Overview of JAXA’s Newest Earth Observation Satellite “SHIZUKU”
~Application & Future plan~

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February 20th, 2013
May 17th, 2012, JAXA launched “SHIZUKU” by H-IIA launch vehicle

Critical operational phase after the launch completed successfully

- Solar array paddle deployment
- Main refractor of mission sensor deployment
Overview of GCOM mission

Objectives of GCOM

Climate change observation:
- Various targets: Atmosphere, land, Cryosphere, Ocean
- Understand: Radiation budget, Carbon cycle, Water and energy cycle

GCOM-W (Water)
- Observe water cycle mechanism
  - Sea surface temperature
  - Sea-ice concentration, etc

GCOM-C (Climate)
- Observe climate change factors
  - Cloud
  - Aerosol
  - Land cover, etc
Overview of “SHIZUKU”

- **SHIZUKU: Medium size satellite**
  - Weight: Approx. 2 tons
  - Size: 5.1m (L) × 17.5m (W) × 3.4m (H)
  - Power generation: Approx. 4000W

- **Mission instrument: AMSR2**
  - Advanced Microwave Scanning Radiometer 2 (AMSR2)
  - Observe weak microwave from the ground, sea surface, atmosphere
  - Follow-on instrument of AMSR-E loaded on Aqua operated by NASA
  - Improvement from AMSR-E in accuracy and spatial resolution
**Overview of “SHIZUKU”**

**Products:**

AMSR2 observes six microwave bands from 7GHz to 89 GHz to generate various products.

<table>
<thead>
<tr>
<th>Frequency</th>
<th>Products</th>
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<tbody>
<tr>
<td>6.9GHz</td>
<td>Total Precipitable Water (TPW)</td>
</tr>
<tr>
<td>18.7GHz</td>
<td>Cloud Liquid Water (CLW)</td>
</tr>
<tr>
<td>36.5GHz</td>
<td>Precipitation (PR)</td>
</tr>
<tr>
<td>89.0GHz</td>
<td>Sea Surface Temperature (SST)</td>
</tr>
<tr>
<td>10.65GHz</td>
<td>Sea Surface Wind speed (SSW)</td>
</tr>
<tr>
<td>23.8GHz</td>
<td>Sea Ice Concentration (SIC)</td>
</tr>
<tr>
<td></td>
<td>Snow Depth (SD)</td>
</tr>
<tr>
<td></td>
<td>Soil Moisture Content (SMC)</td>
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</table>
Overview of “SHIZUKU”
Overview of “SHIZUKU”

Special features of A-Train (The Afternoon Constellation):
- Observe the same location on the Earth by multiple satellites around the same time approximately within 10 minutes
- Consists of multiple satellites orbiting the Earth in close proximity at an altitude of about 700km, crossing the equator at around 1:30 p.m. local mean solar time
Current status of “SHIZUKU”

~2012.8.10
- Completed the initial functional verification of "SHIZUKU"
- Started regular observation

~2013.1.25~
- Initial calibration operation completed
- Started offering brightness temperature products
  - Brightness temperature indicates the radio wave strength of a specific frequency emitted from the atmosphere and the ground

Typhoon No.11 "HAIKUI" observed by SHIZUKU

Examples of Brightness Temperature Products
**Contribution of “SHIZUKU”**

- Monitoring of El Nino & La Nina:
  - EL Nino and La Nina events related to climate variability in various regions
  - SHIZUKU provides high accuracy of Sea Surface Temperature
  - Contribution to the long term climate prediction
Optimization of fishery:

- Sea surface temperature is closely connected with the distribution of fish (Fig.1).
- High accuracy and high frequency data provision
- Contribution to the decrease in the cost and fuel for fishery

Fig.1 Relationship between SST from AMSR-E data and distribution of fish (provided by JAFIC*)
*Japan Fisheries Information Service Center

◇:bonito, O:Tuna, □:Squid, △:horse mackere
Monitoring of drought:
- In the summer of 2010, a large scale drought affected Russia and caused severe damage on the crops.
- Soil moisture data obtained by AMSR-E (Fig.2) shows the lower trend in 2010, even in April.
- Contribution to early detection of drought.

Fig.2 Soil moisture trend
- Black line: Nominal year average
- Red line: Trend in 2010
Monitoring of Sea lane in the Arctic Ocean:

- Sea lane in the Arctic Ocean has been focused on in the marine transport field
  - Decrease the transportation cost and time between Asia and Europe (Fig.3)
- Contribution to find an optimal route and mitigate a risk of beset in ice (Fig.4)
Future plan and access to data

**Future plan**

- Geophysical products obtained by SHIZUKU currently under the evaluation process
- **2013.5~** Start public distribution of geophysical products

**How to access SHIZUKU products**

These products are provided through the “GCOM-W1 Data Providing Service” for free of charge.

[https://gcom-w1.jaxa.jp/auth.html](https://gcom-w1.jaxa.jp/auth.html)
Thank you for your attention.