GNSS and Remote Sensing for Disaster Management & Earth’s Environment Monitoring in Indonesia

Scientific and Technical Subcommittee
UN Committee of Peaceful Uses of Outer Space
Forty-Seventh Session
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Disaster Management

- Mitigation
  - GNSS for monitoring of earth crustal motion
  - RS for Climate Change Studies (GHG, SLR)
  - RS for Disaster Preparedness & Early Warning

- Quick Response
  - RS for Disaster Information
  - RS for Impact Analysis of Earthquake, Volcano, Flood, Forestfire, etc.
  - GNSS for Optimization of Search & Rescue.
Mitigation

1. GNSS for monitoring of earth crustal motion
2. Remote Sensing for Climate Change Studies
3. RS for Disaster Preparedness & Early Warning
Monitoring of Earth Crustal Motion using GNSS integrated in Tsunami Early Warning System

(Subarya, 2004)
Survey mode
GPS coseismic displacements – Dec 26th 2004 and March 28 2005 Earthquake

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Trend of Change of Enhanced Vegetation Index from MODIS data (2000 - 2008) to estimate the Carbon Sink & Carbon Stock in Java
Studies of Impact of Climate Change on Sea Level Rising

Result of Terra/Aqua-satellite data
Simulation using nesting methods from Global Scale into Regional Scale
Prediction of OLR, its Anomaly, Rainfall Estimation & its Anomaly
Flood Prone area in Java
Yearly Hotspot Monitoring using MODIS Imageries
Quick Response

1. Remote Sensing for Disaster Information

2. Remote Sensing for Impact Analysis of Earthquake, Volcano, Flood, Forestfire, etc.

3. GNSS for Optimization of Search & Rescue.
Remotely-Sensed Information System for Natural Disaster Mitigation (SIMBA - LAPAN)

News Flash

Cloud Cover and Rainfall Estimation

News

- Flood in Cilacap, Jawa Tengah (Feb 2010) detail
- Flood in Jakarta (Feb 2010) detail
- Flood in Labuhan Estu, North Sumatera (Feb 2010) detail
- Flood in Palembang, Central Kalimantan (Jan 2010) detail

New Satellite Image

MODIS Terra/Aqua Satellite Images (February 03, 2010)

Daily Weather

Cloud Cover (MTSAT) (February 14, 2010)
Monitoring of Coastal Development after mud-flow break

1945
Monitoring of Coastal Development after mud-flow break
Monitoring of Coastal Development after mud-flow break
Monitoring of Coastal Development after mud-flow break

2000
Monitoring of Coastal Development after mud-flow break

2003
Monitoring of Coastal Development after mud-flow break
IKONOS, 2007-12-12

IKONOS, 2009-03-28

Dam Break @ Situ Gintung near Jakarta

GeoResponse
Situ Gintung Rapid Mapping Assessment
Impact analysis with SAR-data

ALOS PALSAR - August 31, 2008
(Data Source: Sentinel Asia)

ALOS PALSAR - April 1, 2009
(Data Source: Sentinel Asia)
Rapid damage identification using basemap, remotesensing data & GNSS
Information System for Tsunami Victims

Querying the camp

Selected camp

Picture

Aceh Besar
Capacity Building on Satellite Remote Sensing Data for Disaster Management & Earth’s Environment Monitoring

- Modis (jp)
- ALOS (jp)
- Cartosat (in)
- Formosat (tw)
- Radarsat2 (ca)
- TerraSAR-X (de)
- Hyperion (us)
- etc.

Terrasar-X spotlight data (1 m) over flooded Jakarta, 2008
Indonesian Experiment Satellite Lapan Tubsat

Suramadu Bridge 2007

Suramadu Bridge 2008
Research on Earth Environment Change Detection using Multisensor Satellite Imageries

- Landsat ETM+, 2003
- Quick Bird, 2006
- ALOS/AVNIR2, 2008
- Land Cover Change
Research on Hyperspectral Satellite Imageries to Map Bio-diversity & Geo-diversity
Geo-diversity of “Wallace Area”

Wallacea area

(Awang H. Satselia (2008))
It is sometimes difficult under cloud cover, even when satellite imagery come early.
Research on Forest fire Early Detection under Cloud cover using Satellite Radar Imageries
Indonesia Proposal

- **International Standardization**
  - On GNSS data format to guarantee interoperability of existing equipment & system
  - Integrated Spatial Data Handling for Disaster Management of all existing RS-satellites.

- **Improve the Capacity Building**
  - More free sample data for international cooperation on Remote Sensing Research & Training especially in Active Sensor (Radar)
  - More UN sponsored training for GNSS and remotesensing for disaster management & earth’s environment monitoring
Thank you

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