



NATIONAL INSTITUTE OF
AERONAUTICS AND SPACE

Earth observation activity in Indonesia

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*Presented at “the ASEAN Multi-Country Workshop on Space Applications”
Bangkok, 18-19 September 2018*

Law of the Rep. of Indonesia No. 21 of 2013 on Space Activities

Remote sensing activities (*articles 15-23*):

- **Data acquisition**

High resolution data^{*)} for government institutions and local governments is only provided by LAPAN.

- **Data processing**

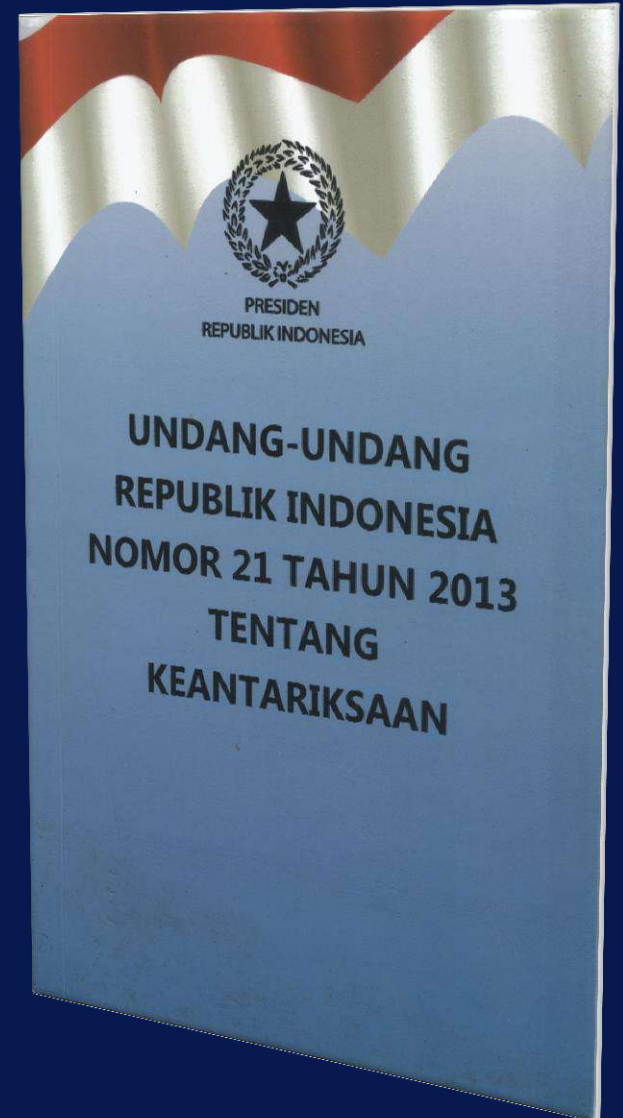
Data processing and its quality should refer to methodology established by LAPAN.

- **Data storing and distribution:**

LAPAN implements data storing and distribution through National Remote Sensing Data Bank.

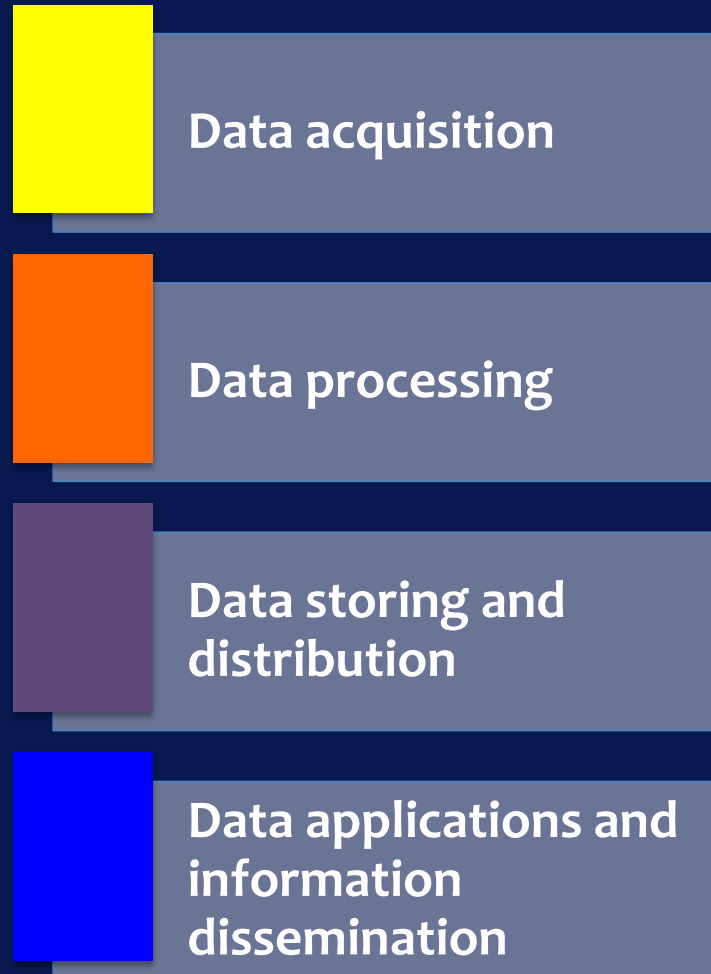
- **Data applications and information dissemination**

Data applications and information dissemination should be designated to the guidance assigned by LAPAN.

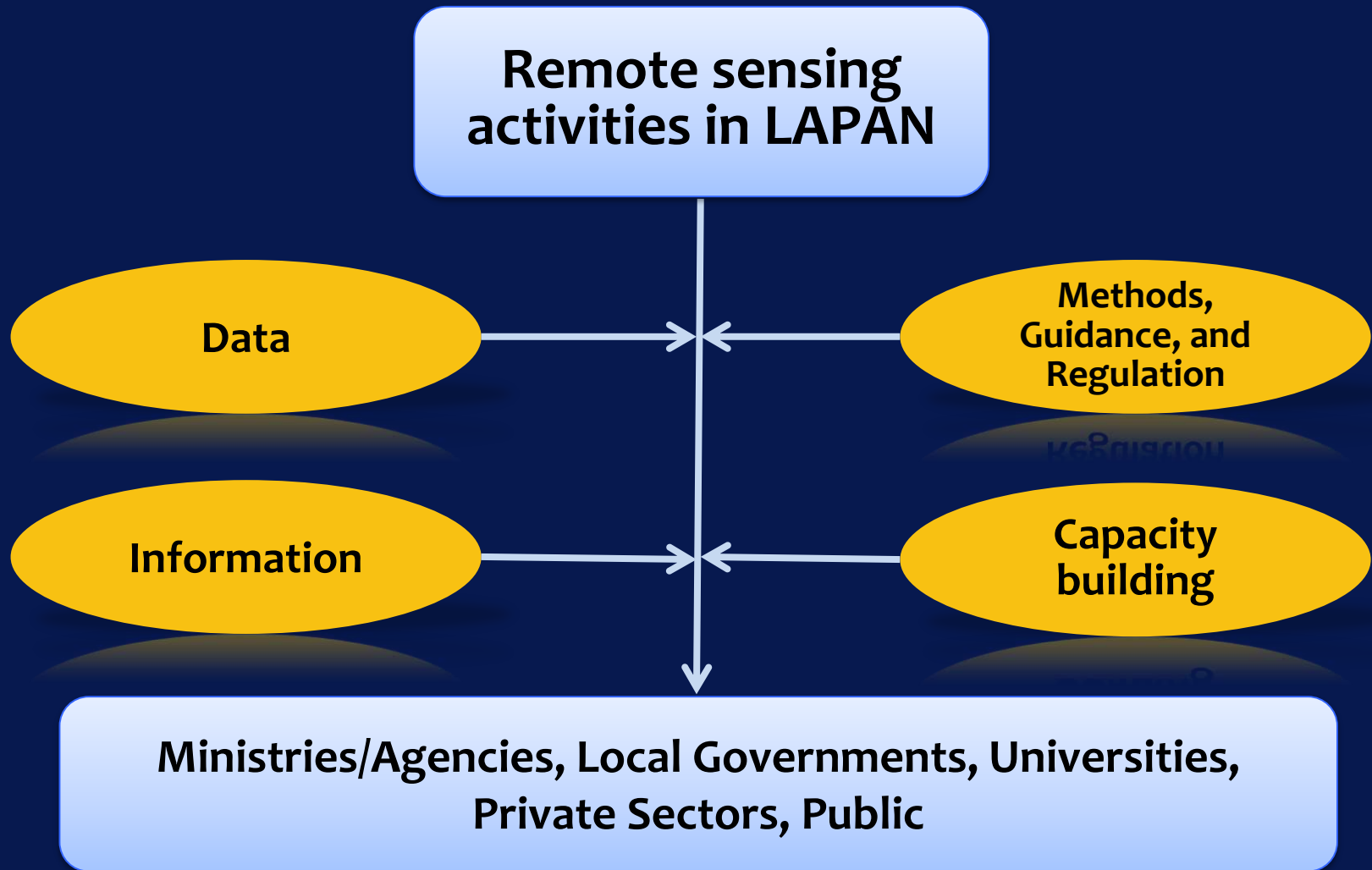


^{*)} spatial resolution < 4 m

Government Regulation No. 11 of 2018 on Procedures for Carrying Out Remote Sensing Activities



Remote sensing activities in LAPAN



OVERVIEW OF ONE MAP POLICY (OMP) IN INDONESIA

Presidential Regulation NO. 9/2016

On Acceleration of One Map Policy Implementation with Map Accuracy Level
on 1:50,000 scale
(enacted on 4 February 2016)

OMP'S OBJECTIVES



1 STANDARD
REFERENCE
DATABASE
GEO-PORTAL

OMP'S BENEFITS

As a basis for:

- Baseline of spatial data improvement
- Spatial planning accuracy
- Accuracy for policy development and decision making

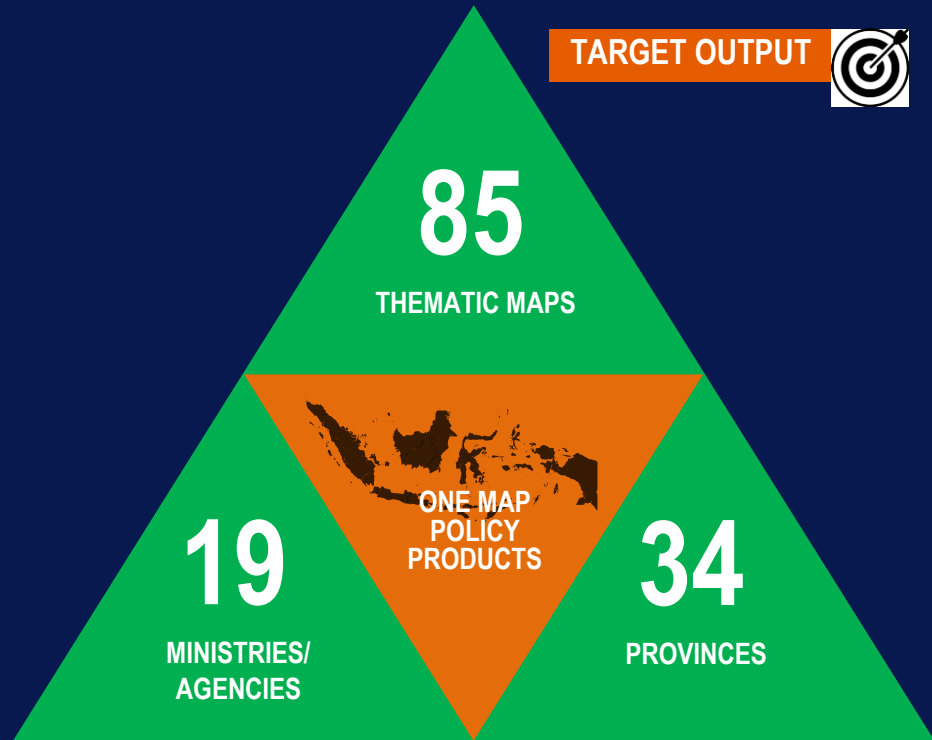
MAIN OMP'S ACTIVITIES

Compilation

Integration

Synchronization

TARGET OUTPUT



One Map Policy is an effort to **make accurate and accountable map** as a basis in **development planning and spatial use** by all stakeholders.

ONE MAP POLICY AFTER 2019



To ensure OMP after 2019, **mid-/long-term roadmap is currently prepared** to ensure the sustainability and completeness of OMP. OMP's geospatial data will be synergized with statistical data from National Statistics Bureau (BPS) to support SDG's target.

GRAND DESIGN



Acceleration of One Map Policy will not end to only 85 thematic maps, but **it can be continued to other thematic maps** that can be used to support economic equity, social welfare, and national development. In addition, **85 thematic maps have to be updated regularly.**

UPDATING AND ADDING THEMATIC MAPS



Advancement of map's accuracy have to be done to higher scale gradually. Geospatial Information Agency (BIG) have to prepare base map with higher scale and to prepare mapping standardization needed.

UPGRADING MAPS' DETAILS/ACCURACIES

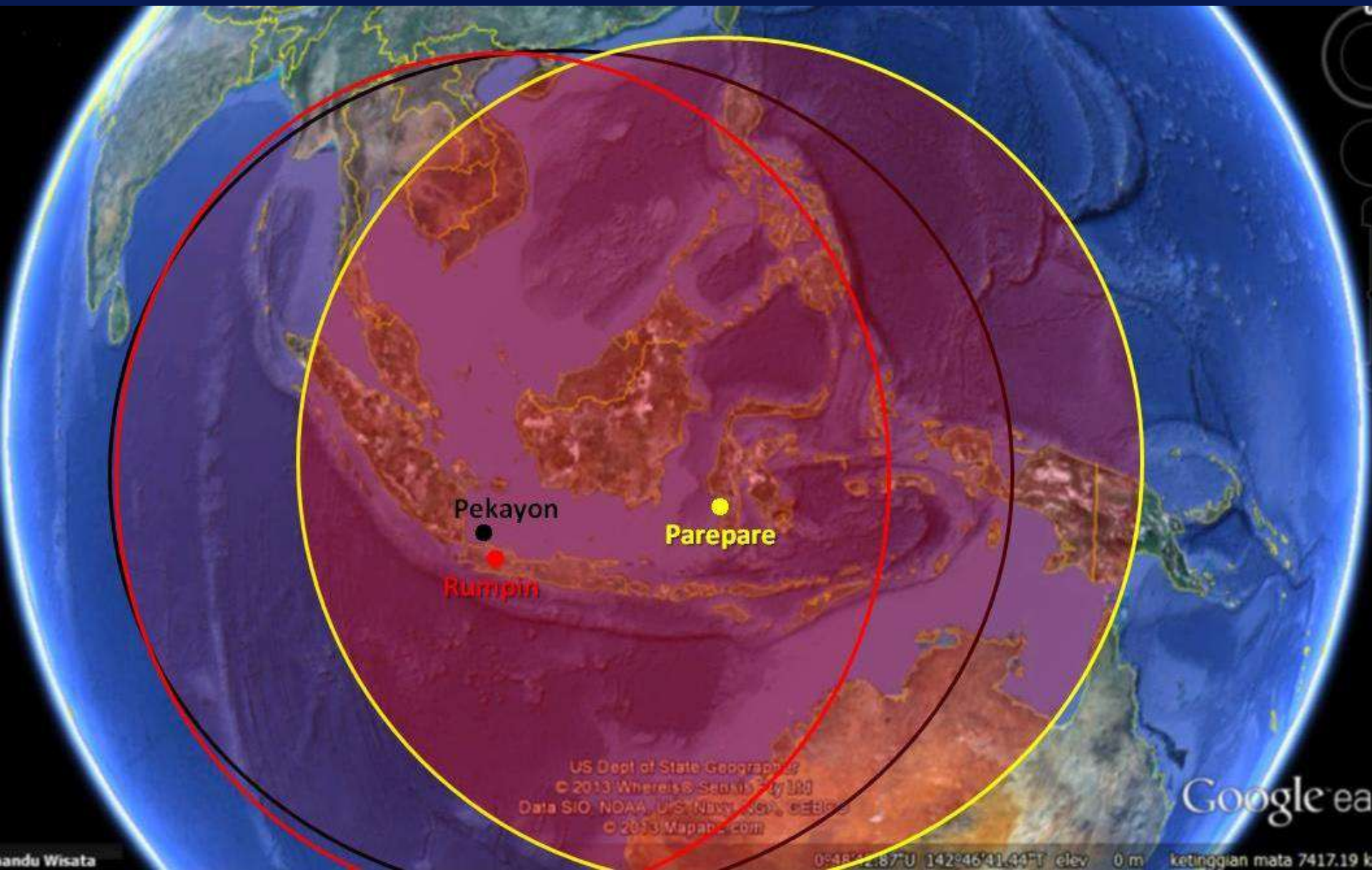


Synchronization Process will be continued **to solve overlapping conflicts** in permits and spatial/land use

SYNCHRONIZATION OF OVERLAPPING LAND USE

Some technical and strategic aspects of One Map Policy **need to be improved** to support the continuity of One Map Policy after 2019, so the OMP's products should be expanded, updated, and used **to support national/local development planning based on spatial data/information.**

Antenna coverage



Optical and SAR data acquired at LAPAN Remote Sensing Ground Stations

Very high res.
(50 cm)

- Pleiades 1A
- Pleiades 1B

High res.
(1.5 m)

- SPOT-6
- SPOT-7

Medium res.
(15 dan 30 m)

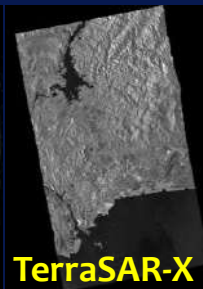
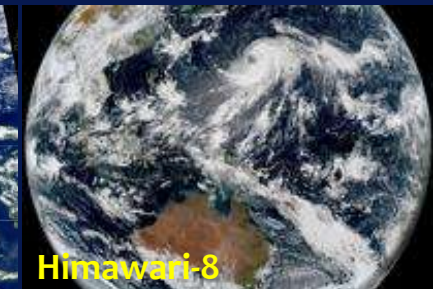
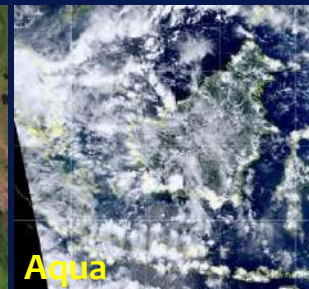
- Landsat-7
- Landsat-8

Coarse res.
(≥ 250 m)

- Terra
- Aqua
- S-NPP
- NOAA-18
- NOAA-19
- NOAA-20
- MetOp-A
- FY-3B/3C
- Himawari-8

SAR
(≤ 40 m)

- TerraSAR-X
- TanDEM-X



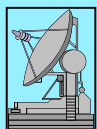
Data acquisition, processing, management, and information dissemination system

Parepare Ground Station



Data acquisition and processing system (Terra, Aqua, S-NPP, Landsat-7/8, SPOT-6/7 Pleiades, TerraSAR-X, TanDEM-X)

Rumpin Ground Station



Data acquisition and processing system (Terra, Aqua, Landsat-7/8)

Jakarta Ground Station



Data acquisition and processing system (NOAA-18/19/20, FY-3B/3C, MetOp-A, Himawari-8)

Data Center (Jakarta)

Data processing
(geometric and radiometric correction, cloud masking, and mosaicing)

Data storing

Data cataloging

Remote Sensing
Applications Center

Ministries/Agencies

Local Governments

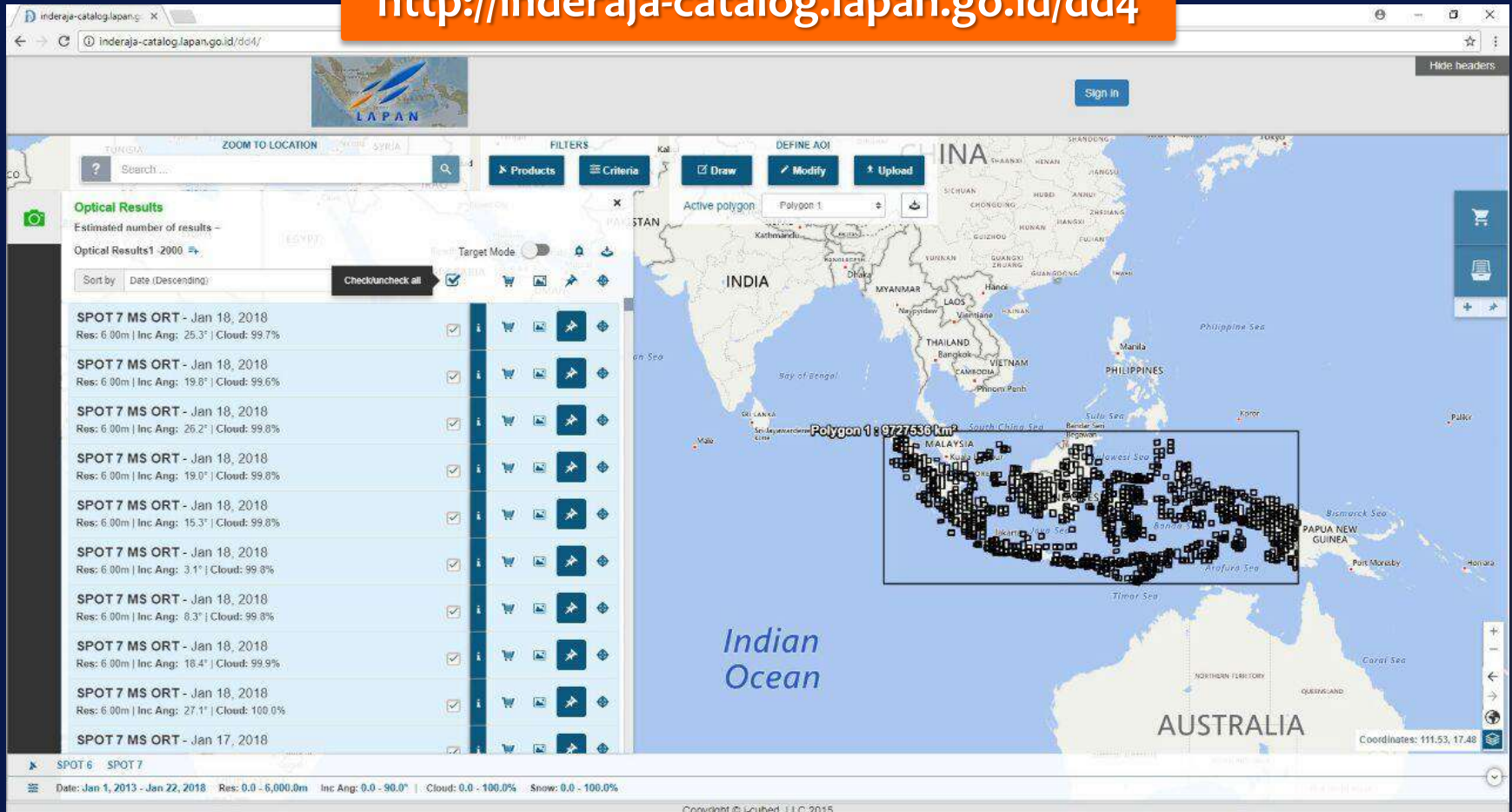
University

Public

Information

Remote sensing data catalog

<http://inderaja-catalog.lapan.go.id/dd4>



The screenshot displays the Inderaja Catalog web application. The interface includes a search bar, a map of Southeast Asia with a polygon drawn over Indonesia, and a list of satellite data results on the left. The map shows a polygon labeled "Polygon 1" with an area of 9727536 km². The list of results includes data for SPOT 7 MS ORT, dated Jan 18, 2018, with various metadata such as Resolution (6.00m), Incidence Angle (25.3°), and Cloud cover (99.7%).

Optical Results
Estimated number of results -
Optical Results1 -2000

Sort by: Date (Descending)

SPOT 7 MS ORT - Jan 18, 2018	Res: 6.00m Inc Ang: 25.3° Cloud: 99.7%	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
SPOT 7 MS ORT - Jan 18, 2018	Res: 6.00m Inc Ang: 19.8° Cloud: 99.6%	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
SPOT 7 MS ORT - Jan 18, 2018	Res: 6.00m Inc Ang: 26.2° Cloud: 99.8%	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
SPOT 7 MS ORT - Jan 18, 2018	Res: 6.00m Inc Ang: 19.0° Cloud: 99.8%	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
SPOT 7 MS ORT - Jan 18, 2018	Res: 6.00m Inc Ang: 15.3° Cloud: 99.8%	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
SPOT 7 MS ORT - Jan 18, 2018	Res: 6.00m Inc Ang: 3.1° Cloud: 99.8%	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
SPOT 7 MS ORT - Jan 18, 2018	Res: 6.00m Inc Ang: 8.3° Cloud: 99.8%	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
SPOT 7 MS ORT - Jan 18, 2018	Res: 6.00m Inc Ang: 18.4° Cloud: 99.9%	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
SPOT 7 MS ORT - Jan 18, 2018	Res: 6.00m Inc Ang: 27.1° Cloud: 100.0%	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
SPOT 7 MS ORT - Jan 17, 2018		<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

SPOT 6 SPOT 7

Date: Jan 1, 2013 - Jan 22, 2018 Res: 0.0 - 6,000.0m Inc Ang: 0.0 - 90.0° Cloud: 0.0 - 100.0% Snow: 0.0 - 100.0%

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Cooperation with Ministries/Agencies



**BADAN INFORMAS
GEOSPASIAL**



BMKG



B N P B



**KEMENTERIAN
KESEHATAN
REPUBLIK
INDONESIA**

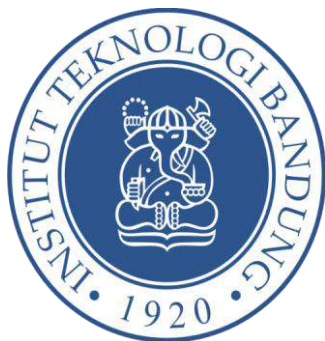


Kementerian Pertar



**KEPOLISIAN NEGARA
REPUBLIK INDONESIA**

Cooperation with Universities and Private Sectors



PT PERIKLANAN NUSANTARA (PERSERO)



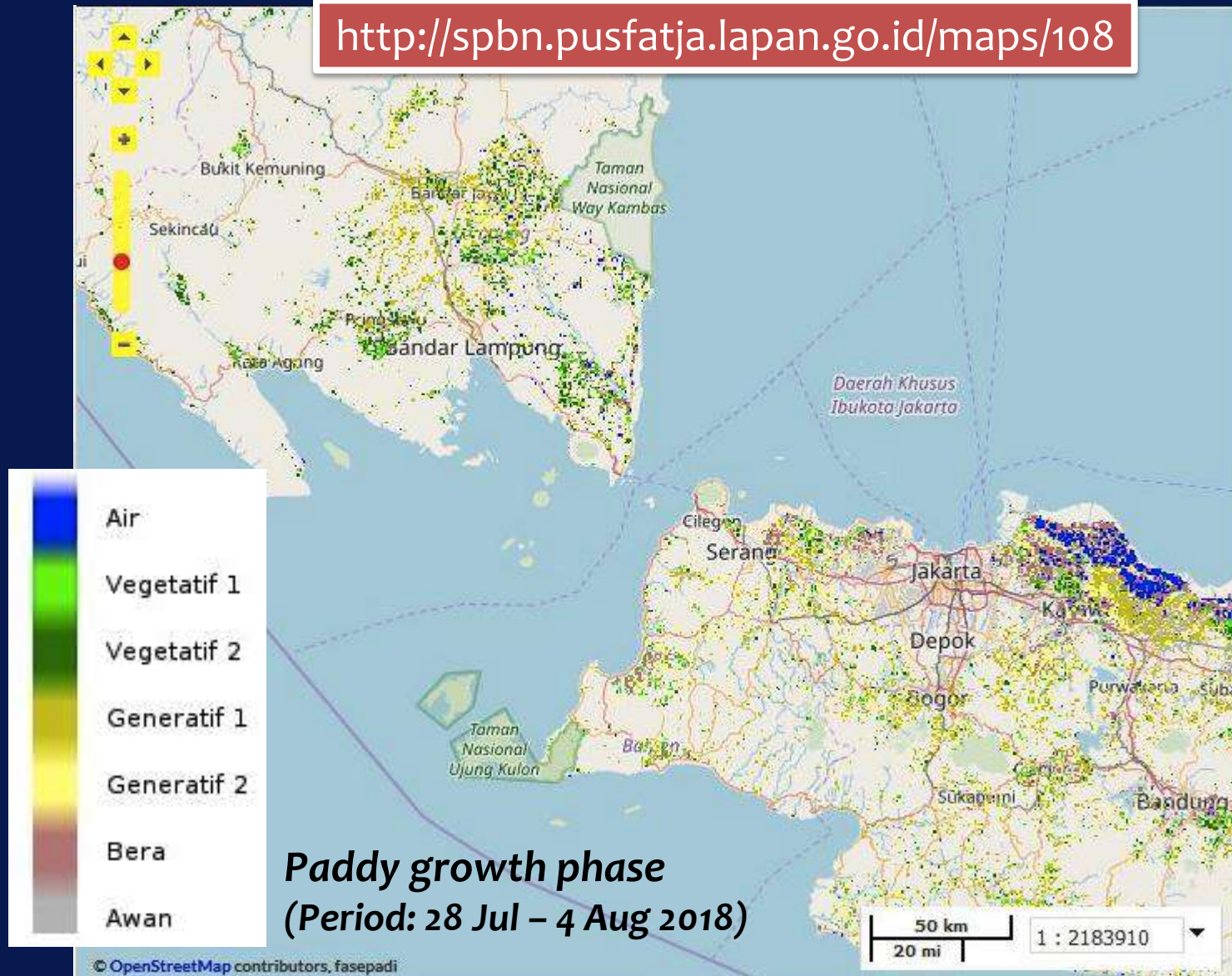
WRI INDONESIA

Cooperation with Local Governments



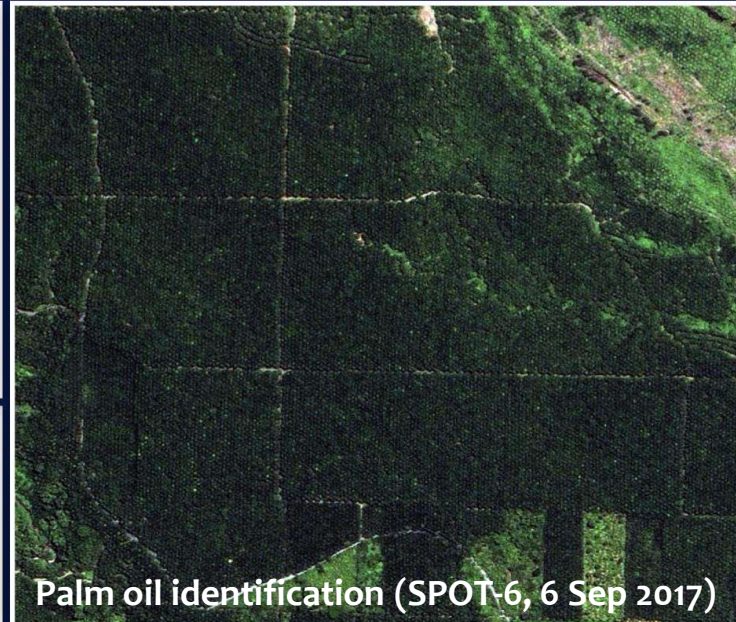
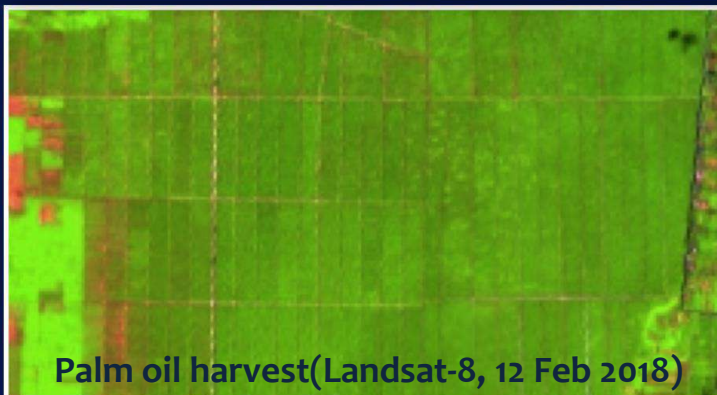
Remote sensing-based information Agriculture

<http://spbn.pusfatja.lapan.go.id/maps/108>

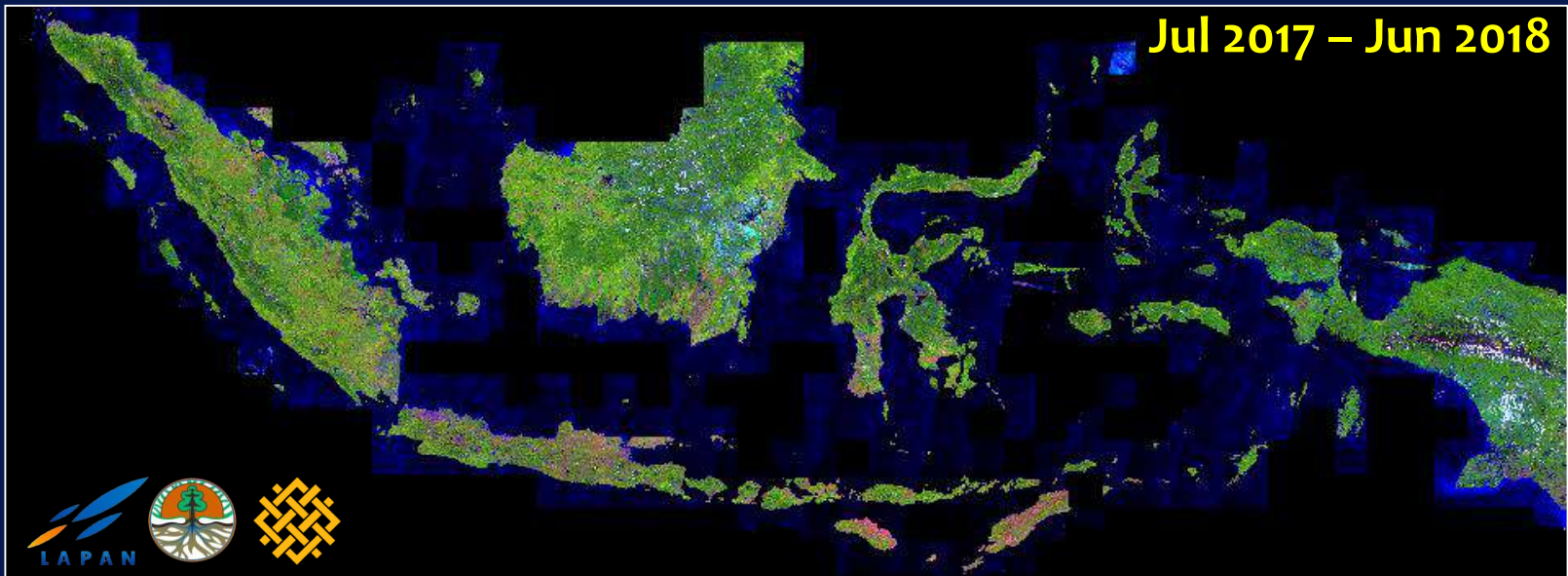
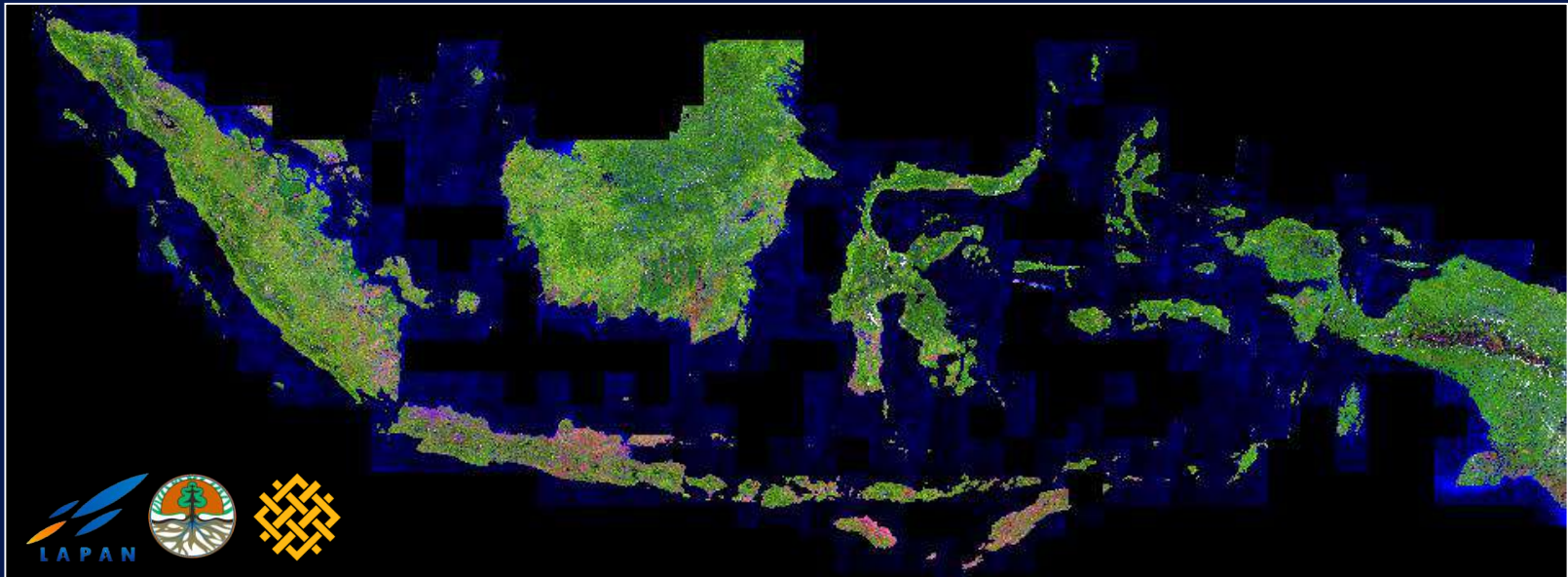


Remote sensing-based information

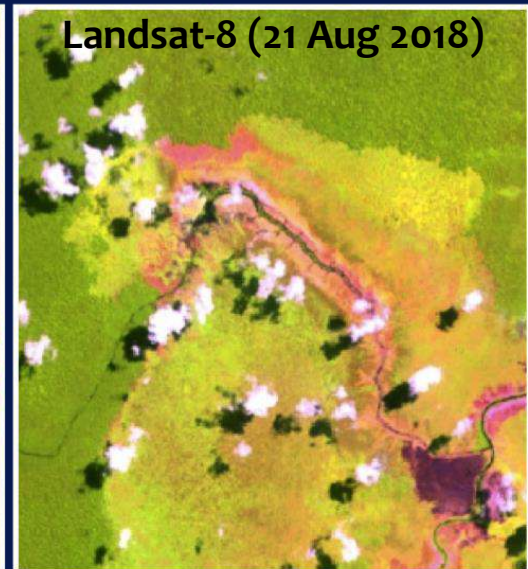
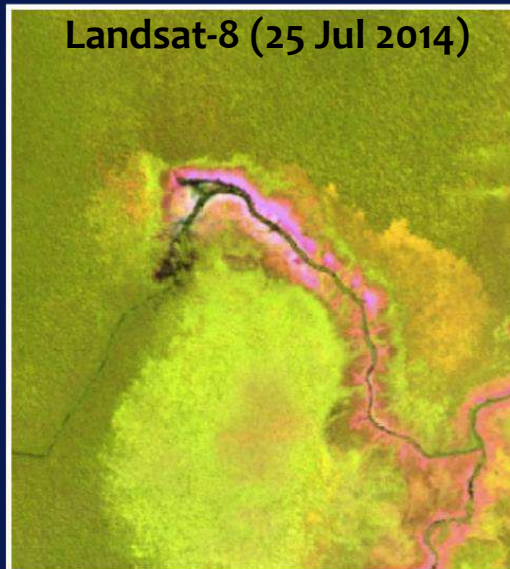
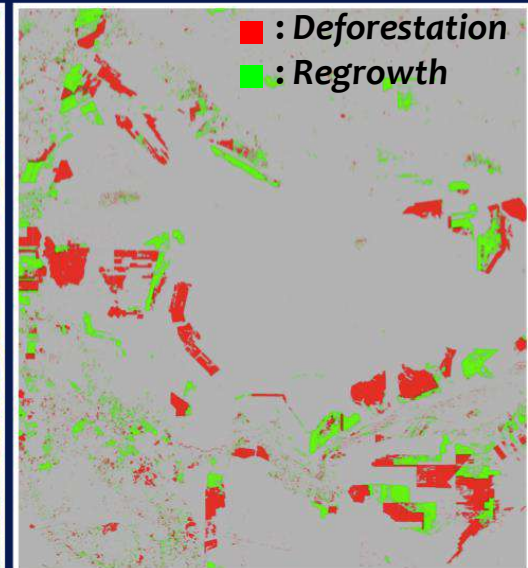
Forestry



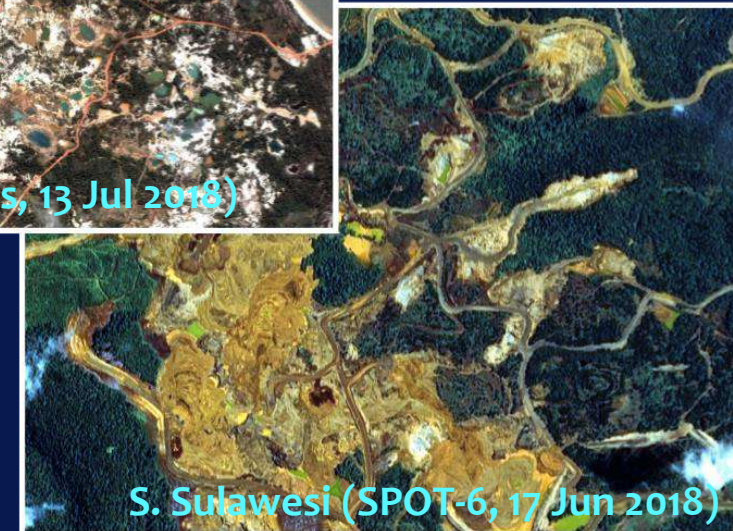
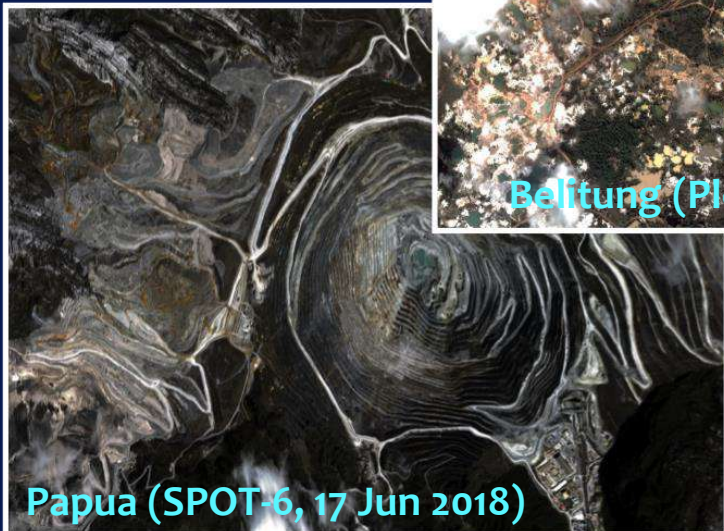
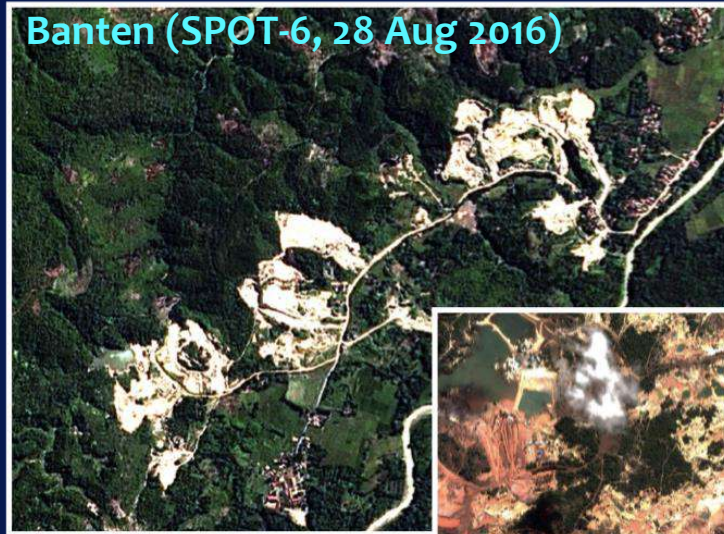
Annual Landsat-8 data mosaic for land cover updating



Remote sensing-based information Forestry

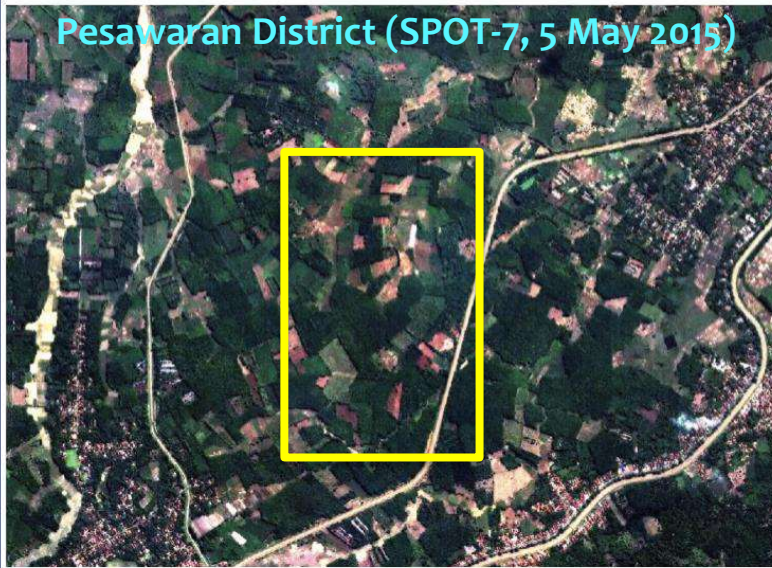


Remote sensing-based information Mining



Remote sensing-based information Spatial Planning

Pesawaran District (SPOT-7, 5 May 2015)



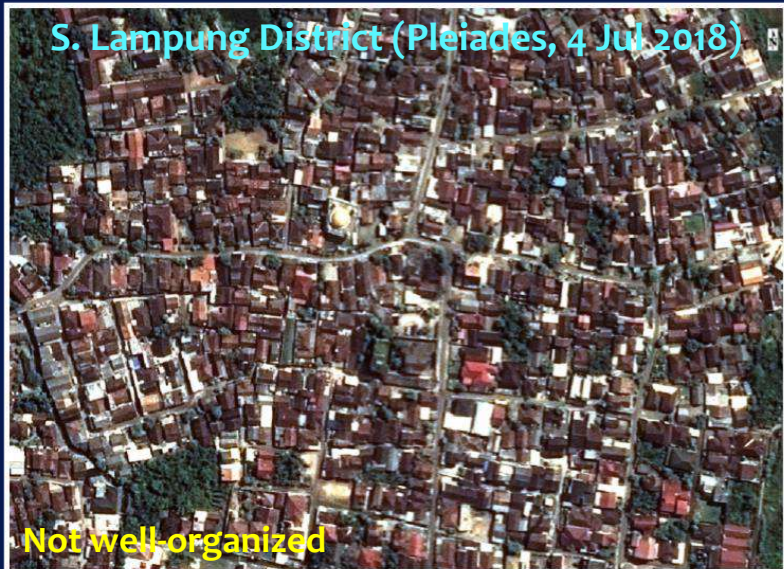
Pesawaran District (Pleiades, 31 Jan 2018)



S. Lampung District (Pleiades, 4 Jul 2018)



S. Lampung District (Pleiades, 4 Jul 2018)



Remote sensing-based information Taxation

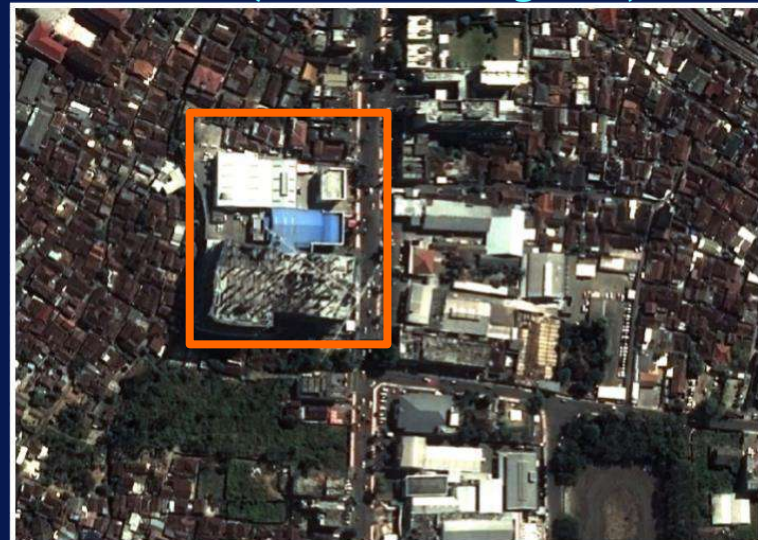
Bandar Lampung City



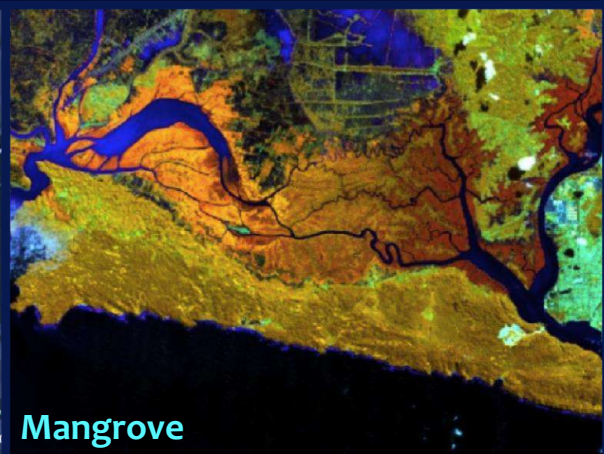
Before (Geoeye, 16 Apr 2011)



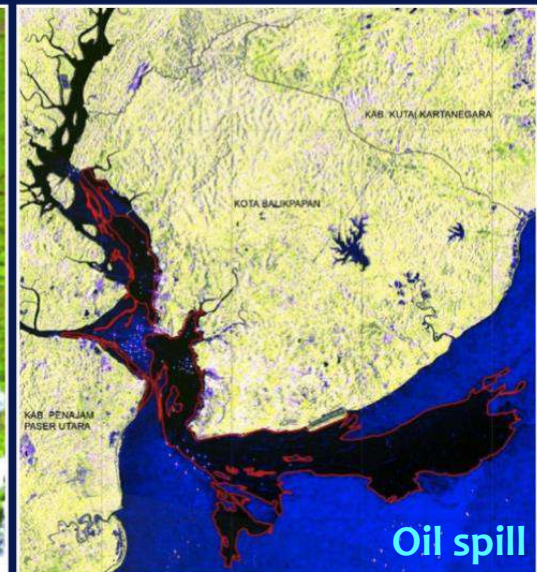
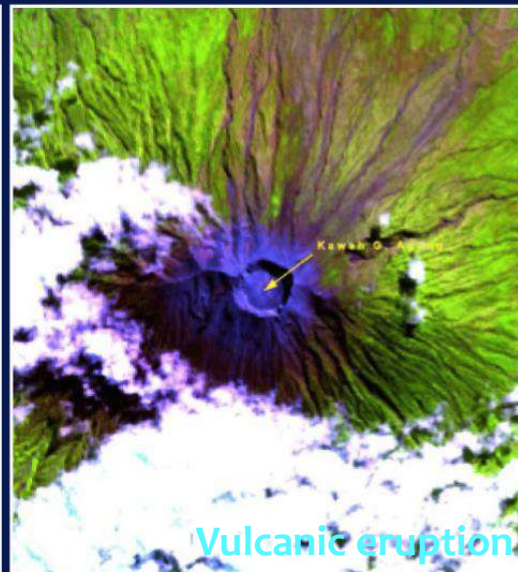
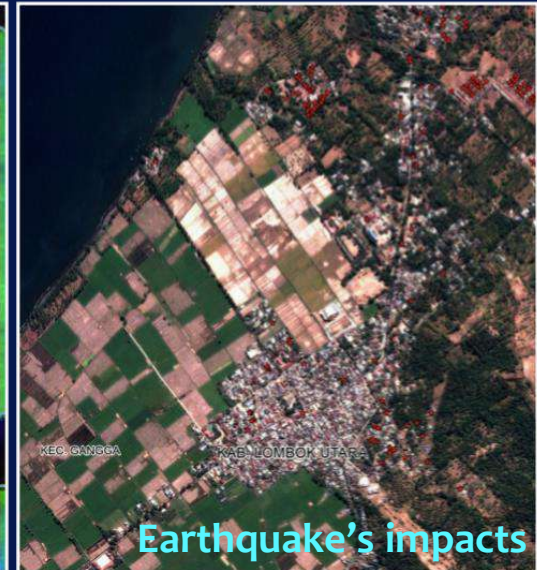
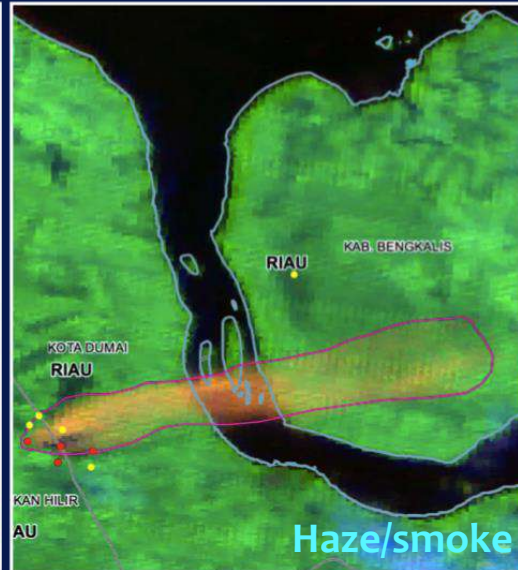
After (Pleiades, 5 Aug 2018)



Remote sensing-based information Fisheries and Marine



Remote sensing-based information Disasters

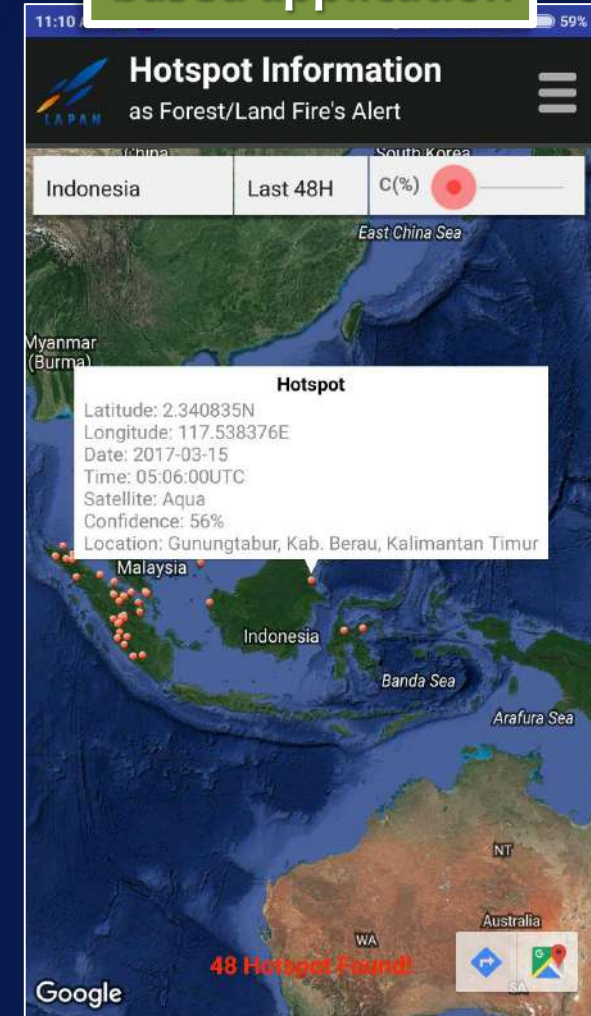


Near-real time hotspot monitoring

<http://modis-catalog.lapan.go.id/monitoring/>



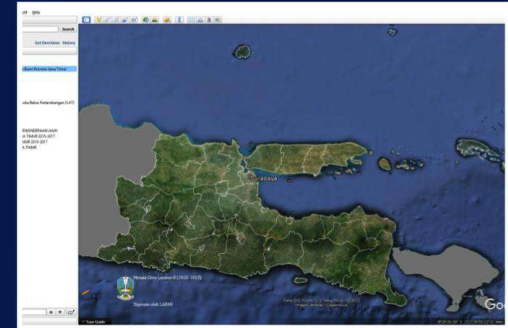
Android dan IOS based application



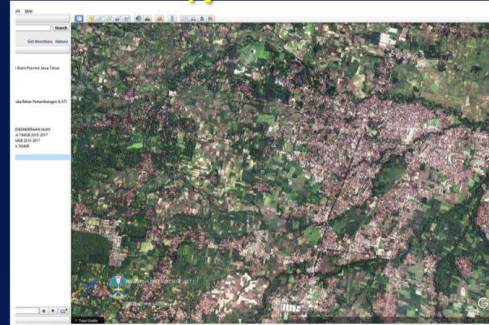
Provincial-based Earth Observation System

- Google Earth-based system (open source)
- Mosaic data and very high resolution images
- Daily/8-daily/annual information

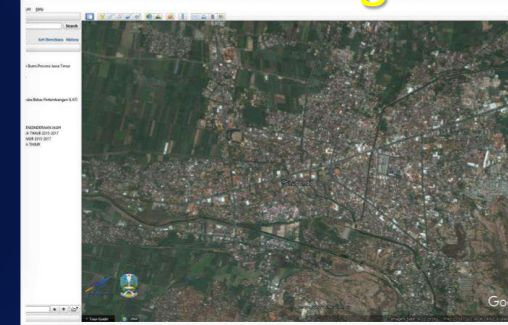
Landsat-8 data mosaic



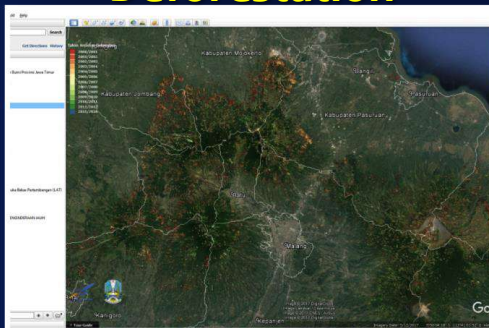
SPOT-6/7 data mosaic



Pleiades images



Deforestation



Paddy growth phase



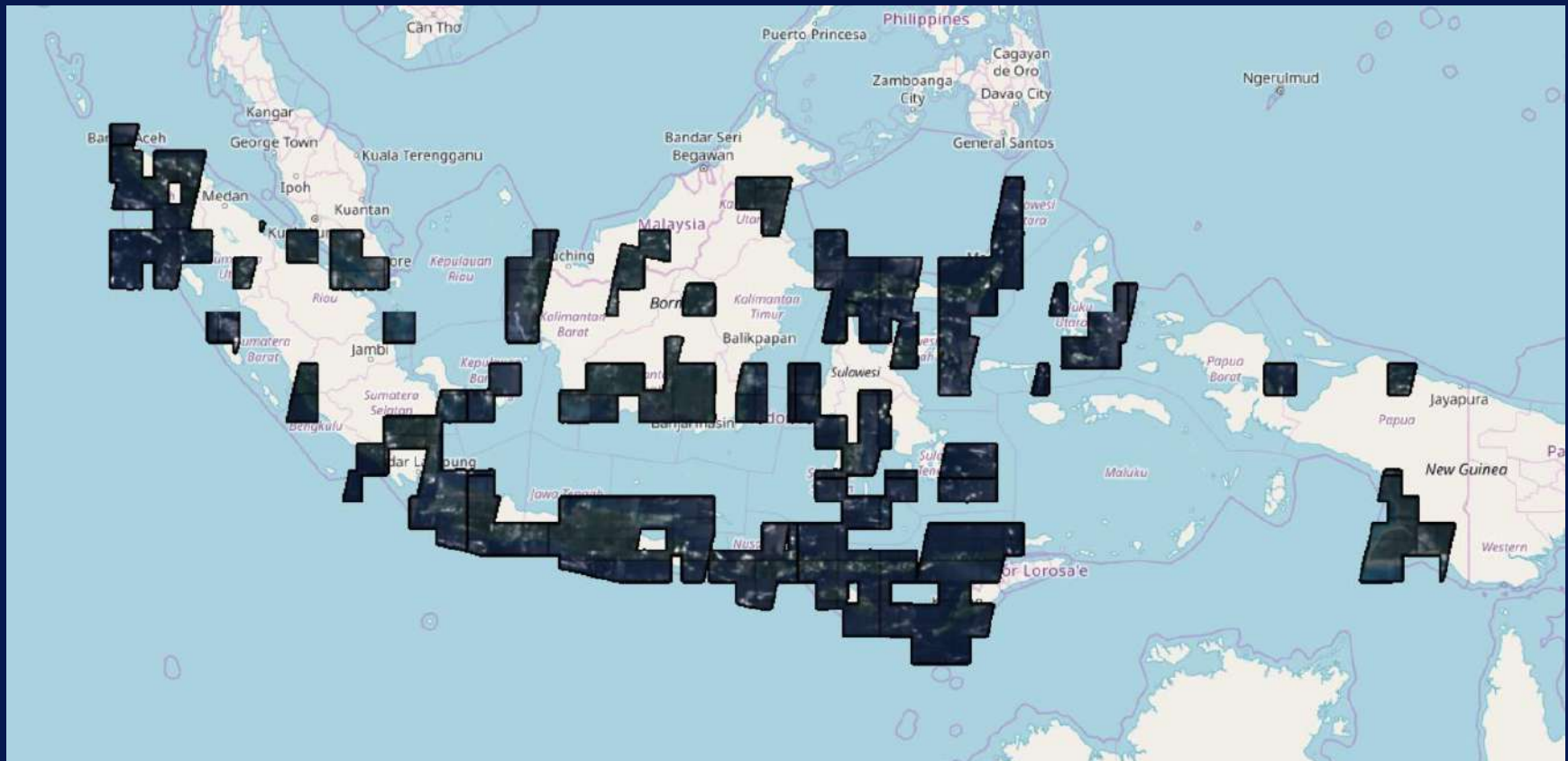
Fishing ground potential



Sentinel-2 data available at LAPAN

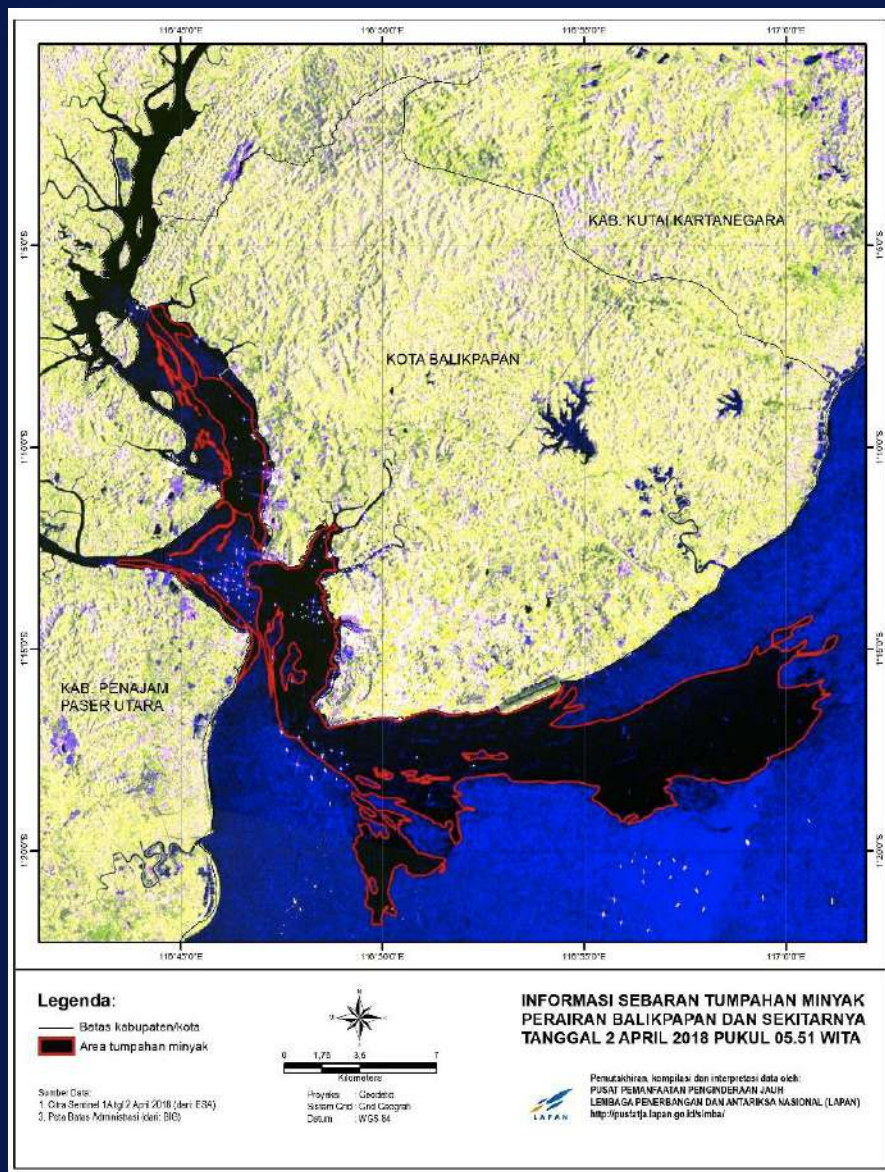
(as per 3 Sep 2018)

Sentinel-2 data (2017-2018) downloaded from Copernicus Program



Sentinel-1A data

Oil spill (East Kalimantan Prov., 2 Apr 2018)



Sentinel-1A/B data

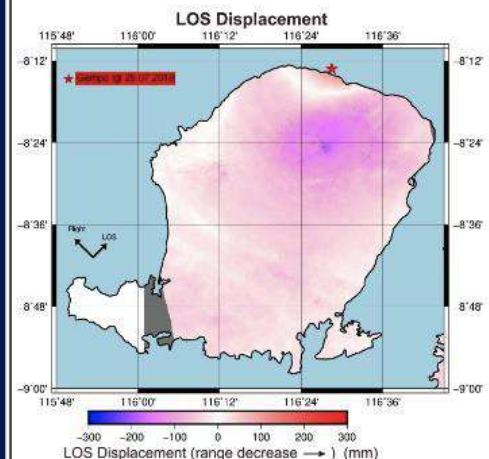
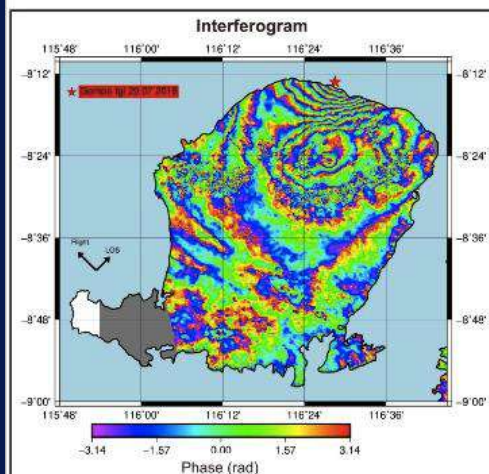
Earthquake (N. Lombok District, 5 Aug and 19 Aug 2018)



DEPUTI BIDANG PENGINDERAAN JAUH
LEMBAGA PENERBANGAN DAN ANTARIKSA NASIONAL

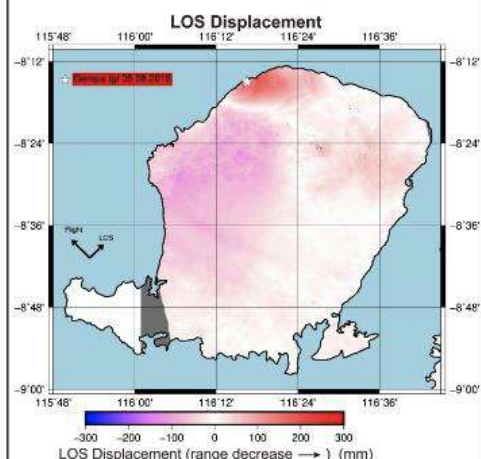
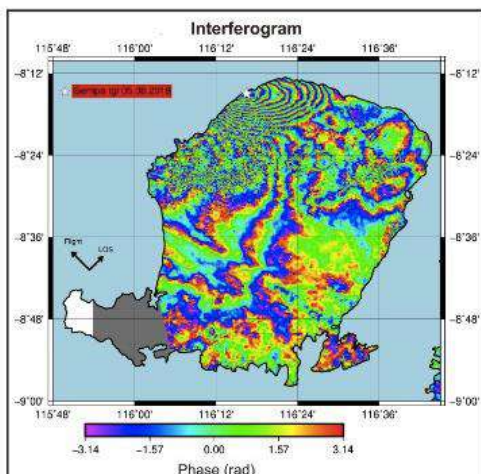
Jl. Kalisan No 8 Pekayon, Pasar Rebo, Jakarta 13710, Indonesia
Telp. 021-8710066 Faks. 021-8722733 email: tmtanggapbencana@lapan.go.id http: www.pusfatja.lapan.go.id

INFORMASI INTERFEROGRAM DAN LOS (LINE OF SIGHT) DISPLACEMENT AKIBAT GEMPA
BERDASARKAN DATA CITRA RADAR SENTINEL - 1
PULAU LOMBOK, NUSA TENGGARA BARAT



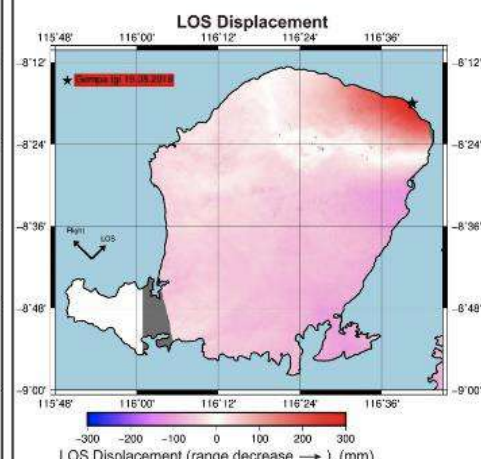
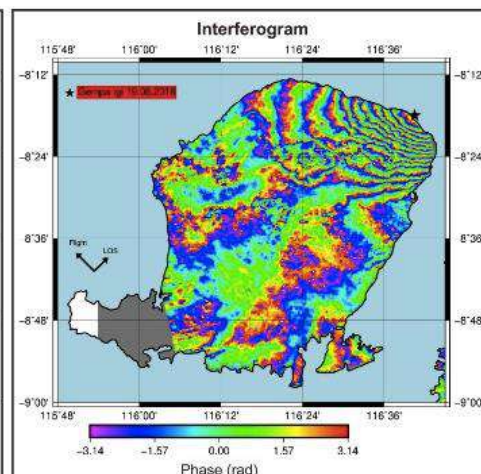
Pasangan data

Sebelum gempa: Citra Sentinel-1 tanggal 27 Juli 2018
Setelah gempa: Citra Sentinel-1 tanggal 02 Agustus 2018



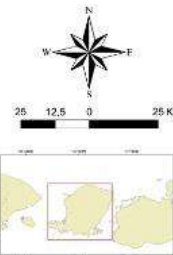
Pasangan data

Sebelum gempa: Citra Sentinel-1 tanggal 02 Agustus 2018
Setelah gempa: Citra Sentinel-1 tanggal 08 Agustus 2018



Pasangan data

Sebelum gempa: Citra Sentinel-1 tanggal 14 Agustus 2018
Setelah gempa: Citra Sentinel-1 tanggal 20 Agustus 2018



Keterangan :

Berdasarkan pengolahan DiNSAR (Differential Interferometry Synthetic Aperture Radar) menggunakan data Sentinel-1 dapat diperoleh data Interferogram dan LOS (Line of Sight) Displacement.

Citra Interferogram dapat digunakan untuk mengetahui wilayah yang mengalami deformasi (perubahan elevasi) akibat gempa yang disebabkan oleh pergerakan lempeng. Daerah yang mengalami deformasi ditunjukkan dengan keberadaan perulangan beda fase yang membentuk perulangan garis - garis warna secara rapat pada citra, membentuk kontur radius di sekitar titik episentrum.

Citra LOS Displacement dapat digunakan untuk mengetahui besaran deformasi berdasarkan perubahan elevasi terhadap posisi satelit. Besaran nilai deformasi berdasarkan citra LOS Displacement kemungkinan berbeda dengan nilai deformasi vertikal di lapangan.

Citra Interferogram dan citra LOS Displacement dapat digunakan untuk memperkirakan daerah yang terdampak gempa.

Sumber Data :

1. Citra Sentinel-1 (EU Copernicus)
2. Batas Administrasi (BIG)

Perolehan dan pengolahan data :
Pusat Teknologi dan Data Penginderaan Jauh

Pemutakhiran, kompilasi dan interpretasi data :
Pusat Pemantauan Penginderaan Jauh

Sentinel-2 data

Lava dome changes (Mt. Merapi, 14-22 Aug 2018)

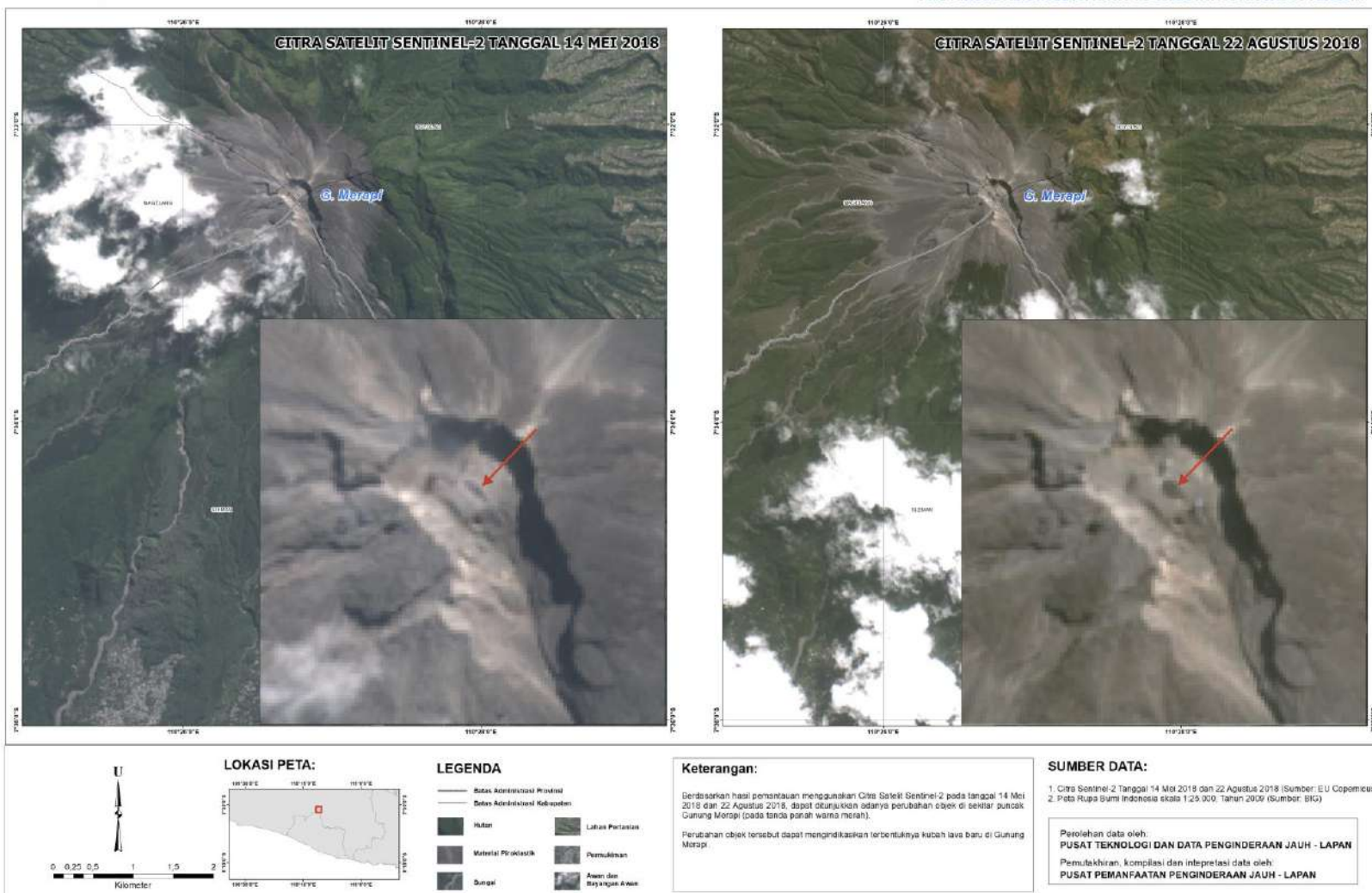


DEPUTI BIDANG PENGINDERAAN JAUH LEMBAGA PENERBANGAN DAN ANTARIKSA NASIONAL

Jl. Kalsaria No. 8, Pekayon, Pasar Rebo, Jakarta 13710, Indonesia
Telp. 021-8710065, Faks. 021-8722733, E-mail: timtanggapbencana@lapan.go.id, http://pusat@lapan.go.id

INFORMASI WILAYAH BENCANA BERBASIS SATELIT IDENTIFIKASI KUBAH LAVA GUNUNG MERAPI PERIODE 14 MEI - 22 AGUSTUS 2018

PROVINSI DAERAH ISTIMEWA YOGYAKARTA DAN JAWA TENGAH



- Utilization of Copernicus data in Indonesia:
 - Various types and resolutions of remote sensing data will be available and easy access.
 - Research and development of user-driven applications will be improved.
 - Capacity building of remote sensing technology and applications will be increasing.
- The European Commission and LAPAN cooperation on data access and use of Sentinel data of the Copernicus programme would increase our understanding on the natural resources and their changes for better local development planning.



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Thank you
for
your attention

inderaja.lapan.go.id
pustekdata.lapan.go.id
pusfatja.lapan.go.id