Status and Data Applications of China High-resolution Earth Observation System
Outlines

- Introduction
- Development of the Space-based System
- CHEOS Data Platform
- Applications of CHEOS Data
Outlines

- **Introduction**

- Development of the Space-based System

- CHEOS Data Platform

- Applications of CHEOS Data
What’s CHEOS

- **Satellites**
- **Airships**
- **Aircrafts**

- Center for receiving and pre-processing satellites data
- Centers for Data distribution and Application
- Integrated Data Platform

**China High-resolution Earth Observation System**
What’s CHEOS

--One of the major national science and technology projects;
--Integrated Systems, such as Space-based system, near space system, aerial system, ground system and also application system;
--with high temporal, spatial and spectral resolution
--to achieve, Observations Information Decision

Who’s leading this project

--The Earth Observation System and Data Center, CNSA
Outlines

- Introduction
- Development of the Space-based System
- CHEOS Data Platform
- Applications of CHEOS Data
GaoFen or GF series

- GaoFen means high resolution in Chinese

Several satellites of the GF series are launched till now

- GF-1, Apr. 2013
- GF-2, Aug. 2014
- GF-4, Dec. 2015
- GF-3, Aug. 2016......

Other satellites have been planed

- GF-5, payloads for atmospheric environment observation
- GF-6, 2m pan and 8m multi-spectral camera
- GF-7, to measure elevation......
GF-1 details

- 645km, 10:30a.m. (LST), Polar Satellite

**Two payloads**

<table>
<thead>
<tr>
<th>High-resolution cameras</th>
<th>Wave-length</th>
<th>Pan</th>
<th>0.45–0.89µm</th>
<th>Multi-spectral</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Pan</td>
<td>B1:0.45–0.52; B2:0.52–0.59; B3:0.63–0.69; B4:0.77–0.89.</td>
<td>Multi-spectral</td>
</tr>
<tr>
<td>Spatial Res.</td>
<td></td>
<td>Pan</td>
<td>2m</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Multi-spectral</td>
<td>8m</td>
<td></td>
</tr>
<tr>
<td>Swath</td>
<td></td>
<td></td>
<td>68km with two cameras</td>
<td></td>
</tr>
<tr>
<td>Data Quant.</td>
<td></td>
<td></td>
<td>10 bits</td>
<td></td>
</tr>
<tr>
<td>Revisit</td>
<td></td>
<td></td>
<td>≤4 days at equator (roll near 25°)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Wave-length (µm)</th>
<th>Multi-spectral</th>
</tr>
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<td>B1:0.45–0.52; B2:0.52–0.59; B3:0.63–0.69; B4:0.77–0.89.</td>
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<td></td>
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</table>

<table>
<thead>
<tr>
<th>Wide-field imager (mosaic)</th>
<th>Spatial Res.</th>
<th>Multi-spectral</th>
<th>Swath</th>
</tr>
</thead>
<tbody>
<tr>
<td>Data Quant.</td>
<td></td>
<td></td>
<td>830km with 4 cameras</td>
</tr>
<tr>
<td>Revisit</td>
<td></td>
<td></td>
<td>10 bits</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>≤4 days at equator (no need to roll)</td>
</tr>
</tbody>
</table>
GF-2 details

- 631 km, Polar Satellite

One payload

<table>
<thead>
<tr>
<th>Wave-length (µm)</th>
<th>Pan</th>
<th>0.45~0.89</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Multi-spectral</td>
<td>B1:0.45<del>0.52; B2:0.52</del>0.59; B3:0.63<del>0.69; B4:0.77</del>0.89.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>High-resolution cameras</th>
<th>Pan</th>
<th>0.81m</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spatial Res.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Multi-spectral</td>
<td></td>
<td>3.24m</td>
</tr>
<tr>
<td>Swath</td>
<td>45km</td>
<td></td>
</tr>
<tr>
<td>Data Quant.</td>
<td>10 bits</td>
<td></td>
</tr>
<tr>
<td>Revisit</td>
<td>≤4 days at equator (roll near 25°)</td>
<td></td>
</tr>
</tbody>
</table>
Space-based System

- GF-3 details
  - 755km, Polar Satellite
- One payload
  - Multi-polarized C-band Synthetic Aperture Radar (SAR)
  - SAR package can operate in 12 different working modes, from high-resolution (1 m) to large-swath (650 km), and from maritime imaging to combined land/water imaging
Space-based System

- GF-4 details
  - Geostationary Satellite
- One payload

<table>
<thead>
<tr>
<th>Wavelength</th>
<th>Pan</th>
<th>Multi-spectral</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pan</td>
<td>B1:0.45~0.52;</td>
</tr>
<tr>
<td></td>
<td></td>
<td>B2:0.52~0.59;</td>
</tr>
<tr>
<td></td>
<td></td>
<td>B3:0.63~0.69;</td>
</tr>
<tr>
<td></td>
<td></td>
<td>B4:0.76~0.90;</td>
</tr>
<tr>
<td></td>
<td></td>
<td>B5:3.5~4.1.</td>
</tr>
<tr>
<td>Spatial Res</td>
<td>Pan</td>
<td>50m</td>
</tr>
<tr>
<td></td>
<td>Multi-spectral</td>
<td>B1~B4:50m</td>
</tr>
<tr>
<td></td>
<td></td>
<td>B5:400m</td>
</tr>
<tr>
<td>Swath</td>
<td></td>
<td>400km × 400km</td>
</tr>
</tbody>
</table>
Outlines

- Introduction
- Development of the Space-based System
- **CHEOS Data Platform**
- Applications of CHEOS Data
CHEOS Data Platform

- Integrated Data Platform, serve with much information

16 different ministries

26 branches in provinces
CHEOS Data Platform

- Data access
- Software
- Lists of products
- Typical application
CHEOS Data Platform

- Remote Sensing Based Service

Natural heritage sites for travelers  RS based research of B-H-T region
1. Observation

- Disaster episode

- Disaster area monitoring

Using GF-1 image to monitor landslide dams after 6.5 earthquake in Aug.3, 2014.

After heavy rainstorm, a large rain lake was formed in low-lying valley.
1. Observation

- Analysis geological disasters with DEM data

GF-1 2m/8m data with DEM       GF-2 0.8m/3.2m data with DEM
Applications of CHEOS Data

1. Observation

- Closely look at Typhoon!
1. Observation

- Continuous observation focus on the eye of Typhoon

That would help to find out how typhoon evolves

Speed, move and estimated damage
Applications of CHEOS Data

1. Observation

- Water bloom distribution product
- Suspended matter distribution

Monitor the distribution of water bloom in Taihu Lake.

Monitor the distribution of suspended matter in Taihu Lake.
1. Observation

- Range monitoring product of main reservoirs and lakes in China

Monitor land surface water in middle reaches of Huaihe River.
2. Information

- Product of corps
- Ecological vulnerability
- Economic development level

Winter wheat per unit yield product distribution image
Ecological system vulnerability products of Beijing-Tianjin-Hebei
Applications of CHEOS Data

2. Information

- Irrigation area remote sensing monitoring product

Actual irrigation area in April 28 2014.

Actual irrigation area in June 1 2014.
2. Information

- Analysis and evaluation of environmental capacity in scenic area product

Evaluation of the environmental capacity of Mount Huangshan Scenic Area
2. Information

- Provincial level forest volume distribution product
  - Small spots forest volume distribution map of Jiagedaqi Forestry Bureau in southeast Greater Khingan Range
3. Decision

- **Risk ranking for regional infectious diseases**

Using GF-1 2m/8m and 16m data to evaluate the risk of schistosomiasis in Longmen region, Ya'an City, Sichuan province after Ya'an earthquake in 2013.
3 Decision

- All Information extracted from remote sensing observation are aiming to assist in decision making.

All above mentioned products and applications can be found here:

http://gfplatform.cnsa.gov.cn (English Version is coming soon)
Thanks for your time and attention!