The 3rd Sentinel Asia Joint Project Team Meeting (JPTM)

The Use of Spatial Data for Disaster Management

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The 3rd Sentinel Asia Joint Project Team Meeting (JPTM) 13-15 March 2007, Le Meridien Singapore Hotel, Singapore
Thailand’s Disaster Cycle

Typically: Dry season
>>> Forest fire
>>> Drought

Rainy season
>>> Flood
>>> Landslide

Rarely: Earth quakes
Tsunamis
Disaster Management Organizations

- Dept. of Disaster Prevention and Mitigation
- National Disaster Warning Center
- Land Development Dept.
- Royal Irrigation Dept
- Dept. of National Park and Wildlife Conservation
- Dept of Town Planning
- Dept. of Fisheries
Disaster Management Organizations

Roles of GISTDA

- Make strategic planning for satellite data acquisition
- Provide RS data and relevant information to government and related agencies
- Analyze the data for damage assessment and rehabilitation planning purposes

Before-During-After disasters
Use of Geo-informatics as a Tool for Disaster Mitigation

• **Emergency**
  - Mitigate damages
  - Rapid response
  - Less accurate and precise

• **Normal Operation**
  - Damage Assessment, compensation planning
  - Time consuming
  - More accurate and precise
Satellite Data Available for Disaster Usage

Historical data: MOS, JERS, ADEOS, ERS
Radarsat, LANDSAT, IRS, SPOT

Currently acq.: IKONOS, Quickbird, SPOT
LANDSAT, Radarsat
TERRA & AQUA MODIS, NOAA

Future: ALOS and THEOS
EOS Ground Receiving Station

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The Thai experiences in the use of RS data for disaster monitoring

Flood

Drought

Land Slide

Coastal

Forest Fire

Tsunami

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Space and Natural Disaster Management

Vulnerability Analysis  Response Planning
Preparedness  Prediction
Forecast Models  Vigilance System

Disaster Identification  Relief  Recovery  Rehabilitation  Impact Study

Pre- Disaster  Post- Disaster

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January 5, 2006
Hot spot detected

March 1, 2006
Hot spot detected

April 4, 2006
Severe Drought

May 5, 2006
Early Monsoon Season

June 7, 2006
Monsoon Season

July 1, 2006
Flood

Oct 12, 2006
Flood

Dec 23, 2006
Drought & Hot spot

Feb 12, 2007
Drought & Hot spot
Rapid Response for Disaster Management

GISTDA

Related Agencies
LDD, DDPM, RID, DPT, DOF, DNP

Ground Receiving Station

Data Processing

Image Classification

Image processing

Early Assessment

End Users

Free of Charge

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Normal Operation for Disaster Management

GISTDA

Related Agencies

End Users

Ground Receiving Station

Data Processing

Image Classification

Image processing

Prevention & Protection

Media

Internet

Etc.
Radarsat Programming for Flood Monitoring
Satellite data of flooded area for the whole country

Data from **RADARSAT, LANDSAT, SPOT** and **ALOS**

More than 400 images acquired and distributed to at least 30 related agencies
2006 Floods  Daily floods situation monitoring from MODIS
2006 Floods

Rapid Flood Assessments

...submitted to PM on a weekly basis
2006 Floods

- Public awareness via GISTDA web page:
  - Disasters situation: viewed from satellite
  - Web map server
2006 Floods

www.gistda.or.th

Web map server
Inundated Area via Web map server
Thailand e–Flood Map for Decision Makers

EOS based geo-information of floods for 2006

• at provincial level: 38 provinces
• during Aug – Nov 2006
• GIS viewer
• contents: sat. images, GIS layers, flooded area, inundation period...

A tool for local flood mitigation and protection planning
e–Flood Map

Normal situation
e–Flood Map  During flood
Flooded area detection

Image interpretation from RADARSAT
Flood status: inundation period
View from Helicopter on Oct 18, 2006

Flight Path
Integration with GIS layers
Attribute data
Forest Fire

Rapid Monitoring

• Hot spot
  - Terra MODIS
  - Aqua MODIS
  - NOAA

Multi temporal Monitoring

• LANDSAT – 5 TM
• SPOT
• ALOS

Hot Spot Validation

By

GROUND Check
Current Activity for Forest Fire

- Daily Monitoring by MODIS
- 16 Days Monitoring by LANDSAT-5
- Field Checking and Ground Truthing
- Public Awareness by Web Map Server
Hot spot and smoke detected

Aqua MODIS

March 4, 2007
Forest Fire

Feb 22, 2007

LANDSAT 5 TM
LANDSAT-5 TM
FEB 22, 2007 Post

Fire front
Hot Spot Validation by Ground Check on Feb 22, 2007
Hot Spot Validation by Ground Check on Feb 22, 2007
Hot Spot Validation by Ground Check on Feb 22, 2007
Image Map
Landsat-5 TM
Acquired on
Feb 22, 2007
Associated with
Feb 22, 2007
Ground Truth data
Towards Geo-Informatics Operation for Disaster Management

One Stop Service

Application
- Input
- Edit
- Update

Database
- MIS Database
- Spatial Database
  - Satellite Image
  - GIS Data

Programming
- Presentation
- Planning
- Management
- Decision making

Web Server

Computer Server

MIS Database Spatial Database - Satellite Image - GIS Data
EOS Database and Service System

Thailand Monitoring System
To be developed and implemented (2007)

End User
Policy makers
Crisis managers
Governors

Sentinel Asia
ASIAS

Portals & Interfaces

Web Server

Database Server

Map Server

GIS-TDA WMS

ThaiSDI
Digital
Thailand

Flood Monitoring
Fire Monitoring
Land cover Change

Satellite Images

Image Preparation
Image Correction
Image Enhancement

Spatial Model

Multi-temporal Imagery

Spatial Database

Vegetation Index
Water Vapor
Chlorophyll
Carbon Monoxide
Phytoplankton
Sea Surface Temp.
Cloud Thickness

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ASIAS
ThaiSDI
Towards Sentinel Asia

- Data/information sharing:
  - Thailand monitoring system
  - ASIAS
  - THEOS

- Capacity building
Thank you for your attention!