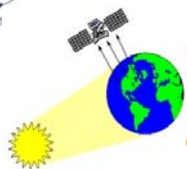


Use of Satellite Data for Disaster Risk Reduction (DRR)

Lal Samarakoon
Director, Geoinformatics Center
Asian Institute of Technology, Bangkok, Thailand

Remote Sensing Satellite Systems



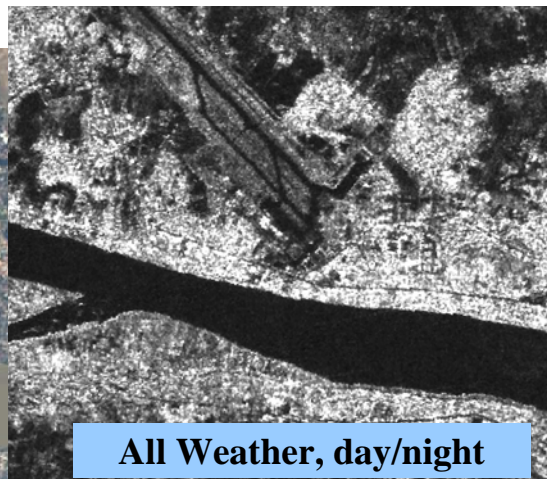
OPTICAL



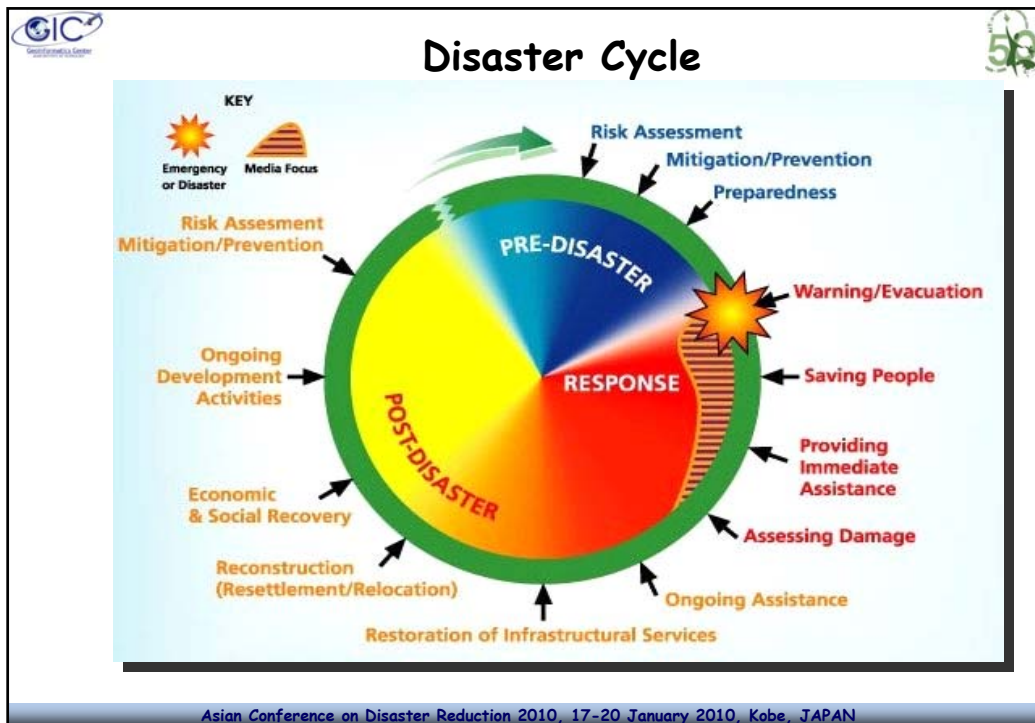
Similar to our vision



RADAR



All Weather, day/night



Flood Disaster Risk Reduction

Phase	Data type	Resolution (meters)	Time Span	Sensor Types
Emergency Response	Flood mapping	10 - 1000	Days	RADAR, Optical
	Damage mapping	1 - 10	Days	Optical
Post Disaster (Risk Assessment)	Land Use	10 - 1000	Months	Optical
	Geomorphology	10 - 30	Years	Optical
	Topography	1 - 10	Years	InSAR & Optical
Pre-Disaster (Early Warning)	Rainfall	1000	Hours	Weather
	topography	0.1 - 1	Months	GPS & InSAR

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Application of satellite Data Derived Information for Emergency Response & Loss Assessment

Early Stage Tsunami Damage Assessment



Early Estimation of Building Damage

©2005 Space Imaging LLC ClearView License

Ikonos Image of Galle City area taken in March 2001, with overlaid building layers, layer represented by red color is damaged buildings

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Lao PDR Emergency Response, 2008 August

ALOS-PALSAR Before Flood

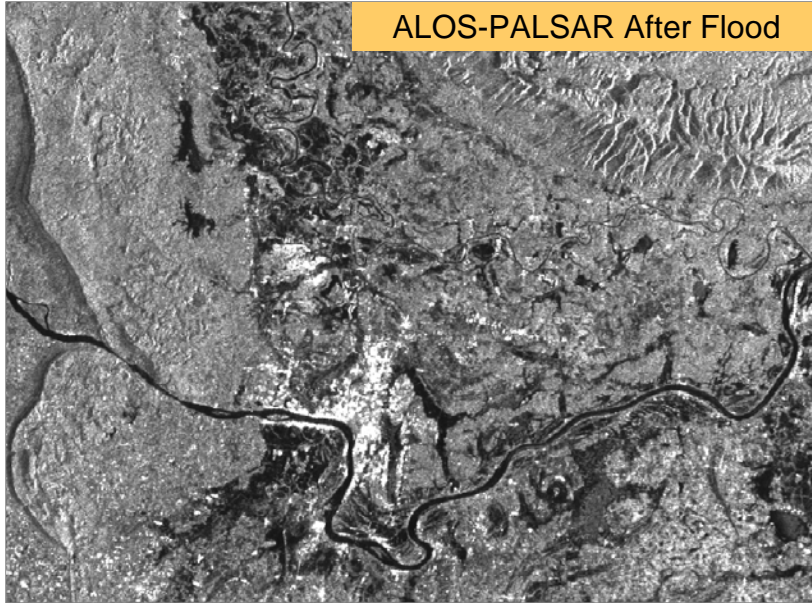
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Lao PDR Emergency Response, 2008 August



ALOS-PALSAR After Flood

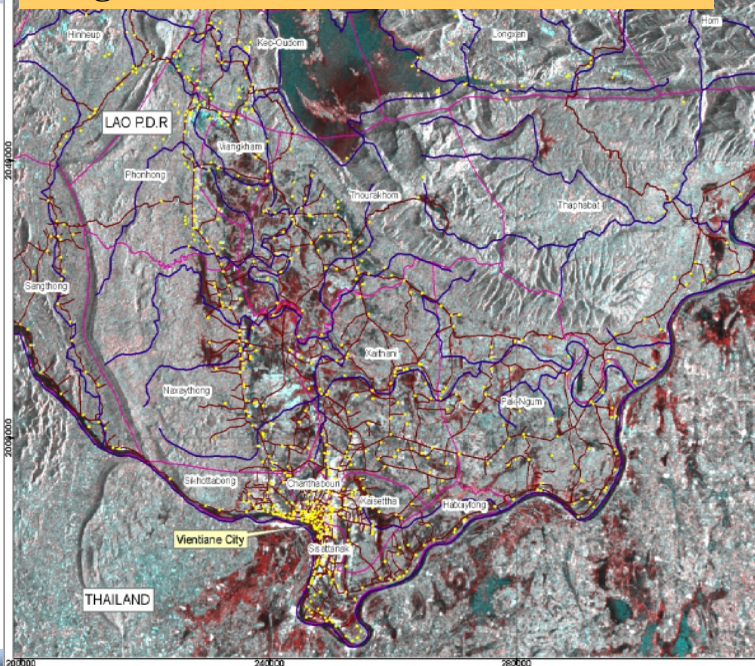


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Integration of Satellite Data and GIS Data

Flood in Laos



- Legend**
- Village
 - River
 - Road
 - District Boundary

Satellite: ALOS
Sensor: PALSAR ScanSAR
© JAXA, METI

RGB Color Composite Image
R:G:B=2007/08/18 : 2008/08/20 : 2008/08/20

Flooded area can be visualized from red to blackish red color patches

Datum: WGS84
Projection: UTM Zone 48N
Scale: 1 : 500,000






Data: Sentinel Asia-
Disaster Management
Support System in the
Asia-Pacific Region

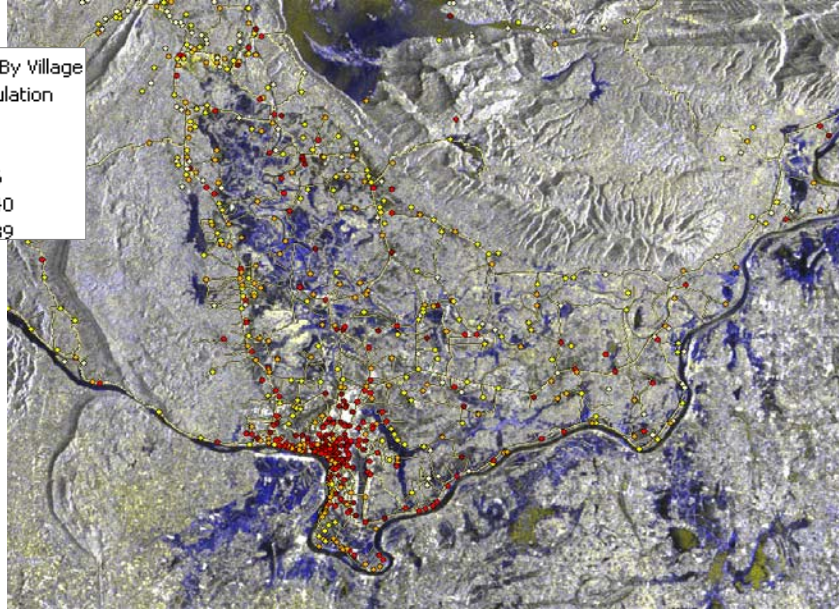


0 5 10 20 Km

Population at Risk - Estimation for Relief

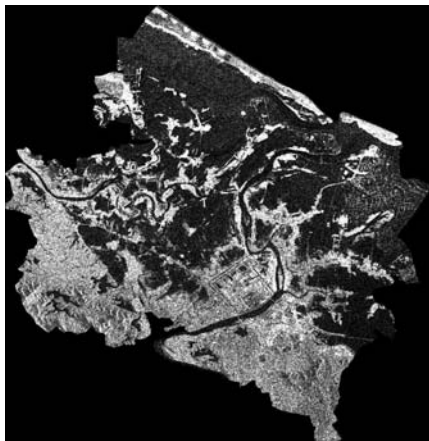
POPULATION By Village
Total Population

	50 - 330
	331 - 657
	658 - 1136
	1137 - 1840
	1841 - 4189



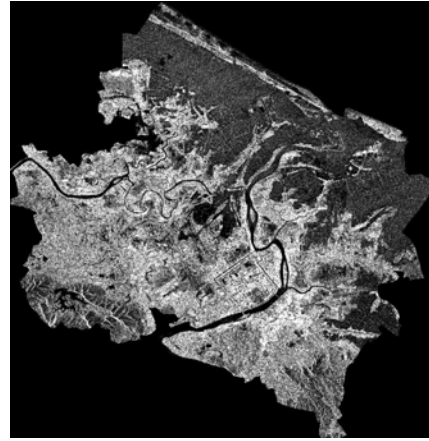
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Loss Estimation in Hue/Vietnam Floods



RADARSAT Imagery

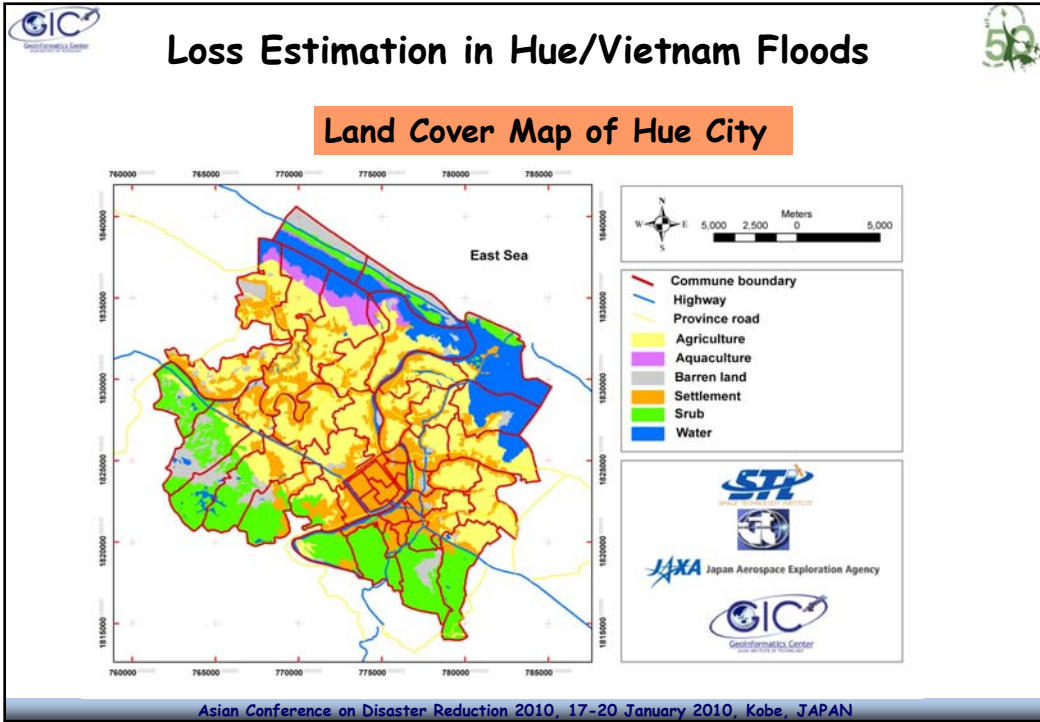
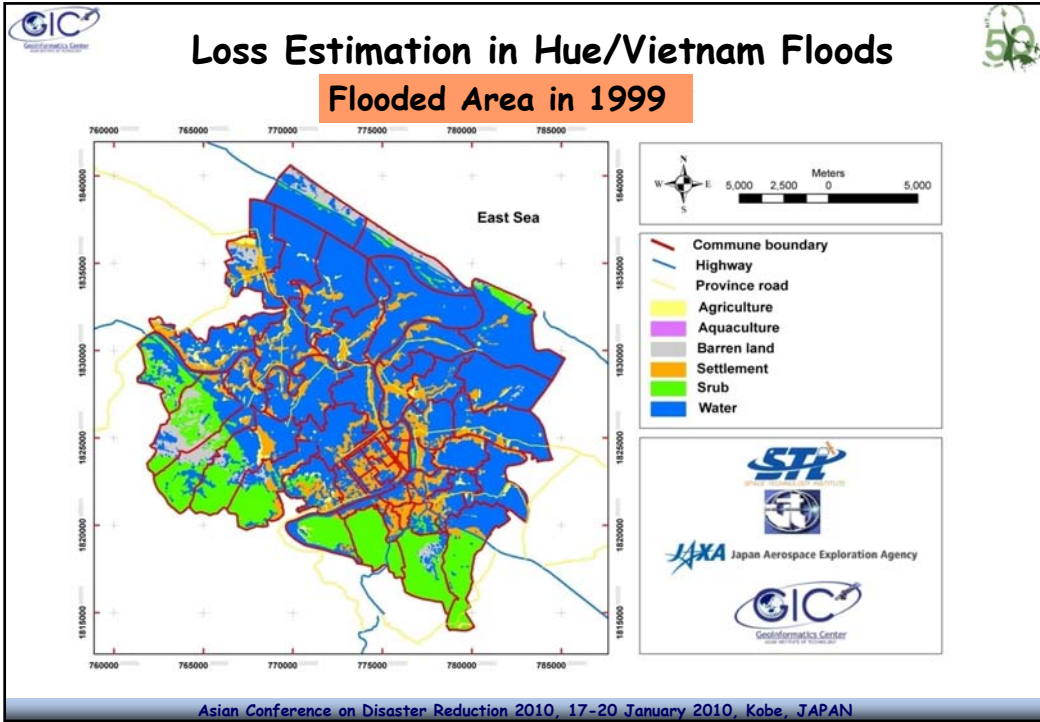
During flood

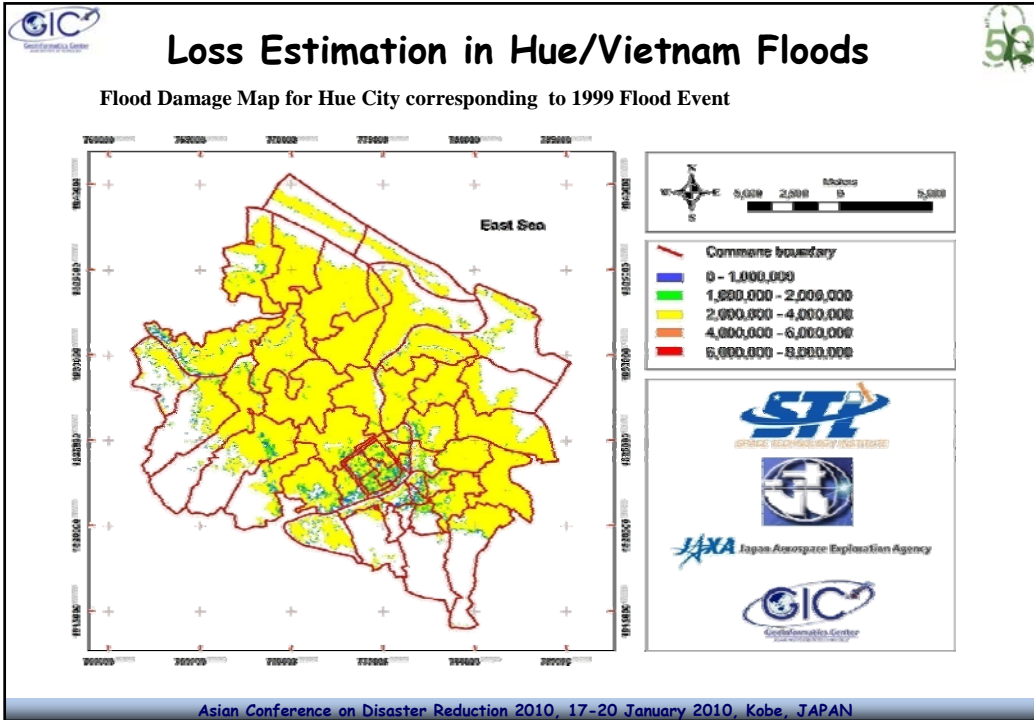


RADARSAT Imagery

After flood

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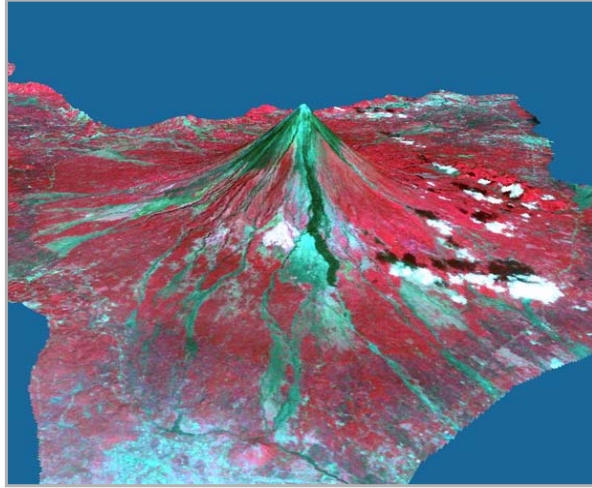


Application of Space Based Systems (satellite Data & other) for Risk Reduction

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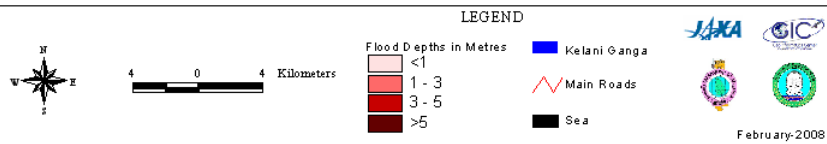
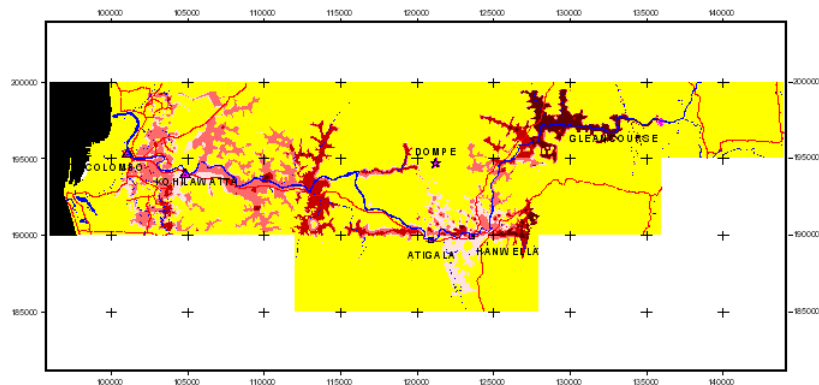
Mt. Mayon Volcano Comprehensive Disaster Prevention Master Plan

- GIS Data Development for Planning
- Historical River planform Change by lava, pyroclastic flow, lahar
- Sediment Production Estimation for river structure planning

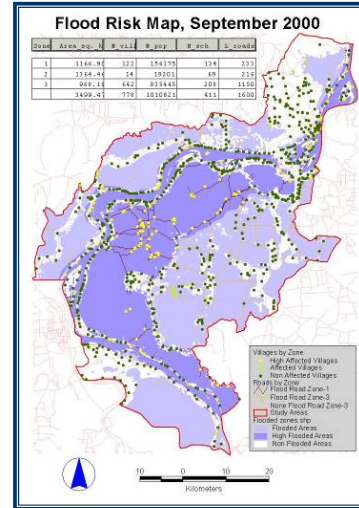
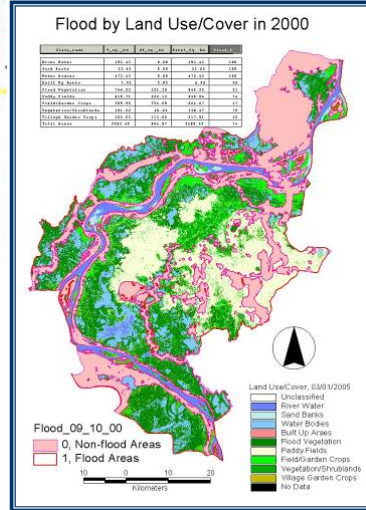
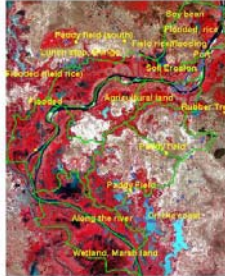


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50-YEAR FLOOD MAP LOWER REACH OF KELANI RIVER - SRI LANKA



Flood Risk Reduction - Case Study in Cambodia



Application of Space Based Systems (satellite Data & other) for Preparedness

Global Rainfall Map from Satellites
 (<http://sharaku.eorc.jaxa.jp/GSMaP>)

produced 4 hours after observation & updated hourly

Internet access

- Images & Movies
- Google Earth files
- Data download

Global Rainfall Map (GSMaP_NRT)

Courtesy of EORC/JAXA

2010-01-13 23:00 - 23:59 (UTC)

Rain 0.1 0.5 1.0 2.0 3.0 5.0 10.0 15.0 20.0 25.0 30.0 [mm/hr]

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Nargis Cyclone Myanmar in May 2008

Courtesy of EORC/JAXA

2008-05-03 00:00 - 00:59 (UTC)

April 28 - May 3 2008

Rainfall map on Google Earth

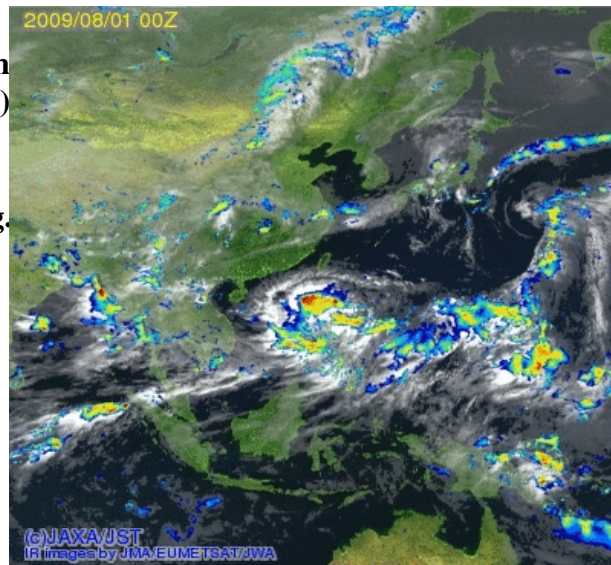
(c)JAXA/JST IR Image by JMA/EUMETSAT/JWA 2008/04/28 00 (Z)

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Typhoon 'MORACOT' by GSMaP_NRT

3 hour animation of Typhoon "MORACOT" (August 2009) GSMaP_NRT.

Animation during 00Z 1 Aug. 21Z 12 Aug. 2009.



*Courtesy of
EORC/JAXA*

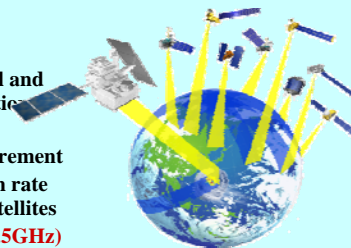
Global Precipitation Measurement (Future)

- Core satellite and several satellites will make formation flight to realize global precipitation frequent observation with high accuracy.
- **Dual-frequency Precipitation Radar (DPR)** onboard core satellite and microwave radiometers onboard constellation satellites will measure precipitation rate.

Core Satellite

Objective:

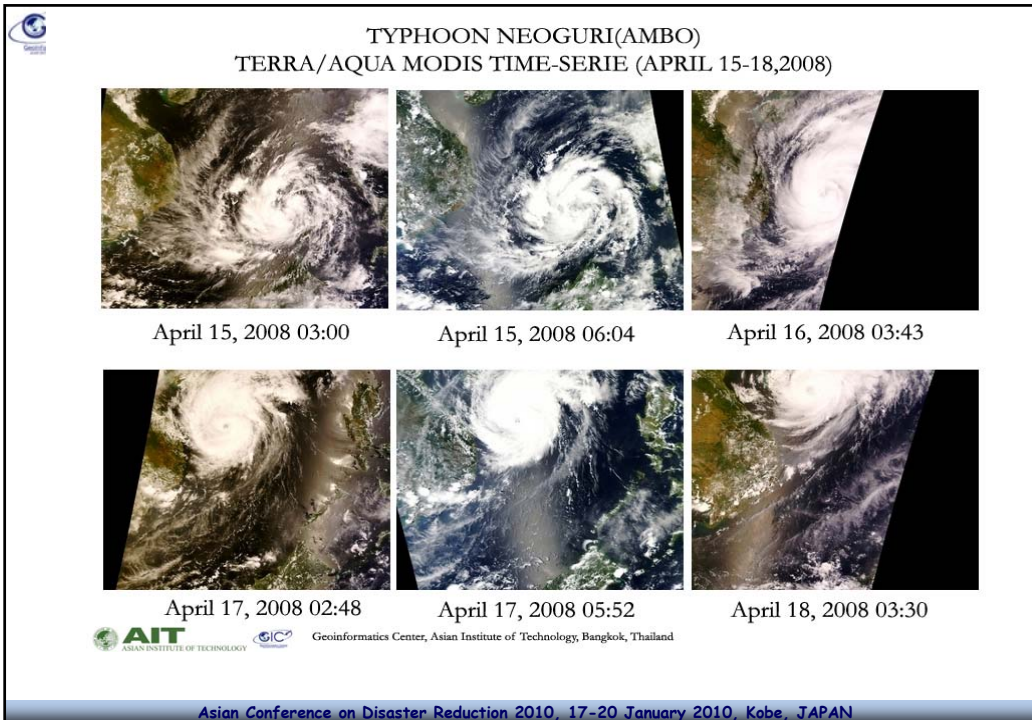


- Understanding the horizontal and vertical structure of precipitation system
- Drop size distribution measurement
- Improvement of precipitation rate accuracy with constellation satellites
- **DPR (JAXA, NICT) (13.6, 35.5GHz)**
- GMI (NASA)
- **Launch in 2013 by H-IIA**
- Non-Sun-synchronous orbit, inclination: 65deg., altitude: 407 km



Constellation Satellites

Objectives:

- Observation frequency
- Science, social applications
- Cooperation with constellation satellite providers; JAXA, NASA, NOAA, etc.
- 3 hourly observation of 80% of the globe.
- Launch around 2013 by each organization
- Mainly sun-synchronous orbit with altitude 600-800 km

Concluding

Satellite data derived information can be used in DRR (response, mitigation & early warning)

Way Forward:
To increase the awareness, information sharing culture, collaboration of space agencies, capacity development and implementation

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Thank You

www.geoinfo.ait.ac.th

lal@ait.ac.th