JAXA’s satellites for Disaster Risk Reduction

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Panel on Space Technology and Applications in Support of the Regional Roadmap for Implementing the 2030 Agenda for Sustainable Development in Asia and the Pacific
ICC21, ESCAP
JAXA's Earth Observation Programs

1. Disaster Risk Management
- Volcano Monitoring
- Flood early warning
- Landslide Monitoring

2. Climate Change (Mitigation/Adaptation)
- Mitigation
  - GHG Monitoring
- Adaptation
  - Prediction of extreme weather event
- Forest Monitoring

3. New Applications
- Ocean
- DSM
- Infrastructure Monitoring

Geospatial Information
By Satellite Remote Sensing

Japanese Current and Future Missions

High Resolution
- ALOS (2005)
- ALOS-2 (2014)
- ALOS-3 High-Resolution Wide Swath Optical (2020)
- ALOS-4 High-Resolution Wide Swath SAR (2020)

Climate Change & Water Cycle
- TRMM/PR (1997)
- GCOM-W (2011)
- GPM/DPR (2013)
- GCOM-C (2017)
- EarthCARE/CPR (2019)

GHG Monitoring
- GOSAT (2009)
- GOSAT-2 (2018)
# Disaster Risk Management

**“Daichi-2” (ALOS-2)**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Launch date</td>
<td>May 24, 2014</td>
</tr>
<tr>
<td>Mass</td>
<td>2.1 tons</td>
</tr>
<tr>
<td>Lifetime</td>
<td>5 years (goal: 7 years)</td>
</tr>
<tr>
<td>Orbit</td>
<td>Sun-synchronous 628 km altitude 14 days revisit</td>
</tr>
<tr>
<td>LSDN</td>
<td>12:00 +/- 15 min</td>
</tr>
</tbody>
</table>
| Onboard sensors    | [1] Phased Array-type L-band Synthetic Aperture Radar 2 (PALSAR-2)  
|                    | [2] Compact InfraRed Camera (CIRC)               |
| Mission data       | Direct: 800 Mbps  
| Transmission       | Data relay: 278 Mbps                             |
| Data recorder      | 128 GB                                            |
Mission Objectives:

- Earthquake
- Volcano
- Flooding
- Ocean
- Environment and land management
  - Forest and wetland
- Agriculture & natural resources
  - Ice

Sentinel Asia

Sentinel Asia is a voluntary initiative by a collaboration between space agencies and disaster management agencies, applying Remote Sensing and Web-GIS technologies to assist disaster management in the Asia-Pacific region.

Sentinel Asia consists of 104 JPT members incl. 89 agencies from 27 countries and 15 international organizations (as of Apr 2017) and ADRC members.

Platform to discuss cross-cutting issues

JPT meeting Colombo, Sri Lanka in January 2016
Asian Disasters Observed by Sentinel Asia

Monitoring in Nepal

Flood in Thailand

observed more than 200 disasters of 24 countries for last 8 years

Landslide in Philippines

Flood and Drought Warning
New versions of GSMaP: GSMaP_NOW

- We have started to provide GSMaP_NOW over the area of Himawari-8!
  - It provides precipitation data in an hour after observation
  - We improved the data latency from GSMaP's 4 hours to “quasi-real-time”

Global Satellite Mapping of Precipitation (GSMaP)

- Flood Forecasting System
- Automatic Calculation of Drought Indices
  - Cell Phone
  - Short Message
  - Website

Flood Warning and Drought Warning in Asia

- Bangladesh
- Viet Nam
- Philippines

Great Mekong Subregion

JAXA Global Rainfall Watch (4-hr delay): [sharaku.eorc.jaxa.jp/GSMaP](http://sharaku.eorc.jaxa.jp/GSMaP)

JAXA Realtime Rainfall Watch (Himawari-area): [sharaku.eorc.jaxa.jp/GSMaP_NOW](http://sharaku.eorc.jaxa.jp/GSMaP_NOW)
<table>
<thead>
<tr>
<th>Portal Name and URL</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>G-Portal: JAXA's Satellite data (for remote sensing expert) (GPM, TRMM, JERS-1, AQUA/AMSR-E....etc.) <strong><a href="https://www.gportal.jaxa.jp/gp/top.html">https://www.gportal.jaxa.jp/gp/top.html</a></strong></td>
<td>Raw Satellite Data</td>
</tr>
<tr>
<td>Precise Global Digital 3D Map &quot;ALOS World 3D&quot; (30m resolution) <strong><a href="http://www.eorc.jaxa.jp/ALOS/en/aw3d/index_e.htm">http://www.eorc.jaxa.jp/ALOS/en/aw3d/index_e.htm</a></strong></td>
<td>Topography</td>
</tr>
<tr>
<td>Global Forest and Non-Forest Map <strong><a href="http://www.eorc.jaxa.jp/ALOS/palsar_fnf/fnf_jindex.htm">http://www.eorc.jaxa.jp/ALOS/palsar_fnf/fnf_jindex.htm</a></strong></td>
<td>Forest Map</td>
</tr>
</tbody>
</table>

**What’s next?**
Future Missions for Precise Earth Observation

Advanced Optical Satellite (ALOS-3)

- Pan: 0.8 m
- Mu: 6 bands, 3.2 m
- Swath: 70 km
- Recurrent: 35 days
- LST: 10:30 am
- Launch: to be in JFY2020

Precise 1/25,000 Map

- Hazard Map

Advanced SAR Satellite (ALOS-4)

- (Configuration is TBD)

Estimate situation of magma chamber under the ground and faulting

Take a decision for evacuation

Earth Cloud, Aerosol and Radiation Explorer (EarthCARE)

To reduce the uncertainties in global warming prediction by measuring the three-dimensional structure of clouds and aerosols

- Joint Mission by Europe and Japan
- Launch in 2019
- 3 years lifetime
- 400 km altitude
- Sun-synchronous orbit (Local time: 14:00)
1. JAXA aims that the earth observation system would become the Space-based Infrastructure as an essential part for our daily life.

2. Space-based Infrastructure should be utilized for specific action and its decision making as a step ahead of the observation and understanding of its phenomenon

3. Space agencies should lead establishment of space-based infrastructure to innovate new systems, new value, and/or new business in a wide range of areas.

Looking forward to further fruitful collaboration with our partners in Asia and the Pacific.
Thank you for your attention.