2ⁿᵈ Joint Project Team Meeting , Yangon, MYANMAR

Space-based Disaster Management Support System in the Asia-Pacific Region

Keynote Presented by:

Zaw Naing

Myanmar Earthquake Committee (MEC)

Myanmar Engineering Society (MES)

Natural Disasters

Natural Disasters
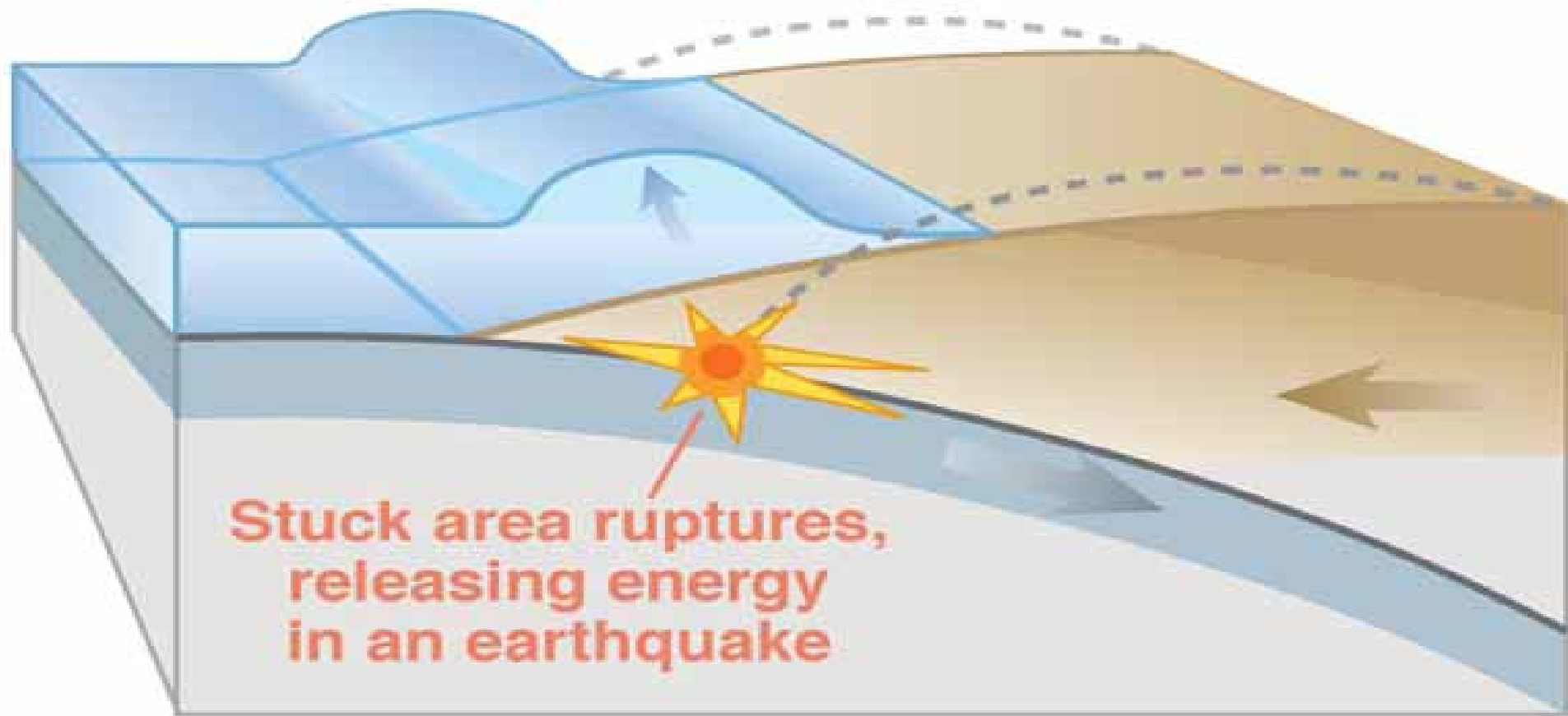
Natural Disasters

Inlay Lake, 2009

Inlay Lake, 2010

Inlay Lake, 2010

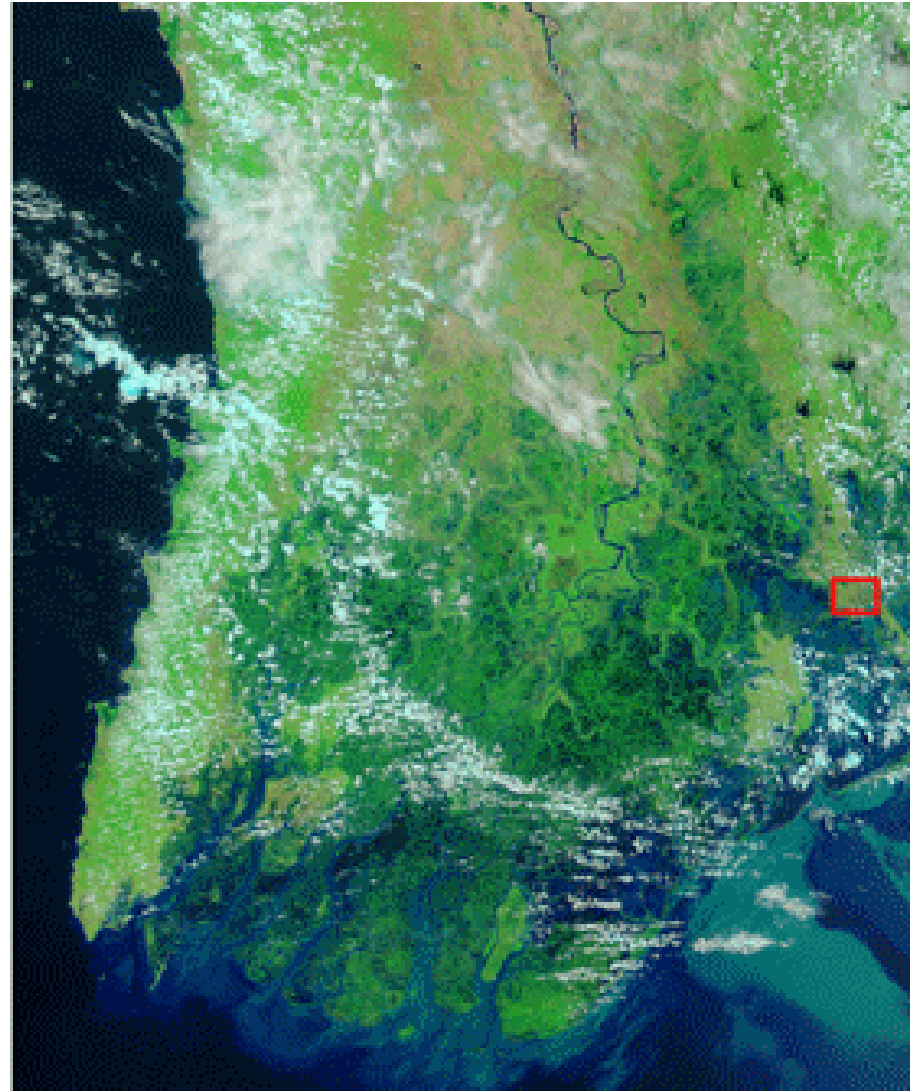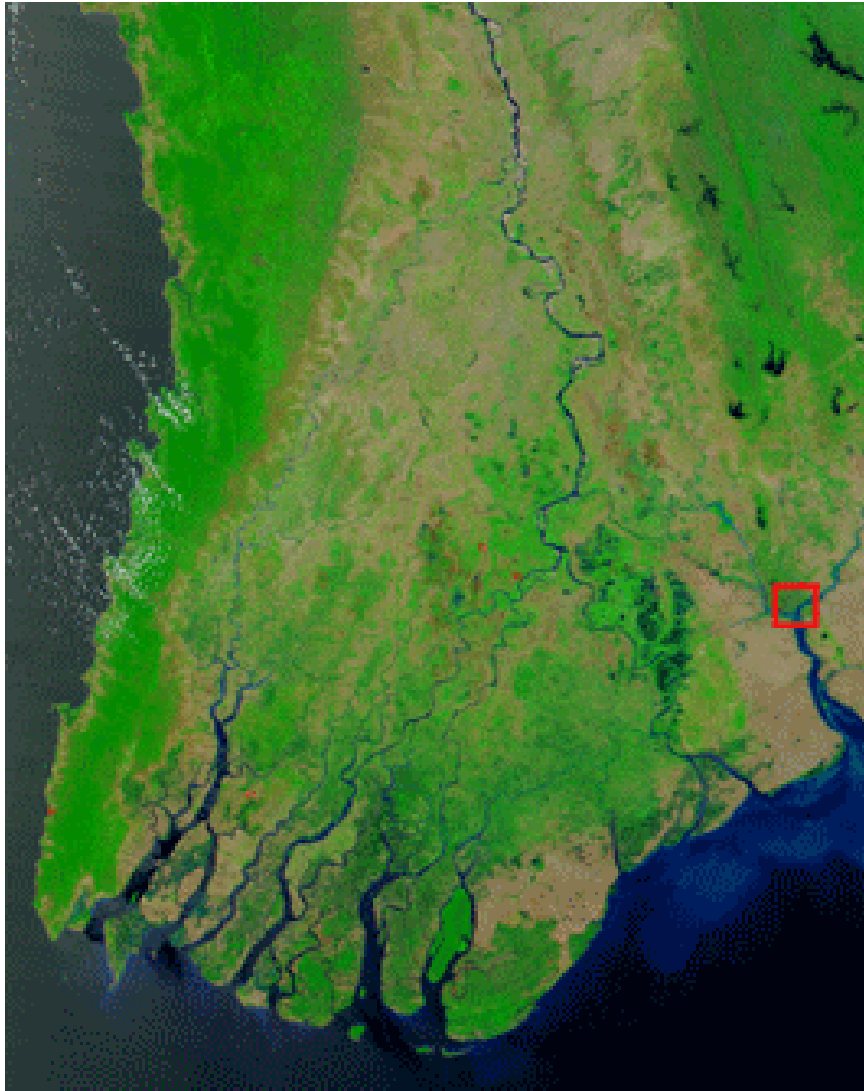# Natural Disasters

Earthquake starts tsunami

Stuck area ruptures, releasing energy in an earthquake

Natural Disasters

Tsunami

NARGIS Cyclone, 2008 May

Cyclone Nargis: Affected Areas and Cyclone Path

Bengal Bay

Andaman Sea

Bago
Waw
Kyaikto
Bilin
Taikkyi
Hlegu
Thanatpin
YegyiKyonpyaw
Danubyu
Hmawbi
Kawa
Thabaung
Kyaunggon
Htantabin
Thaton
Pantanaw
Nyaungdon
Mingaladon
Pathein
Einme
Hlaingtharya
Insein
Kayan
Kangyidaunt
Thanlyin
Thongwa
Maubin
Twantay
Paung
Wakema
Ngapudaw
Myaungmya
Kyaiklat
Kawhmu
Kyauktan
Mawlamyinegyun
Kungyangon
Chaungzon
Dedaye
Labutta
Pyapon
Bogale

Legend:

Cyclone Category:

- 0
- 1
- 2
- 3
- 4

Cyclone Track Category:

- 0
- 1
- 2
- 3
- 4

Cyclone Affected Townships

Vulnerable areas

0   35   70   140 Kilometers

N

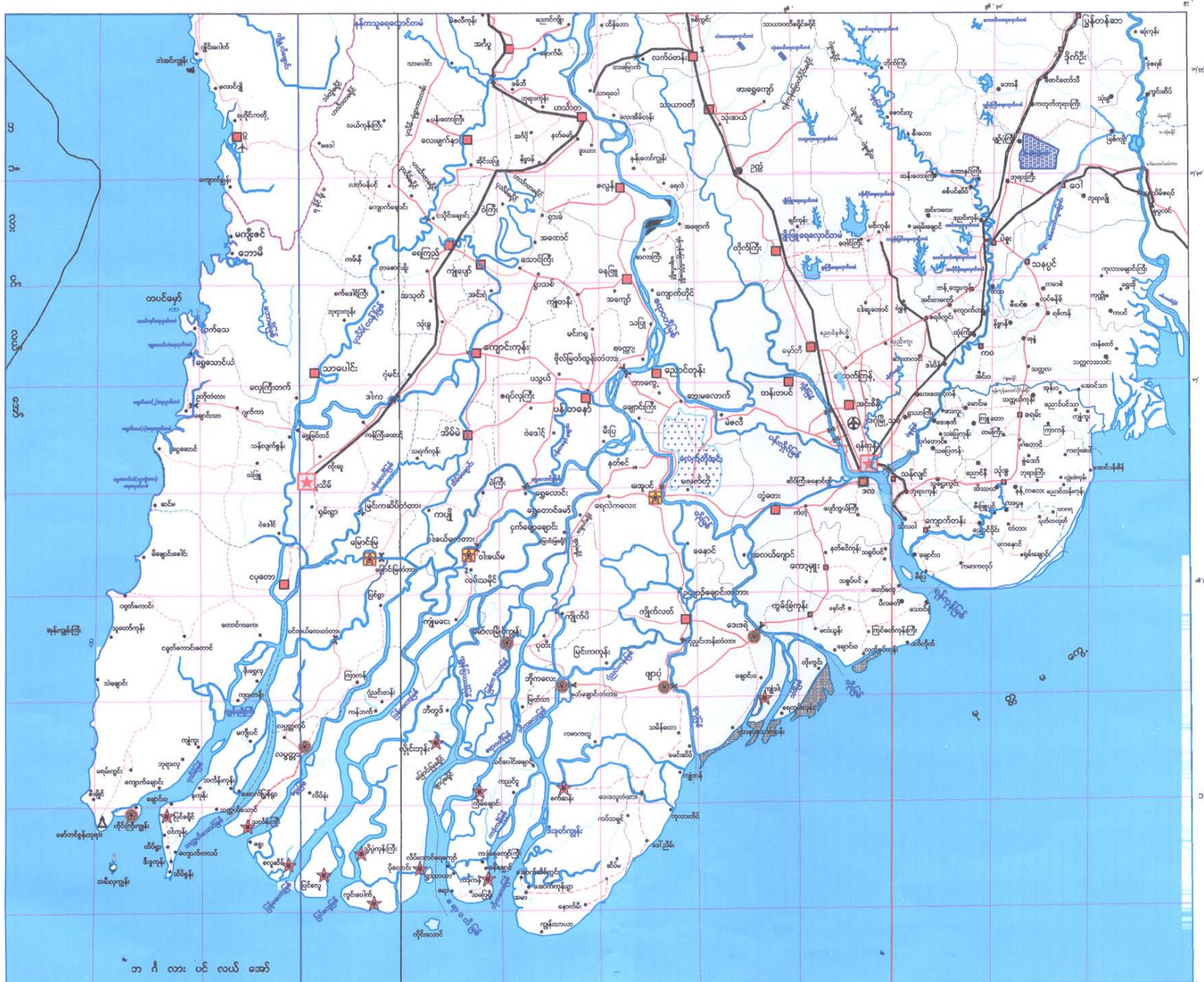# NARGIS Cyclone

NARGIS Cyclone

NARGIS Cyclone

NARGIS Cyclone

ရန်ကုန်တိုင်း နှင့် ဧရာ ဝ တီ တိုင်း

# World Map Showing Various Natural Disasters

Earthquakes
- Zone 0: MM V and below
- Zone 1: MM VI
- Zone 2: MM VII
- Zone 3: MM VIII
- Zone 4: MM IX and above

Volcanoes
- △ Last eruption before 1800 AD
- ▲ Last eruption after 1800 AD
- ▲ Particularly hazardous volcanoes

Tsunamis and Storm Surges
- Tsunami hazard (seismic sea-wave)
- Storm surge hazard
- Tsunami and storm surge hazard

Tropical Storms and Cyclones
- Zone 1: SS 1 (118–153 km/h)
- Zone 2: SS 2 (154–177 km/h)
- Zone 3: SS 3 (178–209 km/h)
- Zone 4: SS 4 (210–249 km/h)
- Zone 5: SS 5 (>= 250 km/h)

→ Principal tracks of tropical storms

World Map Showing Various Natural Disasters
By Continents
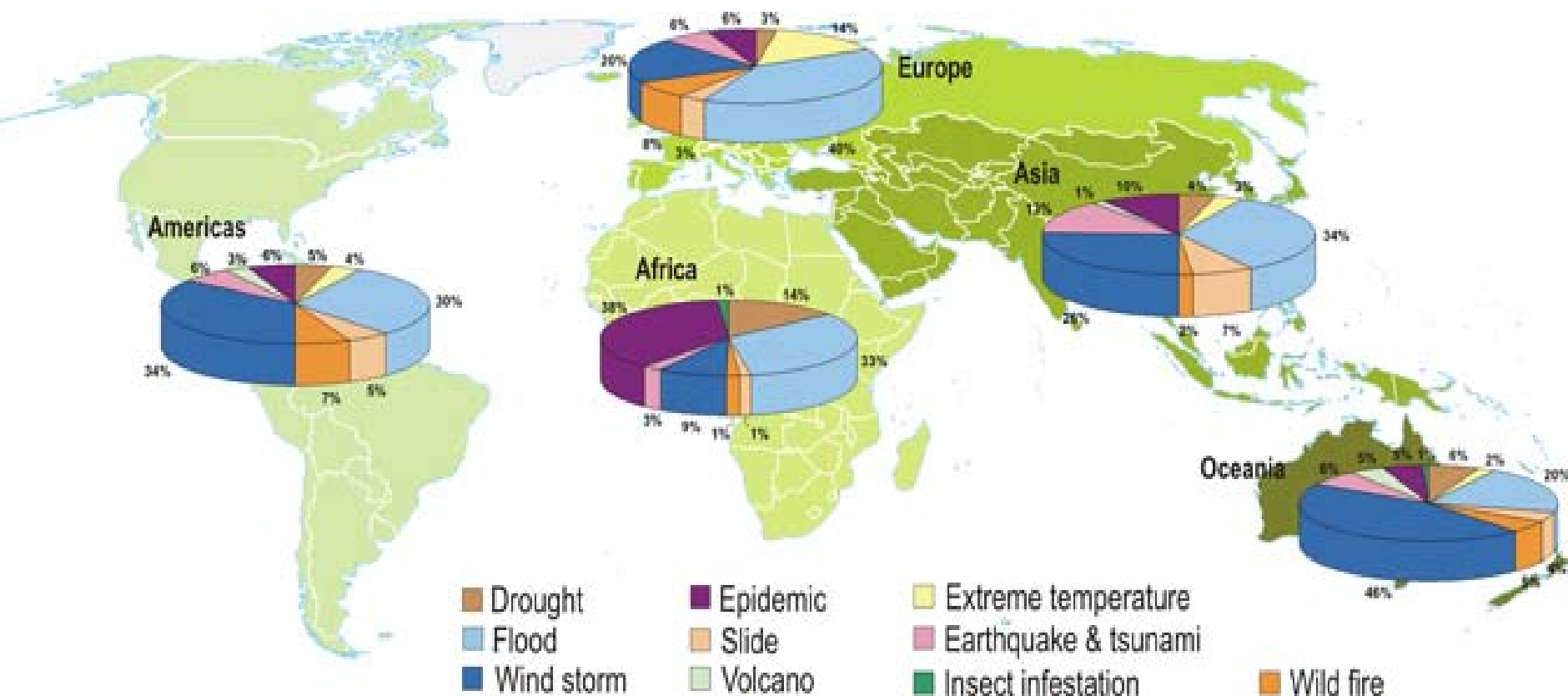
Disaster Cycle

The "traditional" disaster cycle and the role of risk assessment.
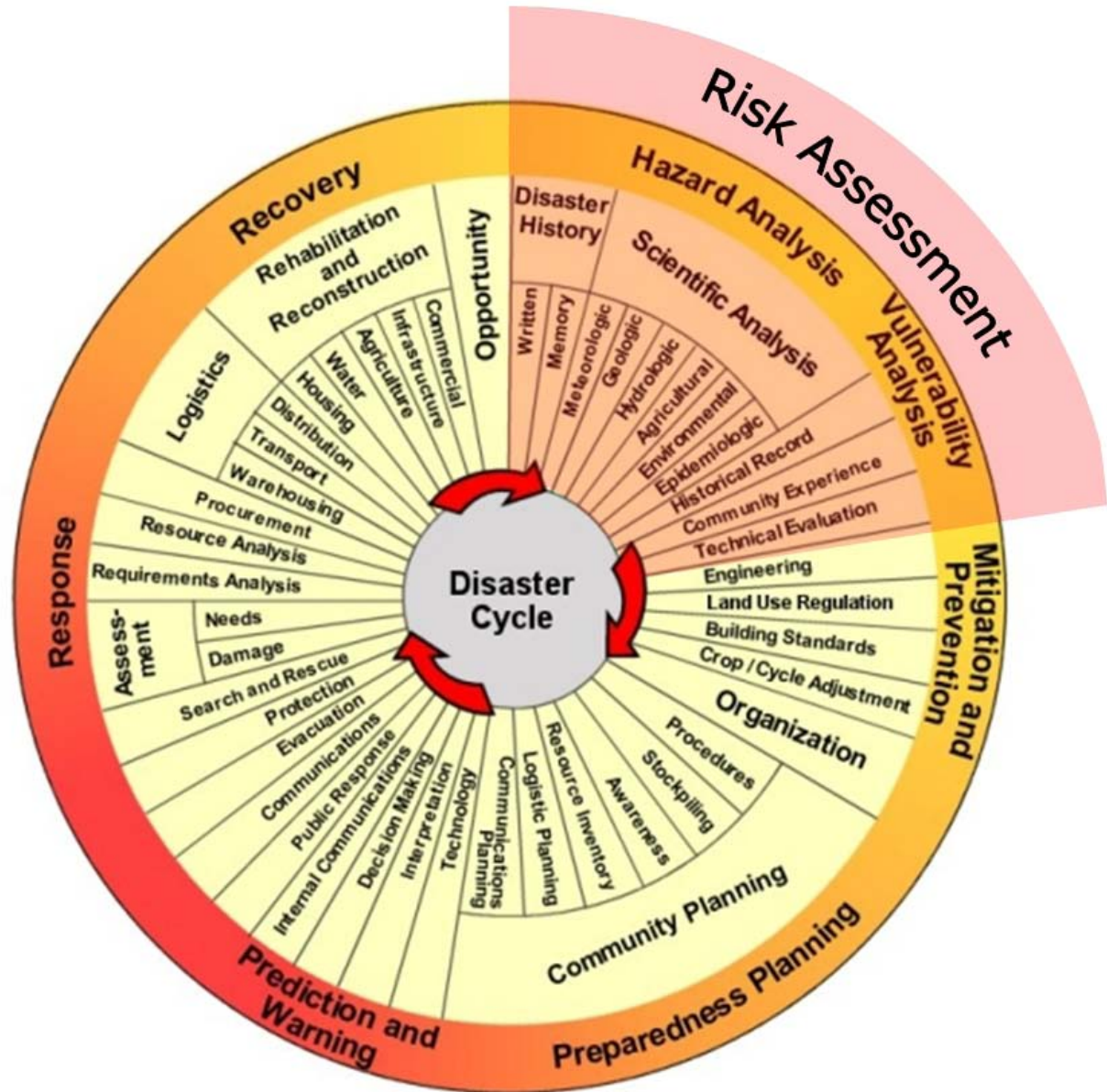
GIS and Remote Sensing for Disaster Risk Reduction, and Disaster Management Support

▸ Disaster Risk Analysis

▸ Disaster Risk Preparedness Planning

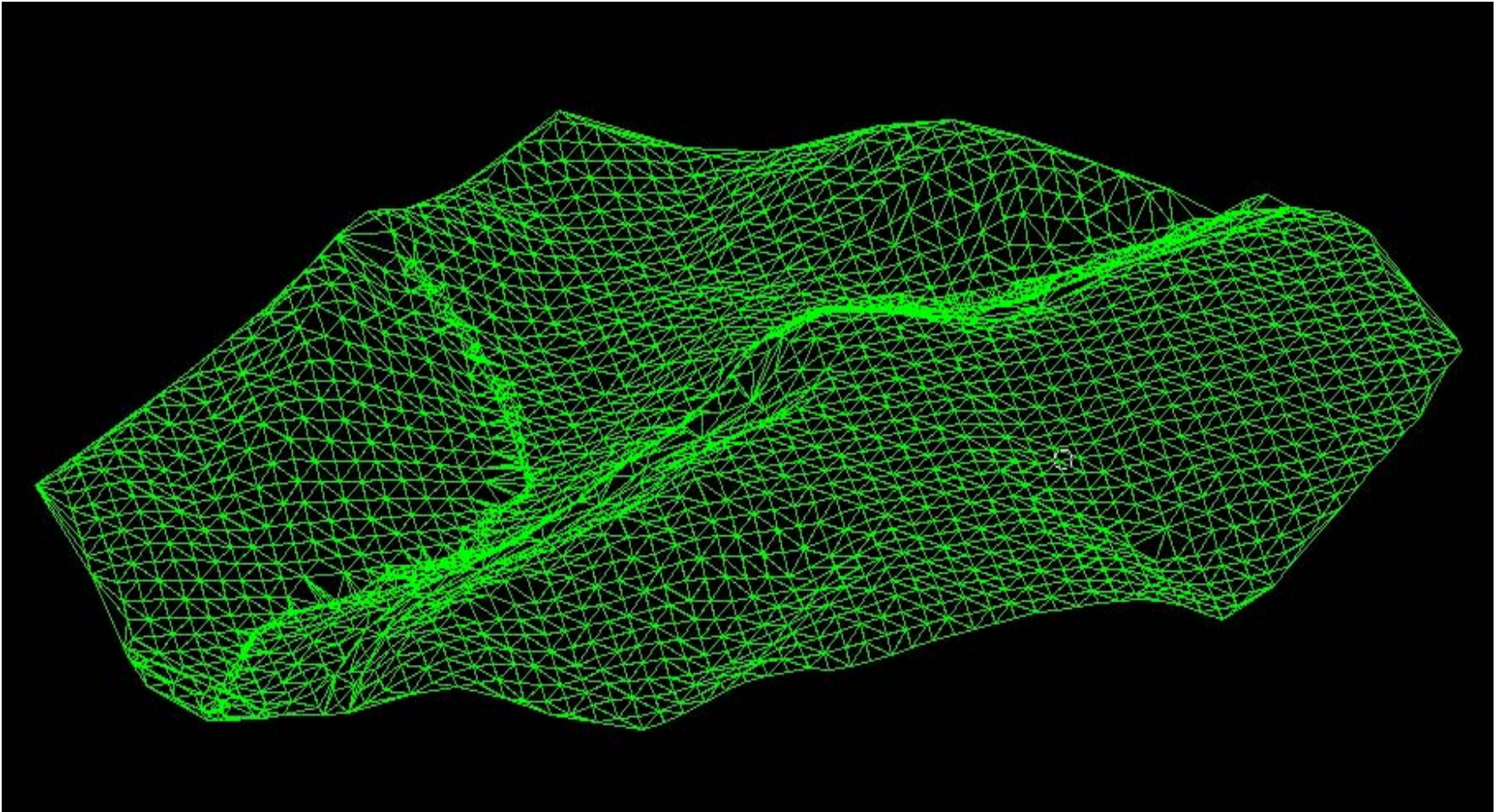▸ Recovery Planning

▸ Disaster Management

▸ Post-Disaster Support

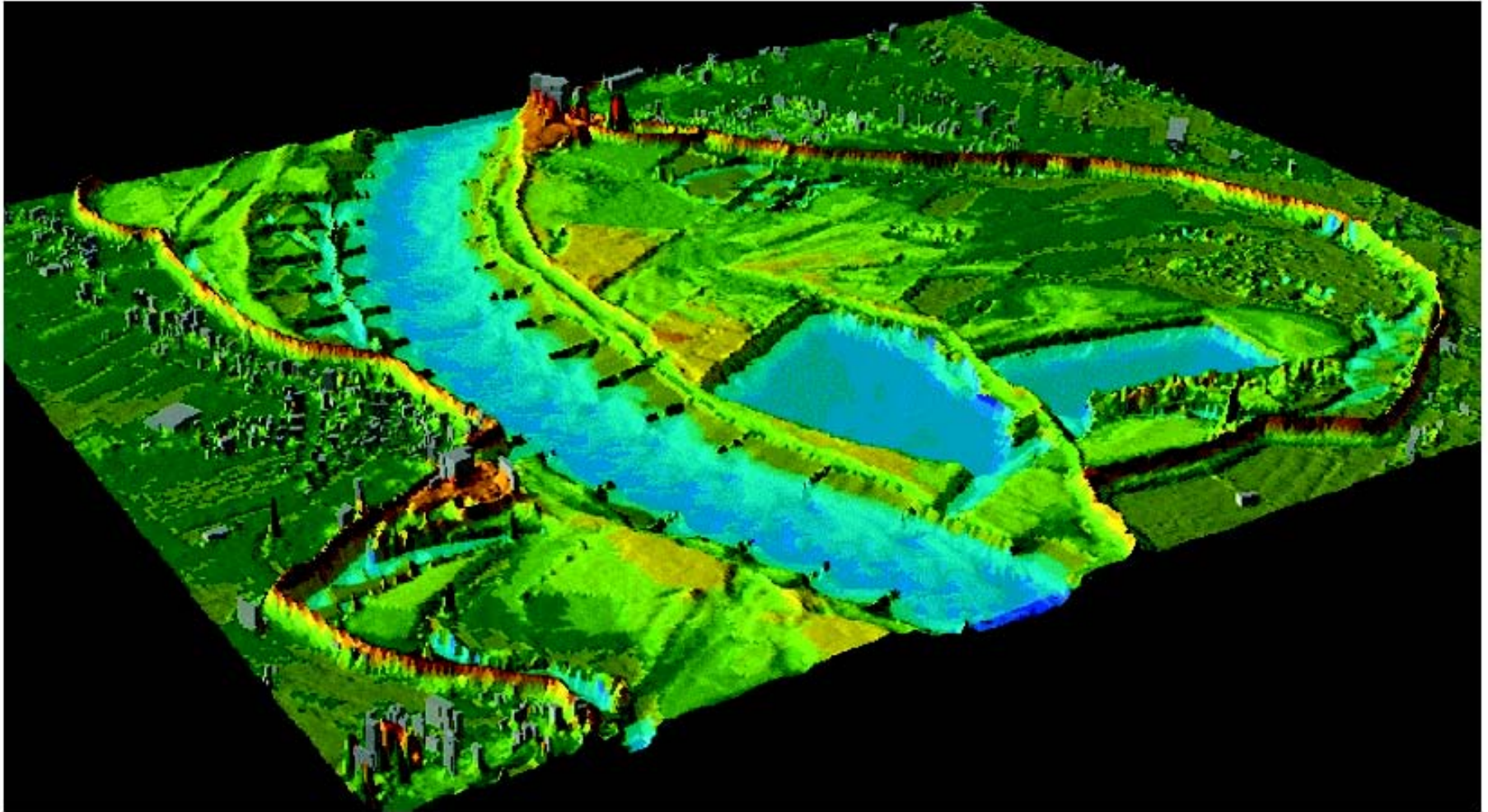# Remote Sensing / Earth Observation (EO) Satellites for Land Use Land Cover and Change Detection
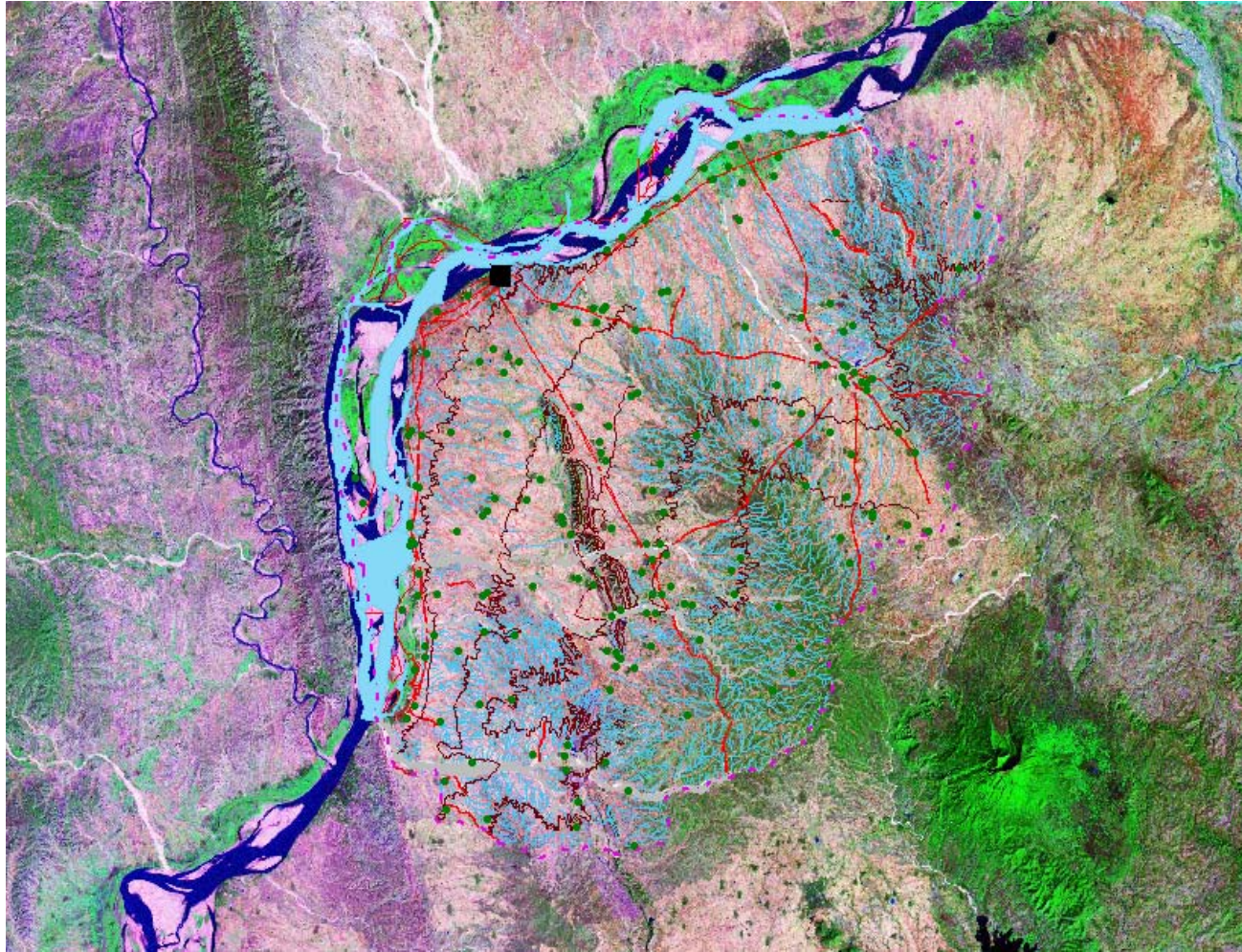
LandSat Satellite Image of Bagan Myanmar

Digital Elevation Models
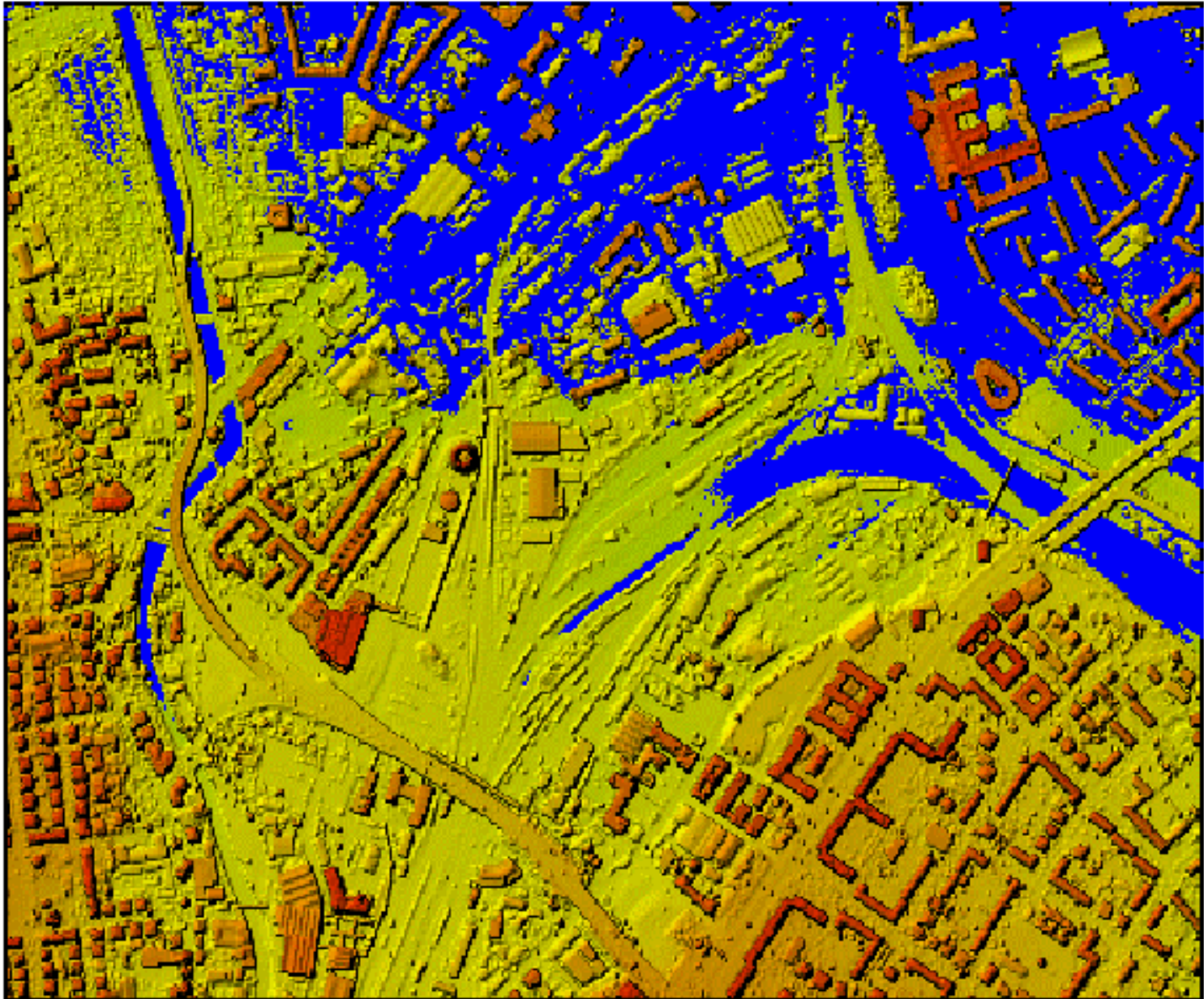
Digital Elevation Models
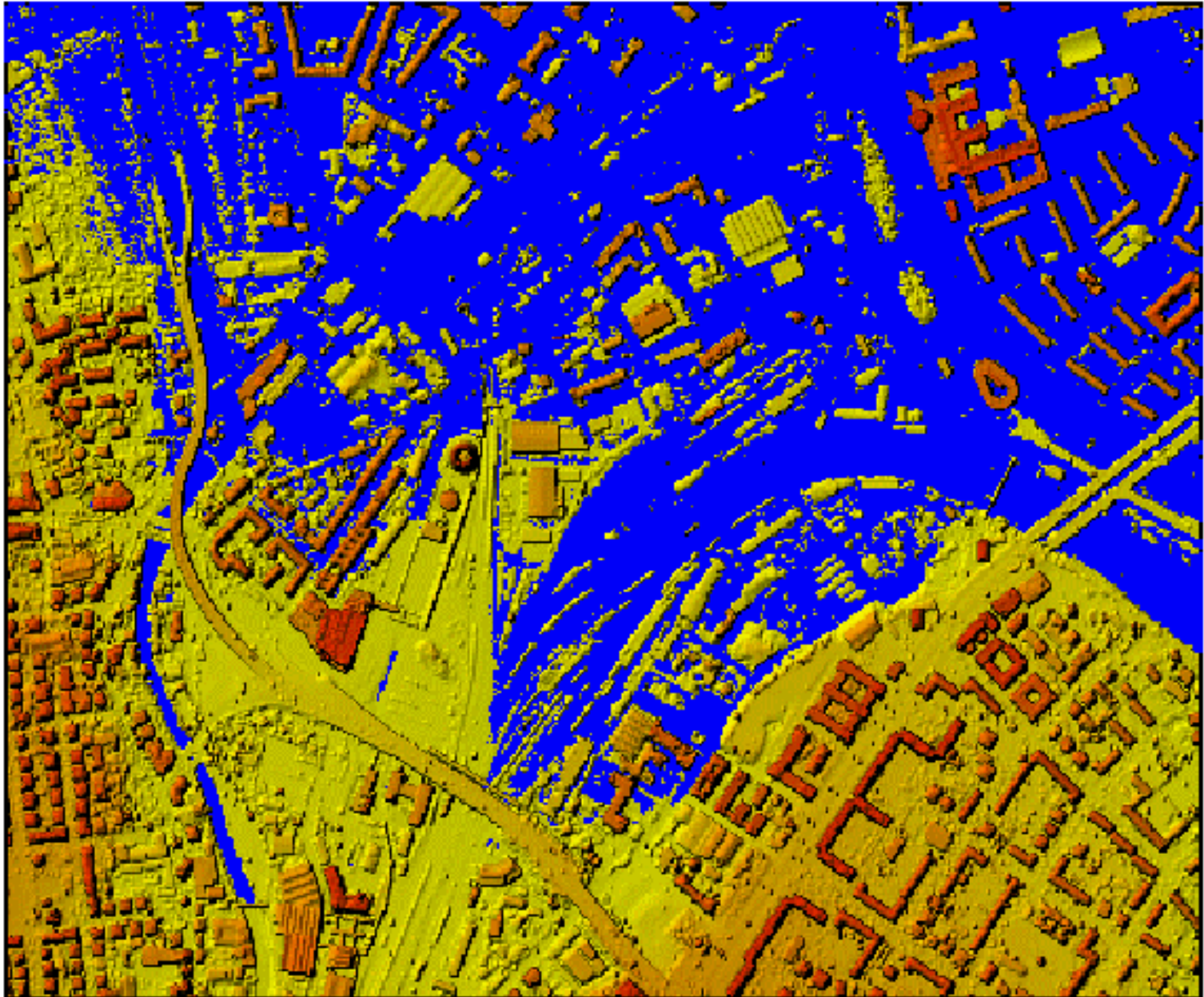
Digital Elevation Models
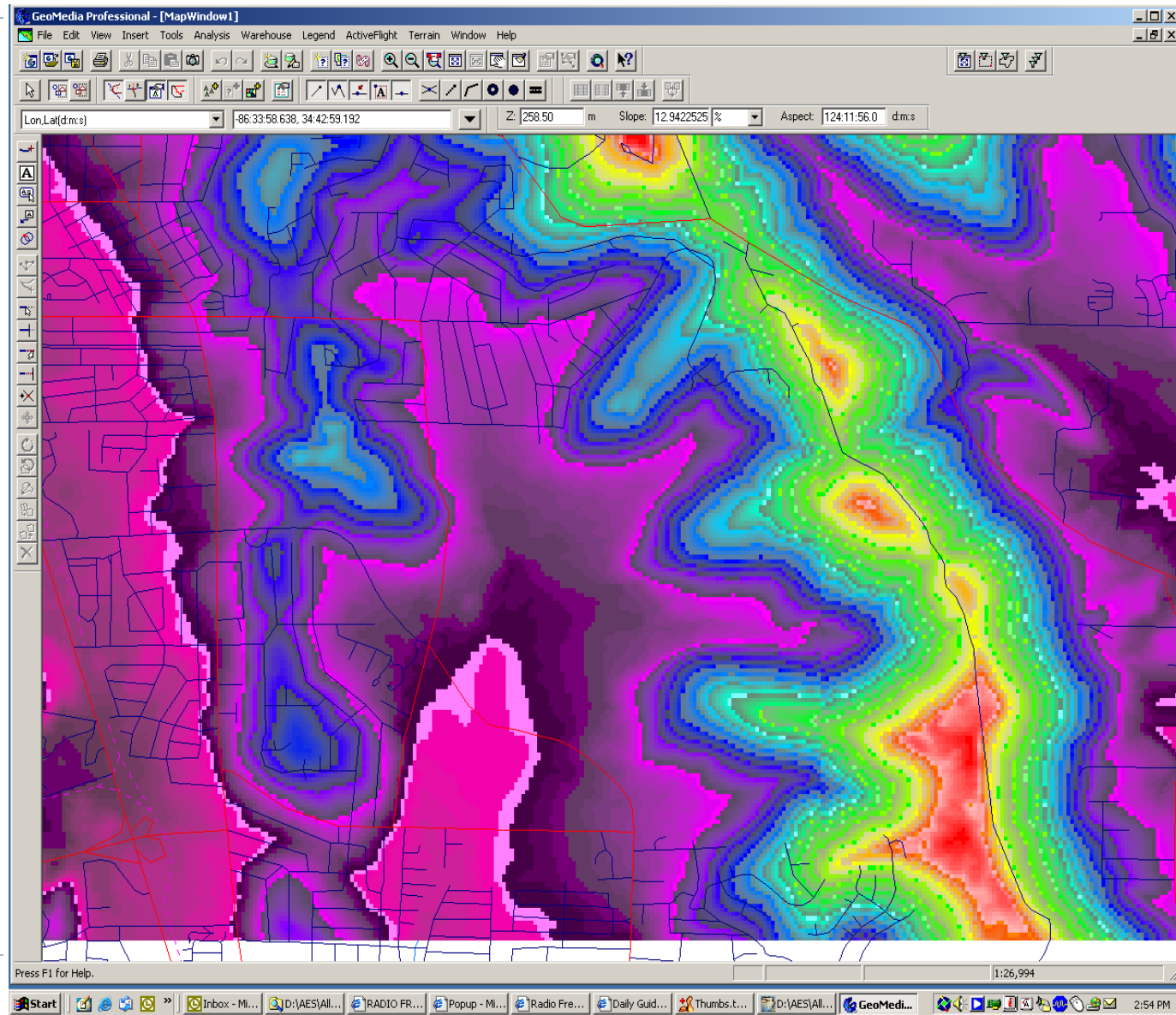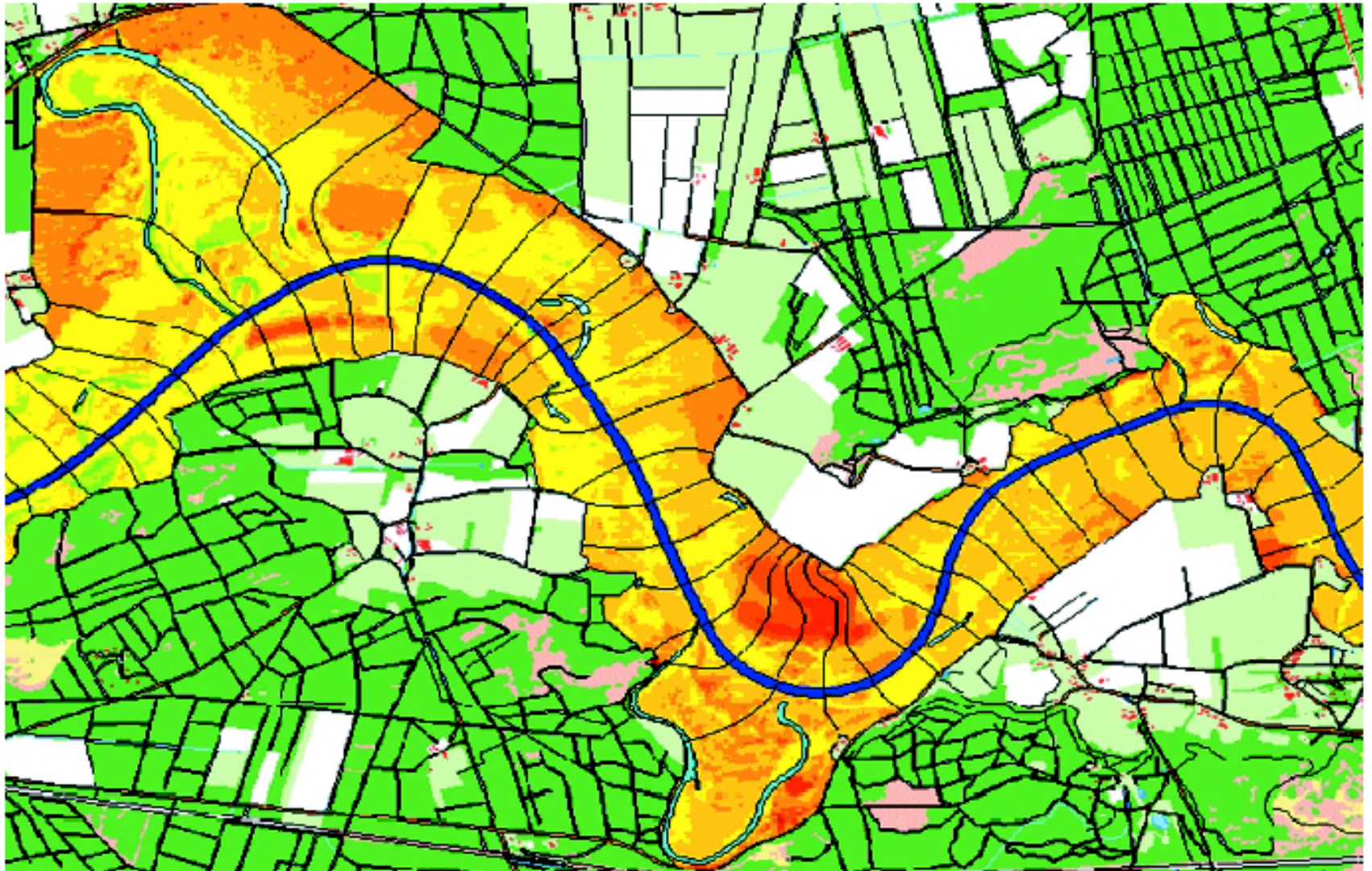
Flood Simulation
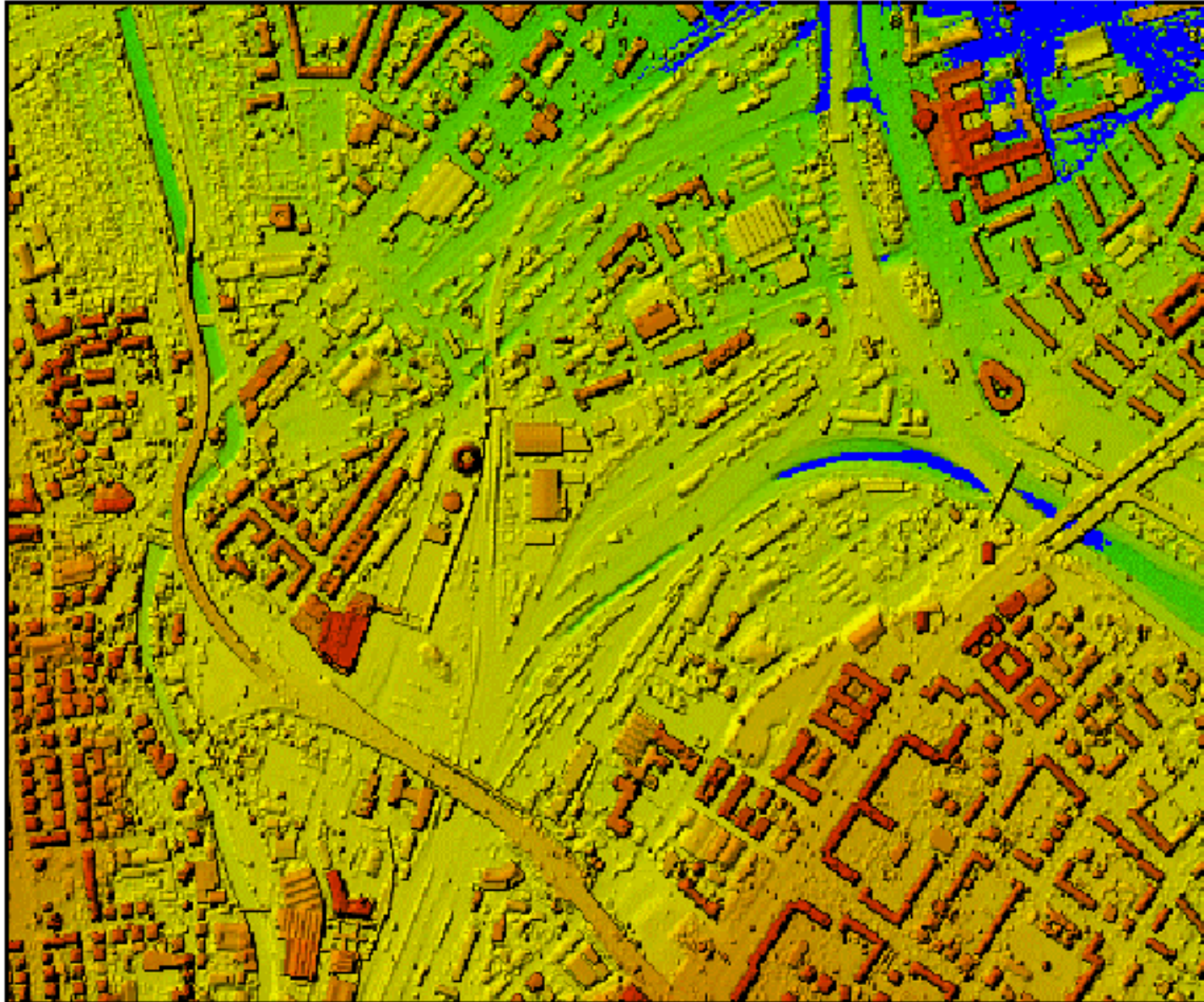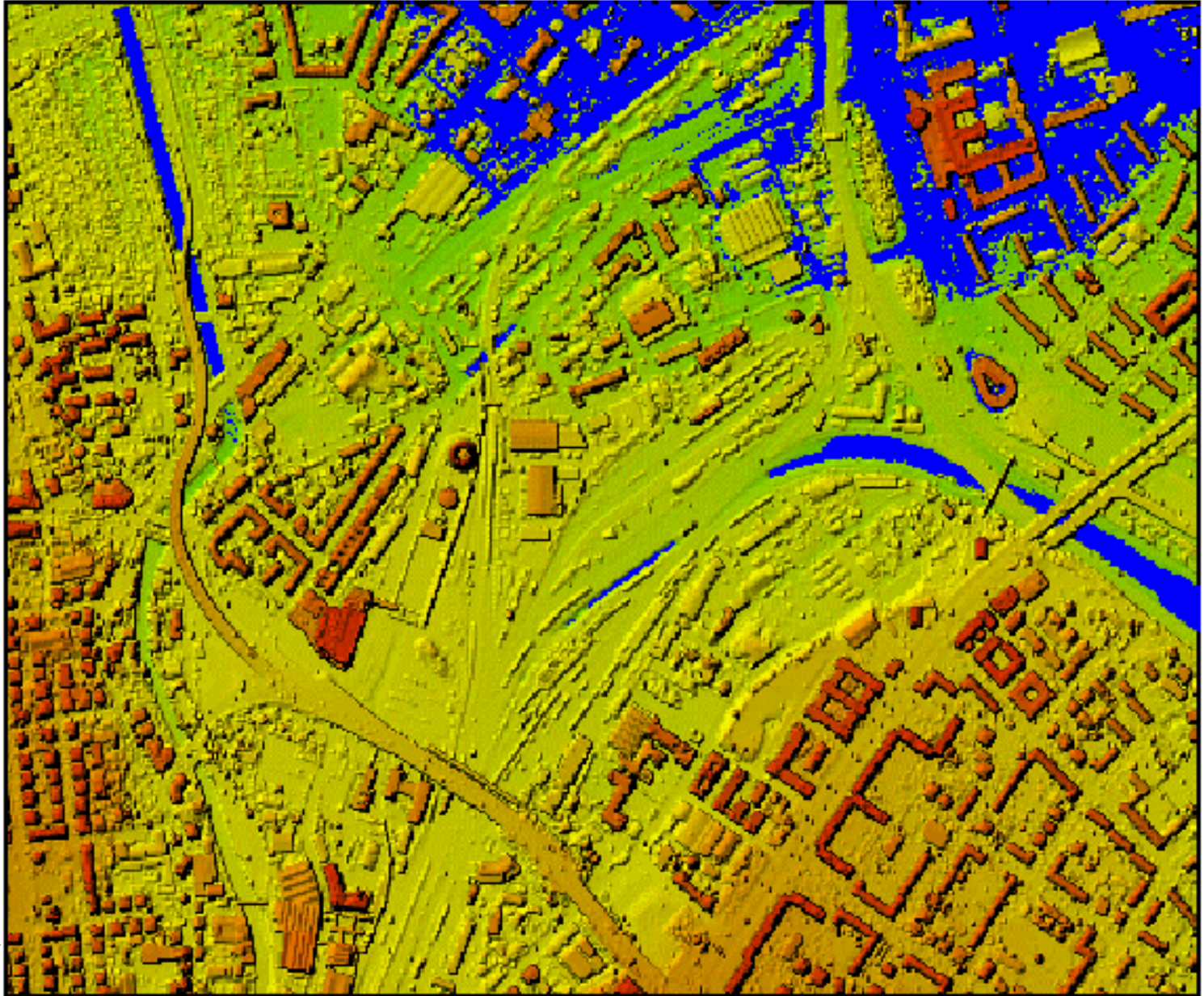
Flood Simulation

Flood Simulation

Flood Simulation

Flood Risk Mapping

International Cooperative Mechanisms

Regional and International Cooperative mechanisms which emphasize the use of Remote Sensing data and GIS for Disaster Risk Reduction (DRR) and Disaster Management Support (DMS)

o **Space Based Information for Disaster Management & Emergency Response (UN-SPIDER) working under United Nations Office of Outer Space Affairs(UNOOSA)**

o **Regional Space Application (RESAP) program under auspices of UN-ESCAP(Economic & Social Commission for Asia & the Pacific)**

o **Sentinel Asia**

o **Asia-Pacific Regional Space Agency Forum (APSARF)**
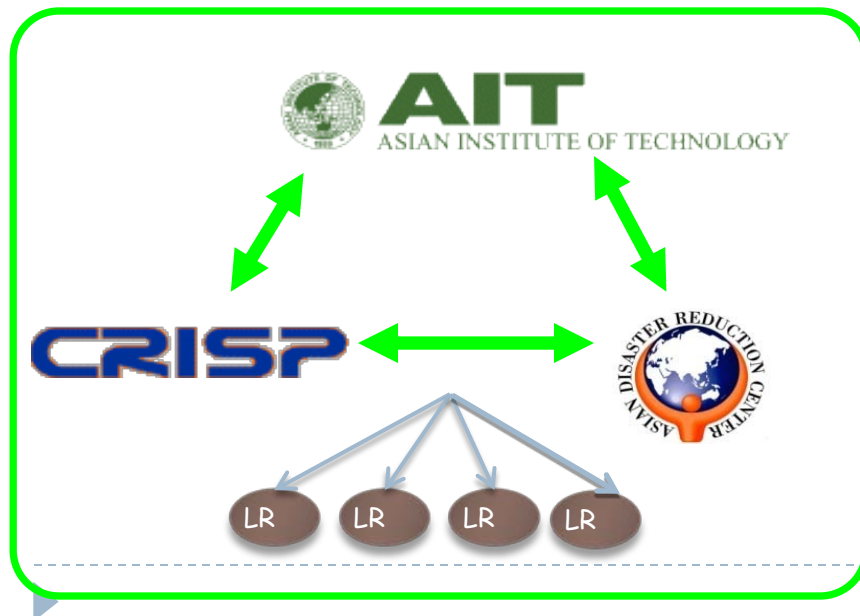
Sentinel Asia

▸ The Sentinel Asia initiative started in 2005

▸ Collaboration between regional space agencies and disaster management agencies,

▸ Applying Remote Sensing and Web-GIS technologies to assist disaster management in the Asia-Pacific region.

▸ Multiple national agencies of about 25 countries in the region have joined and benefited from the disaster support services provided by Sentinel Asia.

Sentinel Asia Basic Structure

Data Provider Node (DPN)

CRISP JAXA JAXA
GISTDA GISTDA ISRO ISRO

DATA

Data Analysis Node (DAN)

AIT
ASIAN INSTITUTE OF TECHNOLOGY

CRISP

LR LR LR LR

Request

Disaster

End User

Product
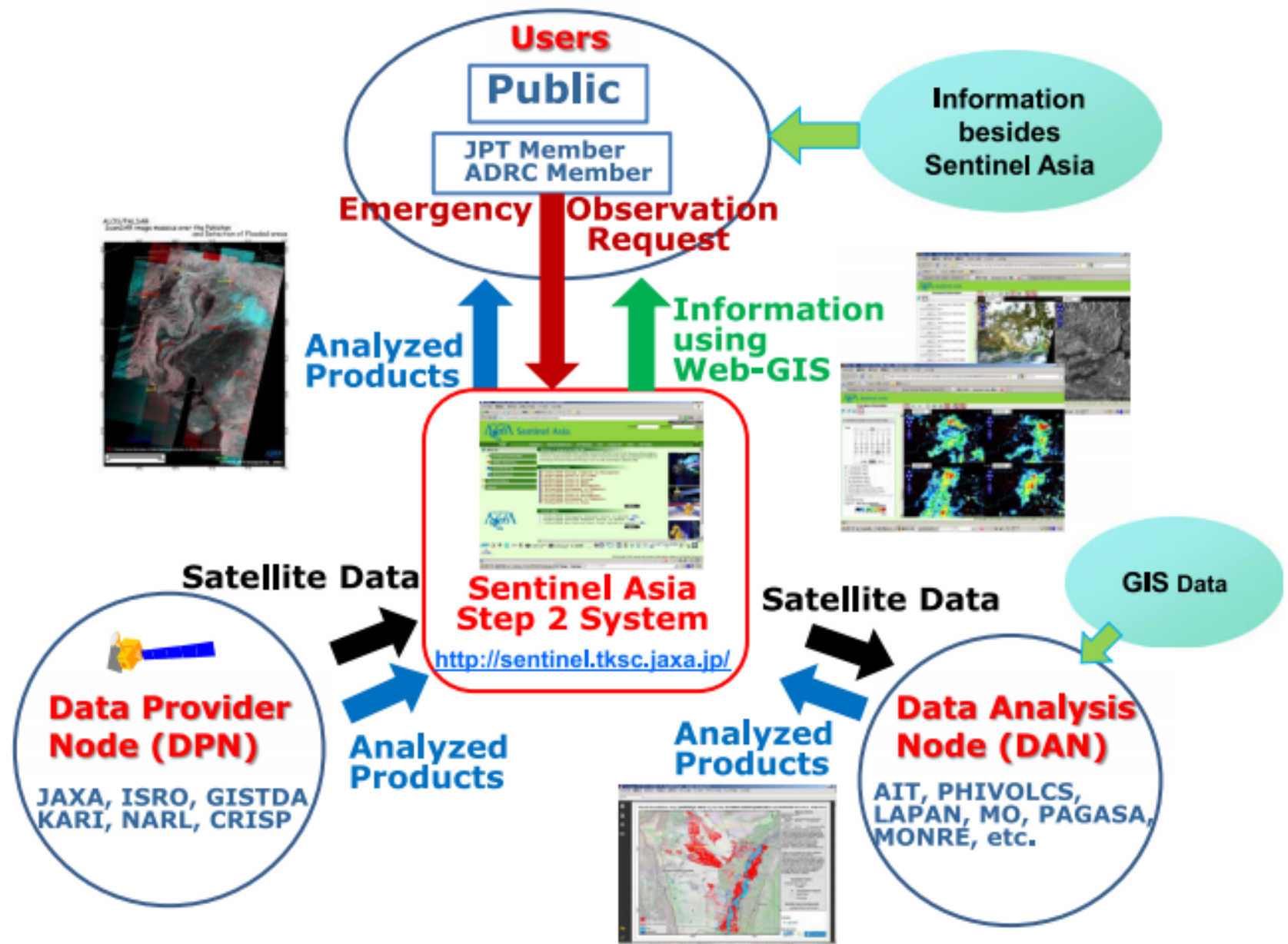
Fig. 12. Information sharing via Sentinel Asia Step 2 System.

Stepwise Approach of Sentinel Asia

Flood Mapping

**Example of utilisazation of satellite data from Sentinel Asia.**

The flood of Koshi river, Nepal, 2008

http://www.dos.gov.np/

KOSHI FLOOD MAP
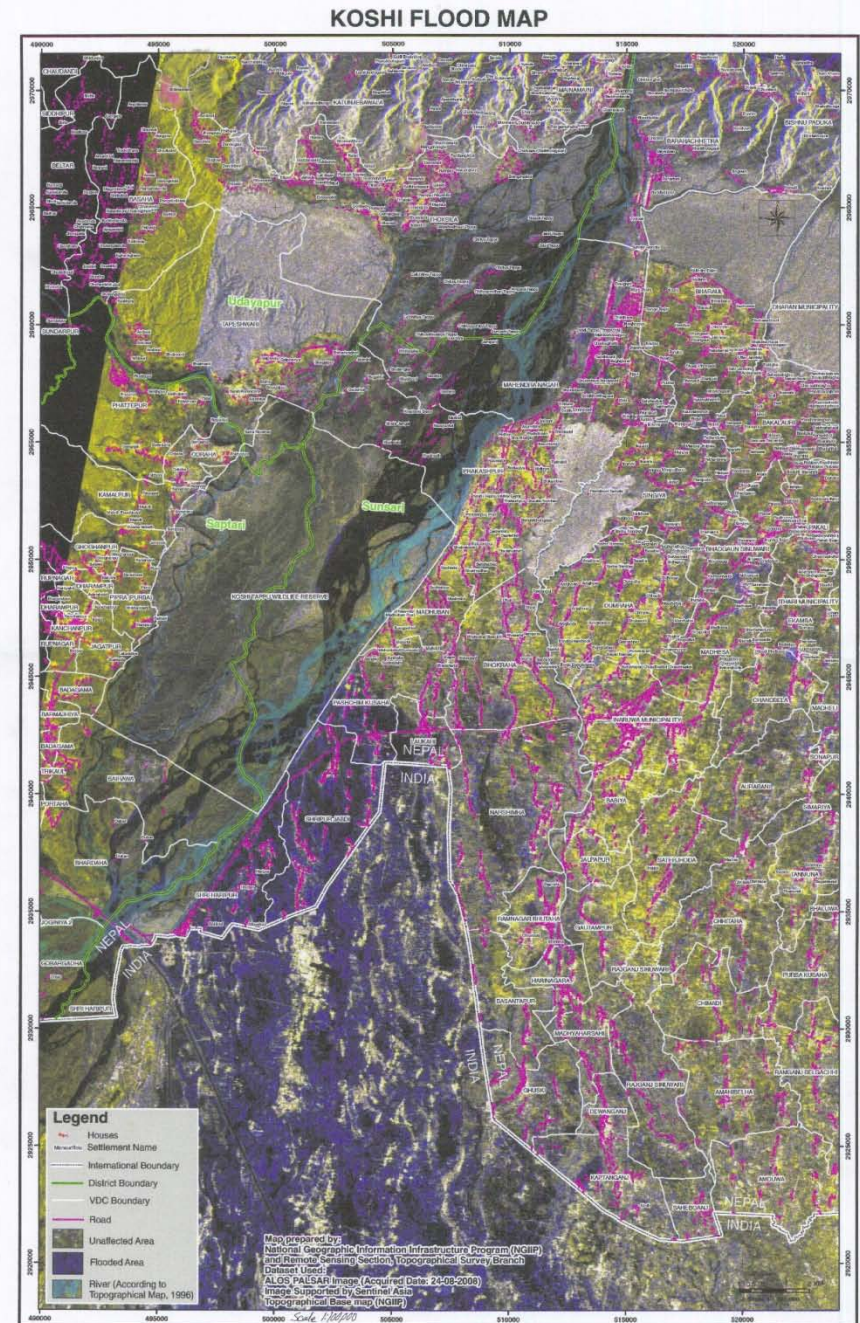
Landslide Early Warning System in Philippines

Early waning for **debris flows and slope failures (short-term events)** is issued based on current (& predicted) rainfall situation and **non-linear CL**. Hourly point of **rainfall vs SWI** is traced on CL, and if it exceeds CL early warning is issued. This method is adopted in Japan.
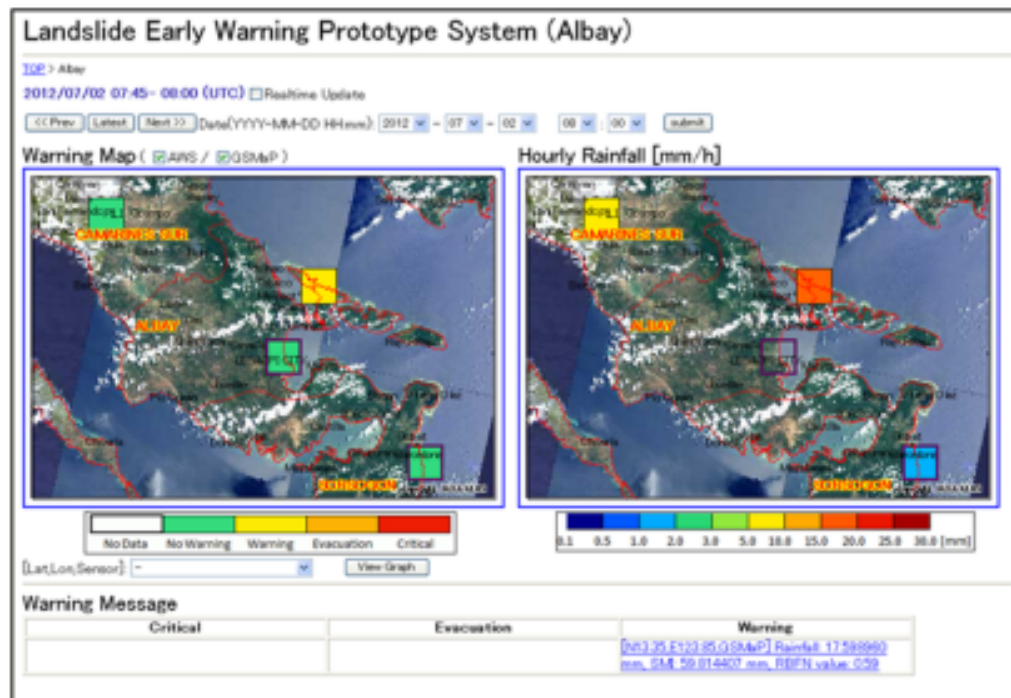
Landslide Early Warning Prototype System in Albay
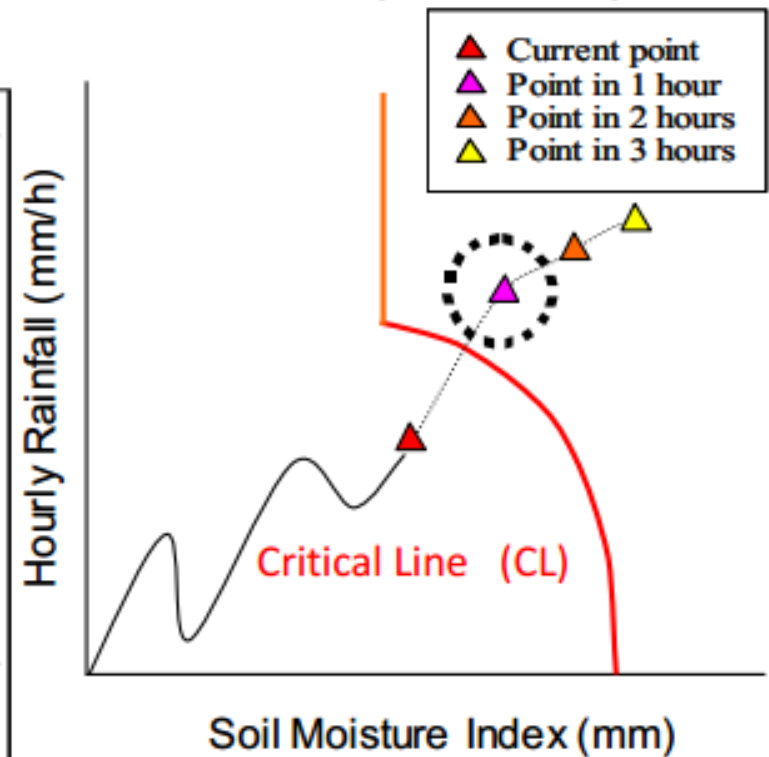
Y-axis: hourly rainfall (mm/h)
X-axis: soil moisture index (SMI) (mm)

NARGIS Cyclone in Myanmar, May 2008

▸ Cyclone Nargis hit the Ayerwaddy delta area of Myanmar in May 2008.

▸ The deadliest natural disaster in the history of Myanmar.

▸ About 150,000 people died.

▸ Many towns and villages were flooded.

International Geospatial Support

▸ United Nations Institute for Training and Research (UNITAR) Operational Satellite Applications Program (UNOSAT) provided satellite imagery and related geographic information

▸ Myanmar Information Management Unit (MIMU) of UNDP provided the administrative GIS data layers for production of required maps for the rescue and rehabilitation works
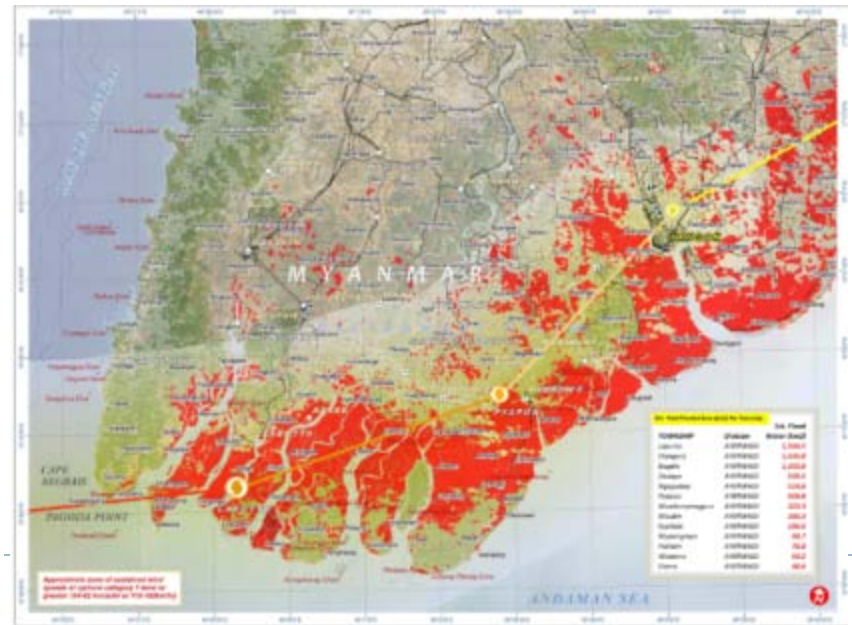
Damage Assessment_ UNOSAT

FLOOD Map _ UNOSAT

Flood Map_ UNOSAT

Post-Disaster: Mangrove Studies with GOOGLE

The Only Mangroves in the area

Kaingthaung Island

© 2008 Europa Technologies
Image NASA
Image © 2008 DigitalGlobe
Image © 2008 TerraMetrics

©2007 Google™

Pointer   16°02'44.03" N   95°07'29.06" E   elev   13 ft   Streaming ||.|||||| 98%   Eye alt   114.54 mi

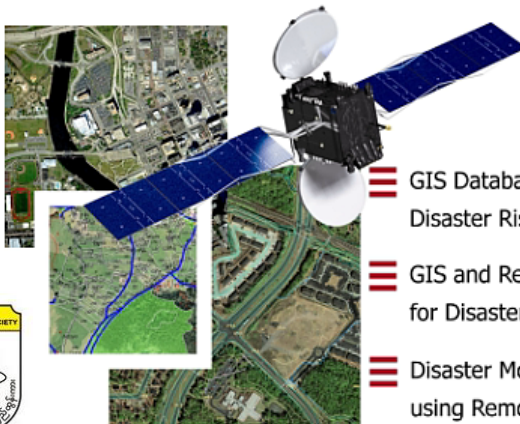# DRR and DRM activities with Geo- and Satellite- information

▸ Remote Sensing Center, Mandalay Technological University (MTU), Ministry of Science and Technology (MOST), Sub-Committee on Space Technology and Applications (SCOSA) of ASEAN, Kobe-based Asian Disaster Reduction Center (ADRC) and Asian Institute of Technology (AIT) _ Capacity Building and HRD programs for utilization of GIS and remotely sensed data for DRR.

▸ Myanmar Engineering Society (MES), Myanmar Geosciences Society (MGS) and related government bodies formed Myanmar Earthquake Committee (MEC) and produced seismic zonation maps (2006) of Myanmar and major cities.

▸ Training workshop on Seismic loss estimation using simplified and GIS-based approaches by MEC and Bangkok-based Asian Disaster Preparedness Center (ADPC)

▸ GIS and Remote Sensing Applications Training for DRR and DRM by MES and Mandalay Technology

▸

Trainings on GIS and RS for Disaster Risk Reduction
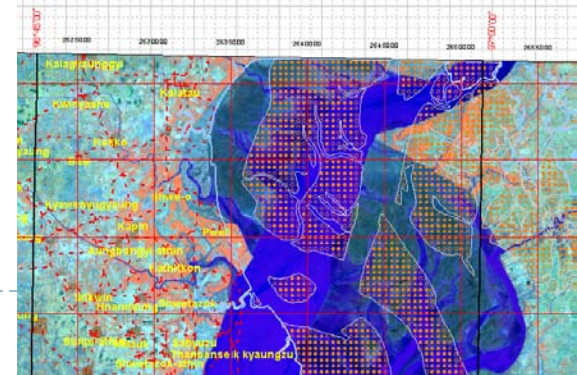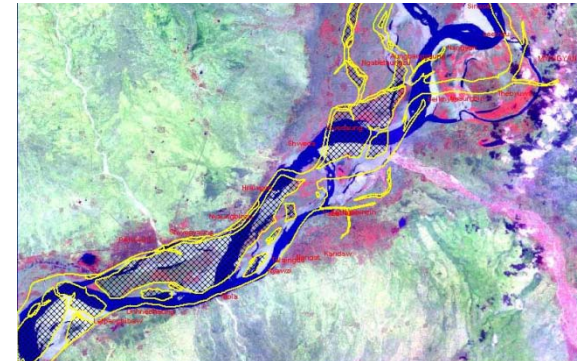
1. New Approach for Data Utilization by Regional Users Communities as Their Own Initiatives

Sentinel Asia Project for closed communities

Space Agencies Analysis Instituions

↓ DATA

Disaster organizations other user communities

limited number of participants from our region
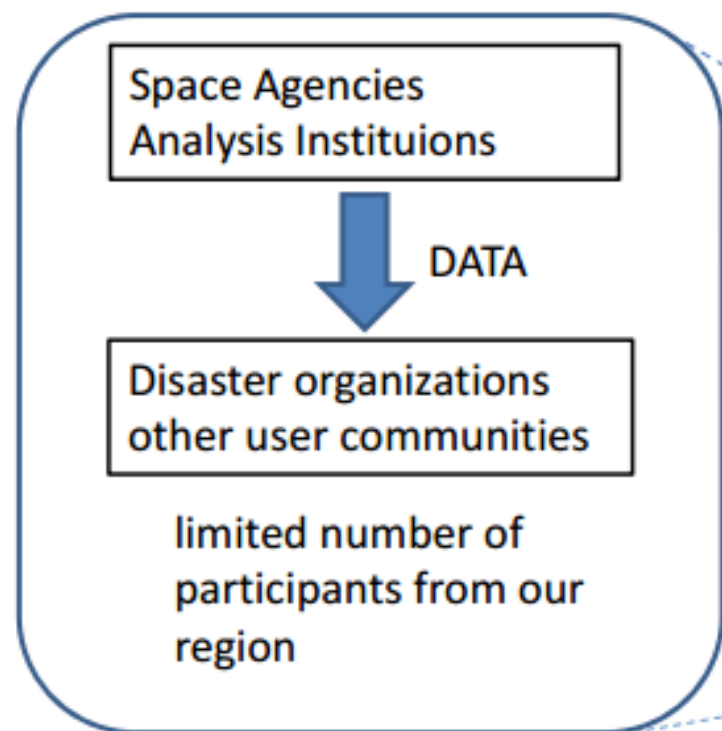
New Approach →

New Sentinel Asia Initiative

New many Initiatives by Huge Communities of Various Users

Promote & Enhance

Raw DATA and Standard Products
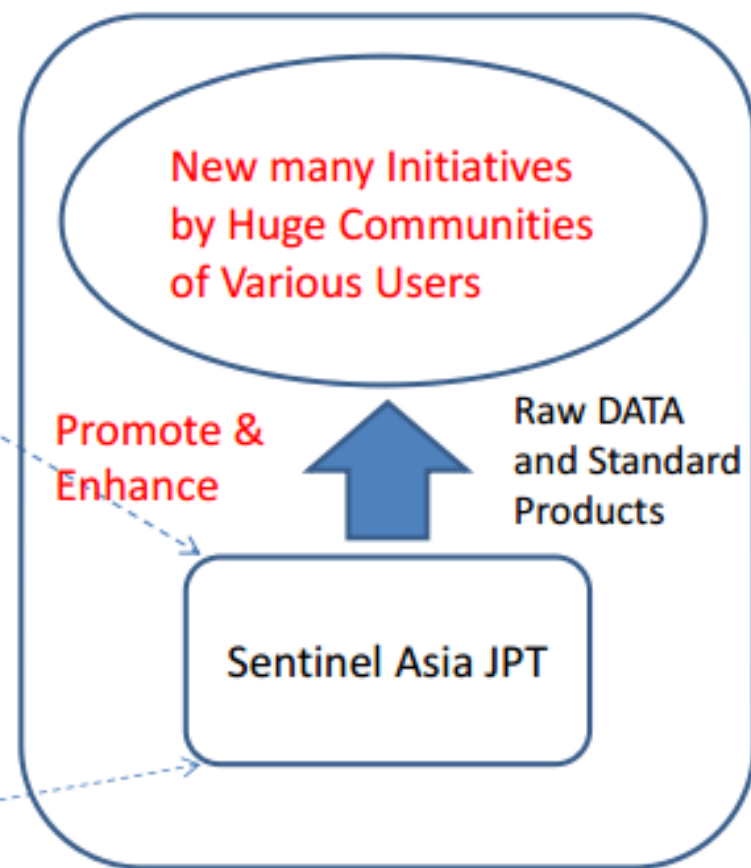
Sentinel Asia JPT

2. Evolution of Emergency Response

Observation

DPN

International Disaster Charter

Provide satellite data timely: Rapid Response

We would like to promote here!

Request

**JPT Member
ADRC Member**

Data Analysis

DAN

Utilization

Disaster Management Organization

End-Users

Provide high quality value-added data products !
- **Pre-disaster preparedness**
- **Post-disaster evaluation**
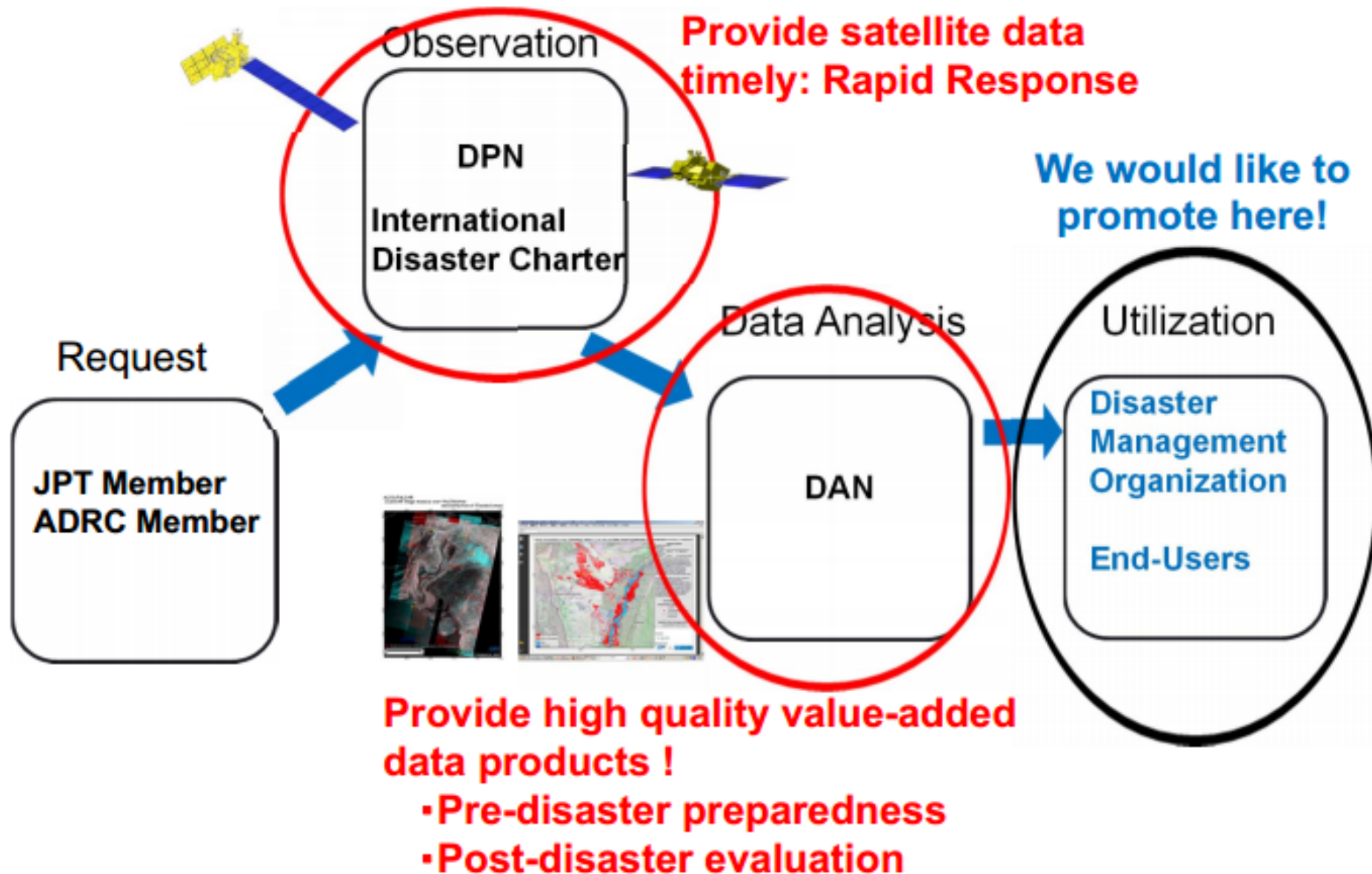
What is next?

We Need:
1. **E**mergency **Response S**ystems
2. **N**ational **baseline information** and **imagery database (One Map and Web-GIS)**
3. **Capacity Building** and **Training** Programs
4. **S**ustainable **L**and **U**se **D**evelopment **P**lanning
5. **E-government** applications for Disaster Risk Reduction
6. Real-time Access of **Post-Disaster imagery**
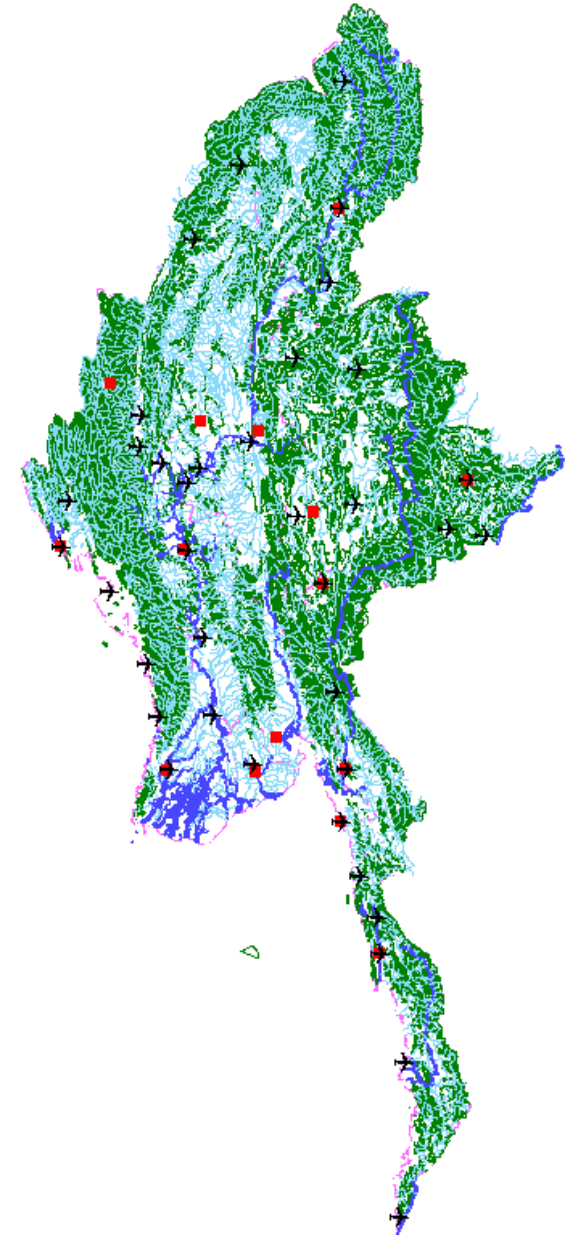
More Importantly

We Need:

1: Cooperation: Local, National, Regional, International
2: Cooperation: Government to Government
3: Cooperation: Ministries to Ministries
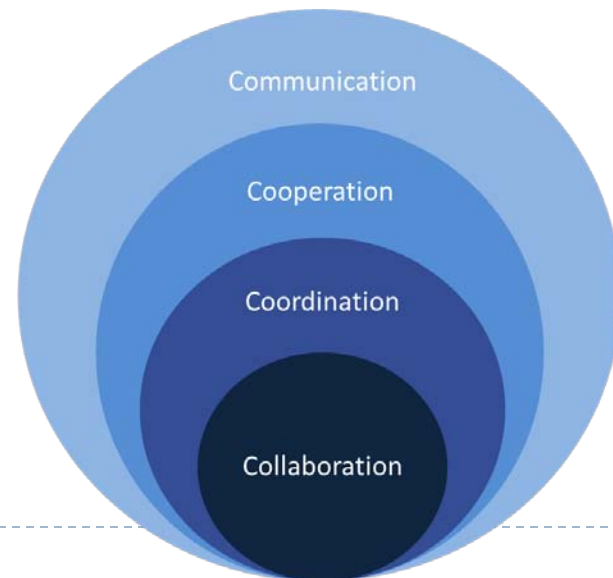4: Cooperation: Departments to Departments
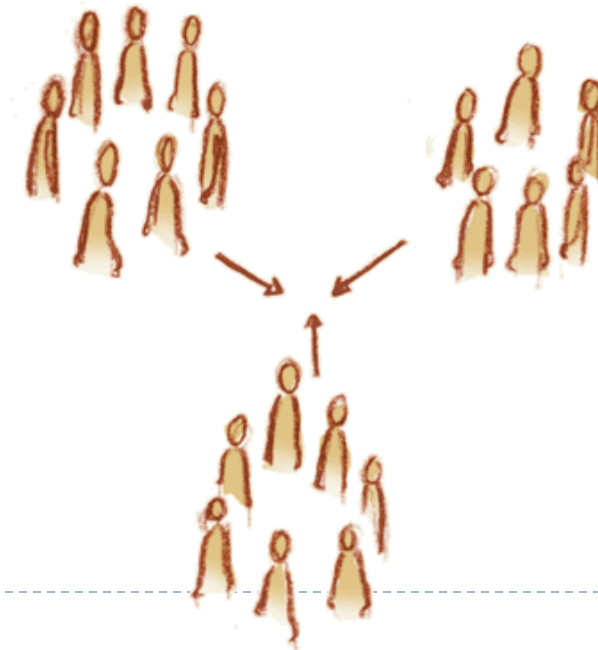
Most Importantly

We Need:

Communication, Cooperation, Coordination and Collaboration

People to People

Thank You.

Zaw Naing
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Managing Director, Mandalay Technology
Central Committee Member, Myanmar Engineering Society
Central Executive Committee Member, Myanmar Earthquake Committee
Visiting Fellow, Center for Global Change and Earth Observation (CGCEO), Michigan State University
Consultant, Global Information and Communication Technology Department, The World Bank
Fellow Member, Consortium on Remote Sensing and Geo-information Systems for Agricultural and Environmental Intelligence in Asia (CoRGAA)
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