GISTDA’s Role and Achievement on using Space Technology and GIS in Disaster Management

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GISTDA Roles on Space

- EO Data acquisition (Thaichote, RadarSat, COSMO Skymed, etc.)
- IKONOS, QuickBird, WorldView
- CODAR
- Field survey
- Constellation

- Data processing & integration
- Thematic products
- Value-added products
- DEM, DSM
- Mobile GIS
- EO applications

- Thailand Monitoring System (TMS)
- Digital Thailand II
- NSDI
- Space Cooperation
- Capacity building/Technology transfer

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GISTDA Data Acquisition

- Thaichote
- MODIS
- MT-SAT
- NOAA
- MODIS
- LANDSAT-8
- COSMO-SkyMed 1, 2, 3, 4
- WorldView-1 & 2
- RADARSAT-1/2
- GeoEye-1
- RapidEye
- RapidEye
- GeoEye-1
- QuickBird

Coming soon

New
Thailand Flood 2011: GISTDA action

- The Royal Thai Government set up “Flood Relief Operation Center or FROC” for rapid response.
- Flood map derived from satellite images integrated with various data is a major source of information to support decision making within 3-4 hours.
- Geospatial information were served for daily meeting and report to the Prime Minister for action and also provided through web map service (WMS).
**EOS Application for Flood**

**Observation / Preparing**
- 2 times of acquisition:
  - Terra (morning)
  - Aqua (afternoon)

**Monitoring / Response**
- Every 1-2 day acquisition:
  - RADARSAT 1&2

**Assessment / Recovery**
- High resolution data
  - Pre and post flood (once)
  - During flood (hot spot)

**Thailand Flood 2011: EO satellite data**

- 402 Radarsat images
- 387 THEOS (THAICHOTE) images
- 482 Terra/Aqua MODIS images
- ~ 50 satellite images (HR, SAR..) from international agencies

**Flood prone area**

28.69 million Rai / ~45,900 km²
International Collaboration

Flood animation during 3 Oct.-28 Dec. 2011 over greater Bangkok
EOS & GIs System for Flood Management

Geospatial Database - Satellite data - FGDS - In situ

RADARSAT

COSMO-SkyMed

ftp

within 2-3 hours daily basis

Water Resources and Flood Management Committee

National Water Info. Database

www.watertorthai.go.th

-Single Command-

Geospatial & In situ data
Geospatial Information of Flood Prone Area during 2005 - 2011

Flood Prone Area

2005
2006
2007
2008
2009
2010
2011

Area (km²)


4,640
3,424
1,440
1,152
1,008

Pre-Post EO Database for Land use Monitoring

1997  2010 (pre flood)  2011 (post flood)

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Satellite Data for Flood Victim Compensation

Identifying of houses in inundated area

Thailand Monitoring System (TMS)
Web Map Service for flood, drought, fire, and ocean monitoring

Flood.gistda.or.th
Drought.gistda.or.th
Fire.gistda.or.th
Ocean.gistda.or.th
Data service through website (http://flood.gistda.or.th)

>1.4 million hits during Oct-Nov 2011

Web Map Service for Fire monitoring using Hotspots (http://fire.gistda.or.th)
GISTDA Capability on Geospatial Information

**Space:** Earth Observation Satellites

**Aerial:** UAV

**Ground:** Mobile Mapping Unit

**Marine:** Coastal radar

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Collecting of Geospatial information from Atmosphere using Unmanned Aerial Vehicle (UAV)

**Step 1:** Flying with a Multirotor UAV, which allows the collection of data from the atmosphere.

**Step 2:** Using an Electric plane or a small Engineplane, flying at low altitude, capturing data at a range of approximately 40 km.

**Step 3:** Performing a mission using a Mini-UAV, covering an area of about 50 kilometers.

Now we are here.
Enhancing GISTDA Potential of Geospatial information (1)

LiDAR – DEM

Supporting hydrological model & discharge

Mobile Operation Unit

Road profile/leveling

Ground data collection

Enhancing GISTDA Potential of Geospatial information (2)

CODAR - Ocean Sensors for Marine & Land Warning

http://coastalradar.gistda.or.th

13 HF-RADAR & 5 X-band stations along coastal area & Gulf of Thailand

System Diagram

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GISTDA Capability for Disaster Management

Geo-spatial data
- Watershed boundary
- Water drainage pattern
- Existing water reservoirs
- River cross section
- Existing physical structures
- Existing water gates/pump
- Land use/land cover
- Surface water (existing/change)
- DEM
- Dam sites
- Rainfall
- Runoff
- FGDS
- etc...

GISTDA Capability
- Web-based GIS (TMS, Digital Thailand, ThaiSDI, GsMap)
- Water surface mapping/monitoring
- Water volume assessment
- Flood scenarios simulation
- Roads/dikes leveling
- Geospatial portal development & services
- Historical geospatial data archiving system
- Near real-time monitoring & services
- Disaster prediction & warning
- Mobile GIS deployment
- Daily disaster prediction & warning
- Evacuation routes/shelters identification
- Retention capacity assessment
- Decision support system
- Fast track data & services delivering
- LU/LC monitoring/planning
- Technology transfer
- Capability building
- Interactive geospatial portal

Technology/Tools
- Space / Air born data
- Satellite data archives
- Flood model (simulation)
- Disaster simulation/prediction model
- Household database
- Satellite data archives
- Hydrological model (simulation & prediction)
- Satellite-based rainfall measurement
- GIS facilities
- Satellite-based rainfall measurement
- Field sensors (CODAR, MIGIS, field server)
- Field survey

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development & services

Issues about Data & Information

- Multi-satellite: constellation
- Multi platform: data processing, integration, access
- In situ data: geospatial & non-geospatial
- Huge amounts of data, multi-source, multi-format, multi-scale
- Data transfer: time consume
- Various requirements / requests of information
- Time constrain: real-time / near real time
- Resources / infrastructure / capacity...

...how to manage

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Thank you for your kind attention