Space-based Activities for Disaster Emergency Response in Indonesa

Presented by:

Suwarsono

CENTER FOR REMOTE SENSING APPLICATION

INDONESIAN NATIONAL INSTITUTE OF AERONAUTICS AND SPACE (LAPAN)

Presented on

United Nations International Conference on Space-based Technologies for Disaster Management - "Disaster risk identification, assessment and monitoring", 23-25 October 2013, Beijing, China.

Outline

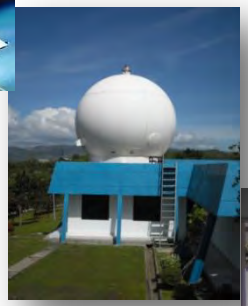
- Introduction: about LAPAN
- Data Acquisition
- Space-based Early Warning System
- Space-based Emergency Response
- Challenges
- Further Improvements

Introduction: about LAPAN

- **LAPAN** is abbreviation of **L**embag**A** **P**enerbangan dan **A**ntariksa **N**asional **(National Institute of Aeronautics and Space)**
- **LAPAN as Indonesian Space Agency was established on November 27, 1963 by Presidential Decree No.236 of 1963**
- **LAPAN role reinforced by the presence of the Law No.21 of 2013 (Indonesian Space Law).**
- **LAPAN has authorities on:**
  1) **Space science,**
  2) **Remote sensing,**
  3) **Space technology mastery,**
  4) **Platform Launching, and**
  5) **Space commercial activities**

Remote Sensing Scope

- In the field of remote sensing LAPAN responsible for:
  1) RS Data acquisition,
  2) RS Data processing,
  3) RS Data storage and distribution,
  4) The use of RS data, and
  5) Dissemination of space-based information


LAPAN Ground Station

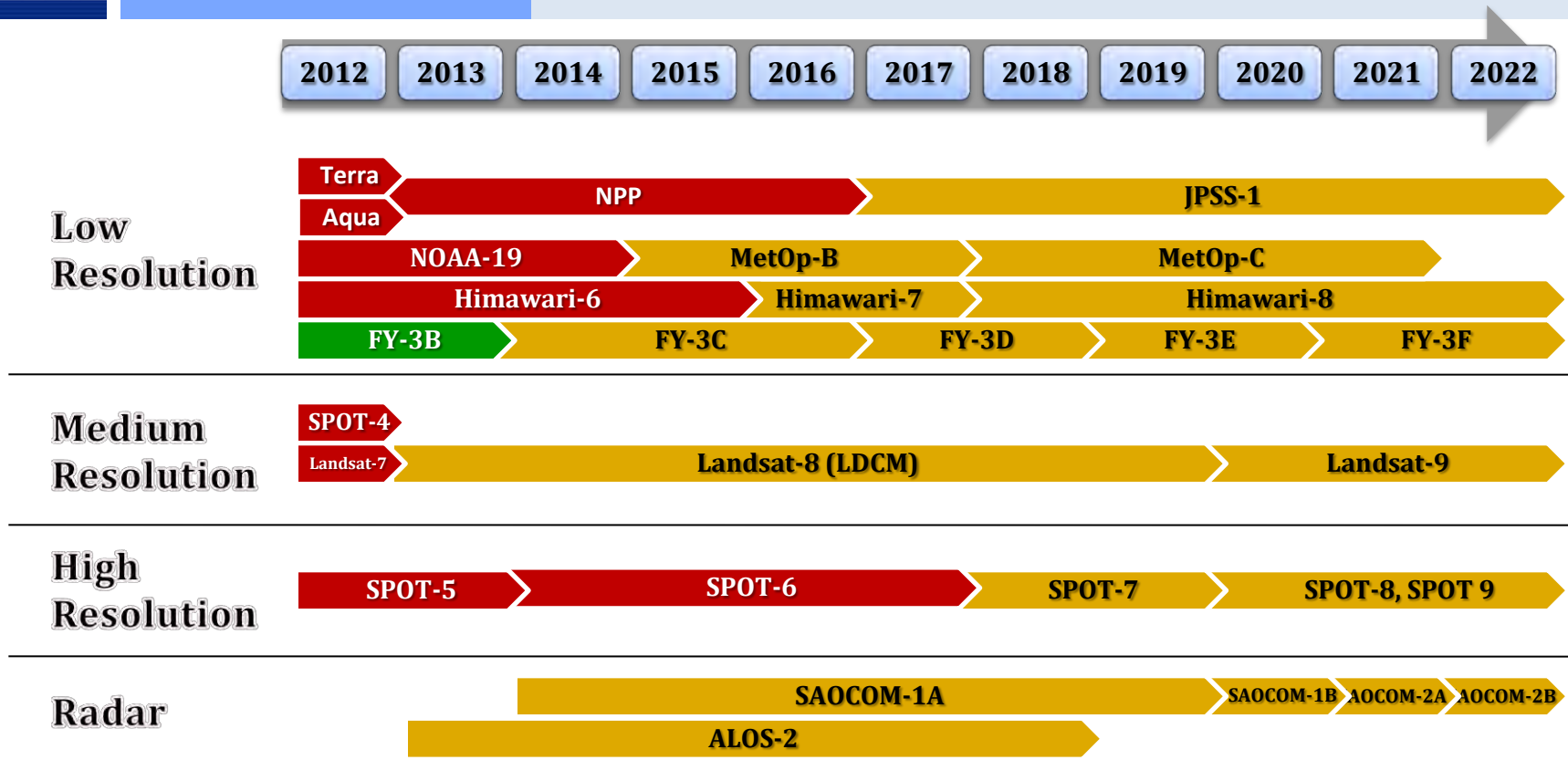
Parepare, South Sulawesi

Jakarta & Rumpin (West Java)

Data Acquisition

- Low Resolution (≥ 30 m):
  - Terra & Aqua
  - NPP
  - NOAA/AVHRR
  - Feng Yun
  - MTSAT/Himawari-6
- Medium Resolution (4 – 30 m):
  - Landsat-7
  - LDCM/Landsat-8
  - SPOT-4
- High Resolution (≤ 4 m):
  - SPOT-5 dan SPOT-6

Roadmap of Satellite Data Acquisition (2012-2022)

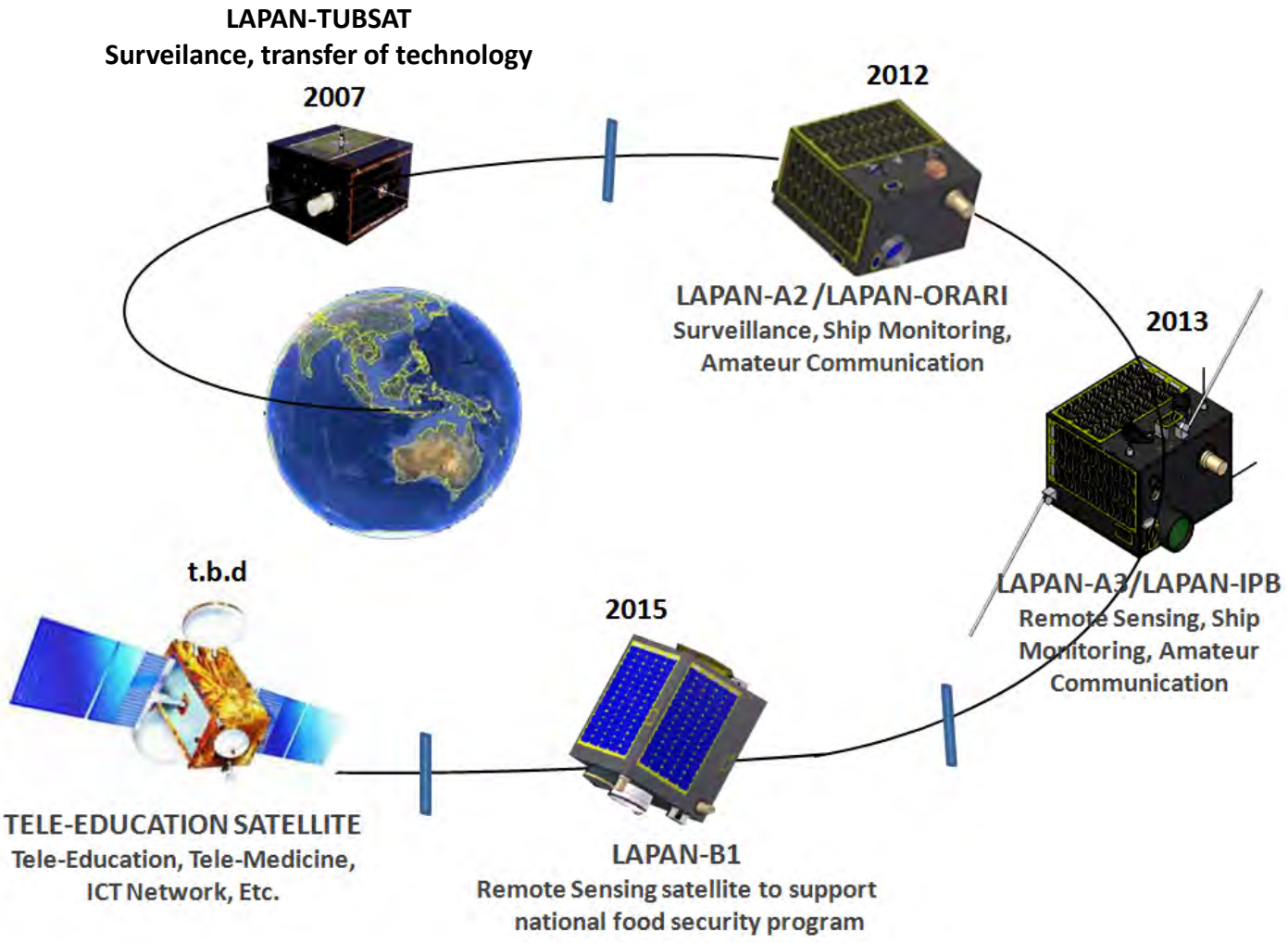


Operational and acquired

Operational and proposed for acquisition

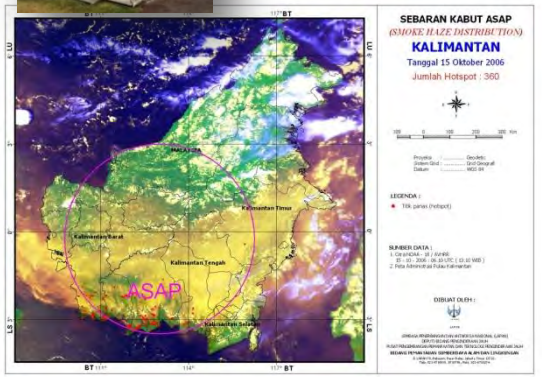
Operational planning and proposed for acquisition

Roadmap of Indonesian Satellite Development

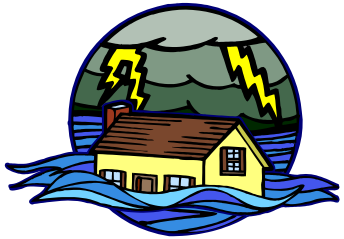


LAPAN contribution in Disaster Management

- Dealing with Disaster, LAPAN committed to provide the space-based information esspecially in the context of preparedness and emergency response.
- In order to support space-based disaster information, LAPAN coordinates with the Indonesian National Board for Disaster Management (BNPB) and another stakeholder agencies (both national and international) .
- LAPAN has implemented several projects in the field of disaster management and emergency response such as flood, drought, fire hotspot, and climate monitoring or prediction, as well as the assessment of those disasters and emergency response for other catastrophes such as landslide, tsunami, earthquake, and volcanic eruption.
- LAPAN has been establised as Regional Support Office of UNSPIDER since February 19, 2013.

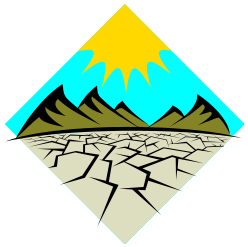


Types of Disaster in Indonesia

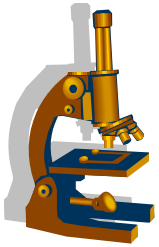


FLOOD

FOREST/LAND FIRE

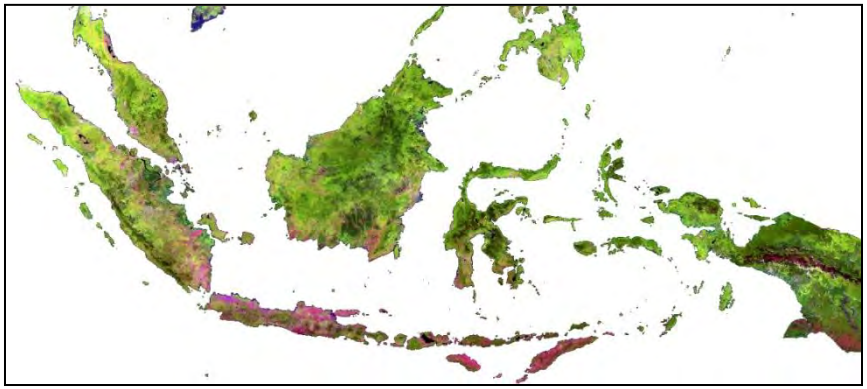


DROUGHT



EPIDEMIC

LANDSLIDE



TECHNOLOGY FAILURE

EARTHQUAKE

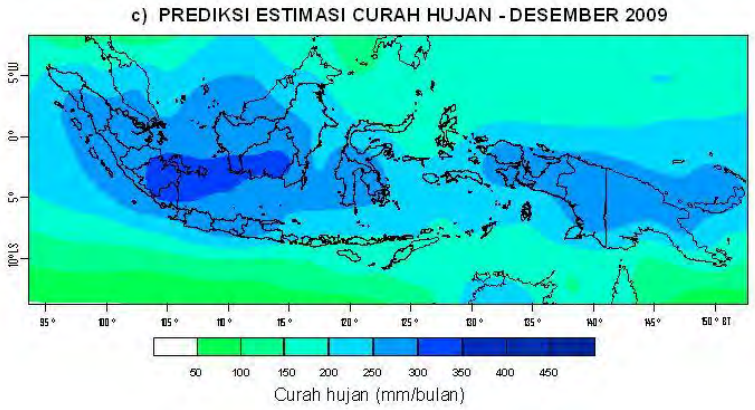
TSUNAMI

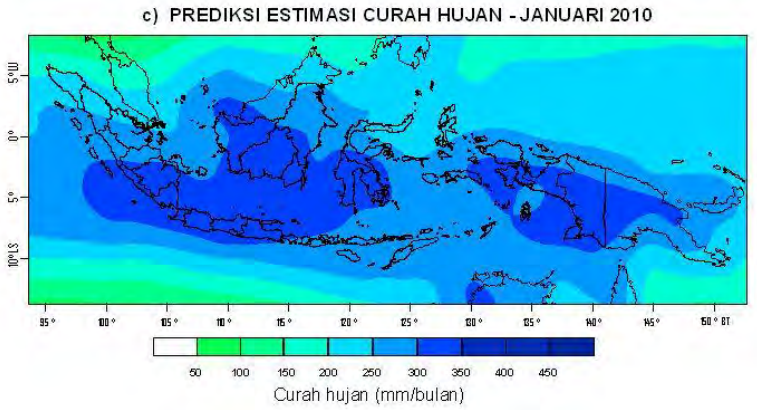
VOLCANIC

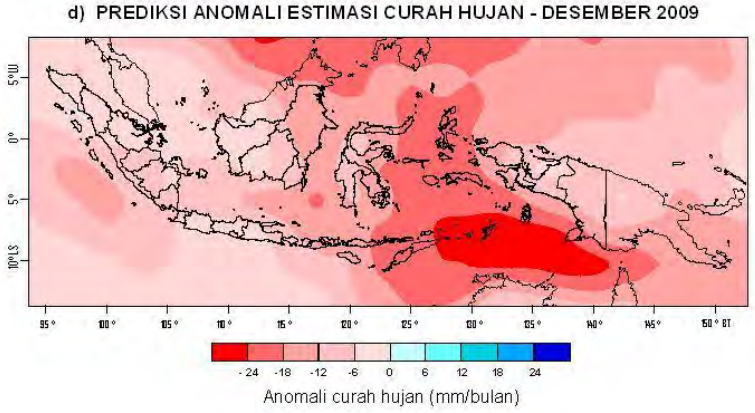
SOCIAL CONFLICT

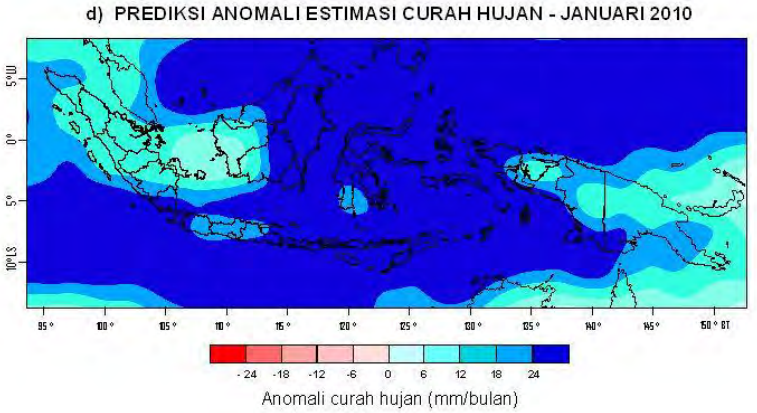
Spaced-based Early Warning System

- **Rainfall Prediction**





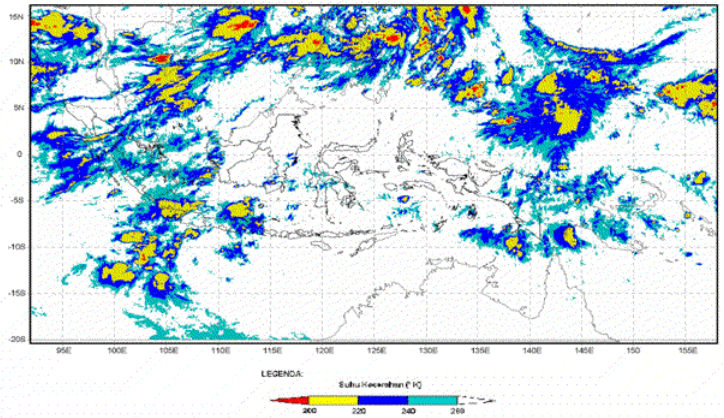




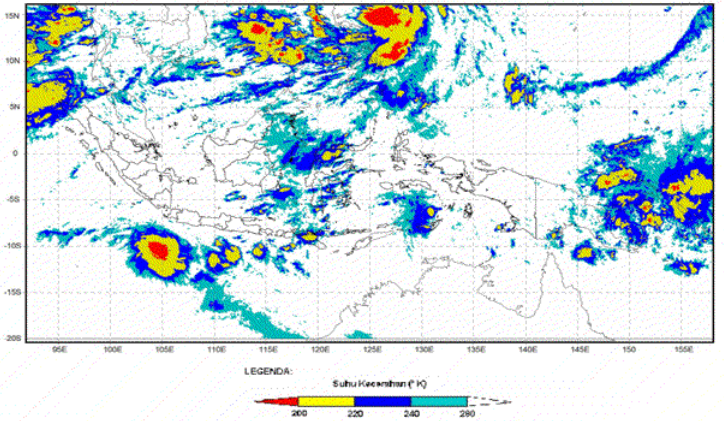
Spaced-based Early Warning System

- **Cloud Cover & Rainfall Monitoring (from MTSAT)**

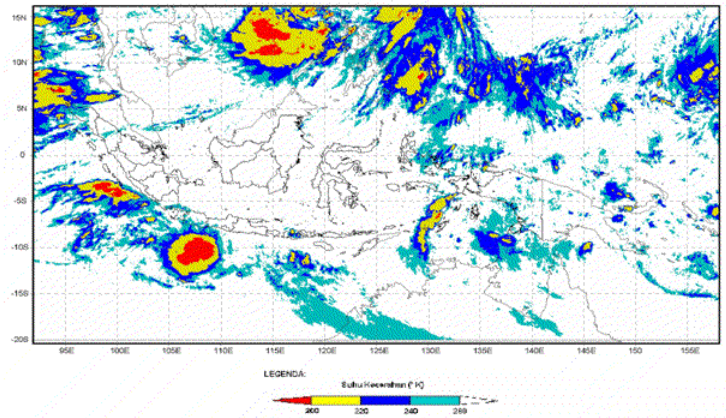
CITRA INFRA MERAH MTSAT - 1R (17 JUNI 2013 12WIB)



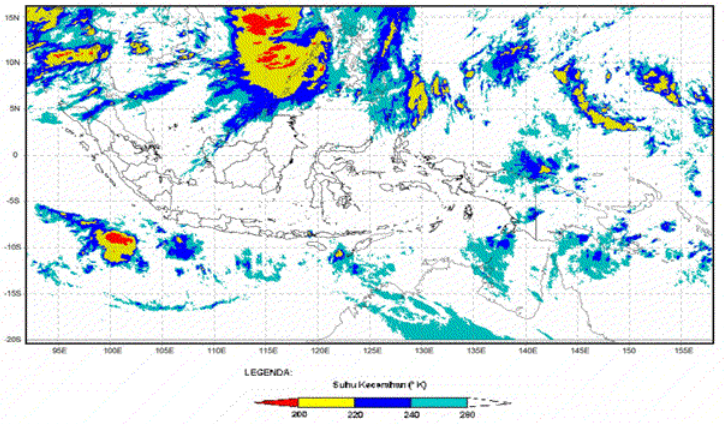
CITRA INFRA MERAH MTSAT - 1R (18 JUN 2013 12WIB)



CITRA INFRA MERAH MTSAT - 1R (19 JUNI 2013 12WIB)

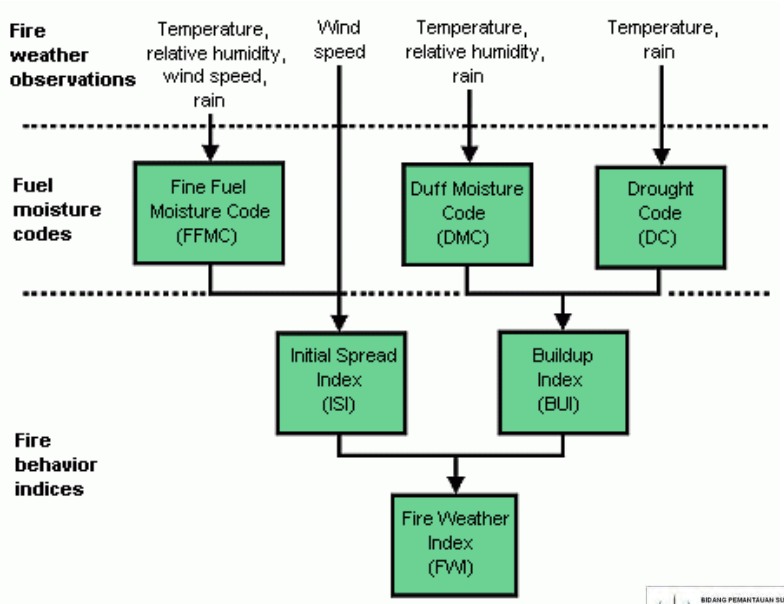


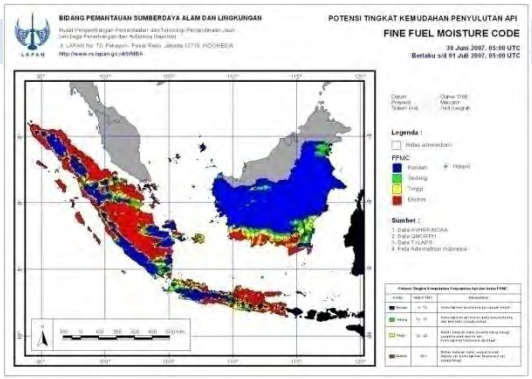
CITRA INFRA MERAH MTSAT - 1R (20 JUN 2013 12WIB)

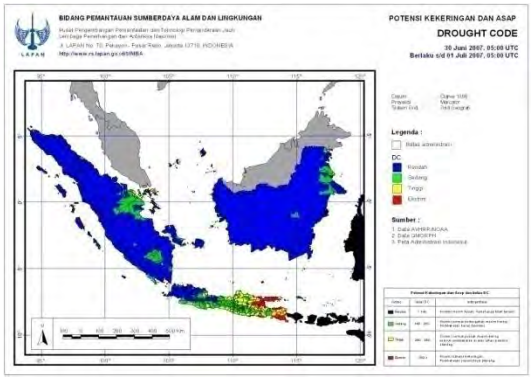


Spaced-based Early Warning System

- **Fire Danger Rating System (FDRS)**

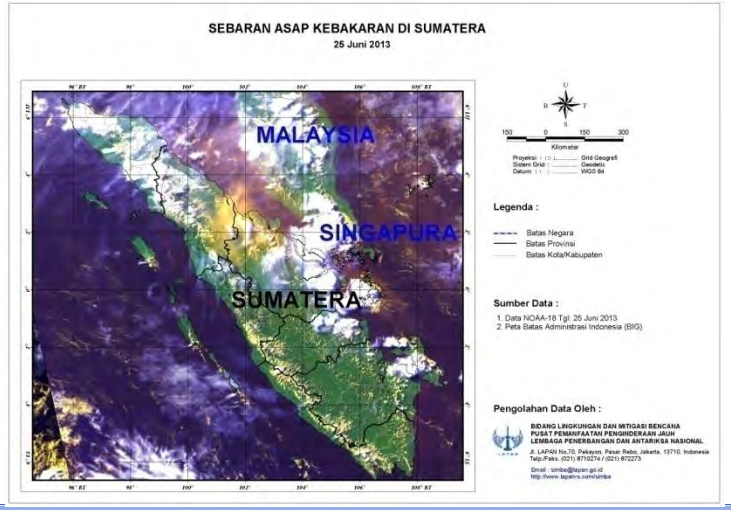






Spaced-based Early Warning System

- Fire Hotspot Monitoring (from MODIS & AVHRR)

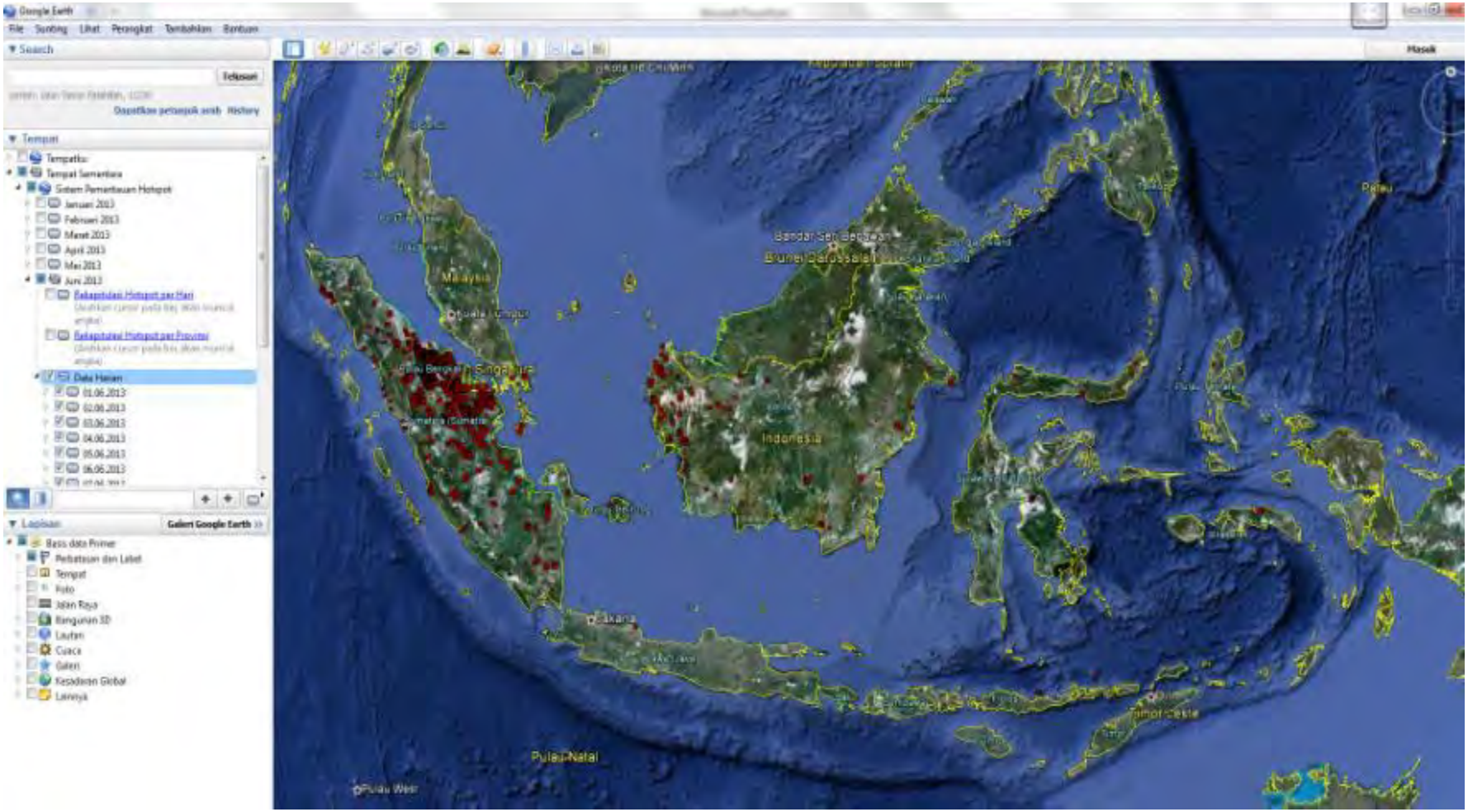


Integration on INDOFIRE System

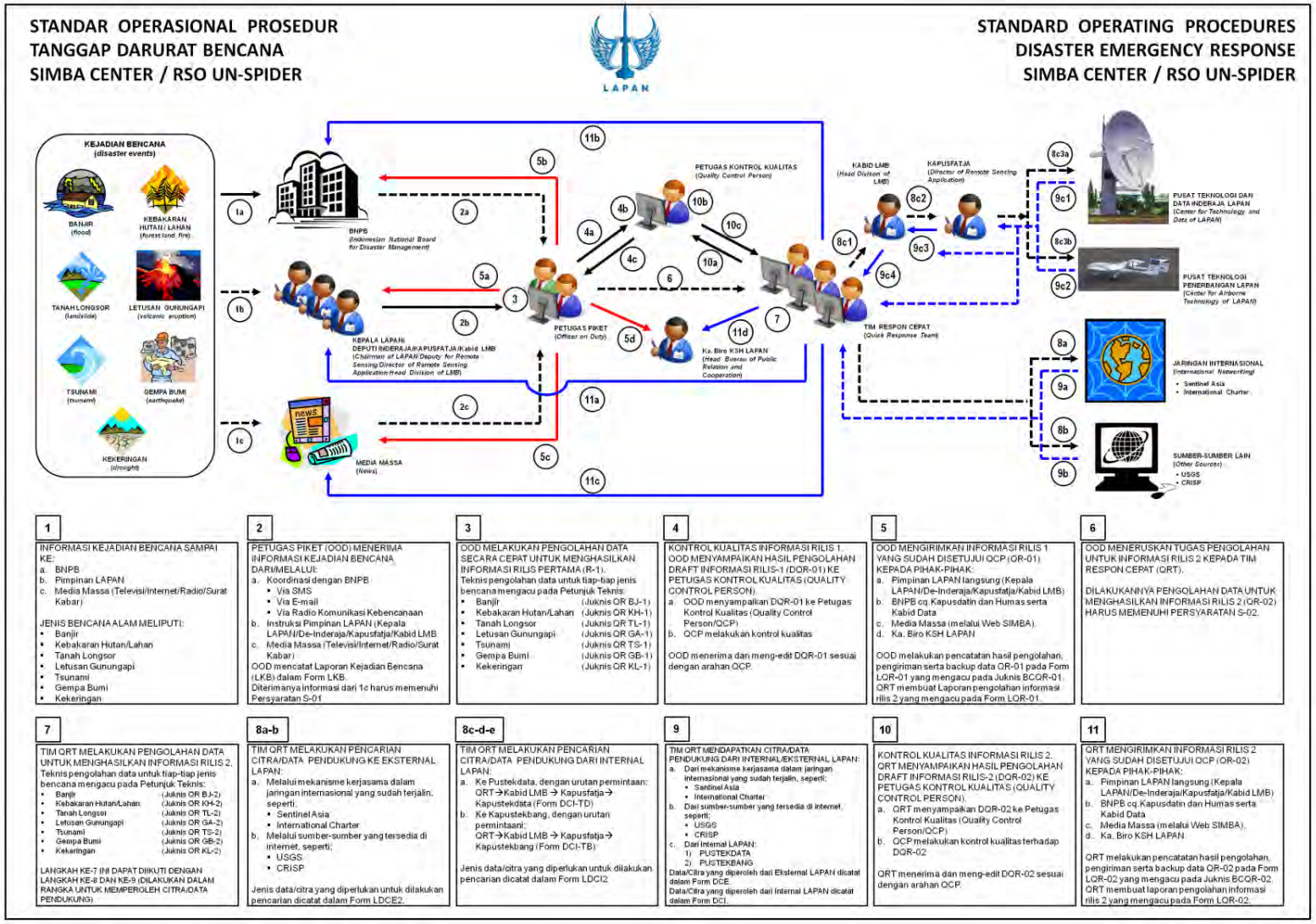
www.lapan.go.id

INDONESIA
October 21, 2013

Integration on Google Earth System



Spaced-based Emergency Response Standard Operating Procedure



1

INFORMASI KEJADIAN BENCANA SAMPAI KE:
a. BNPB
b. Pimpinan LAPAN
c. Media Massa (Televisi/Internet/Radio/Surat Kabar)

JENIS BENCANA ALAM MELIPUTI:
- Banjir
- Kebakaran Hutan/Lahan
- Tanah Longsor
- Letusan Gunungapi
- Tsunami
- Gempa Bumi
- Kekeringan

2

PETUGAS PIKET (OOD) MENERIMA INFORMASI KEJADIAN BENCANA DARI/MELALUI:
a. Koordinasi dengan BNPB
   - Via SMS
   - Via E-mail
   - Via Radio Komunikasi Kebencanaan
b. Instruksi Pimpinan LAPAN (Kepala LAPAN/De-Inderaja/Kapusfatja/Kabid LMB
c. Media Massa (Televisi/Internet/Radio/Surat Kabar)

OOD mencatat Laporan Kejadian Bencana (LKB) dalam Form LKB.
Diterimanya informasi dari 1c harus memenuhi Persyaratan S-01

3

OOD MELAKUKAN PENGOLAHAN DATA SECARA CEPAT UNTUK MENGHASILKAN INFORMASI RILIS PERTAMA (R-1).
Teknis pengolahan data untuk tiap-tiap jenis bencana mengacu pada Petunjuk Teknis:
- Banjir (Juknis OR BJ-1)
- Kebakaran Hutan/Lahan (Juknis OR KH-1)
- Tanah Longsor (Juknis OR TL-1)
- Letusan Gunungapi (Juknis OR GA-1)
- Tsunami (Juknis OR TS-1)
- Gempa Bumi (Juknis OR GB-1)
- Kekeringan (Juknis OR KL-1)

4

KONTROL KUALITAS INFORMASI RILIS 1.
OOD MENYAMPAIKAN HASIL PENGOLAHAN DRAFT INFORMASI RILIS-1 (DQR-01) KE PETUGAS KONTROL KUALITAS (QUALITY CONTROL PERSON).
a. OOD menyampaikan DQR-01 ke Petugas Kontrol Kualitas (Quality Control Person/QCP)
b. QCP melakukan kontrol kualitas

OOD menerima dan meng-edit DQR-01 sesuai dengan arahan QCP.

5

OOD MENGIRIMKAN INFORMASI RILIS 1 YANG SUDAH DISETUJUI QCP (QR-01) KEPADA PIHAK-PIHAK:
a. Pimpinan LAPAN langsung (Kepala LAPAN/De-Inderaja/Kapusfatja/Kabid LMB)
b. BNPB cq. Kapusdatin dan Humas serta Kabid Data
c. Media Massa (melalui Web SIMBA).
d. Ka. Biro KSH LAPAN

OOD melakukan pencatatan hasil pengolahan, pengiriman serta backup data QR-01 pada Form LQR-01 yang mengacu pada Juknis BCQR-01.
QRT membuat Laporan pengolahan informasi rilis 1 yang mengacu pada Form LQR-01.

6

OOD MENERUSKAN TUGAS PENGOLAHAN UNTUK INFORMASI RILIS 2 KEPADA TIM RESPON CEPAT (QRT).

DILAKUKANNYA PENGOLAHAN DATA UNTUK MENGHASILKAN INFORMASI RILIS 2 (QR-02) HARUS MEMENUHI PERSYARATAN S-02.

7

TIM QRT MELAKUKAN PENGOLAHAN DATA UNTUK MENGHASILKAN INFORMASI RILIS 2.
Teknis pengolahan data untuk tiap-tiap jenis bencana mengacu pada Petunjuk Teknis:
- Banjir (Juknis OR BJ-2)
- Kebakaran Hutan/Lahan (Juknis OR KH-2)
- Tanah Longsor (Juknis OR TL-2)
- Letusan Gunungapi (Juknis OR GA-2)
- Tsunami (Juknis OR TS-2)
- Gempa Bumi (Juknis OR GB-2)
- Kekeringan (Juknis OR KL-2)

LANGKAH KE-7 INI DAPAT DIIKUTI DENGAN LANGKAH KE-8 DAN KE-9 (DILAKUKAN DALAM RANGKA UNTUK MEMPEROLEH CITRA/DATA PENDUKUNG)

8a-b

TIM QRT MELAKUKAN PENCARIAN CITRA/DATA PENDUKUNG KE EKSTERNAL LAPAN:
a. Melalui mekanisme kerjasama dalam jaringan internasional yang sudah terjalin, seperti:
   - Sentinel Asia
   - International Charter
b. Melalui sumber-sumber yang tersedia di internet, seperti:
   - USGS
   - CRISP

Jenis data/citra yang diperlukan untuk dilakukan pencarian dicatat dalam Form LDCE2.

8c-d-e

TIM QRT MELAKUKAN PENCARIAN CITRA/DATA PENDUKUNG DARI INTERNAL LAPAN:
a. Ke Pustekdata, dengan urutan permintaan: QRT→Kabid LMB → Kapusfatja→ Kapustekdata (Form DCI-TD)
b. Ke Kapustekbang, dengan urutan permintaan: QRT→Kabid LMB → Kapusfatja→ Kapustekbang (Form DCI-TB)

Jenis data/citra yang diperlukan untuk dilakukan pencarian dicatat dalam Form LDCI2

9

TIM QRT MENDAPATKAN CITRA/DATA PENDUKUNG DARI INTERNAL/EKSTERNAL LAPAN:
a. Dari mekanisme kerjasama dalam jaringan internasional yang sudah terjalin, seperti:
   - Sentinel Asia
   - International Charter
b. Dari sumber-sumber yang tersedia di internet, seperti:
   - USGS
   - CRISP
c. Dari Internal LAPAN:
   1) PUSTEKDATA
   2) PUSTEKBANG

Data/Citra yang diperoleh dari Eksternal LAPAN dicatat dalam Form DCE.
Data/Citra yang diperoleh dari Internal LAPAN dicatat dalam Form DCI.

10

KONTROL KUALITAS INFORMASI RILIS 2.
QRT MENYAMPAIKAN HASIL PENGOLAHAN DRAFT INFORMASI RILIS-2 (DQR-02) KE PETUGAS KONTROL KUALITAS (QUALITY CONTROL PERSON).
a. QRT menyampaikan DQR-02 ke Petugas Kontrol Kualitas (Quality Control Person/QCP)
b. QCP melakukan kontrol kualitas terhadap DQR-02

QRT menerima dan meng-edit DQR-02 sesuai dengan arahan QCP.

11

QRT MENGIRIMKAN INFORMASI RILIS 2 YANG SUDAH DISETUJUI QCP (QR-02) KEPADA PIHAK-PIHAK:
a. Pimpinan LAPAN langsung (Kepala LAPAN/De-Inderaja/Kapusfatja/Kabid LMB)
b. BNPB cq. Kapusdatin dan Humas serta Kabid Data
c. Media Massa (melalui Web SIMBA).
d. Ka. Biro KSH LAPAN

QRT melakukan pencatatan hasil pengolahan, pengiriman serta backup data QR-02 pada Form LQR-02 yang mengacu pada Juknis BCQR-02.
QRT membuat laporan pengolahan informasi rilis 2 yang mengacu pada Form LQR-02.

Earthquake and Tsunami

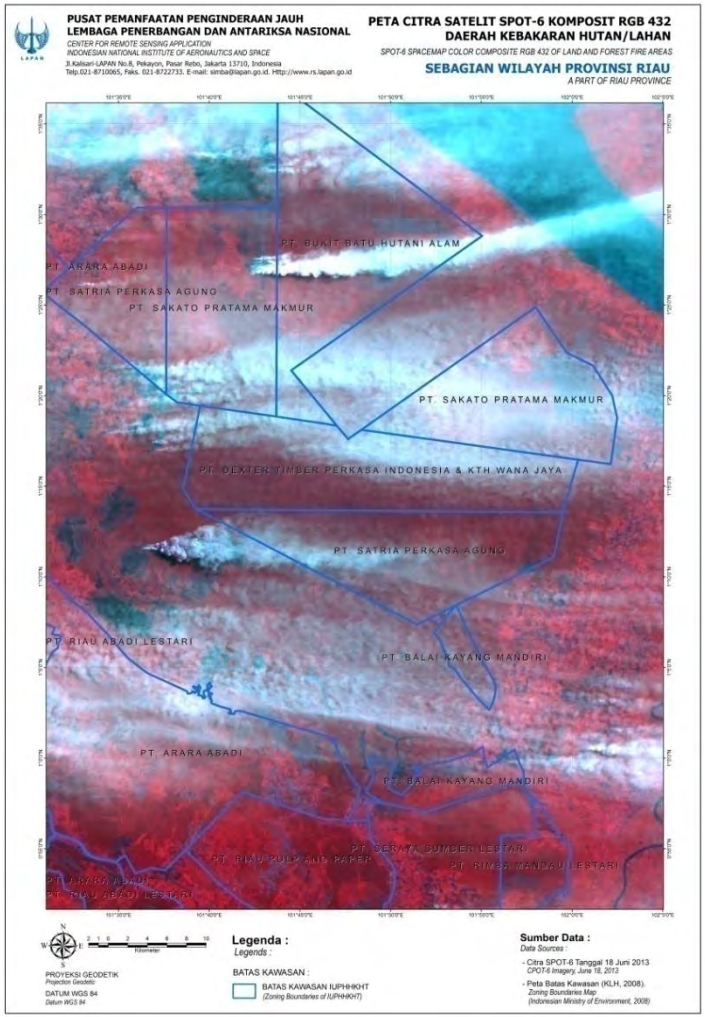
Aceh
December 26, 2004
QUICKBIRD

Before Tsunami,
June 23, 2004

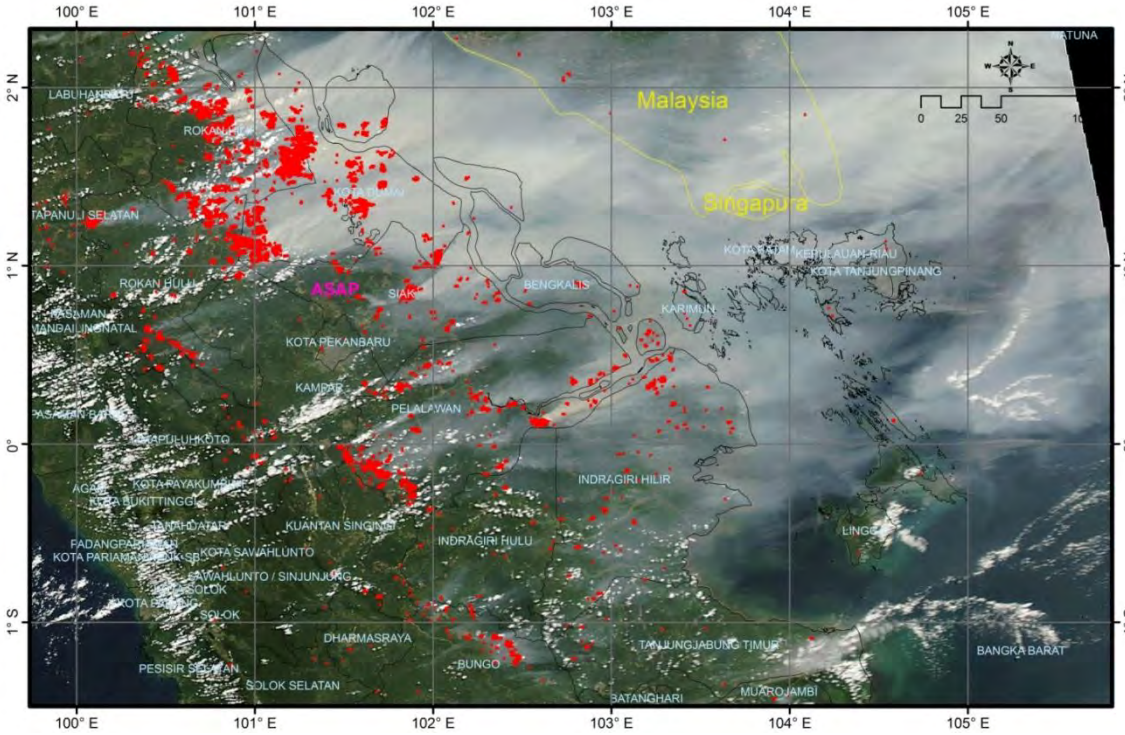
AfterTsunami,
Dec 28, 2004

Forest/Land Fire – Smoke Dispersion

Riau Province
June, 2013



SPOT-6
June 18, 2013

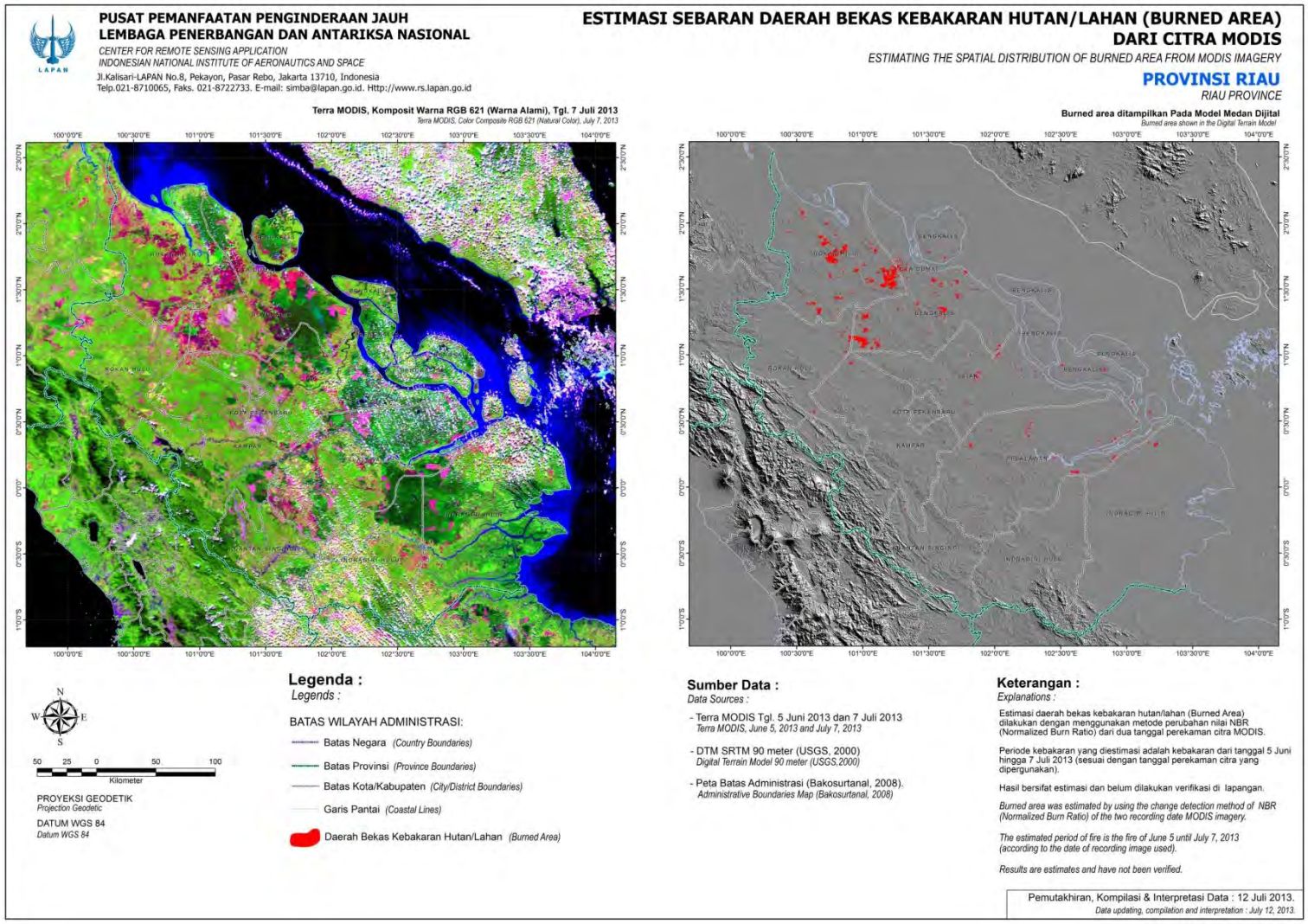


- **Fire hotspot, June 14-23, 2013**

Aqua MODIS
June 20, 2013

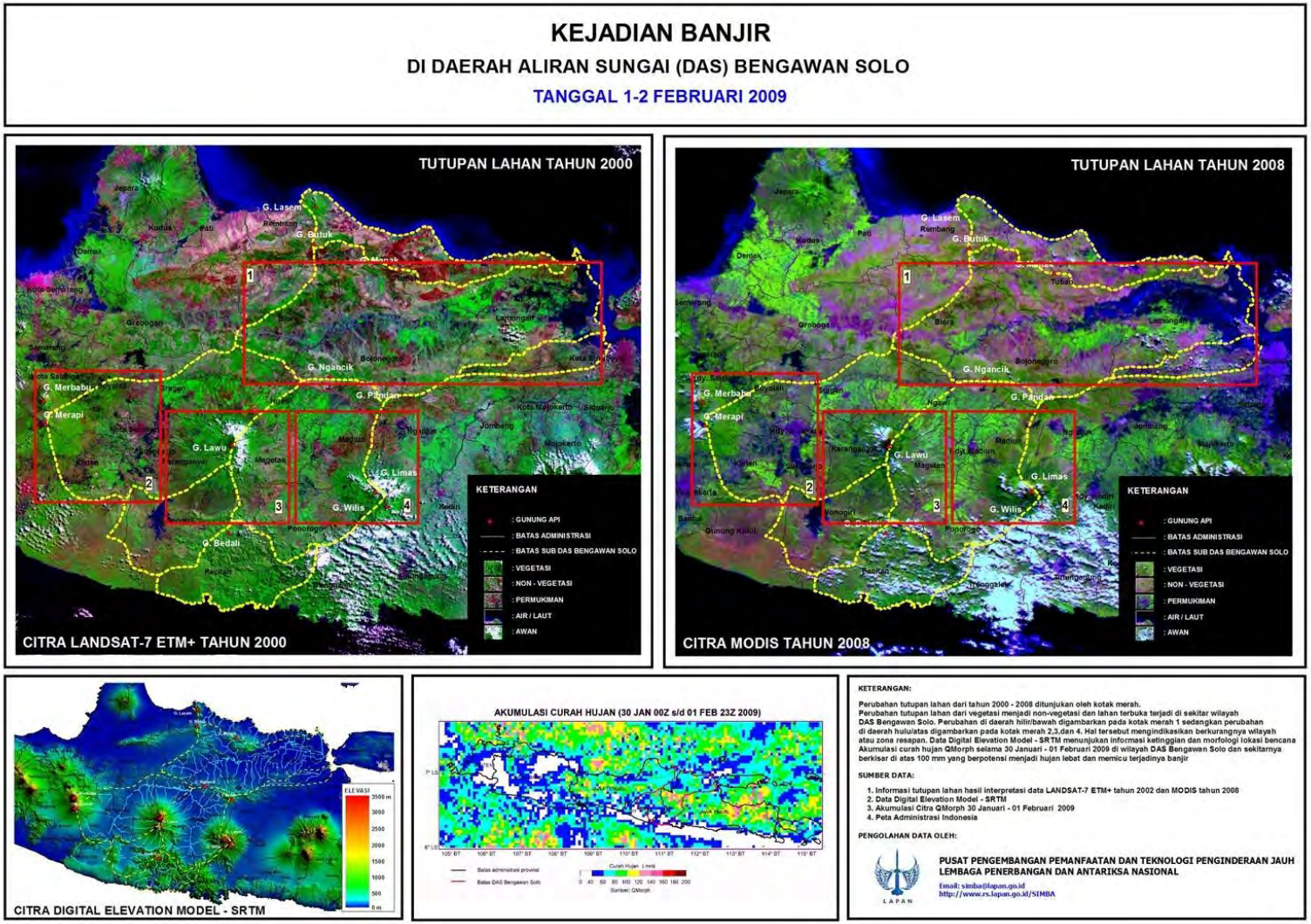
Forest/Land Fire – Burned Area Mapping

Riau Province
June 5 – July 17, 2013
Aqua MODIS



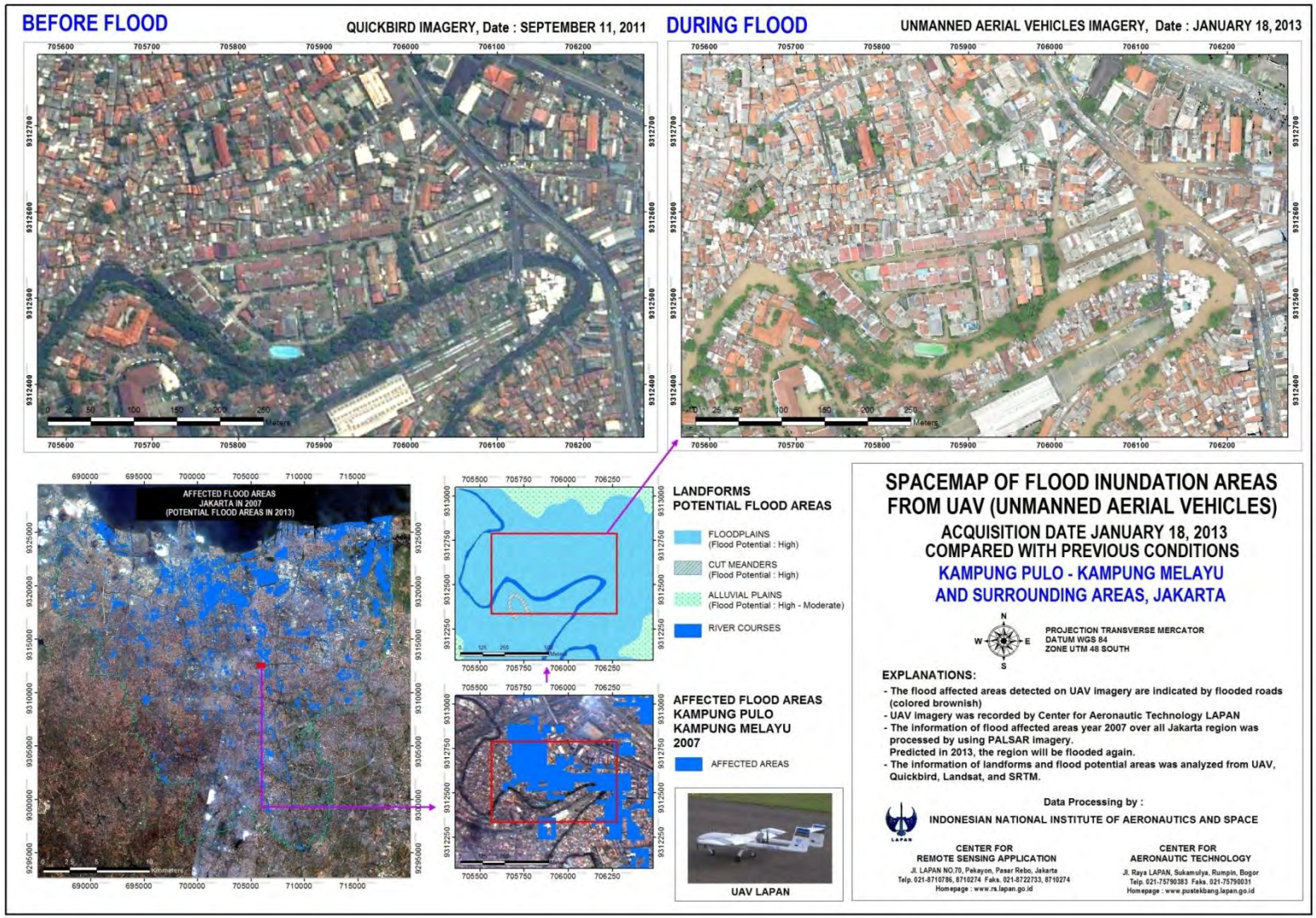
FLOOD

Bengawan Solo River
February 1-2, 2009
Terra MODIS



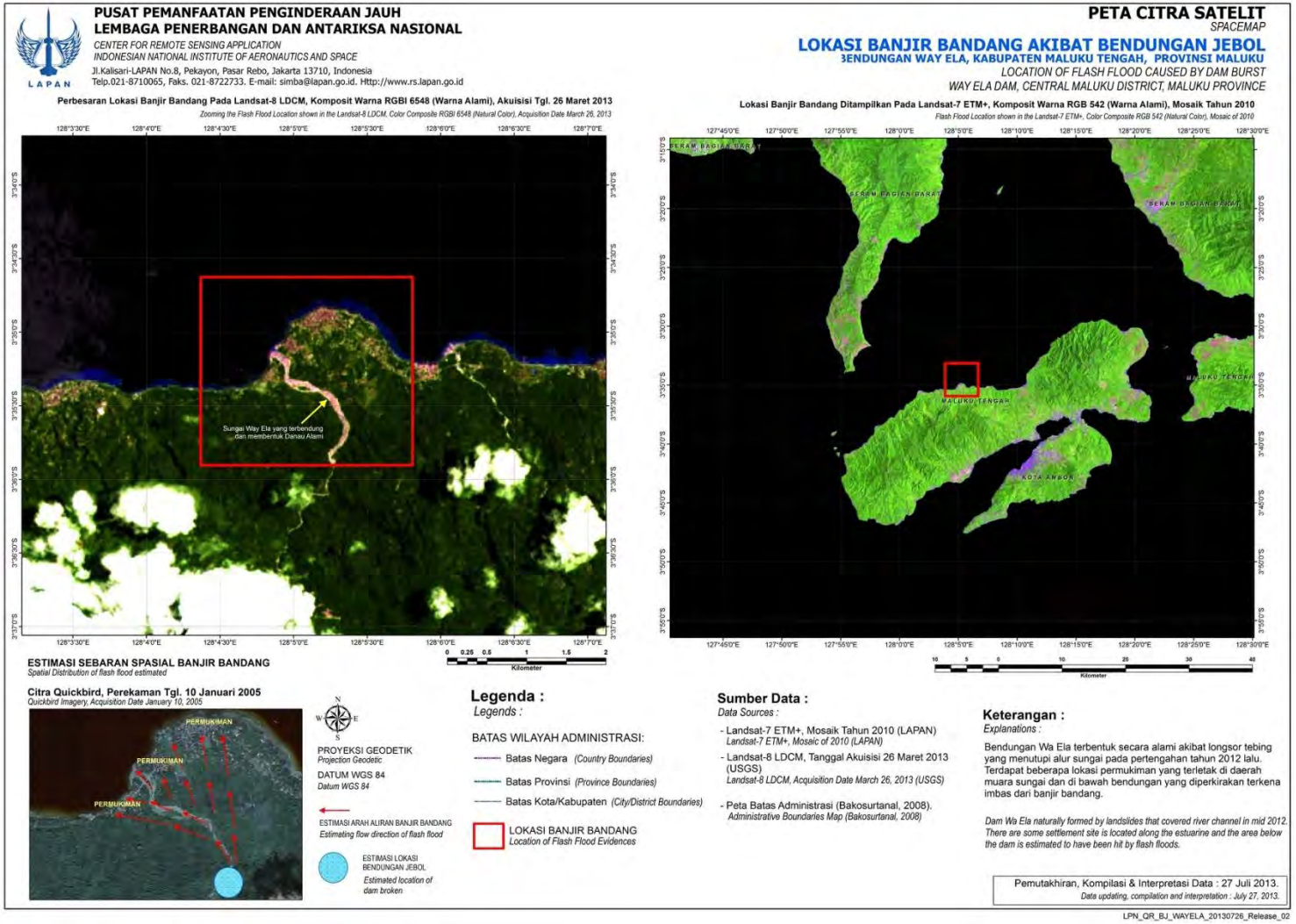
FLOOD

Kp. Melayu Village, Jakarta City
January 18, 2013
Unmanned Aerial Vehicle



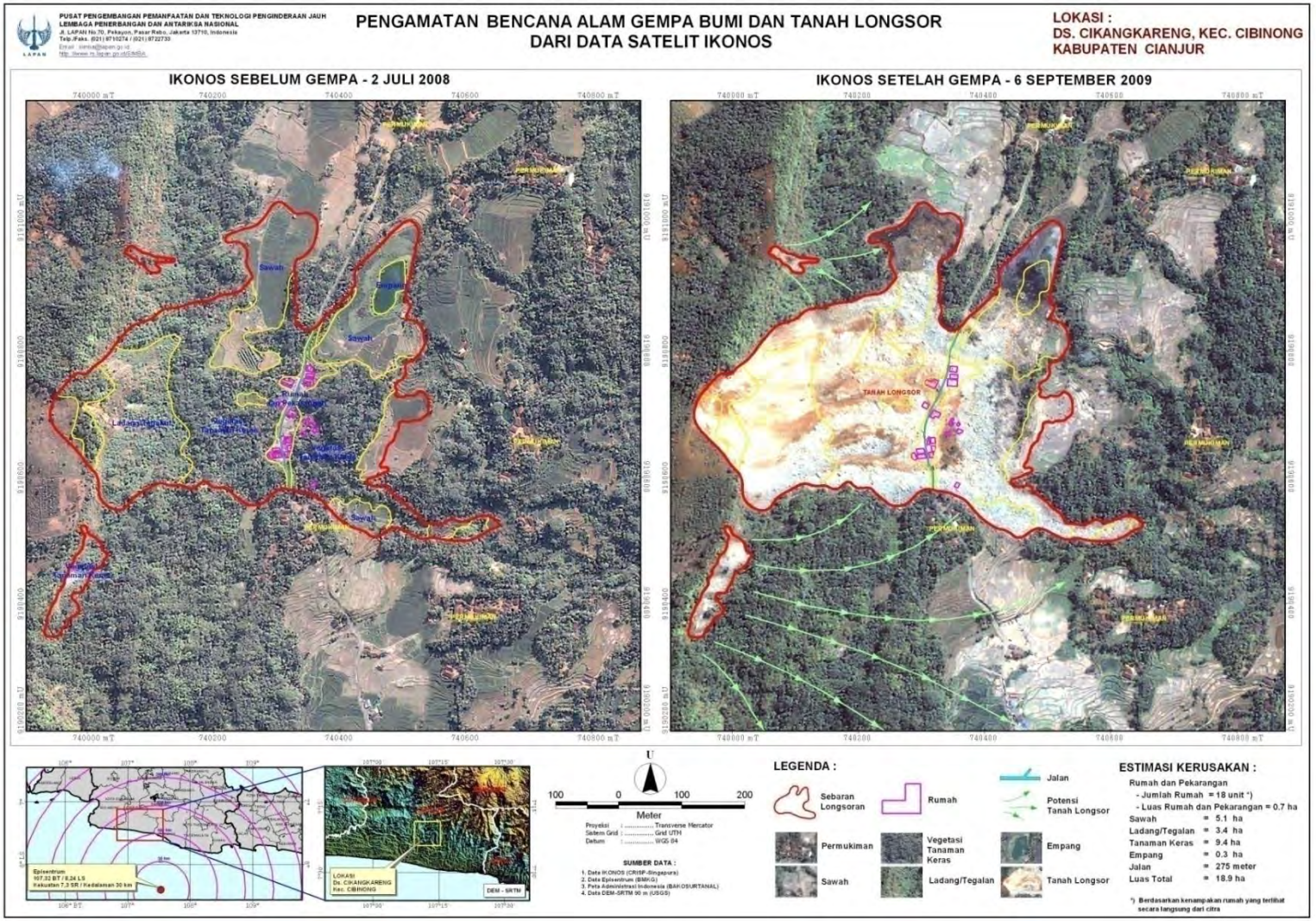
FLASHFLOOD

Central Maluku
July 27, 2013
Landsat-8 OLI



LANDSLIDE

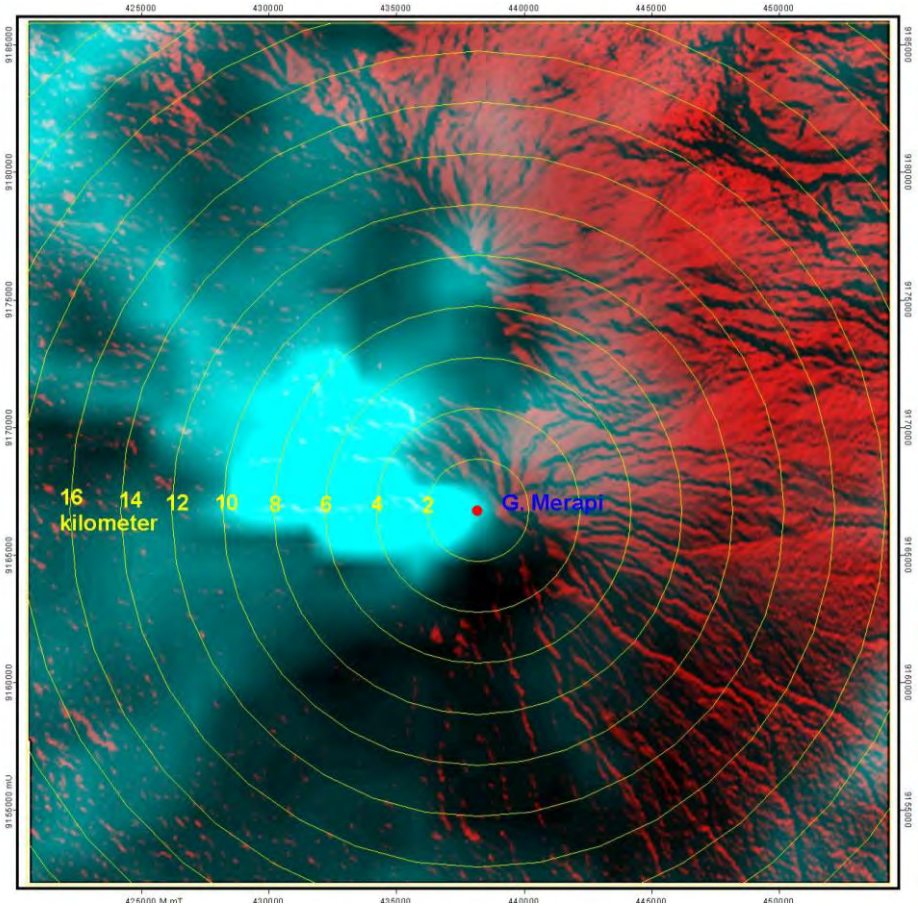
Cianjur District, West Java
September, 2009
Landsat-5 TM



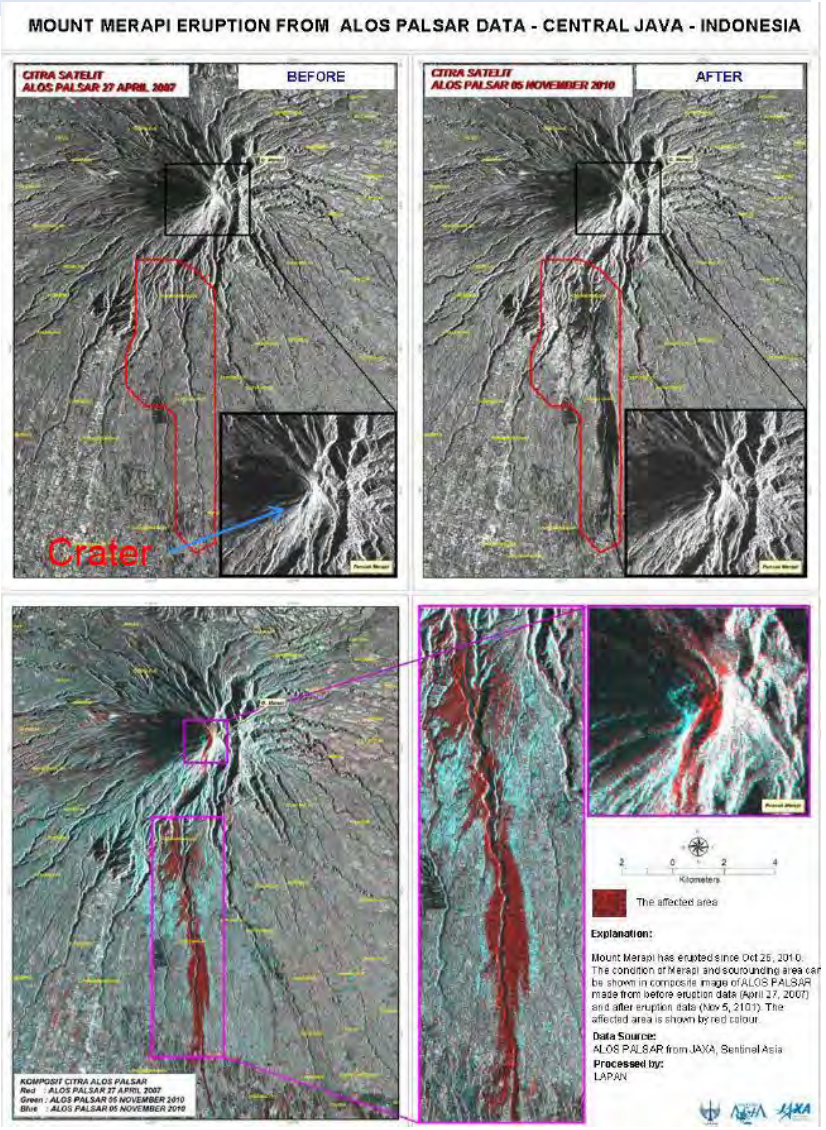
VOLCANO ERUPTION

Mt.Merapi, Central Java
October 26, 2010
ALOS-PALSAR

Nuee Ardente

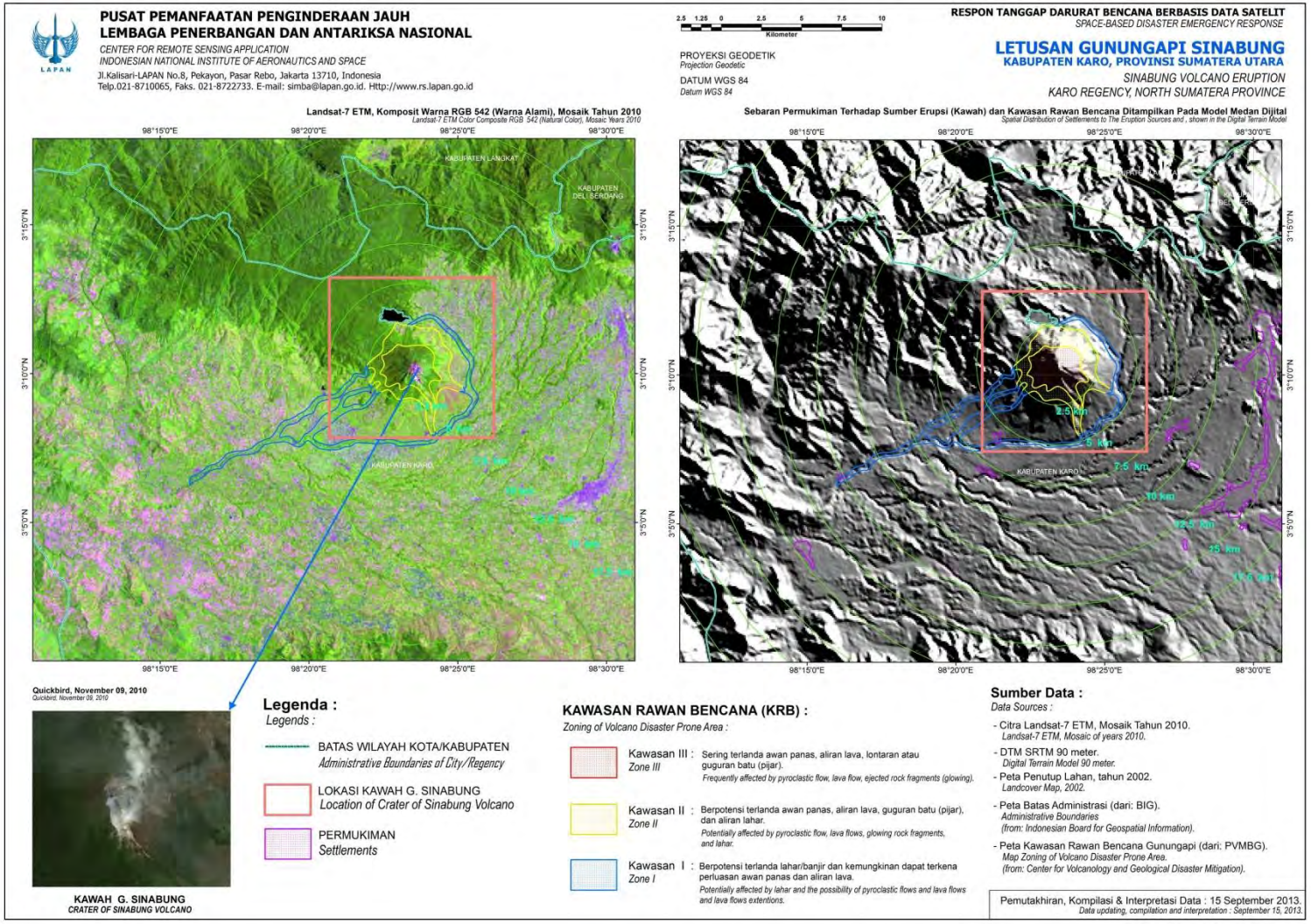


DEM & NOAA-14, May 16 , 2006

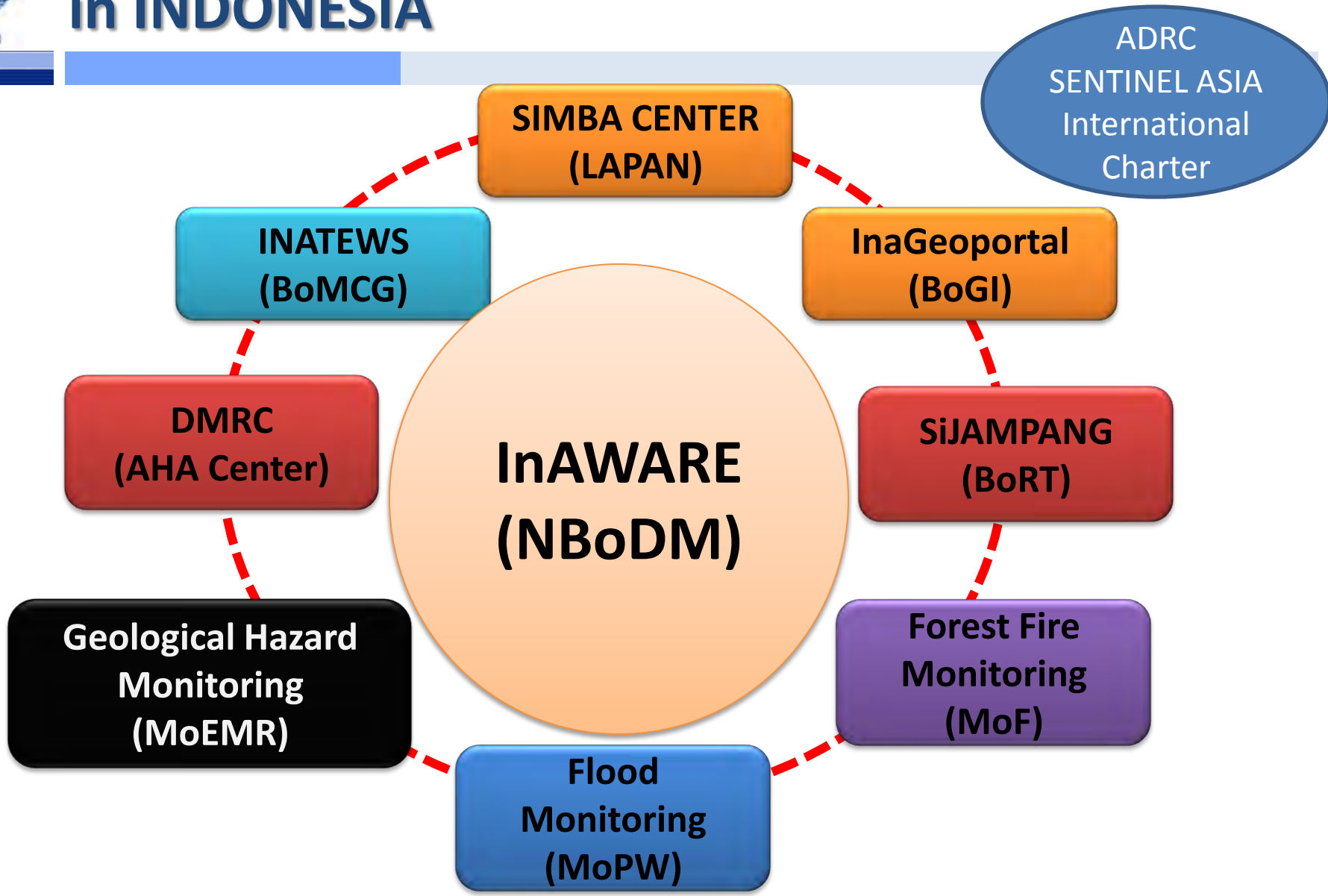


VOLCANO ERUPTION

Mt. Sinabung
September 15, 2013
Landsat



Integrated Disaster Information System in INDONESIA



Challenges

- Timely availability of data.
- Lack of trained manpower.
- Difficulty in getting high resolution satellite images during emergencies.
- Discrepancies in maps and data from various organisations.

Further Improvements

- Improve hazard information systems and early warning by making effective use of InAWARE (new disaster management early warning and decision support system at Indonesia's national disaster management agency).
- Develop best practice of using space based information in pre-disaster phase (such as information preparedness) to address hazard, risk and vulnerability mapping, specially promoting role of LAPAN, BNPB and other scientific organization, and
- Strengthen emergency response using space based information by addressing important concerns such as provision of high resolution images and microwave image to monitor hydro-meteorological disasters.

Resulted from the Discussion of
Stakeholder Meeting of Spaced-Based Information
for Disaster Risk Management
Jakarta, September 3rd, 2013
Cooperate with UNSPIDER

Thank You

謝謝