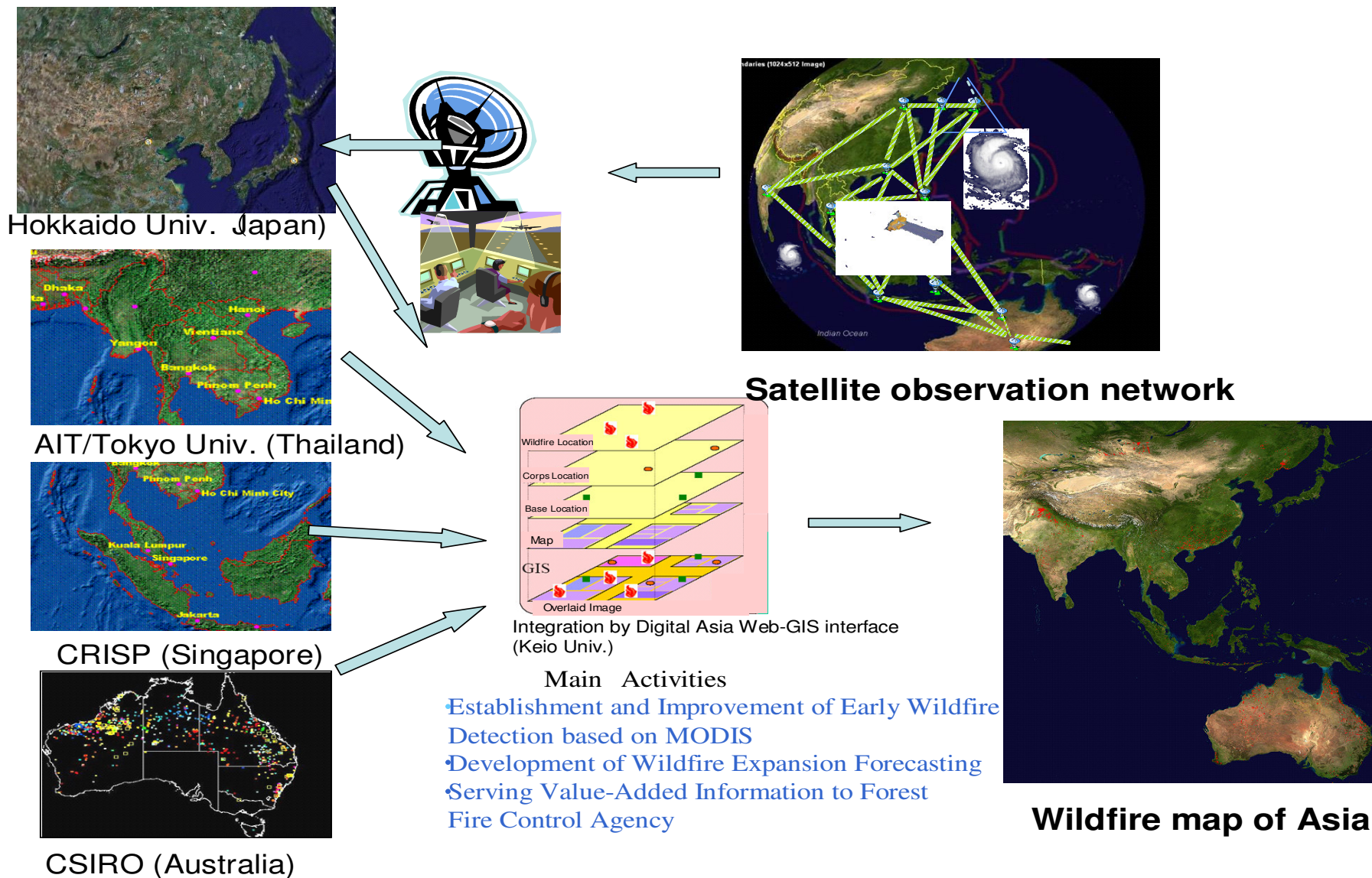
##### Other Information

- DEM
- LAND COVER

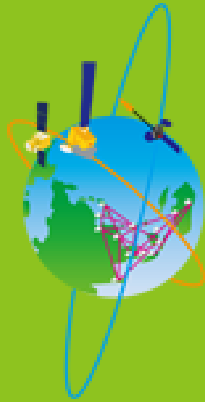




# Framework of Wildfire Monitoring



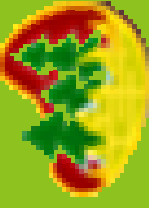




# Sentinel Asia

Disaster Management Support System in the Asia-Pacific Region

## Wildfire Monitoring



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

[About This Page](#)

**Display Data**

[Time Span \(UTC\)](#)

Today

Yesterday

By Date (Last 3 Weeks)

From:

To:

**MOSES Messages**

ISU-Tokyo (Japan)

CRISP (Singapore)

CERCOA (Australia)

AT (Thailand)

**Satellite Images / Data**

MODIS (L2)

24hr accumulated

Precipitation (FNet)

set

**Overlays**

**Map Data**

DCW (Maple)

GSI DM2500 (Japan only)

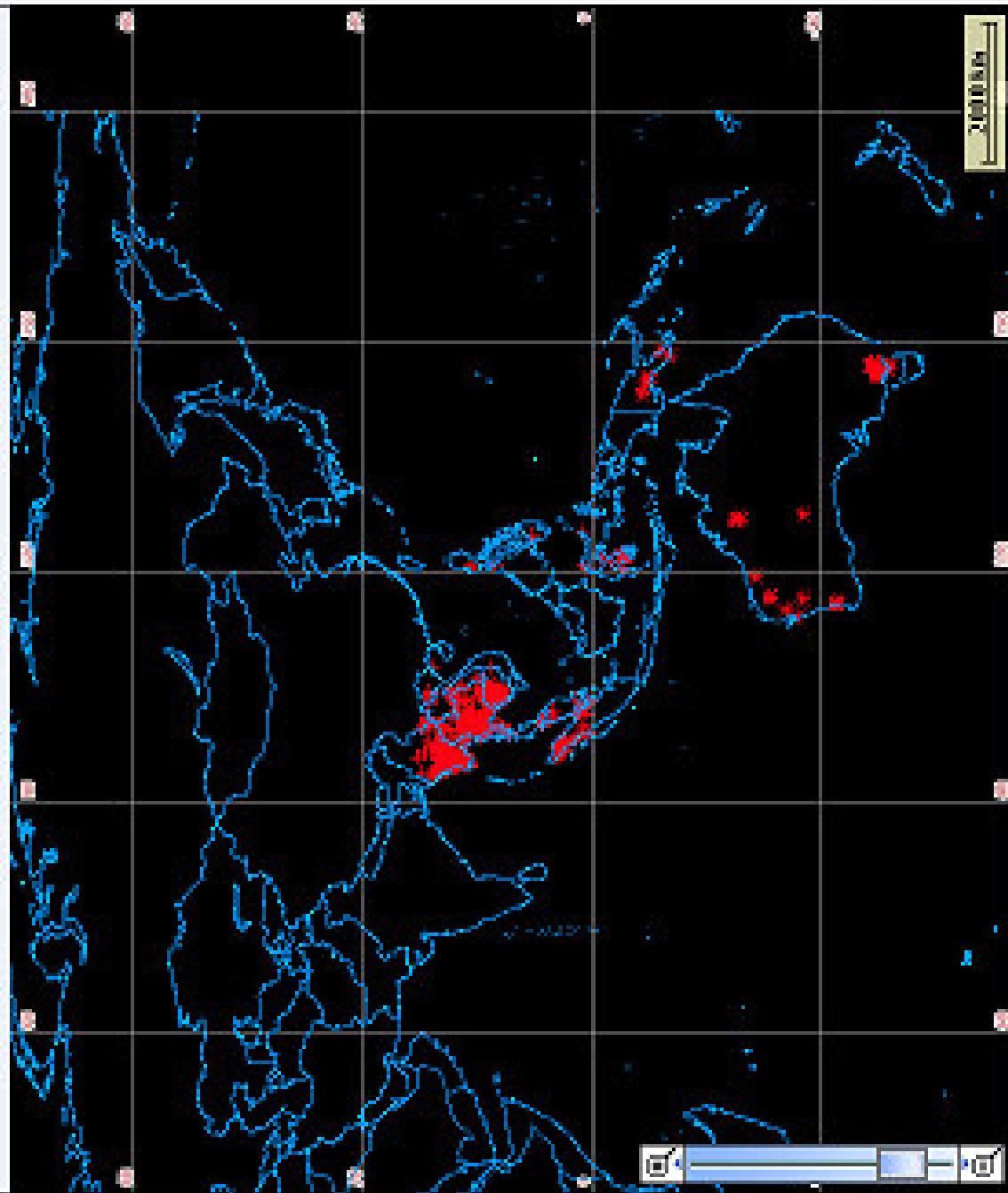
**Other Information**

LandSat

DEM

Land Cover

Population



Lat: 10d 24m 8.812s N(10.403447777777778 N), Lon: 116d 17m 33.279s E(116.29025872222222 E)



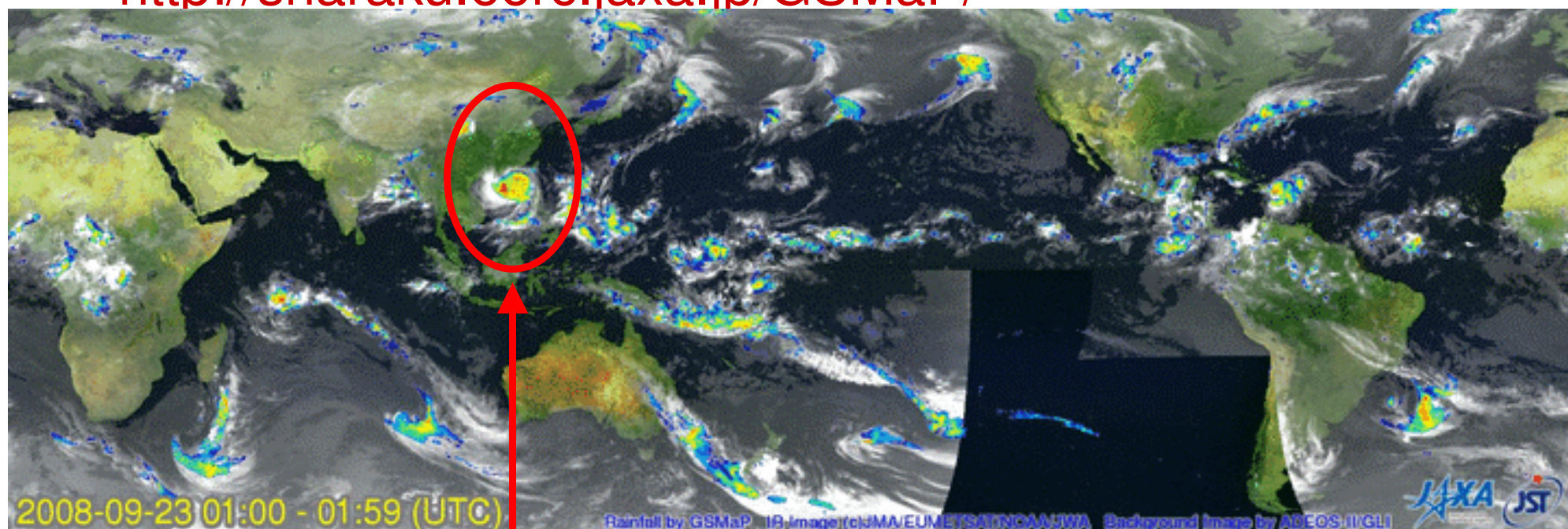
# Sentinel Asia

Disaster Management Support System in the Asia-Pacific Region

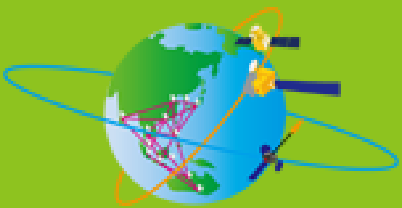


Flood  
Monitoring

- Hourly movie of Typhoon HAGUPIT from 01Z to 24Z 23 Oct. 2008, produced by GSMaP near-real-time products.
- <http://sharaku.eorc.jaxa.jp/GSMaP/>



**Typhoon  
HAGUPIT**



# Sentinel Asia

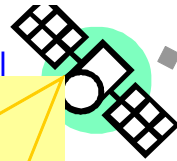
Disaster Management Support System in the Asia-Pacific Region



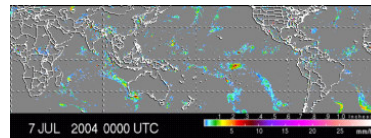
## Flood Monitoring

## Cooperation with Integrated Flood Analysis System (IFAS)

Global observation of rainfall by earth observation

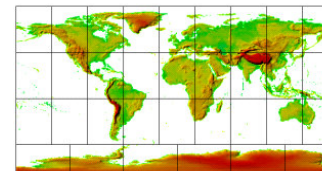


Satellite-based near real-time rainfall data

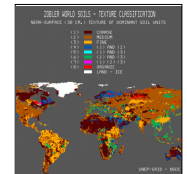
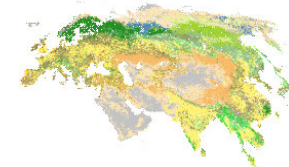


Ex.) IFNet-GFAS, NASA-3B42RT, JAXA-GSMaP

Topographic data



Other GIS data for runoff mode (Land use, soil, etc.)



Data download through Internet, free of charge

Flood disaster prevention & mitigation

Flood forecasting & warning

*IFAS (A basis for flood forecasting/warning system)*

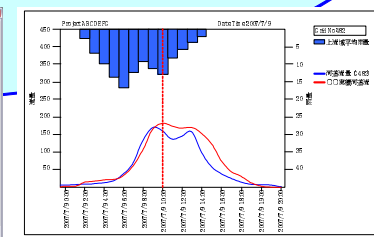
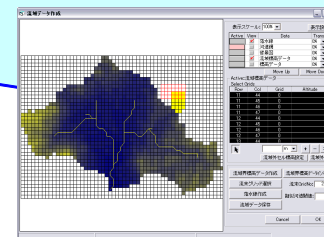
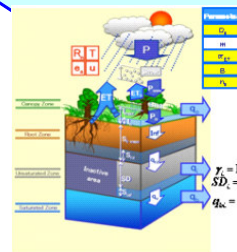
- Real-time input: Satellite & ground rainfall
- GIS data input for setting parameters
- GIS analysis to build runoff model
- Runoff analysis and flood simulation
- User-friendly interfaces for output

### Current situation

Despite of the needs for flood forecasting/warning,  
No rainfall, GIS data, nor analytical tools  
→ Required much money & time for implementation

### After the application of IFAS:

- Prompt & efficient implementation
- No need to develop original core system
- Step-by-step improvement of accuracy with hydrological observational network

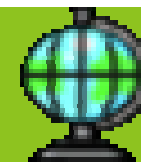






# Sentinel Asia

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



**Capacity  
Building**

## Capacity Building and Human Network



The 3rd Sentinel Asia  
System Operation Training  
by JAXA

in cooperation with  
AIT, ISRO, ADRC  
in September 2008

The 4th Sentinel Asia  
System Operation Training  
is planned  
in Lao PDR  
in February 2009







# Sentinel Asia

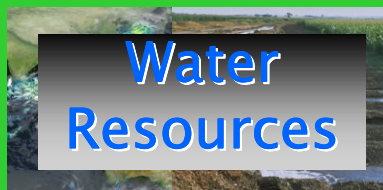
Disaster Management Support System in the Asia-Pacific Region

## SAFE (Space Applications For Environment)

### Datasets For Environmental Monitoring



Land Use  
Land Cover



Water  
Resources

Photosynthetically  
Active  
Radiation

Datasets  
provided by  
Partner agencies  
In Asia-Pacific

### Social Benefits in Asia-Pacific



Water



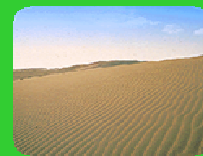
Weather



Ecosystems



Energy



Climate



Health

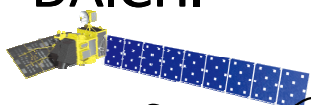


Agriculture

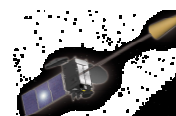


Biodiversity

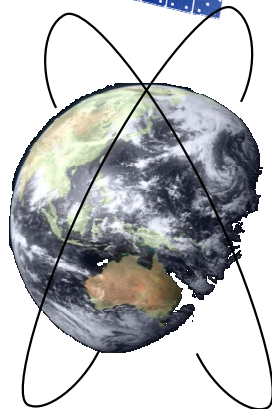
DAICHI



TRMM/PR



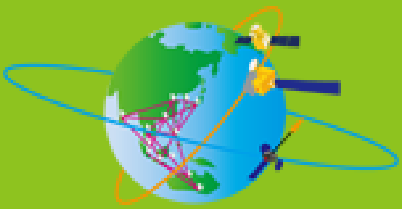
MTSAT



Aqua/AMSR-E



Terra/MODIS



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## **Relations with SPIDER**

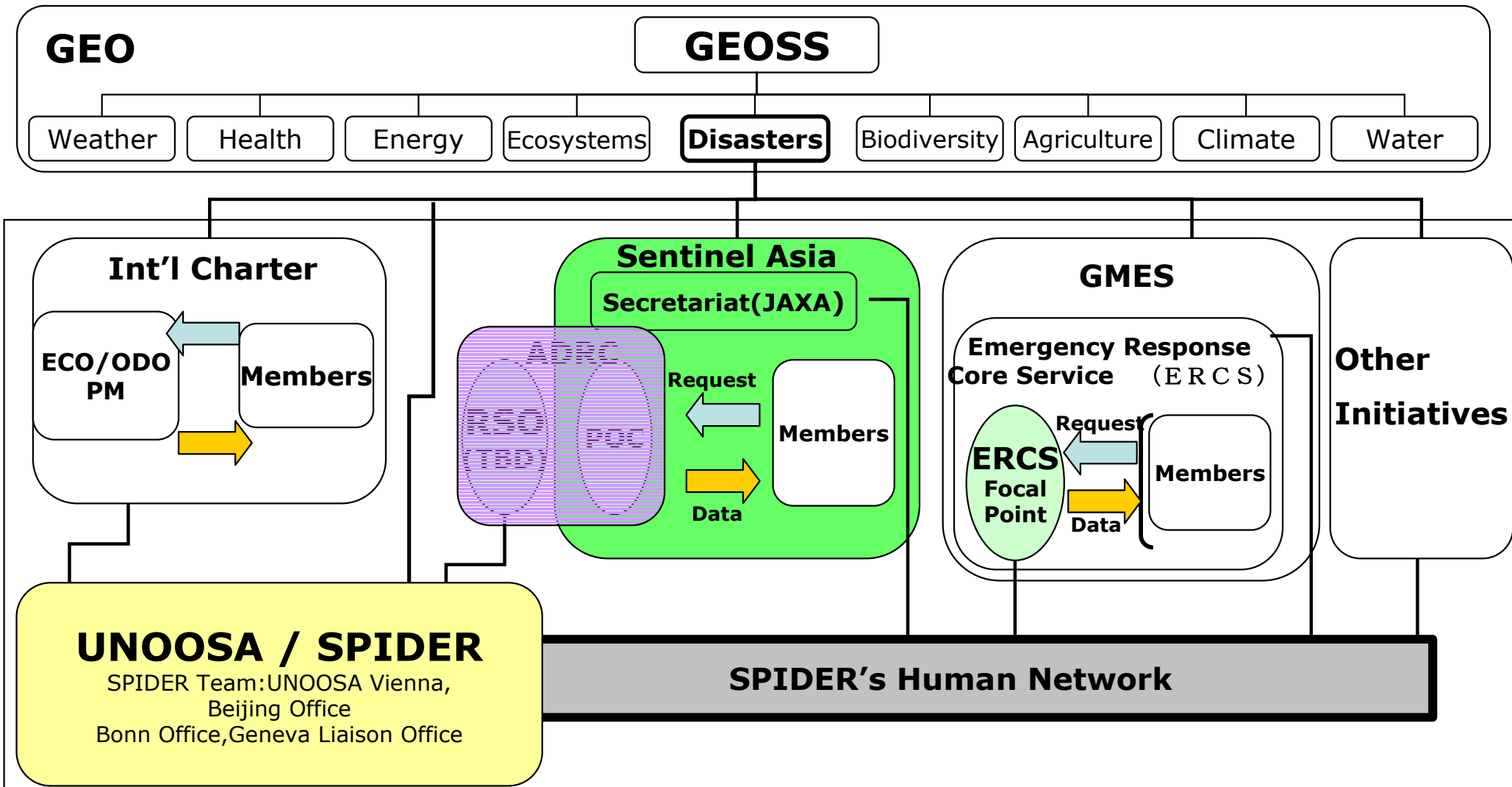
- **JAXA and UNOOSA exchanged information concerning Sentinel Asia and SPIDER, at COPUOS/STSC, SA Joint Project Team (JPTM) meetings and via Permanent Mission of Japan to UN, Vienna**
- **Through the information exchanges, following relationship between Sentinel Asia and SPIDER is suggested:**
  - **Transferring knowledge and experiences of Sentinel Asia to SPIDER**
  - **UNOOSA forwards information requests to Sentinel Asia when it receives requests from Asia-Pacific countries**

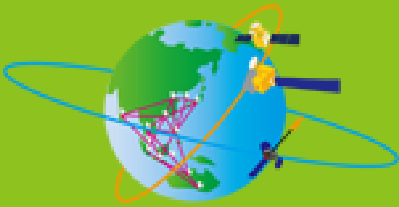


# Sentinel Asia

Disaster Management Support System in the Asia-Pacific Region

## Overall Picture of Existing Initiatives (Straw man)





# *Sentinel Asia*

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

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

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**Disaster Management Support System Office**

**Space Applications and Promotion Center**

**Japan Aerospace Exploration Agency**

