Sentinel Asia
Collaborative works for better decision making in disaster management

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Disclaimer

- All works and results presented in this presentation were produced during my assignment with GeoInformatics Center, Asian Institute of Technology, Thailand.
Introduction
**Fig. 2.** Impacts of natural disasters by region, 1987–2016. Source: ADRC-Natural Disasters Data Book 2016 [7].

<table>
<thead>
<tr>
<th>Occurrence</th>
<th>Asia: 4,151</th>
<th>World: 10,720</th>
<th>Asia 39%</th>
<th>Americas: 24%, Africa: 20%</th>
<th>Europe: 13%, Oceania: 4%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Damage (million US$)</td>
<td>Asia: 1,340,762</td>
<td>World: 2,763,275</td>
<td>49%</td>
<td>Americas: 36%, Europe: 12%</td>
<td>Oceania: 3%, Africa: 1%</td>
</tr>
<tr>
<td>Fatalities</td>
<td>Asia: 1,166,202</td>
<td>World: 1,912,162</td>
<td>61%</td>
<td>Americas: 19%, Africa: 11%</td>
<td>Europe: 9%, Oceania: 0.3%</td>
</tr>
<tr>
<td>Victims</td>
<td>Asia: 5,750,586,898</td>
<td>World: 6,530,479,731</td>
<td>88%</td>
<td>Africa: 7%, Americas: 5%</td>
<td>Europe: 1%, Oceania: 0.4%</td>
</tr>
</tbody>
</table>
Remote Sensing in Disaster Management

- Positioning satellites
- Earth observation satellites
- Communication satellites

Information delivery to personal terminals
Monitoring
Information/data transmission

Pre-disaster
Preparedness:
Capacity building
Hazard mapping
Early warning system

Response:
Emergency observation
Data analysis and value-adding

Right after disaster

Post-disaster
Recovery:
Recovery planning
Monitoring of recovery

Observation
Employment

Space agency
International collaboration
Disaster Information/data

Framework
Sharing/providing (Web-GIS)
Feedback/user requirements

Disaster management organization
Users
International/Governmental organizations (ADRC members etc.)

End-users
Local governmental/Regional organizations etc. working for rescue/relief/evacuation

Residents

Human network
Case studies/capacity building/human resource development

Fig. 14. Conceptual illustration of applying satellite remote sensing to disaster management support.
Previous participations
This map shows possible damaged buildings in Imadol VDC of Lalitpur district, Nepal after the 25 April 2015 earthquake in Nepal. Visual interpretation of high resolution satellite image was done to prepare the map.

Legend:
- Red: Completely damaged
- Yellow: Partially damaged
- Blue: Health Facility
- Gray: Roads
- Light Gray: Village Development Community (VDC)
- Lighter Gray: Ward

Satellite Data: WorldView-3
Imagery Date: 27 April 2015
Resolution: 50 cm
Copyright: DigitalGlobe, Inc.

Road Data: OpenStreetMap (OGM)
Health Facility Data: WHO
Administrative Boundary Data: Survey Dept.

Disclaimer:
GIS data collected from various sources. Accuracy is not verified.
DEFORMATION ANALYSIS USING ALOS-2 DATA
06 July 2017 M6.5 LEYTE EARTHQUAKE, PHILIPPINES

Legend
Displacement in meters
High : 0.6637
Low : -0.569502
Leyte Fault (PHIVOLCS, 2007)

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Date : 6 July 2017
Requester : PHILVOCS

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Vietnam activation 2017

Date: 17 July 2017  
Requester: MONRE  
Disaster: Typhoon  
Area: Ha Tinh  
Data provided: ALOS-2
Indonesia activation 2017

- Date: 21 November 2017
- Disaster: Volcano eruption
- Requester: LAPAN/BNPB
- Data provided: ALOS-2

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Indonesia activation 2017

Coherence Change Detection of Pre- and Post-Eruption of Mt. Agung, Indonesia

- Date: 21 November 2017
- Disaster: Volcano eruption
- Requester: LAPAN/BNPB
- Data provided: ALOS-2

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Indonesia activation 2018

- Date: 28 September 2018
- Disaster: Earthquake and Tsunami
- Area: Palu

Requester: LAPAN/BNPB
• Date: 28 September 2018
• Disaster: Earthquake and Tsunami
• Area: Palu

Requester: LAPAN/BNPB
Image processing techniques
Visual interpretation

Peta Citra Satelit Pleiades
Tanggal: 30 September 2018
(Setelah Gempa)

Legenda:
- Pekanbaru
- Lahan Terbuka
- Purbalingga Kecil
- Perumahan Gare Partai
- Bangunan Rusak
- Lahan Betakar

Keterangan:
Identifikasi bangunan rusak dan penimbunan gars serta diukur menggunakan interpretasi visual berdasarkan data Citra Spots sebelum dan setelah gempa darat.

Sumber:
1. Citra Pleiades tanggal 30 Oktober 2018
2. Citra Pleiades tanggal 6 Juli 2018
3. Data Gempa: LAPAN

PENGAJAR
Dr. Firman Hadi (UNDIP)

PENERBIT
Sentinel Asia

SEPTEMBER 11, 2023
Change detection

Pre-image
  Pre-processing
    Differential image
      Thresholding
        Post-processing
          GIS data overlay
            Flood map

Post-image
  Pre-processing

https://youtu.be/HR_7kENFGT4
Messages from the field
Results from the field

- Around 400 geotagged photos have been collected by AIT in Palu, Sigi and Donggala.
- Partnership with local humanitarian organization was established, including international NGO (World Central Kitchen).
- Local participatory mapping and field survey was initiated.
- Based on personal judgement, the engagement and cooperation between humanitarian initiatives was low or inexist.
Conclusion
Conclusion

- Intensive communication and collaboration with LAPAN, BNPB (national agencies) and universities (ITB, UGM, UI) accelerate the production of VAPs
- Intensive communication with local partner in the ground is useful to disseminate the product
- Partnership with local humanitarian provides benefit in data collection and updating.
- Continuous engagement between all stakeholders involved in disaster events are crucial.
Thank you
Terima kasih