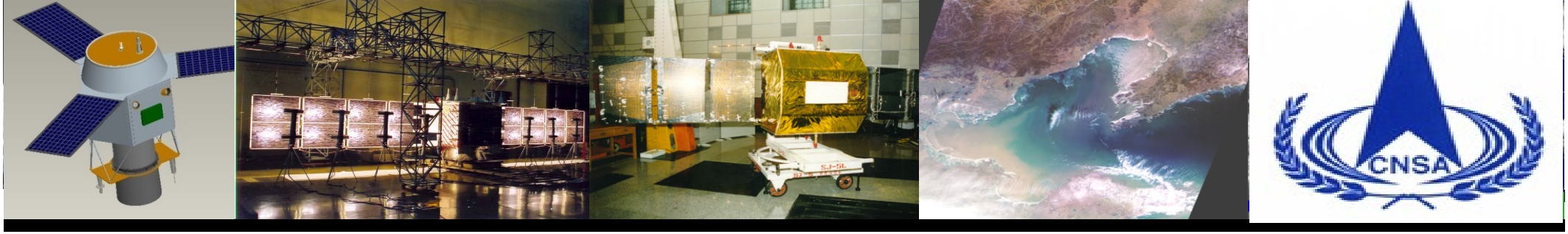
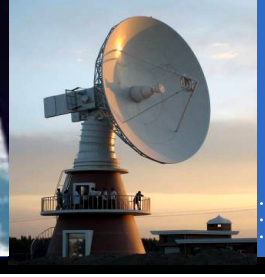


China High-resolution Earth Observation System (CHEOS) and its Lastest Development

The Earth Observation System and Data Center , CNSA

2014-2



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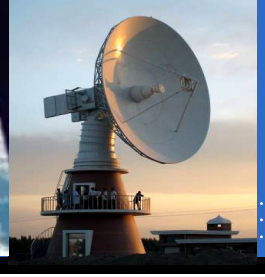
4 Implementation plan



1. Introduction

The Chinese government pays great attention to the development of space industry. It has progressively formulated the policies, laws and regulations for guiding and regulating its space activities.

China's Space Activities in 2000

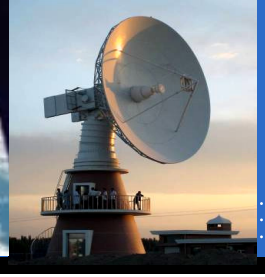
Information Office of the State Council
The People's Republic of China

China's Space Activities in 2006

Information Office of the State Council
The People's Republic of China

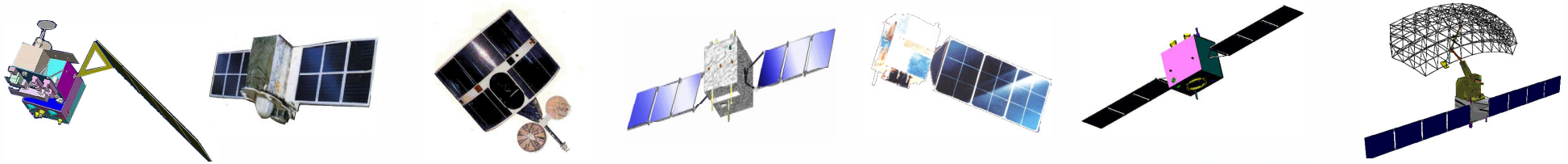
China's Space Activities in 2011

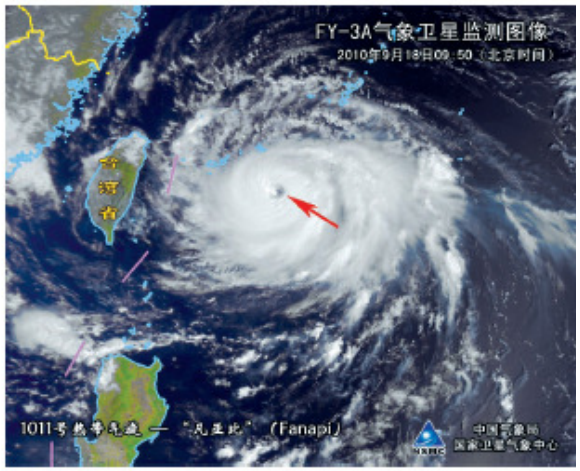
Information Office of the State Council
The People's Republic of China

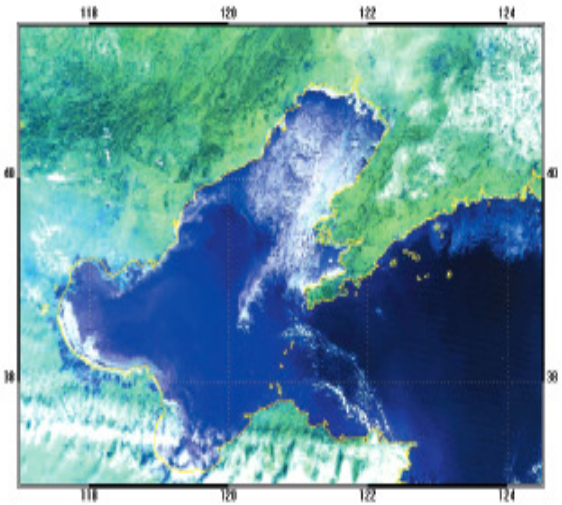
1. Introduction

China has developed Fengyun, Haiyang, Ziyuan satellite series & a constellation (composited by small satellites). These satellites has made great contributions in weather forecasting, climate variation and ocean monitoring, environment and disaster monitoring and forecasting etc.

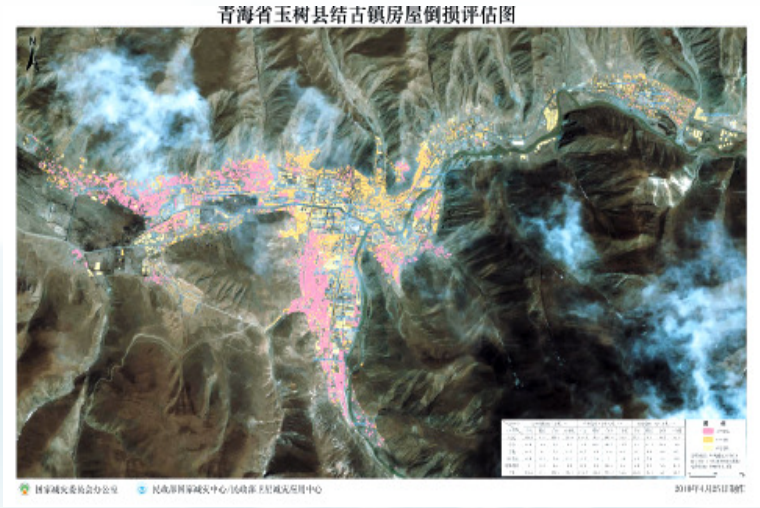




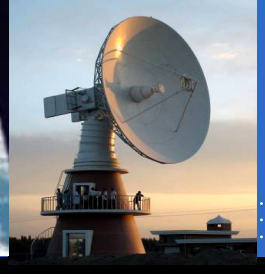
Typhoon monitoring image acquired by FY-3A satellite (Sept. 18, 2010)



Sea ice remote sensing image from HY-1B/ COCTS (Feb. 13, 2010)



Evaluation image for the damaged and collapsed houses in Gyegu Town, Yushu County, Qinghai Province



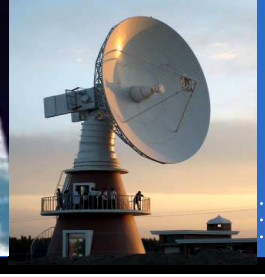
1. Introduction

CHEOS

In order to improve the comprehensive capabilities of China's earth observation system, in 2010, the Chinese government approved to implement CHEOS.

CHEOS will be completely activated by 2020, which is composited by

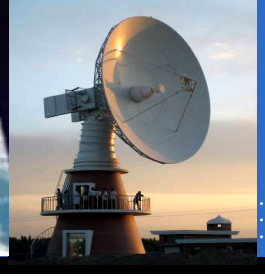
- Space-based System
- Near space and Airborne System
- Ground system
- Application System



1. Introduction

Implementation objective

- Construct an advanced earth observation system with high spatial, spectral and radiometric resolution.
- Achieve all-weather, all-day and global coverage EO data acquiring capability.
- provide global application service in the fields of agriculture, disaster, resource and environment, etc.
- promote international cooperation.



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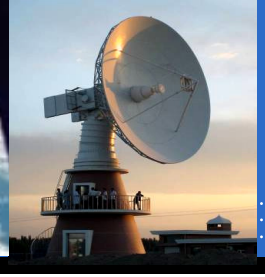
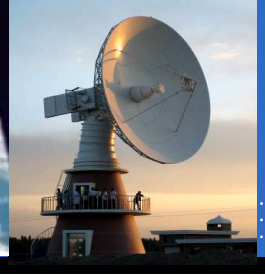


2. The composition of CHEOS

Space-based system

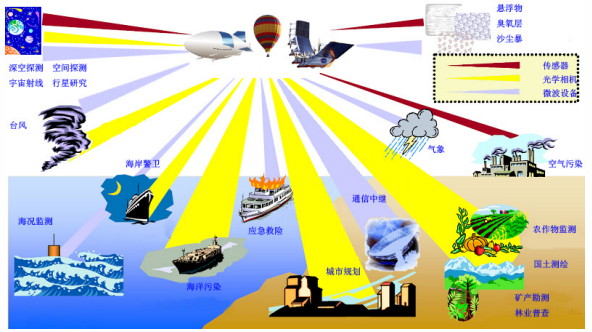
- 7 optical/microwave satellites.
- Will be launched by LM launch vehicles.
- The highest spatial resolution is 1 m, spectral resolution reaches nanometer level, and swath width is from dozens of km to hundreds of km.

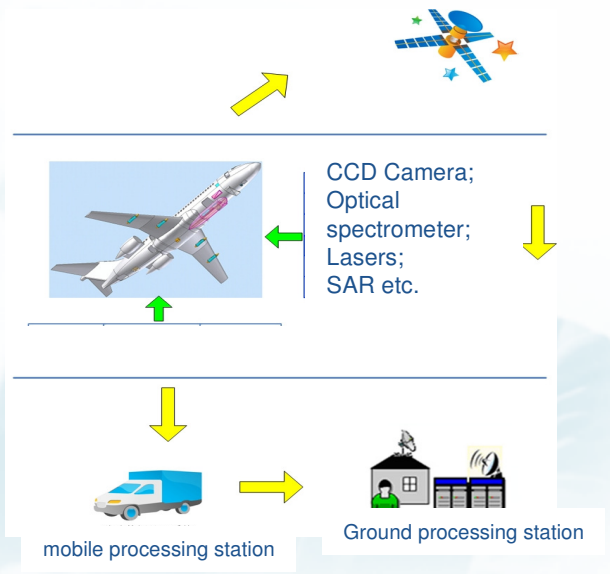


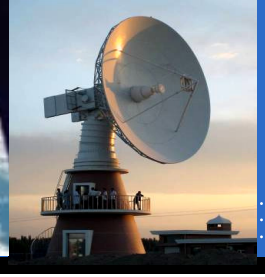
2. The composition of CHEOS

Near space and Airborne system

- Consists of nearspace airship, air flight platform, airborne earth observation instruments and data processing system.
- Developes three types of earth payloads, including Optical, Laser and SAR.
- Spatial resolution is better than 0.1m, and spectral resolution is better than 1nm.



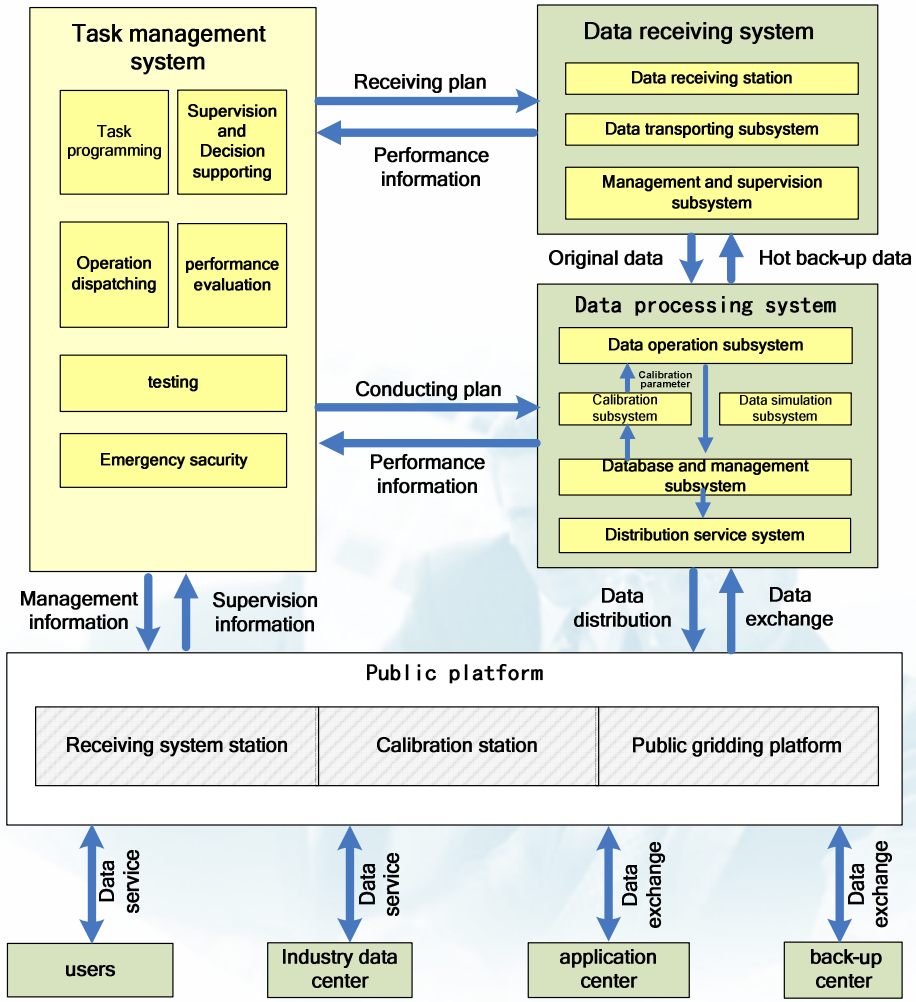


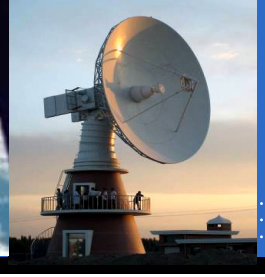


2. The composition of CHEOS

Ground system

- Consists of three operational systems: data receiving, data processing, task management system; and three kinds of supporting facilities: data receiving, calibration and public platform.
- Responsible for mission planning, data receiving and processing, data distribution and management.
- Available for data sharing and efficient operation.

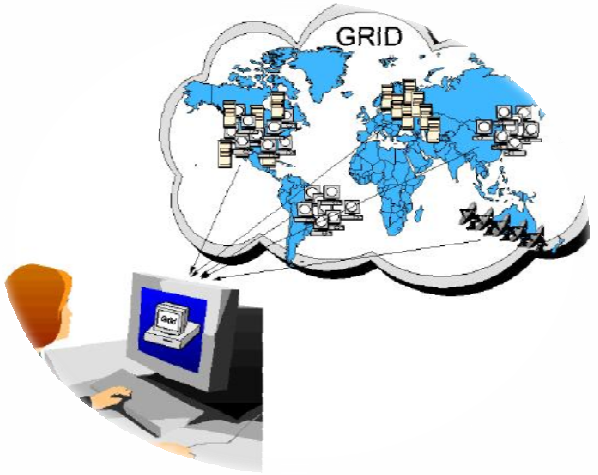


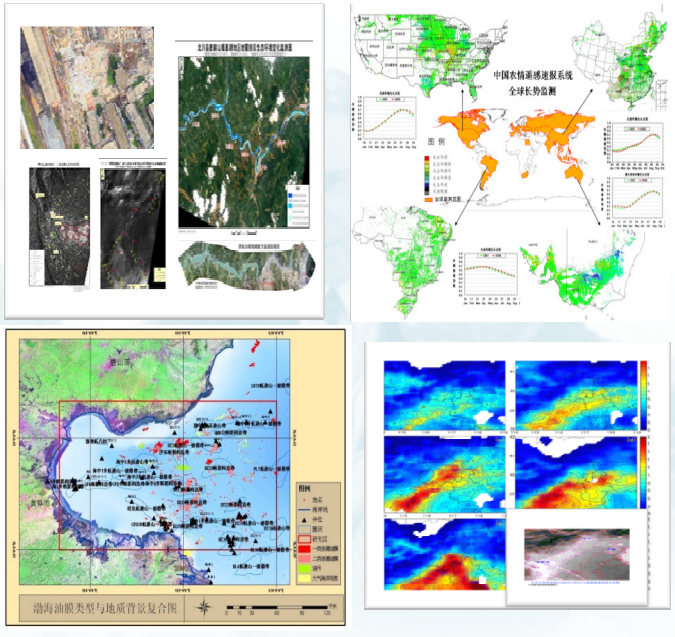


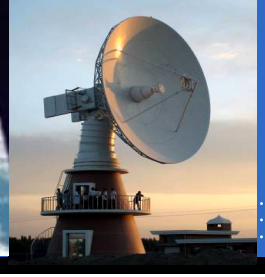
2. The composition of CHEOS

Application system

- Consists of application technology center subsystem and typical application subsystem.
- Responsible for transferring earth observation data into information and knowledge, and providing services.
- Establishes an comprehensive application and service system with multi-source data to meet the domestic and international users' requirements.







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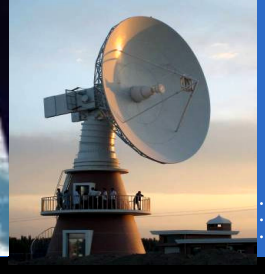
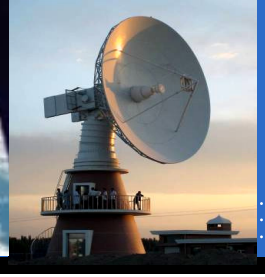


3. The latest development of the first satellite of CHEOS

GF-1—— The first satellite of CHEOS

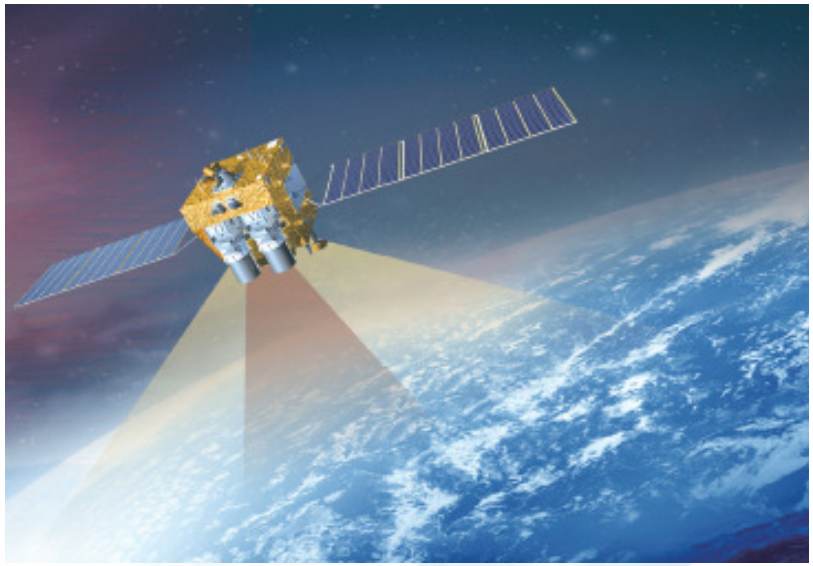
- In 2013. 4. 26, the first satellite of CHEOS has been successfully launched by LM-2D, which marked that CHEOS has entered into a new stage with features "contructing, operating, applying".
- This launching has also carried 3 microsatellites which is made by Ecuador, Argentina, Turkey.



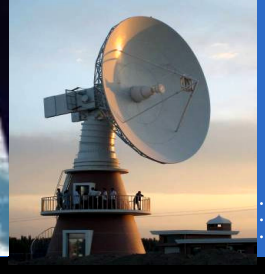
3. The latest development of the first satellite of CHEOS

GF-1—— The first satellite of CHEOS

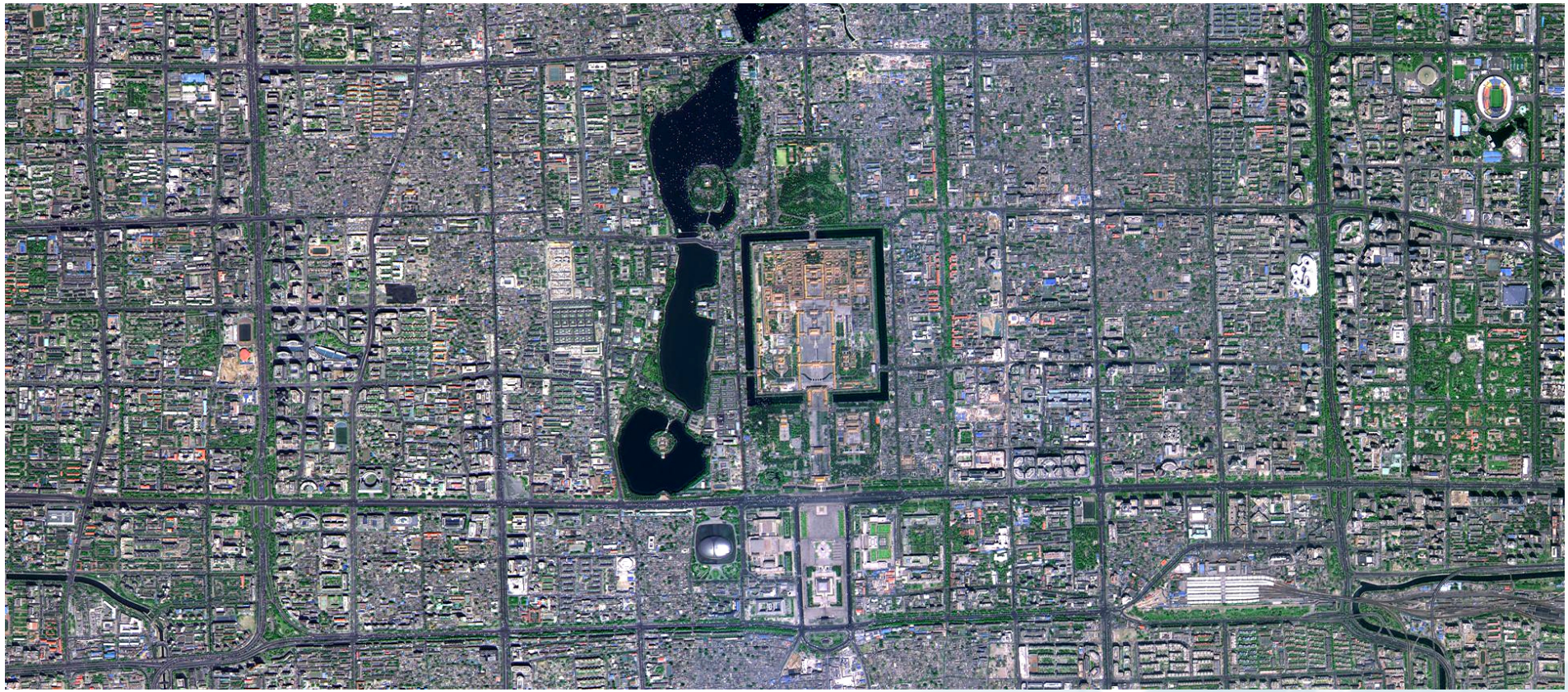
- Orbit: 600-700km
- Life time: 5-8 years
- Platform: CAST-2000
- Payload: 2m Pan / 8m multispectral camera （swath width 60km）
  16m multispectral camera （swath width 800km）



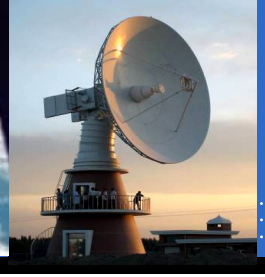
The in-orbit test demonstrated the performance of GF-1 meets the design requirement completely.



3. The latest development of the first satellite of CHEOS

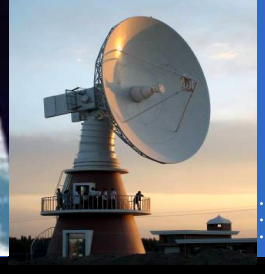


2m panchromatic/8m multispectral camera fusion image of the Gaofen-1 satellite, Beijing District in China, acquisition time: May 1, 2013



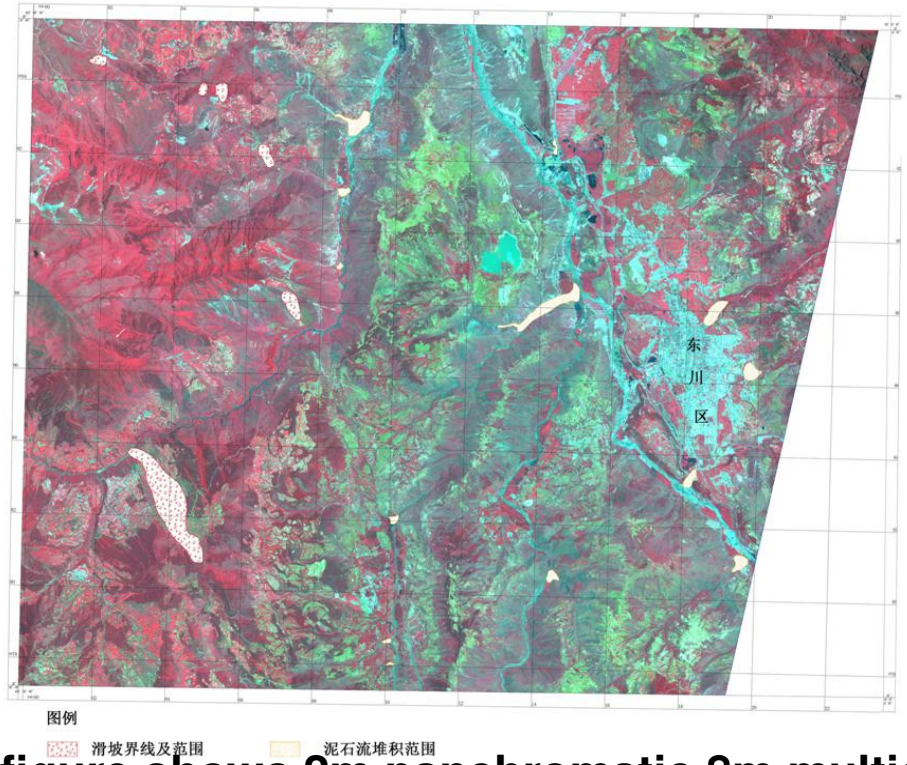
3. The latest development of the first satellite of CHEOS

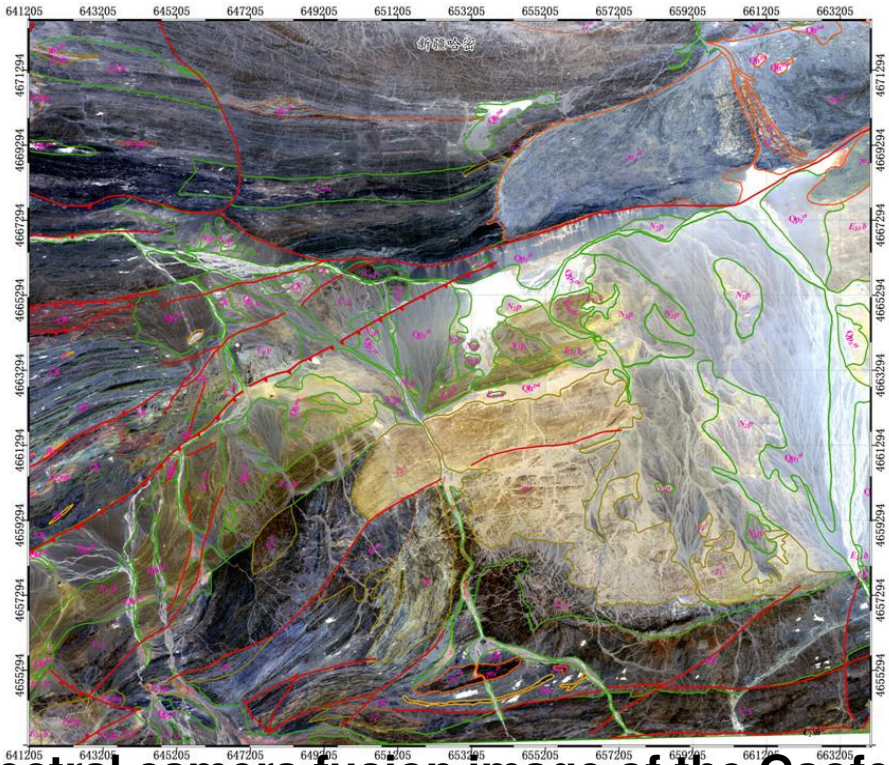
16m multispectral camera image of the Gaofen-1 satellite. Yellow River Delta region in China, acquisition time: May 21, 2013



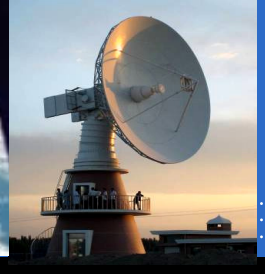
3. The latest development of the first satellite of CHEOS

GF-1 Satellite application in Geological interpretation



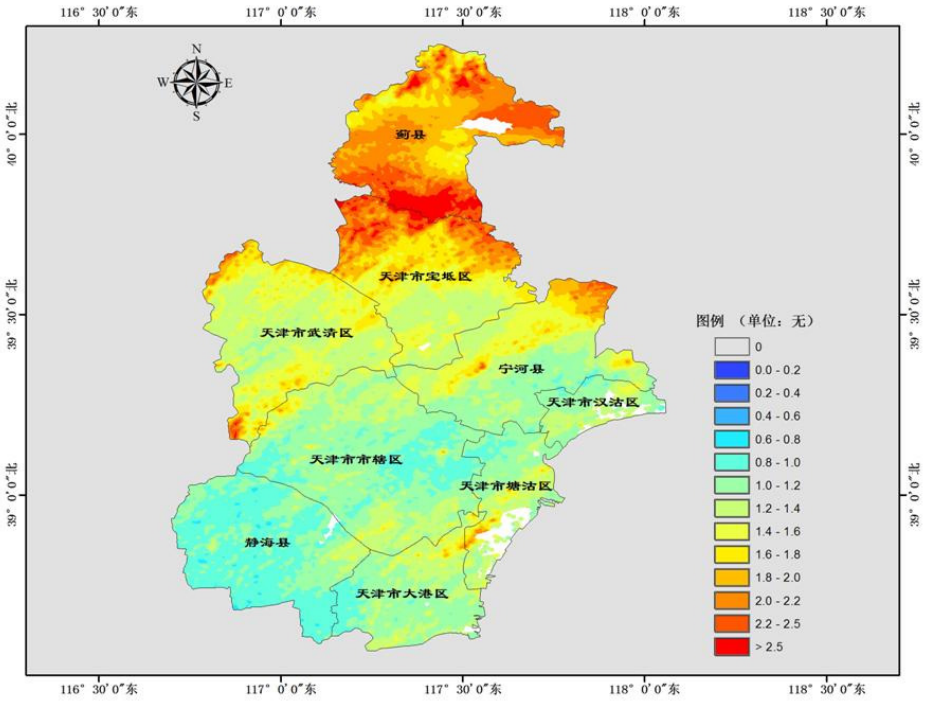


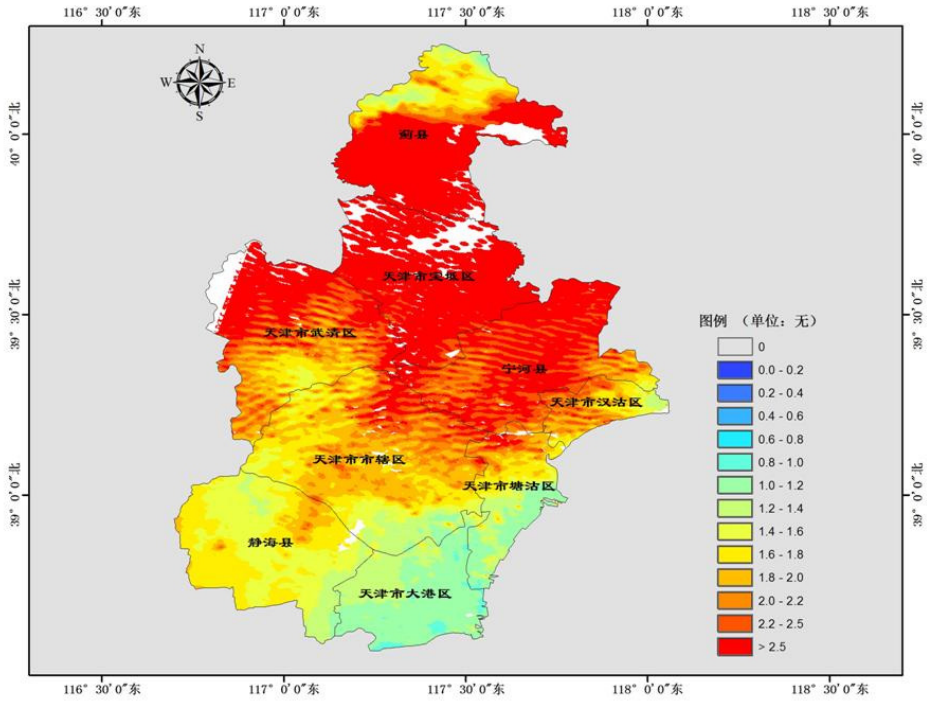
Left figure shows 2m panchromatic 8m multispectral camera fusion image of the Gaofen-1 satellite. The imaging region includes Dongchuan District of Kunming City and Hami city of Xinjiang Uygur Autonomous Region. Right figure shows the inrerpretation geology information including six larger scale landslides of Dongchuan District and fold structure,shear zone of Hami Disrrict, according to the specifications and requirements of the geological disaster remote sensing interpretation technology specification and requirement.



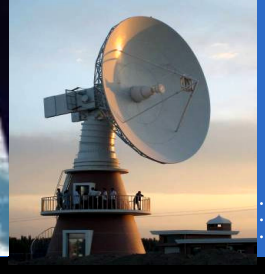
3. The latest development of the first satellite of CHEOS

GF-1 Satellite application effect in Environmental Protection interpretation



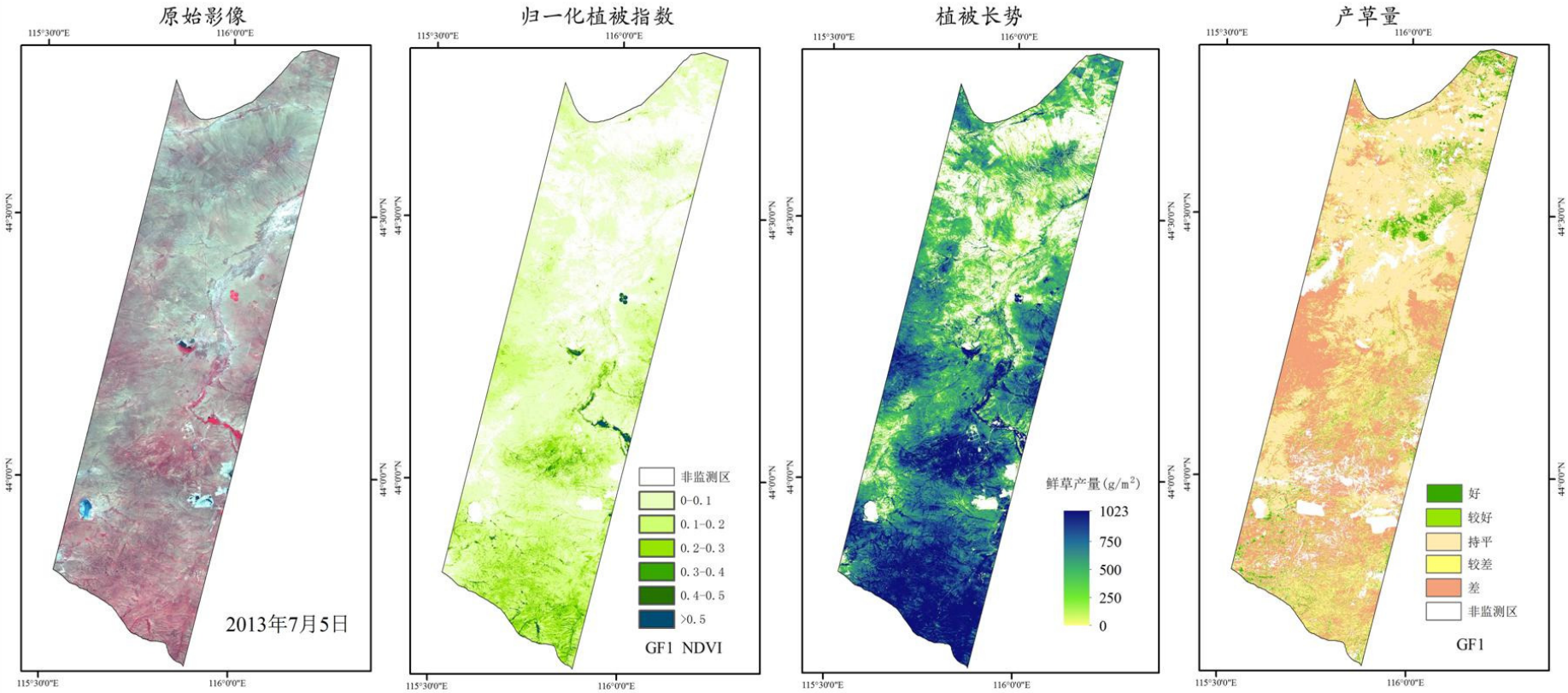


The figures show Gaofen-1 satellite 16m large swath images of Tianjing area, which were acquired on August 10,2013 and Octerber 6, 2013 respectively and the imaging region for Tianjin area. Through the monitoring of aerosol optical thickness, we can find that Tianjin and the surrounding areas of aerosol thickness is north area higher than south area on August 10. At the same time, the aerosol optical thickness continued to increase on October 6, for the distribution of North Higher South lower.

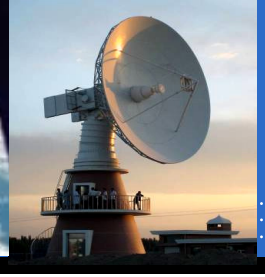


3. The latest development of the first satellite of CHEOS

GF-1 Satellite application in modern agriculture

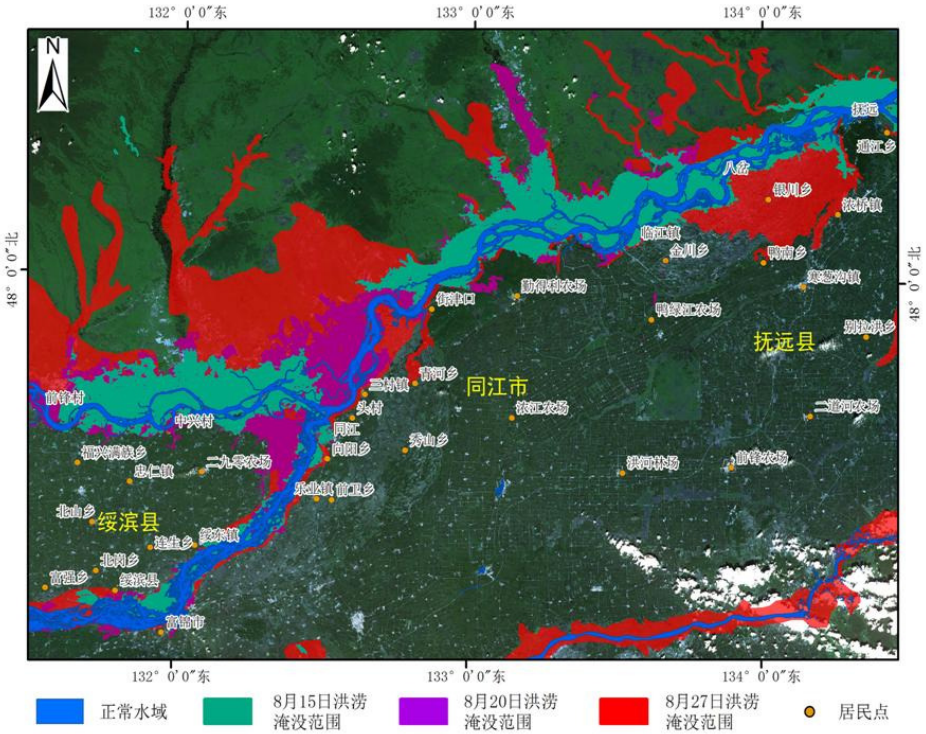


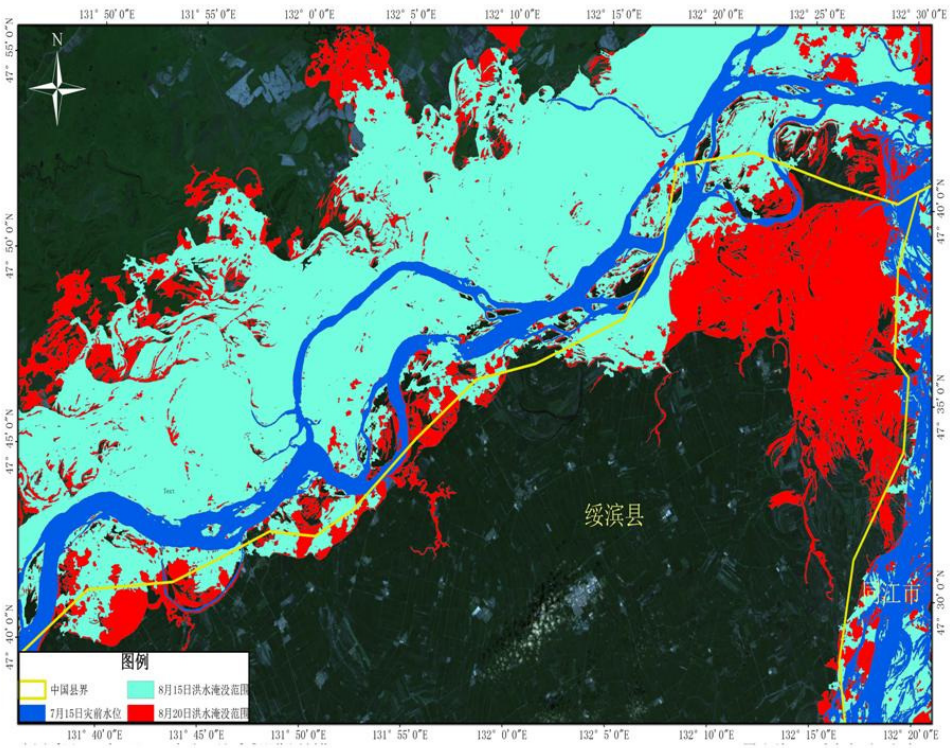
The figures show 8m multispectral image of Xinlin Haote in China, which was acquired by the Gaofen-1 satellite on July 5,2013. Based on the comparative analysis for the grassland normalized difference vegetation index and the ground sample data, the remote sensing and ground database was established. We estimate and analyse its distribution on the yield of grass. The result shows that the application of the Gaofen-1 satellite image in modern agriculture is very good, and has a bright prospect.



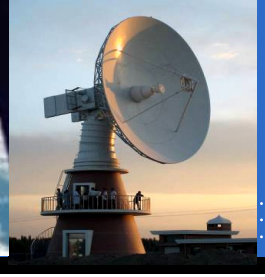
3. The latest development of the first satellite of CHEOS

GF-1 Satellite application in China Northeast huge flood disaster monitoring





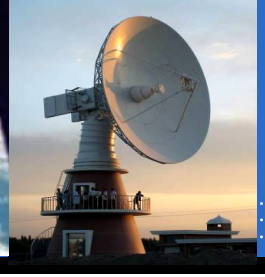
Left figure shows Gaofen-1 satellite 16m large swath image. Right figure shows 2m panchromatic 8m multispectral camera fusion image of the Tongjiang area of Heilingjiang province in China, which was acquired mainly on August, 2013. By extracting the Gaofen-1 satellite image information, we can find the change of the flood area. By constrast, we can see that the object is more clearly and the interpretation precision is higher by using the Gaofen-1 images.



3. The latest development of the first satellite of CHEOS

GF-1—— International Cooperation

- In 2003.7, CNSA & Roskosmos discussed about sharing data of earth observation satellites. According to the principle of equality and mutual benefit, CNSA considered to exchange the data of GF-1 etc with the data of the same type of satellites of Roskosmos.
- In 2013.9, according to the application of APSCO, CNSA offered the data of GF-1 to Pakistan timely to support the local rescuing after the earthquake.



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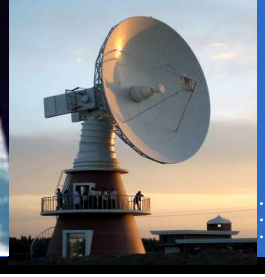
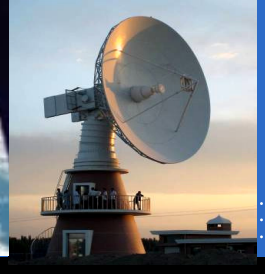


4. Implementation plan

Implementation plan

- Construction duration：2010-2020.
- In 2014，launch second satellite and put into service.
- By 2016，launch 3 satellites.
- By 2020，completely activated.



Thank you for your attention!