A practice of Disaster Monitoring from ISS/Kibo

For CANEUS Workshop @Sendai
03-17-2015

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Disaster Monitoring by ALOS
1 day after Tsunami 3-11-2011

Sendai Airport

No Imagery of damaged Area
Disaster Monitoring                           (3 days after Tsunami)

Sendai

02-27-2011

5km (3mi.)

03-14-2011
Needs to Disaster Monitoring from Space

**Needs**

1. **Rapid Monitoring**
   - within 3 hours

2. **Night Data**
   - 1 survey in night time for rescue from morning
   - within 6 hours

3. **More Resolution**

**Means**

- Satellites Constellation (Big/Small)
- ISS
- Airship/Airplane
- Synthetic Aperture Radar
- IR Camera
- High Sensitivity Camera
- Optical Sensor
Disaster Monitoring from ISS

- Astronauts can:
  - look over all the earth
  - detect and select easily about observing area
- Various Camera/Sensors can be launched in short time:
  - 4K camera, High Definition Camera;

Major Observing Points

- Kibo (Japan Module)
- Colombus (ESA Module)
- Destiny (US Module)
- Cupola (attached w/ Node 3)

Taihoon#8
July.2014

East Japan EarthQuake
March.2011

Ishinomaki, Miyagi
Shin-Kitakami
Great Bridge

WildFire (USA)
Aug.2013
Disaster Monitoring from ISS

Observed Taihoon #27 and #28 in Oct. 2013 by High Definition Camera on Kibo/Exposd Facility. And NHK (Major Broadcast) used these photos.
4K Camera from ISS
CIRC is developed as a technology demonstration payload of the ALOS-2 and ISS (JEM/CALET).

ALOS-2
- Disaster, and continuous updating of national land information
- Launched in May 24, 2014

JEM/CALET
- Research for the nature of the sources of high energy particles and photons
- Launch in Aug. 2015
Compact Infrared Camera (CIRC)

Proto Flight Model

Microbolometer (uncooled infrared array detector)

- Small size
- Light weight
- Low power consumption

Baseline specifications of the CIRC

<table>
<thead>
<tr>
<th>Detector</th>
<th>Microbolometer SOI diode IR FPA (MELCO)</th>
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</thead>
<tbody>
<tr>
<td>Size</td>
<td>11 cm x 18 cm x 23 cm</td>
</tr>
<tr>
<td>Mass</td>
<td>~ 3 kg</td>
</tr>
<tr>
<td>Wavelength</td>
<td>8 - 12 μm</td>
</tr>
<tr>
<td>Pixel Array</td>
<td>640 x 480</td>
</tr>
<tr>
<td>Spatial resolution</td>
<td>&lt; 210 m @ 630 km (ALOS-2)</td>
</tr>
<tr>
<td></td>
<td>&lt; 130 m @ 400 km (CALET) (&lt;0.33 mrad)</td>
</tr>
<tr>
<td>Field of View</td>
<td>12° x 9°</td>
</tr>
<tr>
<td>Dynamic range</td>
<td>180 K - 400 K</td>
</tr>
<tr>
<td>Power</td>
<td>&lt; 20 W</td>
</tr>
<tr>
<td>NEdT</td>
<td>0.2 K @ 300 K</td>
</tr>
<tr>
<td>FPN</td>
<td>0.3 K @ 300 K</td>
</tr>
</tbody>
</table>

☆ The largest microbolometer ever used for earth observations from space.
Wildfires detected by CIRC

Wildfires are detected more than 300 scenes of ALOS-2/CIRC

Aug. 31, 2014
Angola

Oct. 09, 2014
South Borneo
Wildfire detection with the CIRC

Observation time: UT 2014/08/31 10:29
Angola wildfire

MODIS visible image and areas wildfire was detected (MOD14)

http://fire.cris.hokudai.ac.jp/
provided by K. Nakau
Disaster Data Sharing in Region/World

- JAXA/Japan’s Government share the data to:
  1. Sentinel Asia
  3. Direct data providing in Bi-lateral level
Backup
JAXA’s Missions & Organization

Total personnel: 1,650

President
Dr. Naoki Okumura

Vice-President
Mr. Kiyoshi Higuchi

- Policy & Budget Control
- Admin. Management
- Systems Engineering
- S&MA
- Industries Collaboration Center
- University Collaboration Center
- Space Education Center
- Space Tracking and Data Acquisition Dep.
- Environment Test Technology Center

- Space Science (ISAS)
- Lunar & Planetary Explor.
- Human Spaceflight
- Space Transport
- Satellite Application (Civil)
- Satellite Application (Security)
- Aviation
- R&D

Dr. Naoki Okumura
Mr. Kiyoshi Higuchi
# New Japan’s Basic Plan for Space Policy
modified Jan. 2015

<table>
<thead>
<tr>
<th>Social Infrastructure</th>
<th>Security and Prevention to Disaster</th>
<th>Promotion for Space Industries</th>
<th>Expansion of Frontier</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>National Security</td>
<td>Application Promotion</td>
<td>Science &amp; Technology</td>
</tr>
<tr>
<td></td>
<td>Protect ion from Disaster</td>
<td>Industrial Capability</td>
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<tr>
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<tbody>
<tr>
<td>B. Remote Sensing Satellites</td>
<td>IGS</td>
<td>ASEAN Disaster Information Network (Satellites Constellation)</td>
<td>F. Human Space Activity</td>
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<tr>
<td></td>
<td>Geometological Satellite</td>
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Refered from wep page of Japan’s Cabine Office