Space Technology Application for Disaster Reduction in China

National Disaster Reduction Center, Satellite Application Center for Disaster Reduction. MCA, China

Feb.7, 2011
1. Disaster Information in China in 2010
2. Small Satellite Constellation for Environment and Disaster Monitoring
3. Space Technology Application
4. International Product Service
China is one of the countries which suffers the most natural disasters in the world. In 2010, because of the natural disasters, there were

- 430 million people affected;
- 7844 people dead and missing;
- 18.6 million people evacuated and resettled;
- 37.4 million ha. crops affected;

The direct economic loss is 534 billion RMB.
Small Satellite Constellation for Environment and Disaster Monitoring
Constellation Objective

◆ Constellation Construction

H-1-A and HJ-1-B were launched on Sep. 6th, 2008.

<table>
<thead>
<tr>
<th>Satellite</th>
<th>Payload</th>
<th>Resolution (m)</th>
<th>Swath (km)</th>
<th>Band</th>
</tr>
</thead>
<tbody>
<tr>
<td>HJ-1-A</td>
<td>CCD</td>
<td>30</td>
<td>360</td>
<td>4 bands</td>
</tr>
<tr>
<td></td>
<td>HSI</td>
<td>100</td>
<td>50</td>
<td>115 bands</td>
</tr>
<tr>
<td>HJ-1-B</td>
<td>CCD</td>
<td>30</td>
<td>360</td>
<td>4 bands</td>
</tr>
<tr>
<td></td>
<td>IRS</td>
<td>B1, B2, B3 : 150</td>
<td>720</td>
<td>4 bands</td>
</tr>
<tr>
<td></td>
<td></td>
<td>B4 : 300</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

HJ-1-A

HJ-1-B
National Disaster Reduction Center of China (Satellite Application Center for Disaster Reduction) takes the responsibility of operation management of the HJ-1-A/B satellites. Till Feb.7, the satellites and payloads are in well operation conditions. There are totally more than 5,800 orbit of images have been acquired and the tasking time of the two satellites is more than 950 hours since being launched. Totally more than 400,000 scenes images were acquired.
Space Technology Application
Operational Working Modes

- **Routine operational working mode**

- **Emergency operational working mode**
Application Product System

- Disaster risk
- Disaster monitoring
- Disaster assessment
- Recovery and Reconstruction Assessment

[Images of maps and disaster-related content]
Disaster Risk and Early-warning

Pastoral Snow Risk Distribution

Road Risk Early-warning

Drought Risk in Chongqing Municipality

Satellite data: HJ-1-B
Sensor: CCD, IRS
Acquisition time: 13/02/2009, 11:52
Resolution: CCD(30m), IRS(300m)
Wavelength: CCD(3,4), IRS(4)
Projection: UTM
Ellipsoid: WGS84
Drought Risk
Flood Risk
Disaster Monitoring

Flood Monitoring in Poyang Lake

Fire Monitoring in Heilongjiang Province

Snow Coverage Monitoring in Tibet

Quake Lake Monitoring in Wenchuan

Remote Sensing Monitoring and Assessment on Quake Lake and Landslide in Wenchuan

Earthquake

Fire Area 1066 km² in 29th Apr

Fire Area 1020 km² in 29th Apr

Fire Area 187 km² in 29th Apr

Remote Sensing Data
Post disaster: HJ-1B-COV; Oct 4, 2008
CBERS-2B; Jun 1, 2008
Preceding disaster: SPOT; 2006
Mapping: NDIRCC; 12:00, Dec 10, 2008

http://www.ndrc.gov.cn/
Flood Monitoring

江西省抚州市唱凯洪水淹没范围变化监测（三）
Sea Ice Monitoring

2010/01/21

Sea ice area approximately 19,200 km²
Snow Coverage Monitoring

全国积雪覆盖图（2010年11月28日）
Drought Monitoring

2009年1月29日

2010年2月2日

2009年1月17日

2010年2月2日
Sandstorm Monitoring
Fire Monitoring
Disaster Assessment

Yushu Earthquake Influenced Range

- Centric location: Longitude 96.7°, Latitude 33.1°
- Depth: 4378 meters
- Time: Beijing Time 2010-04-14 7:49

- 0 - 50 km: 7 affected towns, affecting population of 64,000
- 50 - 75 km: 5 affected towns, affecting population of 124,000
- 75 - 100 km: 3 affected towns, affecting population of 4,300

Yushu Earthquake Traffic jam in Jiegu Town

- Distance from center: 0.45 km
- Distance from town center: 0.32 km

- Traffic jam in Jiegu Town

Office of National Committee for Disaster Reduction
National Disaster Reduction Center of China
Evacuated Tents Monitoring in Jiegu town, Qinghai Province
Collapsed Houses Assessment in Jiegu town, Qinghai Province
International Product Service
In 2010, NSDR has made the HJ-1 satellite mosaic image of Pakistan, Thailand, Mongolia, Indonesia, Bangladesh, Iran, Peru and provided them to related government departments.
On April 20, a serious oil spill incident occurred in Gulf of Mexico. NSDR provided dynamic monitoring this area.
Landslide and Flood Monitoring in Pakistan

On Jan. 4, a massive landslide broke out in northern Pakistan, and it resulted in forming quake lake afterwards. NSDR provided multi-temporal monitoring on flood change.

Monitoring Flood in Pakistan

Since late July, Pakistan suffered a serious flood disaster. 20th, Jan, 2010

Monitoring Landslide in Hunza River

18th, Mar, 2010

1st, Jan, 2010

3641km² in 27th, Aug

23rd, Feb, 2010

2nd, Mar, 2010

4190km² in 13th, Sep

900km² in 15th, Jul

Monitoring Landslide in Hunza River

NSDR provided multi-temporal monitoring on landslide change.
Flood Monitoring in Venezuela

Flood Area Monitoring Map in Venezuela

This map shows the situation of flood disaster in Venezuela. Compared with water area of 96.97 sq km on 14th Jan, 2010 using HJ-1 satellite data, the water area on 2nd Dec, 2010 in the region has increased 44.02 sq km.
Haiti Earthquake monitoring using HJ-1 of China
Thanks