INDONESIA

COUNTRY REPORT

25th APRSAF 2018, Singapore

Erna Sri Adiningsih
Prime Secretary
National Institute of Aeronautics and Space
[LAPAN]
A- FIVE-YEAR ROCKET R&D PROGRAM

- Multi Stage Sounding Rocket Joint Research Program
- RX 320 Atmospheric Sensor Payload Flight Test Joint Program w/ TU Berlin
- Indonesian Spaceport Feasibility Studies
- Indonesian Spaceport Design and Preparation Coordination
- Spaceport Development
- Multi Stage Sounding Rocket Dissemination
- Rocket Technology Dissemination Joint Cooperation Program w/ National Consortium, private sectors and universities for Lightning Trigger and Weather Modification and other purposes to solve existing national problems
- High Speed Autonomous Rocket Control System Research and Development
- Low-speed Autonomous Control Qualification & Acceptance Tests
- Liquid Propellant Engines Research and Development
- Qualification and Acceptance Tests
- Dissemination

Timeline:
- 2019
- 2020
- 2021
- 2022
- 2023
Legal Basis:
- Indonesia Space Law No 21 in 2013
- President Regulation No. 45 in 2017 about National Space Roadmap
LAPAN-A4 SATELLITE

<table>
<thead>
<tr>
<th>Launch Plan</th>
<th>Q1: 2020</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dimension (mm)</td>
<td>744 x 700 x 520</td>
</tr>
<tr>
<td>Mass (kg)</td>
<td>~150 kg</td>
</tr>
<tr>
<td>Orbit</td>
<td>500 km</td>
</tr>
<tr>
<td>Inclination (deg)</td>
<td>97 SSPO</td>
</tr>
<tr>
<td>Power</td>
<td>~200 W (EOL)</td>
</tr>
<tr>
<td>Communication</td>
<td>TTC AIS</td>
</tr>
<tr>
<td>Payload</td>
<td>S-Band; 20 kbps/384 kbps Up/down</td>
</tr>
<tr>
<td></td>
<td>VHF; 156 – 162 MHz</td>
</tr>
<tr>
<td></td>
<td>X-band, 200 Mbps Downlink</td>
</tr>
</tbody>
</table>

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**Medium Res Multispectral Camera**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Imaging Method</td>
<td>Pushbroom</td>
</tr>
<tr>
<td>Multispectral bands</td>
<td>Blue : 450-510 nm</td>
</tr>
<tr>
<td></td>
<td>Green : 523-605 nm</td>
</tr>
<tr>
<td></td>
<td>Red : 629-690 nm</td>
</tr>
<tr>
<td></td>
<td>NIR : 774-900 nm</td>
</tr>
<tr>
<td>GSD</td>
<td>16 m@500 km altitude</td>
</tr>
<tr>
<td>Swath</td>
<td>230 km@500 km altitude</td>
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**High Res Multispectral Camera**

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</tr>
<tr>
<td>Multispectral bands</td>
<td>Panchromatic : 410-700 nm</td>
</tr>
<tr>
<td></td>
<td>Red : 630-700 nm</td>
</tr>
<tr>
<td></td>
<td>NIR : 770-900 nm</td>
</tr>
<tr>
<td>GSD</td>
<td>5 m@500 km altitude</td>
</tr>
<tr>
<td>Swath</td>
<td>33 km@500 km altitude</td>
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</table>

**Next Gen AIS**

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**Earth Magnetometer**

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- **Launch Plan**: Q1: 2020
- **Dimensions**: 744 x 700 x 520 mm
- **Mass**: ~150 kg
- **Orbit**: 500 km
- **Inclination**: 97 SSPO
- **Power**: ~200 W (EOL)
- **Communication**: TTC AIS
- **Payload**: S-Band; 20 kbps/384 kbps Up/down
- **Frequency Range**: 156 MHz – 163 MHz
- **Sensitivity**: < -125 dBm @20% PER
- **Earth Magnetometer**: Resolution 7 Km/Sample
- **Medium Res Multispectral Camera**
  - **Imaging Method**: Pushbroom
  - **Multispectral bands**: Blue : 450-510 nm, Green : 523-605 nm, Red : 629-690 nm, NIR : 774-900 nm
  - **GSD**: 16 m@500 km altitude
  - **Swath**: 230 km@500 km altitude
- **High Res Multispectral Camera**
  - **Imaging Method**: Pushbroom
  - **Multispectral bands**: Panchromatic : 410-700 nm, Red : 630-700 nm, NIR : 770-900 nm
  - **GSD**: 5 m@500 km altitude
  - **Swath**: 33 km@500 km altitude

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- **50 Million Km² High Res Images**
- **150 Million Km² Multispectral Images**
- **950 Million Ship Position Report Identified**
- **20.8 Million Km Earth Magnetic Field Measured**
- **2500 Hours TTC Operations**

*Expected after 2 years Ops*
PROGRAM DEVELOPMENT 2011-2015

- PROTOTYPING
  To produce basic prototype (LSU01-05) and LSA to be Development as Tactical UAV and MALE

- OPERATIONS
  To operated at many application to get requirement and experienced

CONSOLIDATION PHASE 2015-2019

- CERTIFICATION
  To certificate one off series (LSU-03) to improve system engineering AND qualification procedure (CASR)

- STANDARIZATION
  To standardized a component to fulfill professional UAV (control, airframe and special frequency of Communication System)

MISSION DEVELOPMENT 2019-2024

- MISSION CHAMPAGN
  To define strategic mission base on LSU for Maritime Application

- MISSION DEVELOPMENT
  To define mission to strategic step and start develop system design engineering, requirement and operations concept
Decision Support System (DSS)

- **Research & Model**
  - Dynamics
  - Physics
  - Composition

- **Observation & Measurement**
  - Satellite
  - Radar
  - Airborne

- **DSS**
  - Assessment
  - Decision Support System

- **Prediction**

- **Partnership**

- **Benefit for the Nation & Community**
  - Policy Decision
  - Manage. Decision

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<tr>
<th>INPUT</th>
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<th>OUTCOME</th>
<th>IMPACT</th>
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<td>OPERATIONAL AGENCY</td>
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DSS Applications Development Based on Meteorological Satellite and Atmospheric Models

• Satellite Disaster Early Warning System (SADEWA)
  – Real time satellite-based observation and prediction of extreme rainfall and potential hydro-meteorological disaster in Indonesia to support disaster management.

• Maritime Information System (SEMAR)
  – Real time satellite-based observation and prediction of oceanic and atmospheric condition in Indonesia to support marine safety and fish production. Also provide information on potential fishing ground and ships location.

• Indonesia Atmospheric Composition Information System (SRIKANDI)
  – Real time satellite-based observation and prediction of atmospheric composition and air quality over Indonesia to support environmental and forest fire management.

• Indonesia Climate Change Information System (SRIRAMA)
  – Long term model-based climate change projection over Indonesia to support national, regional and urban planning and development.
LAPAN Ground Stations from experimental to operational


Low resolution
- NOAA series s/d 17
- GMS series s/d 5
- FY-1 series
- FY-3A
- FY-3B/3C

Medium resolution
- SPOT-2/4
- Landsat-MSS
- Landsat-7
- Landsat-8

High resolution
- SPOT-5
- SPOT-6/7

Very high resolution
- JERS
- ERS-1/2

SAR
- No longer acquired
- Actively acquired

Experimental
- Operational
Role of LAPAN as the national remote sensing data provider begins from

- **The Presidential Instruction No. 6/2012**
  LAPAN is obligated to provide high resolution remote sensing data (resolution < 4 meters) nationally

- **The Law No. 21/2013 on Space Activities**
  - LAPAN develops National Remote Sensing Data Bank
  - Methodologies of remote sensing data and information processing should refer to LAPAN regulation

- **The Government Regulation No. 11/2018**
  Regulation on the procedure of remote sensing data acquisition; data processing; data storing and distribution; and data applications and information dissemination
Acquisition of high resolution data has started in 2013

As the follow-up of the Presidential Instruction No. 6/2012, LAPAN supported by the President's Delivery Unit for Development Monitoring and Oversight (UKP4) began to assess the acquisition of high resolution data in the Remote Sensing Ground Station in Parepare, South Sulawesi.

The acquisition of SPOT-5 and SPOT-6 data of Airbus DS established through the international bidding held by UNOPS under the Indonesia-Norway LoI of “Cooperation on reducing greenhouse gas emissions from deforestation and forest degradation”.

The inauguration of the upgraded Remote Sensing Ground Station in Parepare was held on 12 September 2013 by Minister of Research and Technology.
Role of LAPAN in supporting National Development Priorities

Main factors
- Human resources
- Cooperation
- Budget
- Infrastructure

Targets of National Development Priority

Remote sensing data and information services

Operationalization of remote sensing data and information

Capacity building at national and local governments

Research on remote sensing technology, data and applications
LAPAN Remote Sensing Facilities
Distributed data to Ministries, Agencies, Local Governments and Educational Institutions

Periode 2015 - July 2018

![Graph showing distributed data to different satellite systems: Pleiades, SPOT-5, SPOT-6, SPOT-7, TerraSAR-X/TanDEM-X. The data is presented for the years 2015 and 2016.]
Distributed data to Local Governments

Periode 2015 - July 2018
North Lombok earthquake 29 July 2018

SPOT-6/7 mosaic, 2014-2017
North Lombok earthquake
29 July 2018

SPOT-7 data,
30 July 2017
Earthquakes and Tsunamis that hit Donggala Districts, Palu City, and Sigi Districts in Central Sulawesi on Friday, 28 September 2018 have been killing more than 1700 people (BNPB Data). It damaged buildings and important infrastructure in those regions. To describe the condition and situation of the disaster areas, LAPAN analyzed the areas by using remote sensing data satellites.

**Initial information:**
The potential tsunami inundation using a tsunami wave height scenario is carried out to provide an overview of the community in relation to the potential of the affected-tsunami area. The inundation potential is overlaid with very high resolution images to show the building and infrastructure in the inundation zone.

**Petobo:**
The Petobo region which was suspected experiencing a liquefaction, has been calculated by the remote sensing satellite data, long before and after the earthquake covering an area of 175.64 Ha with the number of damaged buildings around 2059.

**Balaroa:**
The Balaroa region which was suspected experiencing a liquefaction, has been calculated by the remote sensing satellite data, long before and after the earthquake covering an area of 47.8 Ha with the number of damaged buildings around 1045.

**Jono Oge (Sigi):**
The Jono Oge (Sigi) region which was suspected experiencing a liquefaction, has been calculated by the remote sensing satellite data, long before and after the earthquake covering an area of 202.1 Ha with the number of damaged buildings around 417 and possibly damage around 277. Damaged paddy fields around 113 Ha, damaged plantation around 26 Ha and damaged bushes around 50 Ha.

**Other damage**
Remote sensing data has also identified 4101 other damaged buildings outside the area affected by the liquefaction. There might be additional buildings being damaged, because not all areas could be covered by satellite images.
Tourism

Garuda Wisnu Kencana Cultural Park, Bali Province
Settlement
Aertembaga district, North Sulawesi Province
Mining area

Palu City, Central Sulawesi Province
Change detection

Jakarta
Flood simulation

Bima City, West Nusa Tenggara Province
Natural Resources Monitoring

- Paddy growth
- Deforestation
- Plantation
- Mining
- Mangrove
- Coral reefs
- Fishing ground
- Water Quality
- Spatial planning
Environment and Disaster Mitigation

- Flood
- Drought
- Forest Fires
- Earthquake
- Volcano
- Tsunami
- Oil Spills
- Small island
- Country Border
- Cannabis
International cooperation signed in 2018


2. LAPAN-PASCO Agreement on Joint Development of Regional Data Node (ReDaNo) for SEA users.

3. LAPAN-JAMSTEC

4. Provision and Implementing Arrangement between LAPAN-CLTC, China

5. LoI Cabinet Office of JAPAN with 6 Indonesian Government Bodies and Institutions.
• **ATZG (ASIAN TRY ZERO G) 2017-2018**

**SPACE EXPERIMENT 13 February 2018, JAXA, Tsukuba Space Center**

• **SURYA SAT-1.** JAXA and UNNOSA have selected a team from Surya University of Indonesia for the third round of KiboCUBE as the second entity, after the selection of the team from Mauritius Research Council in June this year

• **Rocket Payload and Atmospheric Balloon Payload Competition (KOMURINDO-KOMBAT)**
CONCLUDING REMARKS

RECENT AND FUTURE ACTIVITIES

4. Development of Decision Support System (DSS) based on meteorological and remote sensing satellite data for environment, natural resource and disaster management.
5. Upgrading the remote sensing antenna in Pare-pare LAPAN Facilities.
CONCLUDING REMARKS

• LAPAN welcomes collaboration with agencies in Asia/Oceania in development and utilization of meteorological satellites.

• LAPAN welcomes collaboration in space activities with agencies, institutions, and other space players
THANK YOU
TERIMA KASIH

“LAPAN Unggul, Indonesia Maju
LAPAN Melayani, Indonesia Mandiri”