



Indonesian Country Reports on GEOS- related Activities

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Presentation Outlines

- Role of LAPAN on Earth Observation
- Satellite Technology Development
- Remote Sensing Data Availability
- Remote Sensing Application
(Natural resources, Environment, Disaster Mitigation, and Strategic Mission)
- Green House Gases and Climate Change
- Collaborations



Role of LAPAN on Earth Observation

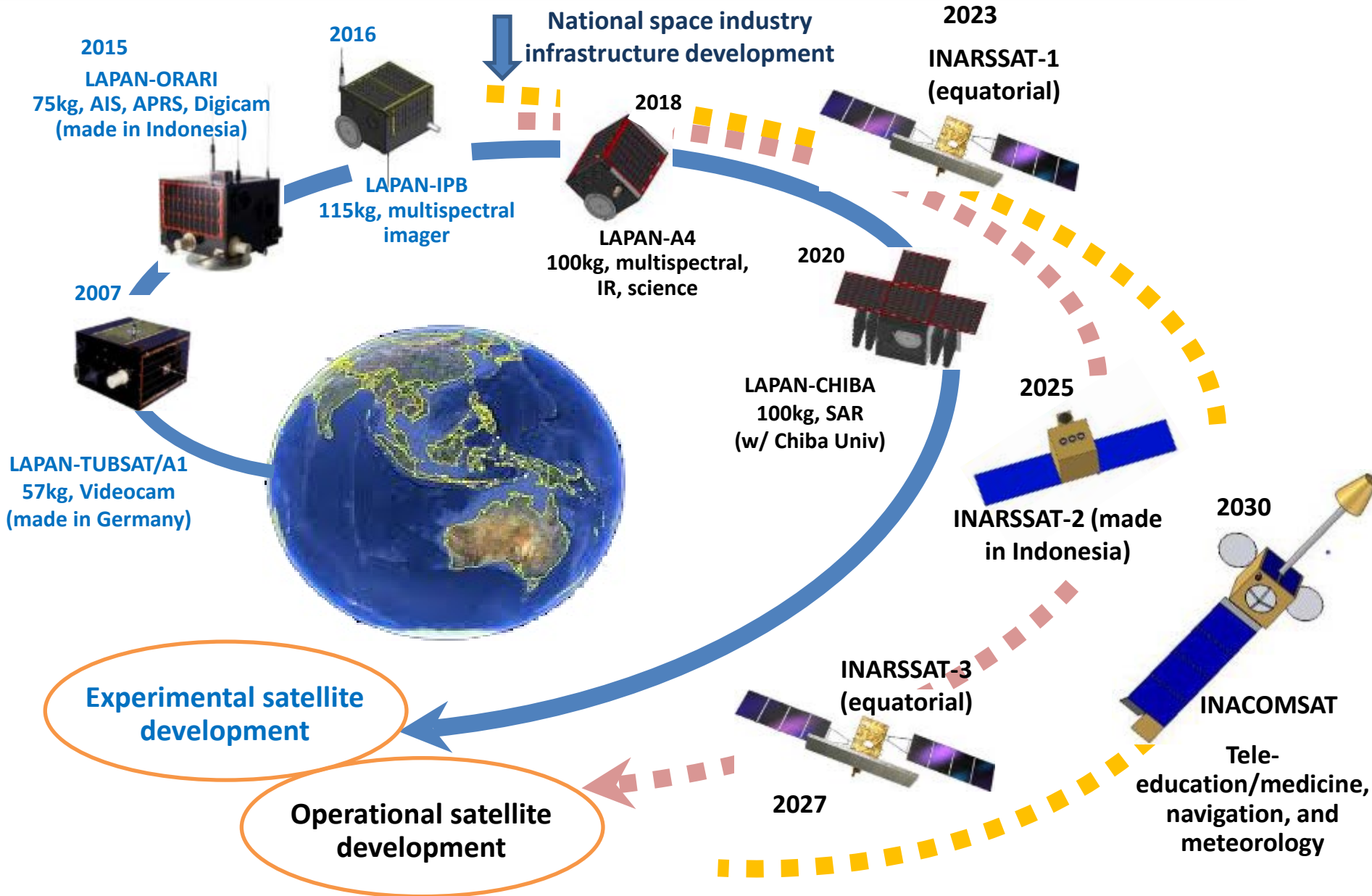
Substances related to remote sensing activities, such as:

- Planning, developing and operating **satellites and remote sensing ground stations** (articles 16 and 17).
- **Procurement** of high-resolution remote sensing data (article 18).
- Preparation of **the standard methods and the data processing quality** (article 19).
- Organizing the storage and distribution of data through **the National Remote Sensing Data Bank** as a network node remote sensing data in the National Spatial Data Network System (article 20).
- Establish **guidelines for the use and dissemination of remote sensing information** (article 22).



Satellites Technology Development

SATELLITE TECHNOLOGY PROGRAM



SATELLITE SPECIFICATIONS



LAPAN - A3 / LAPAN-IPB SATELLITE

Microsatellite for Experimental Remote Sensing, Maritime Traffic Monitoring and Earth Magnetic Field Measurement

Satellite Technical Specifications

- Dimension : 677x574X960 mm (antenna include)
- Weight : 115kg
- Orbit : ~97 inclination (Polar)
- Altitude : 505 Km

Power System:

- 5 GaAs Solar Arays : @ 465X262 mm:
30 cell in series, Max Power 37 Watt
- Li-On Battery with capacity of 36 Ah with 16 V Nominal Voltage

Communications and Data Handling

- UHF for 2 TTCs; 1200bps; FFSK; 5 W RF output
- X-Band ; 105 Mbps; 5 W max RF Output
- S-Band ; 3,5 W RF Output
- OBDH is 32 bit RISC processor
- On Board Data Solid State Memory with 4 GB RAM & 16 GB Flash Memory with CCSDS Formatter

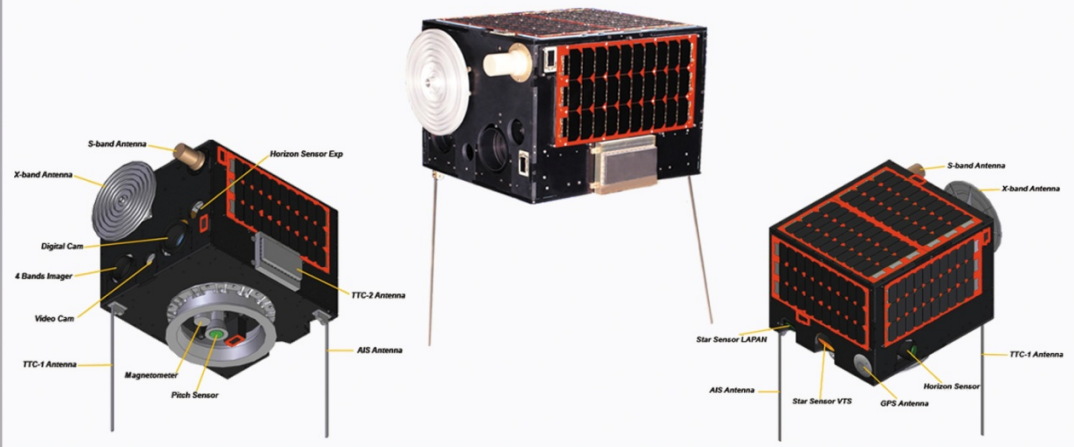
Attitude Control System

- 4 reaction wheel & gyro
- 2 Star Sensor
- 3 magnetic coils
- 6 single solar cell for sun sensors
- 1 Pitch sensor
- 2 Horizon Sensor

Payloads

- Camera - 1
 - On Push-broom Multispectral 4 band Imagers (R, G, B, Nir) with 300 mm Lens; 8002 Pixel; Digitalization of Max 16 bits.
 - Ground Resolution of ~15 Meters and Swath of 100 Km.
- Camera - 2
 - Digital Space Camera with 1000 mm lens with 2000x2000pixel; 14 Bits Digitalization
 - Ground Resolution of 3 meters with 6 Km Swath
- Camera - 3
 - CCD Color Video Camera with ~150 Meters Resolution
- Automatic Identification System (AIS) Receiver;
 - Sensitivity 117 dBm; Estimated footprint 2800 km radius; Max no of ships to be track : 104/min
- Space based Magnetometer

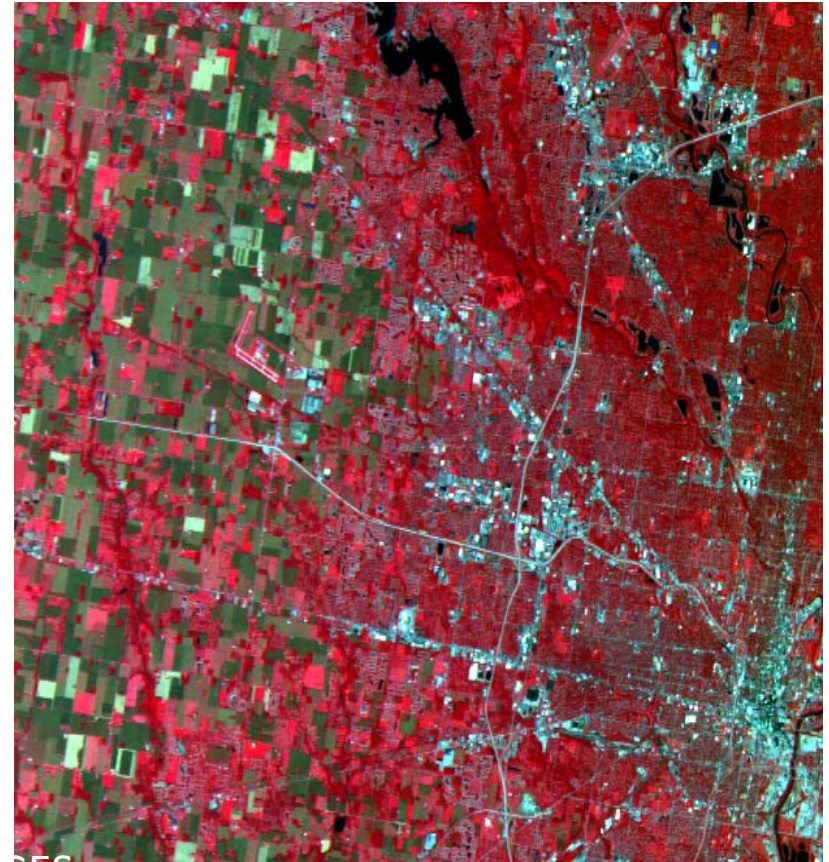
Satellite Structure and Sub System



MISSIONS:

1. Design, integration, test and operation is done in Indonesia.
2. Earth observation with 4 bands multispectral imager for land use classification and environment observation.
3. Supporting global maritime awareness by reception of Ship AIS signal.
4. Earth Magnetic Field measurement for scientific purposes.

Imaging Testing of LAPAN-A3: Indiana Polis (True & False color)



First Images Taken 27 September 2016. All Band working. Vegetation can be seen by NIR channel

Imaging taken by LAPAN-A3: Bali and Flores Island



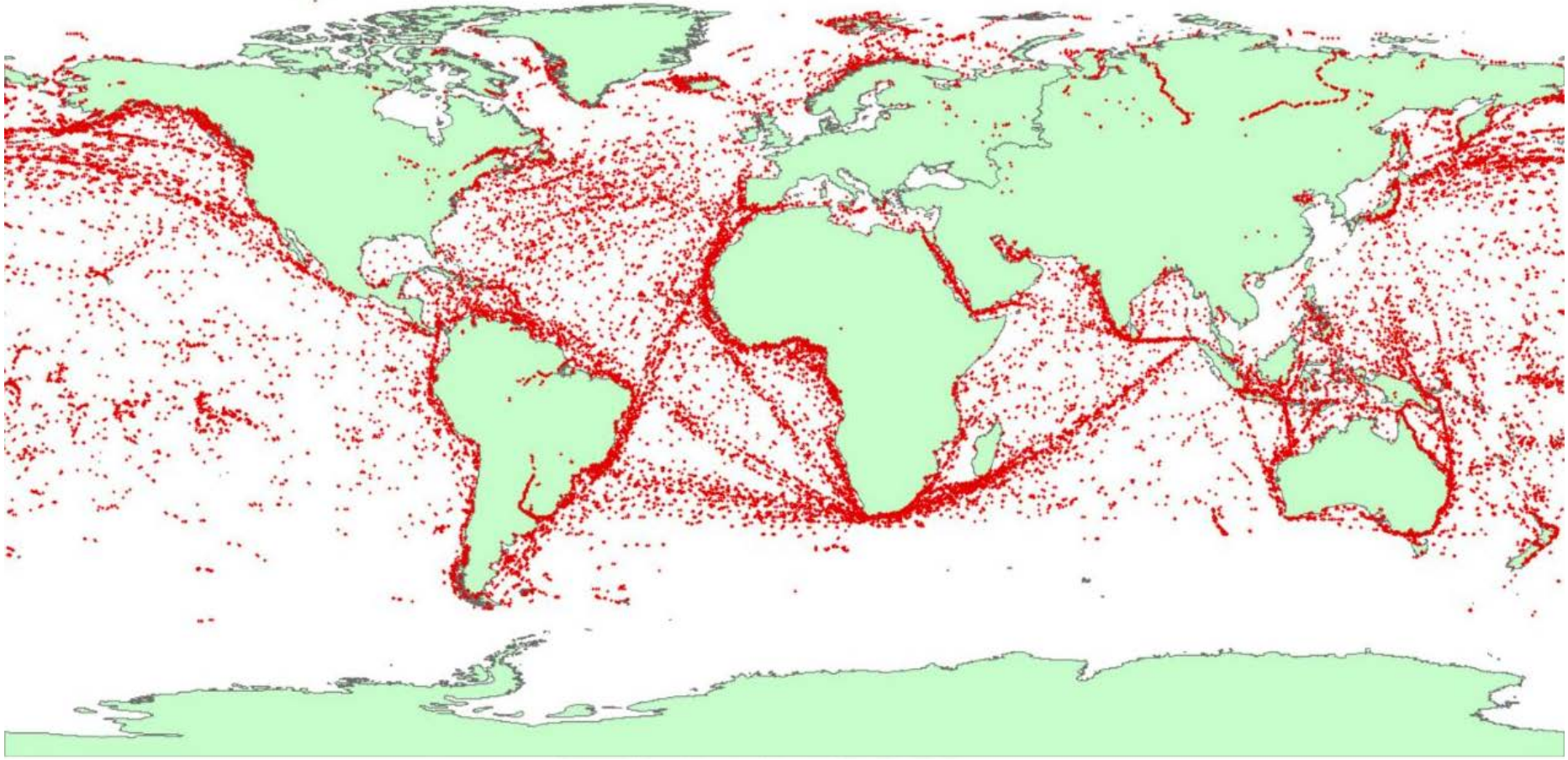


Taken 18 October 2016



Raung Mountain – East Java

SAMPLE OF LAPAN-A3 AIS DATA : SHIP TRACKING

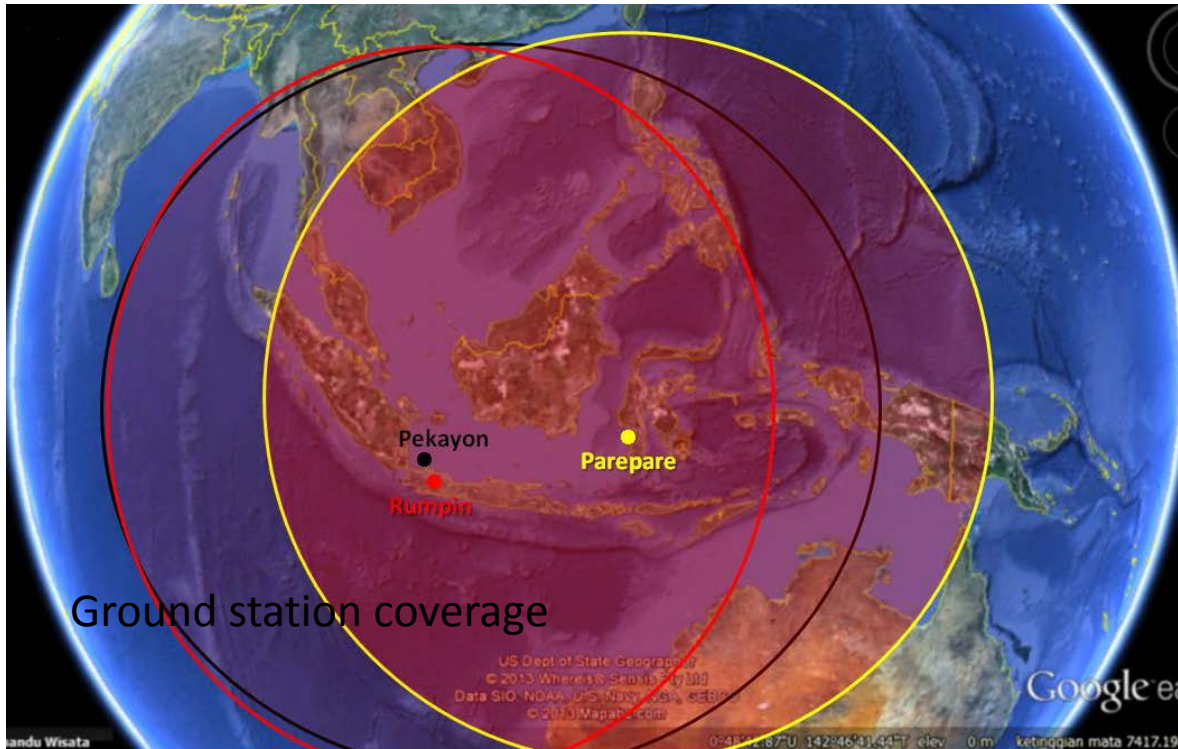


Red dots represent all ship positions



Remote Sensing Data Availability

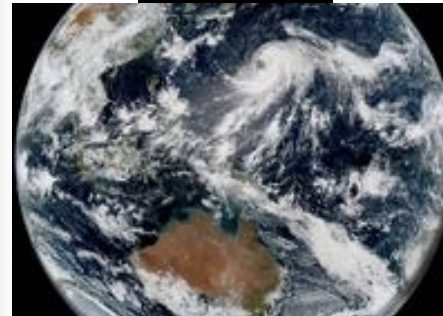
Remote Sensing Data Facility



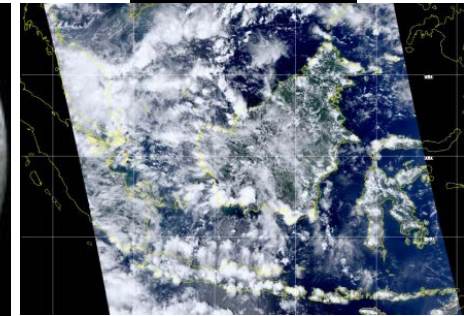
Data received by LAPAN Ground Stations



Himawari-8
(0.5 - 2 km)



Aqua/MODIS
(250 m - 1 km)



Landsat-8
(15 - 30 m)



SPOT-6
(1.5 m)



High resolution
(≤ 1.5 meter)

- SPOT-6
- SPOT-7

Medium resolution
(15 - 30 meter)

- Landsat-7
- Landsat-8

Low resolution
(≥ 250 meter)

- Terra/Aqua
- SNPP
- NOAA-18/19
- MetOp
- Himawari-8

Other available data

Pleiades (50 cm)



Quickbird (61 cm)



WorldView-2 (50 cm)



WorldView-3 (31 cm)



Geoeye-1 (41 cm)



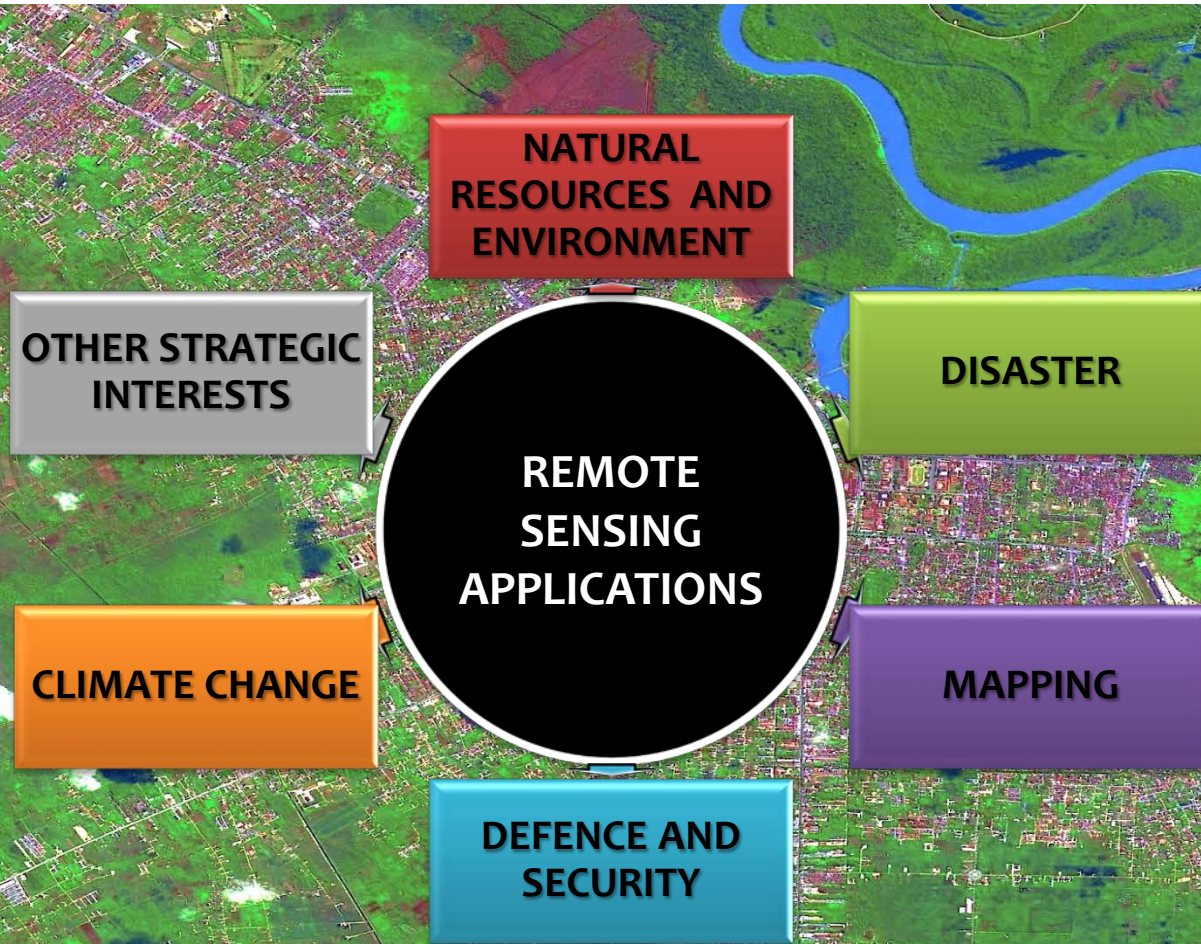
TerraSAR-X (3 m, 18 m)



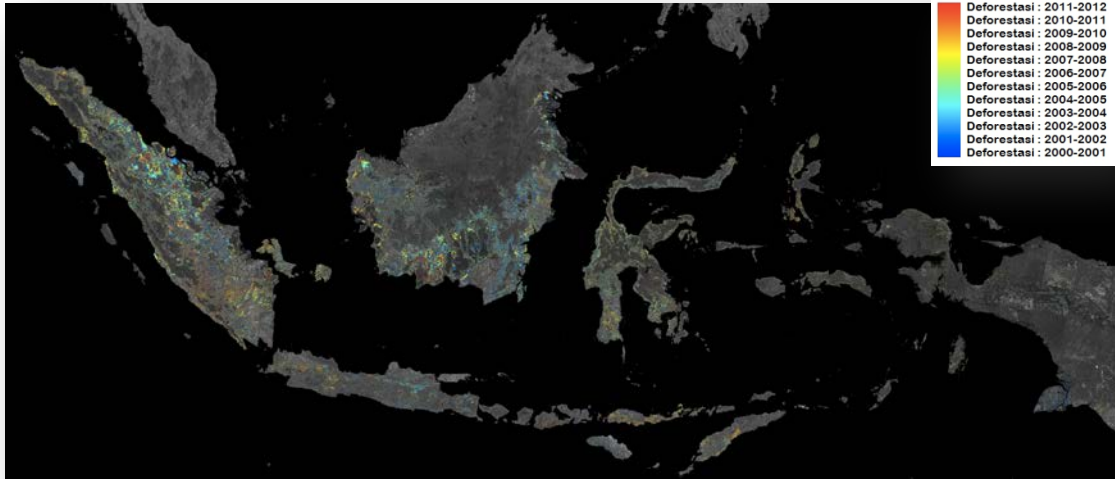


Remote Sensing Application

Remote Sensing Application



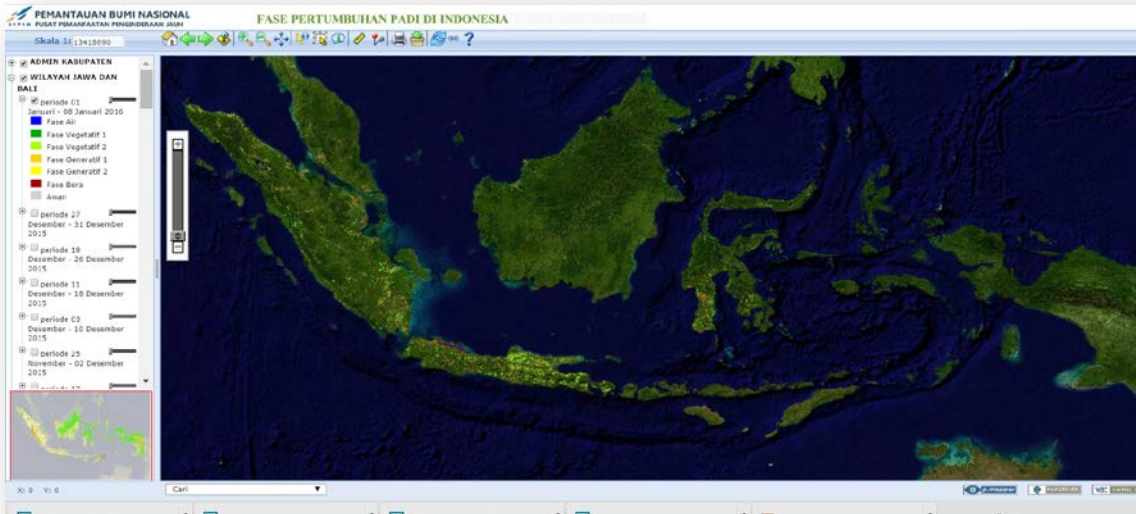
Natural Resources (Land)



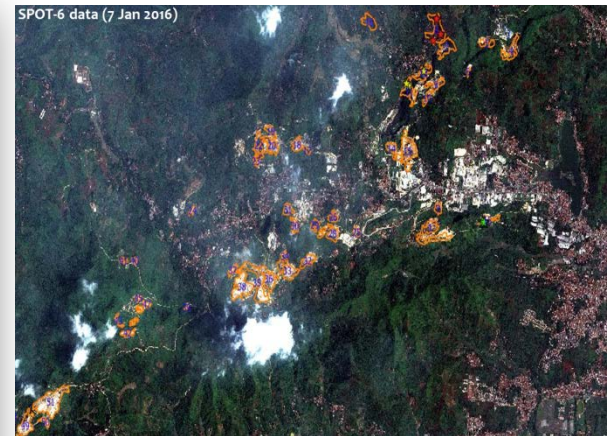
Forest Monitoring



Water Resources

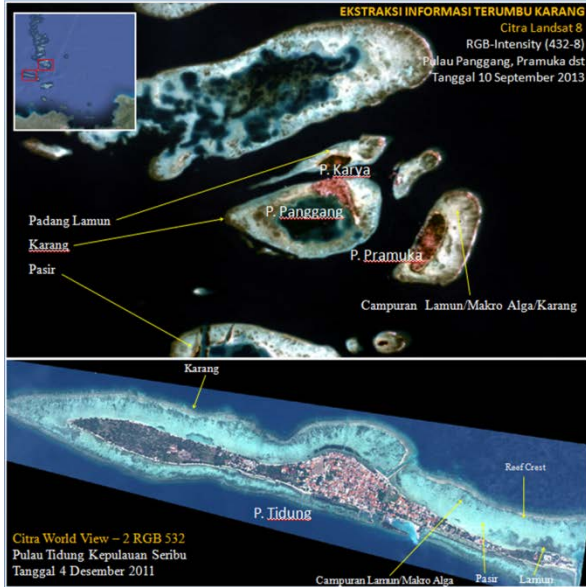


Agriculture Monitoring



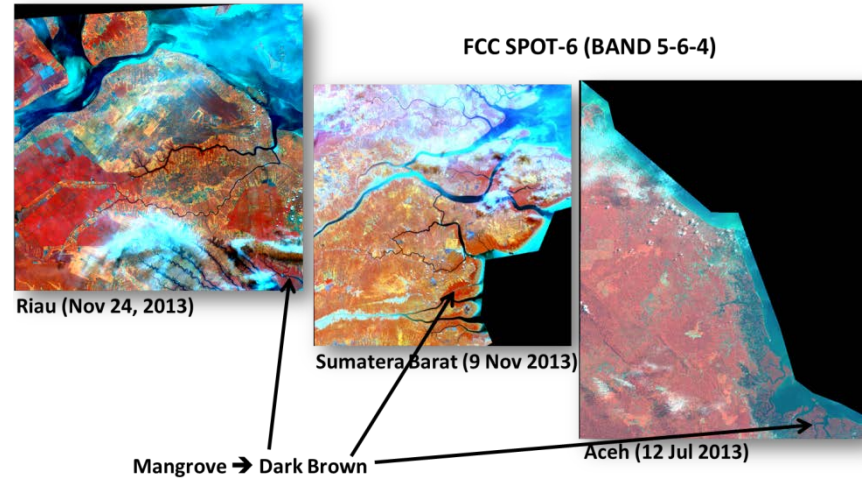
Mining

Natural Resources (Sea)

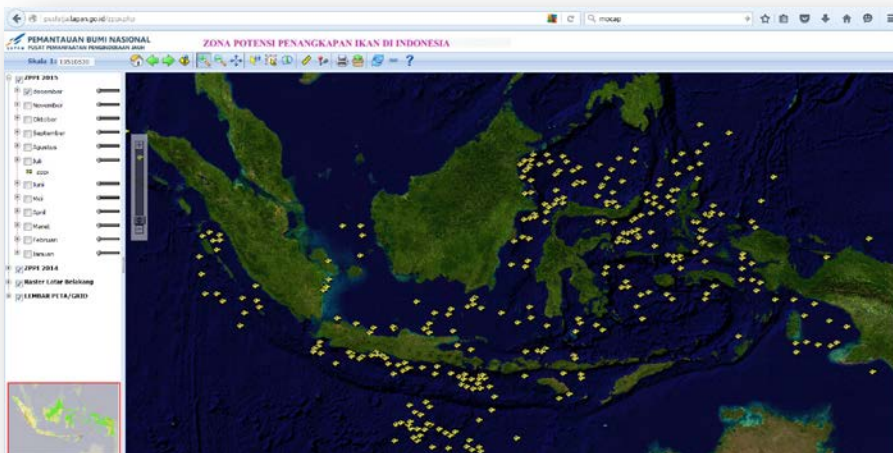


Coral reefs

Kondisi terumbu karang di P. Pramuka dan P. Panggang



Mangrove



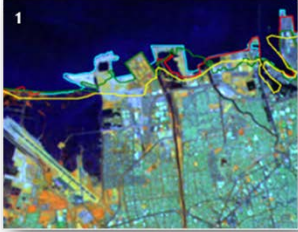
Potential Fishing Ground



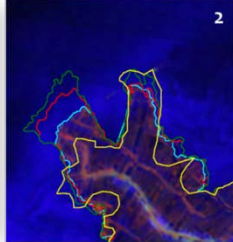
Small Island Monitoring

Environment

Land addition in Semarang City



Delta Wedung Changes

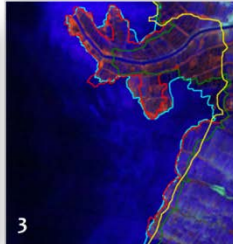
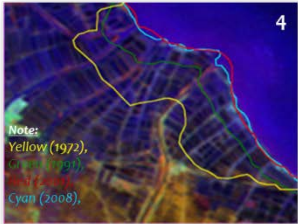


Landsat TM 26 June 2008

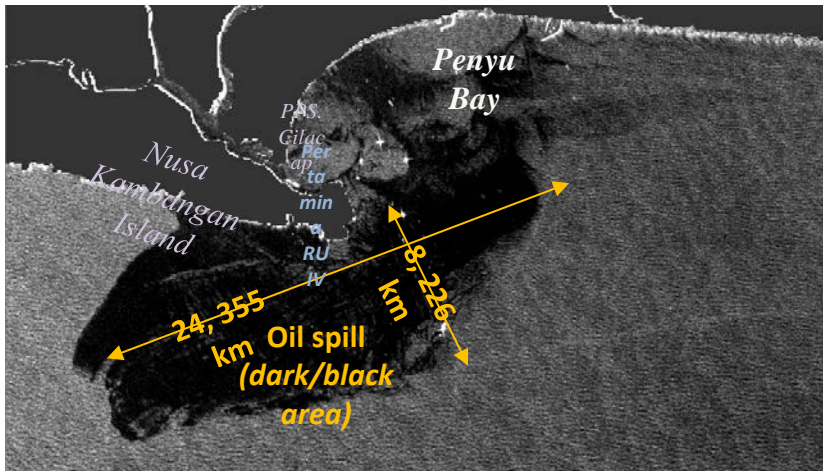


Beach sinks due to abrasion, Serik village, Demak Regency (Source :VHRmedia , 2010)

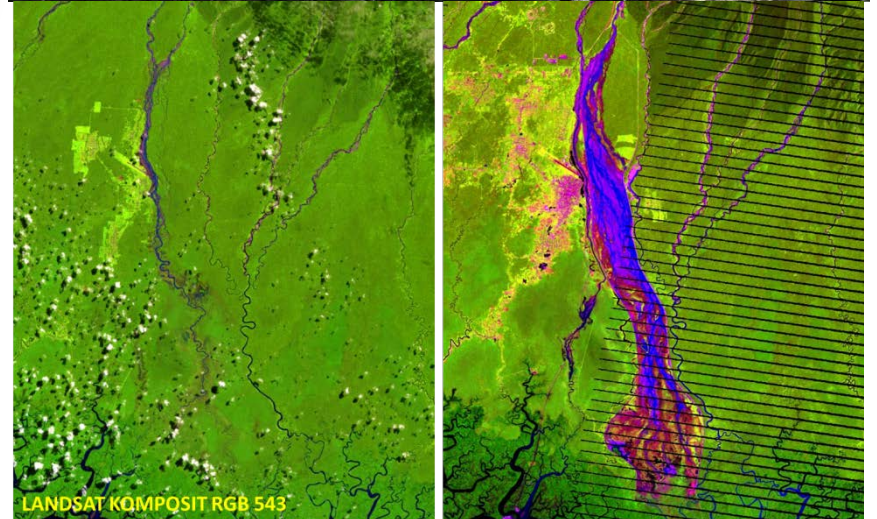
Sedimentation in Kendal City



Coastlines changes

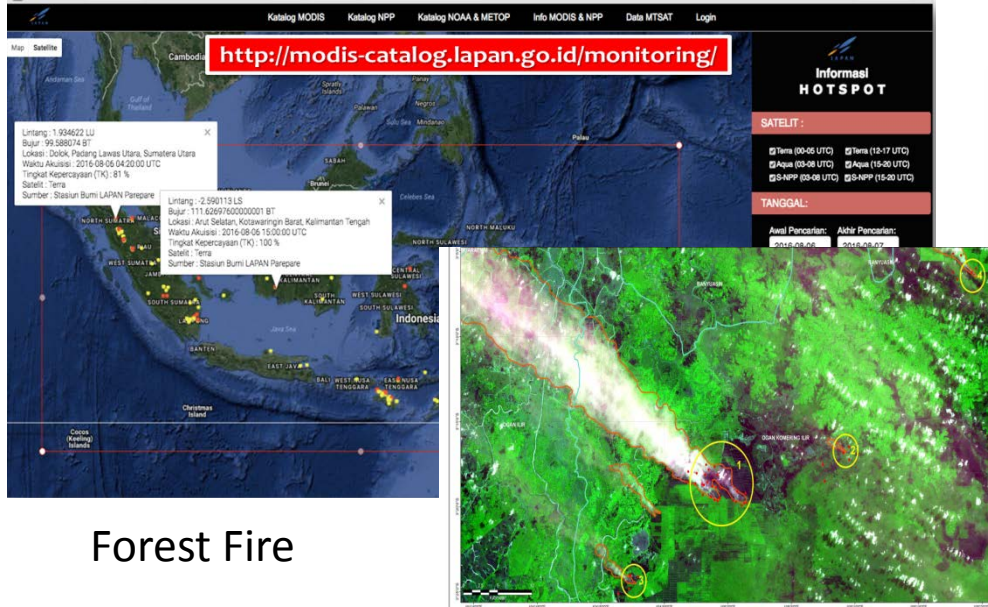


Oil Spills



Mining Exploration Impact

Disaster



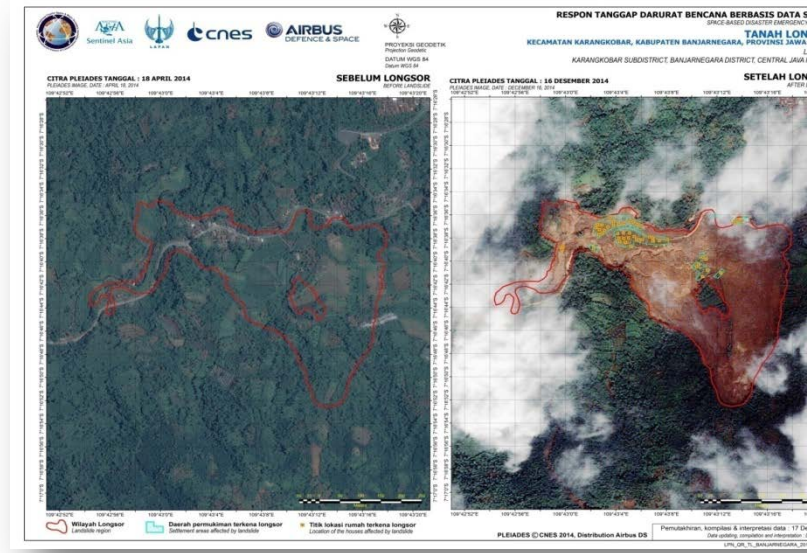
Forest Fire



Flood

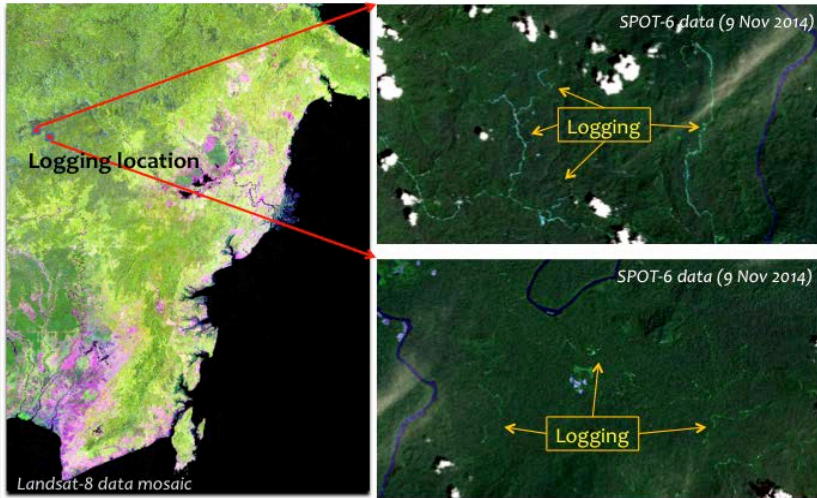


Volcano Eruption

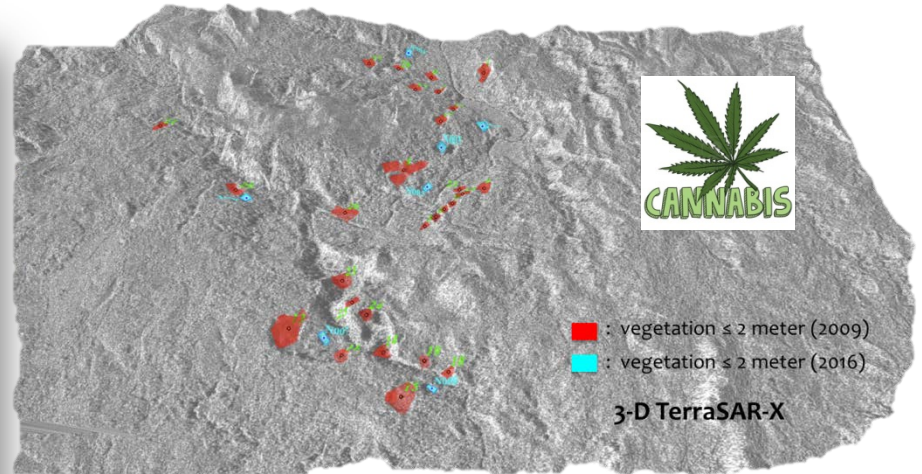


Landslide

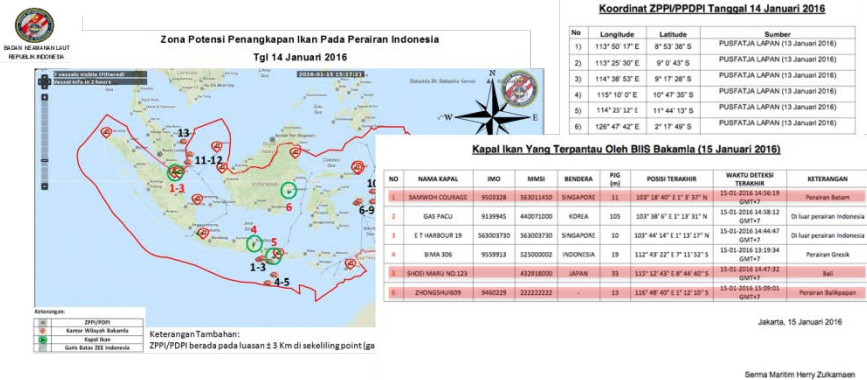
Security and strategic application



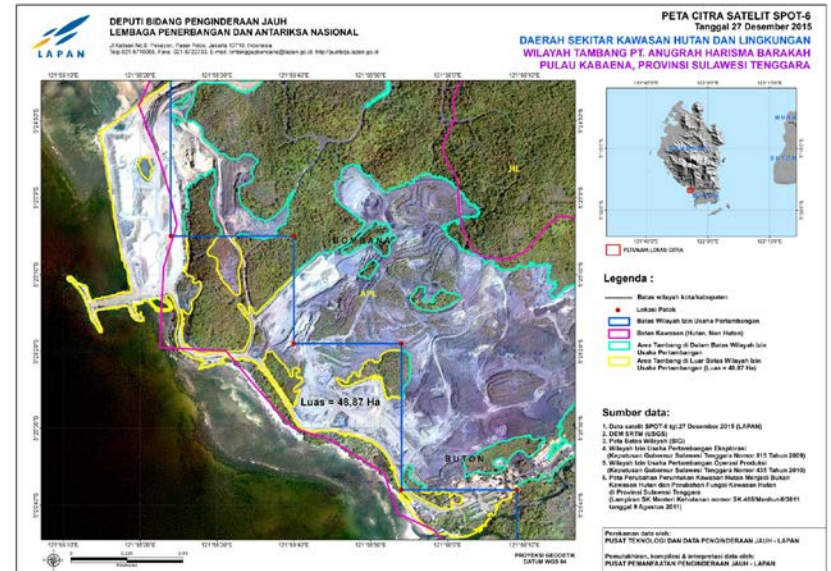
Illegal logging



Illegal Crop (Cannabis)



Illegal Fishing (+AIS detection by LAPAN Sat)



Illegal mining

Security and strategic application (Taxes)



Kota Semarang, IKONOS: 22 Juli 2007

 Empty land



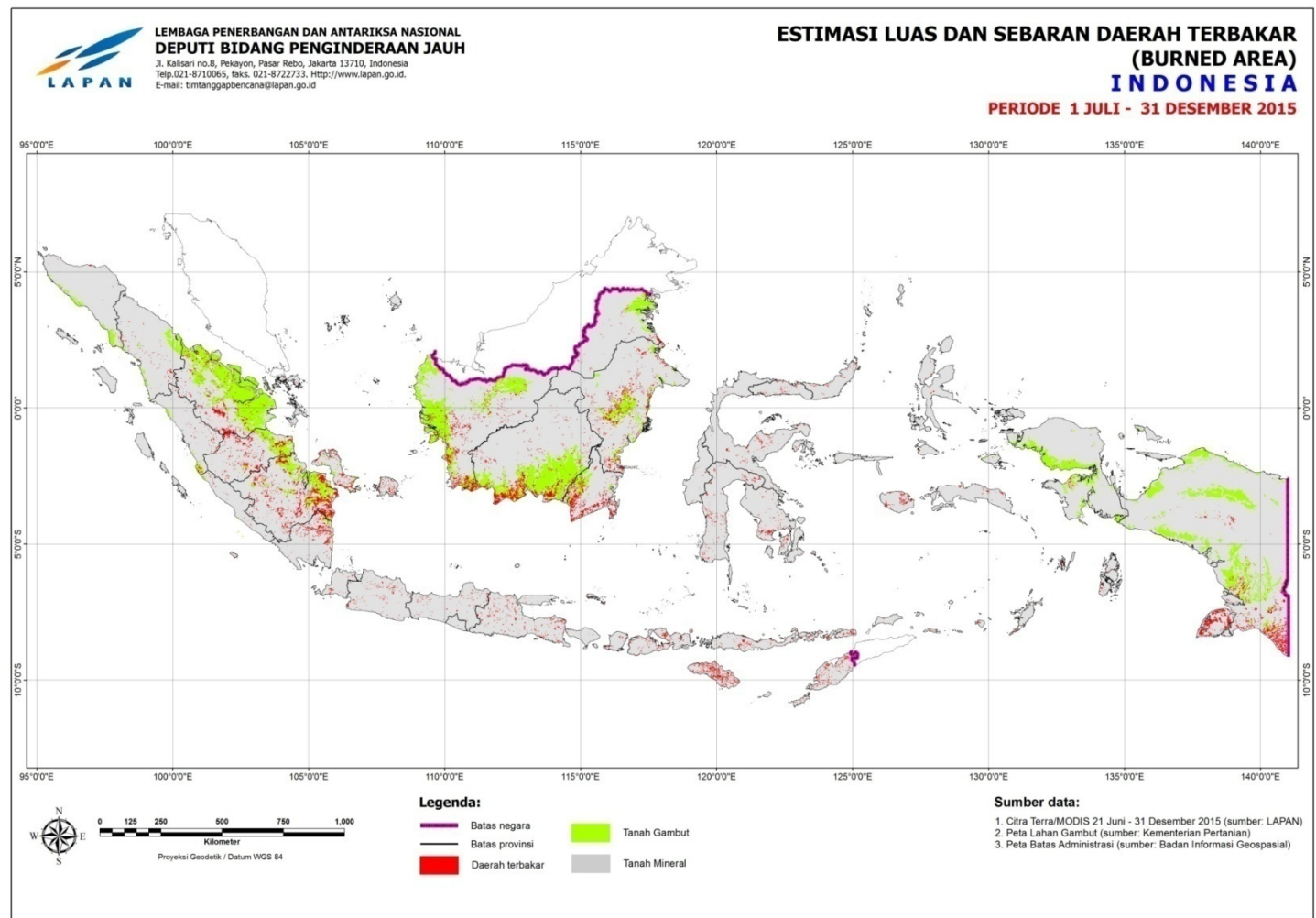
Kota Semarang, PLEIADES: 06 Maret 2013

 New building (new tax object)



Green House Gases and Climate Change

Climate Change (Carbon estimation)



Forest Fire Impact: Burned area mapping



Collaborations



Cooperation with Ministries/Agencies, Army, Police, and private sectors (National)

Ministries/Agencies

1. Geospatial Information Agency (*BIG*)
2. Agency for Meteorology, Climatology, and Geophysics (*BMKG*)
3. National Board for Disaster Management (*BNPB*)
4. National Narcotics Agency (*BNN*)
5. The Audit Board (*BPK*)
6. Min. of Maritime Affairs and Fisheries (*KKP*)
7. Min. of Environment and Forestry (*KLHK*)
8. Min. of Health (*Kemenkes*)
9. Min. of Finance (*Kemenkeu*)
10. Min. of Public Works and Public Housing (*Kemen. PUPR*)
11. Min. of Agriculture (*Kementan*)

Army

Police

Private sectors

1. PT. Perikanan Nusantara
2. PT. Citra Sari Makmur
3. PT. Marlin



International Collaborations

- JAXA
- USGS
- ISRO
- RSO UNSPIDER
- Astrium DS
- Digital Globe
- Sentinel Asia – JAXA
- Safe Project – JAXA
- CAST/SSTC
- GIC-AIT
- G4INDO
- JICA
- UNWFP
- GIZ
- CIFOR
- Deltares (JCP-3)
- DLR
- Etc.



THANK YOU FOR
YOUR KIND ATTENTIONS