

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

Earth Observation System and Data Center , CNSA

Sep, 2016



# Outlines



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



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# Introduction



## ➤ 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



# Introduction



## ➤ 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



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



# Space-based System



- **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.....**



# Space-based System



## ➤ GF-1 details

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

## ➤ Two payloads

High-resolution cameras	Wave-length	Pan	0.45~0.89 $\mu$ m
		Multi-spectral	B1:0.45~0.52; B2:0.52~0.59; B3:0.63~0.69; B4:0.77~0.89.
Spatial Res.	Pan	2m	
	Multi-spectral	8m	
Swath	68km with two cameras		
Data Quant.	10 bits		
Revisit	$\leq 4$ days at equator (roll near 25°)		

wide-field imager (mosaic)	Wave-length ( $\mu$ m)	Multi-spectral	B1:0.45~0.52; B2:0.52~0.59; B3:0.63~0.69; B4:0.77~0.89.
	Spatial Res.	Multi-spectral	16m
	Swath	830km with 4 cameras	
	Data Quant.	10 bits	
	Revisit	$\leq 4$ days at equator (no need to roll)	





# Space-based System



- **GF-2 details**
- 631km,Polar Satellite**
- **One payload**

	Wave-length (μm)	Pan	0.45~0.89
		Multi-spectral	B1:0.45~0.52; B2:0.52~0.59; B3:0.63~0.69; B4:0.77~0.89.
High-resolution cameras	Spatial Res.	Pan	0.81m
		Multi- spectral	3.24m
	Swath	45km	
	Data Quant.	10 bits	
	Revisit	≤4 days at equator (roll near 25°)	



# 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**

<b>High-resolution cameras</b>	<b>Wave-length</b>	<b>Pan</b>	<b>0.45~0.89</b>
		Multi-spectral	B1:0.45~0.52; B2:0.52~0.59; B3:0.63~0.69; B4:0.76~0.90; B5:3.5~4.1.
	Spatial Res	Pan	50m
		Multi- spectral	B1~B4:50m B5:400m
	Swath	400km × 400km	



# Outlines



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- **CHEOS Data Platform**
- Applications of CHEOS Data



# CHEOS Data Platform



## ➤ CHEOS Data Platform

--Integrated Data Platform, serve with much information



16 different ministries



26 branches in provinces

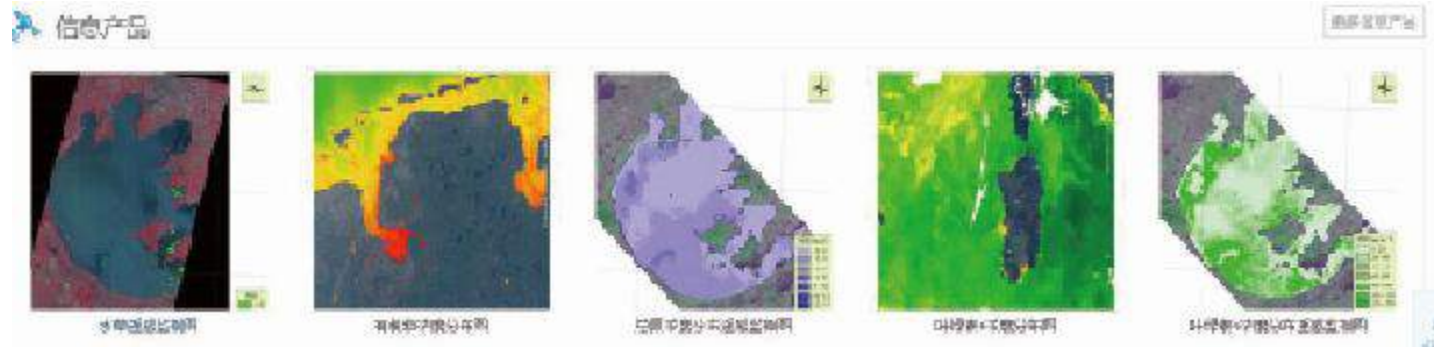
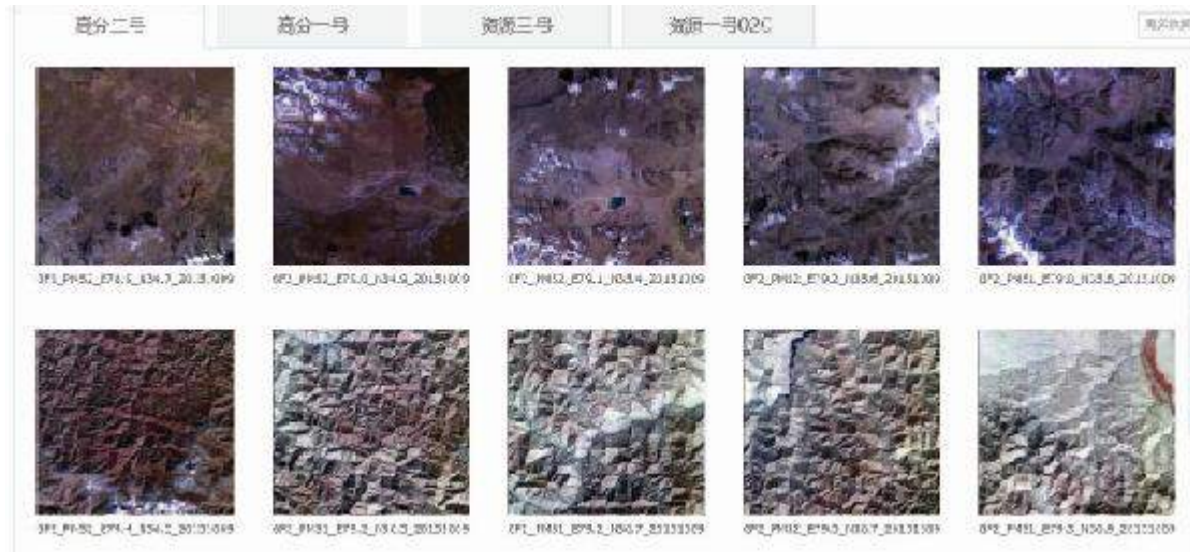




# CHEOS Data Platform



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





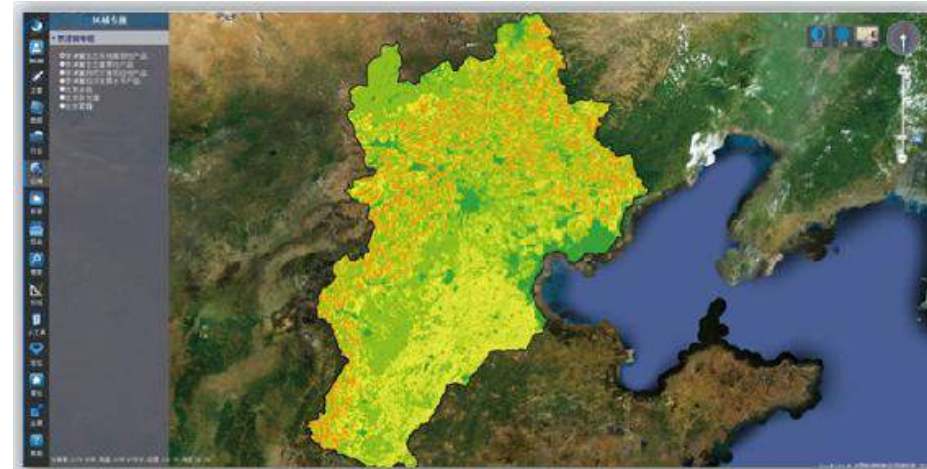
# CHEOS Data Platform



- CHEOS Data Platform
- Remote Sensing Based Service



Natural heritage sites for travelers



RS based research of B-H-T region



# Applications of CHEOS Data

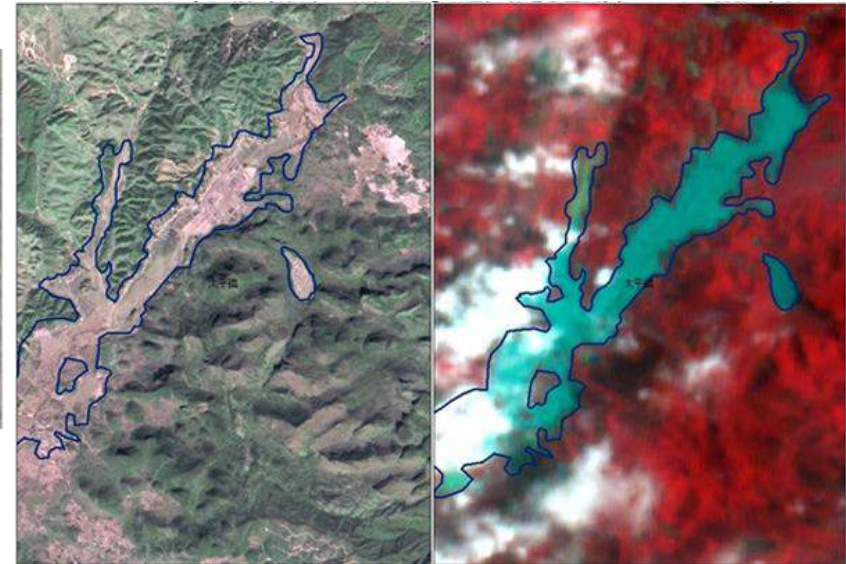


## 1. Observation

- 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.





# Applications of CHEOS Data



## 1. Observation

### ■ Analysis geological disasters with DEM data

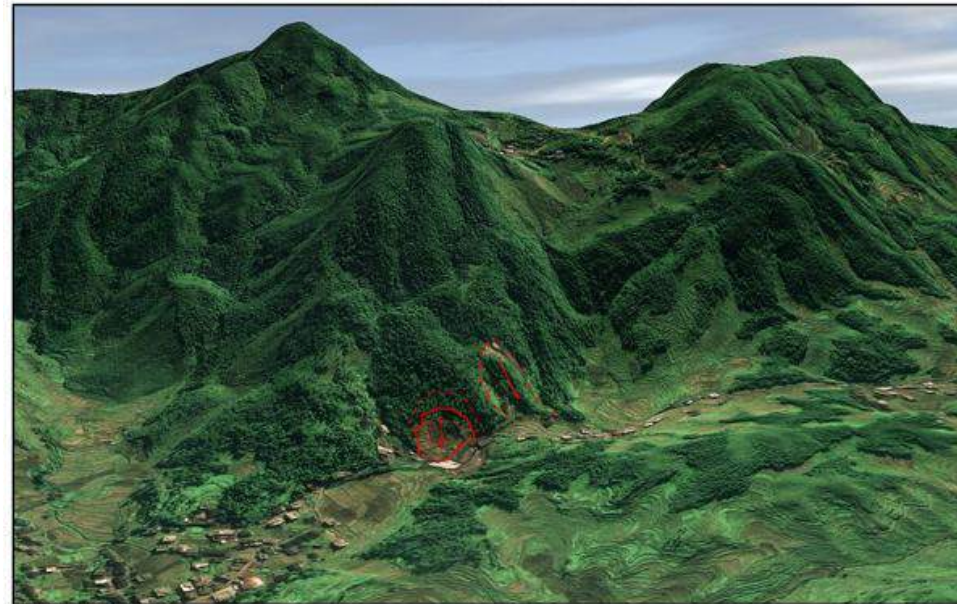
示范区地质灾害遥感解译图（三维）



数据源：GF-1数据

**GF-1 2m/8m data with DEM**

新化示范区地质灾害三维解译图



数据源：GF-2数据

**GF-2 0.8m/3.2m data with DEM**



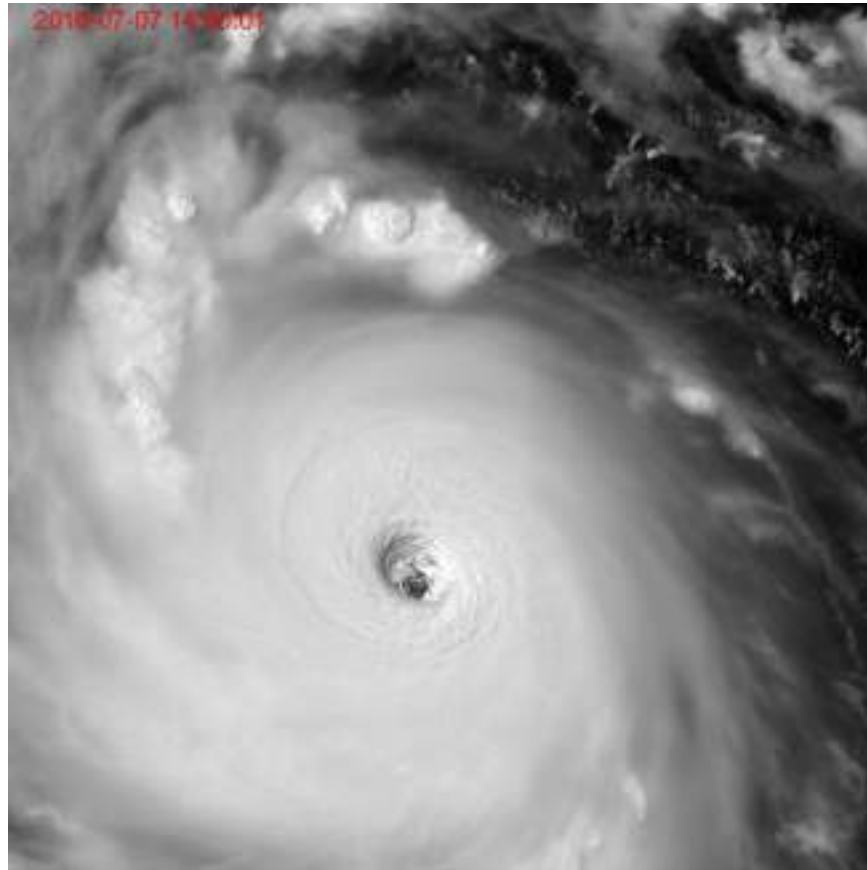
# Applications of CHEOS Data



## 1.Observation

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### ■ Closely look at Typhoon!





# Applications of CHEOS Data



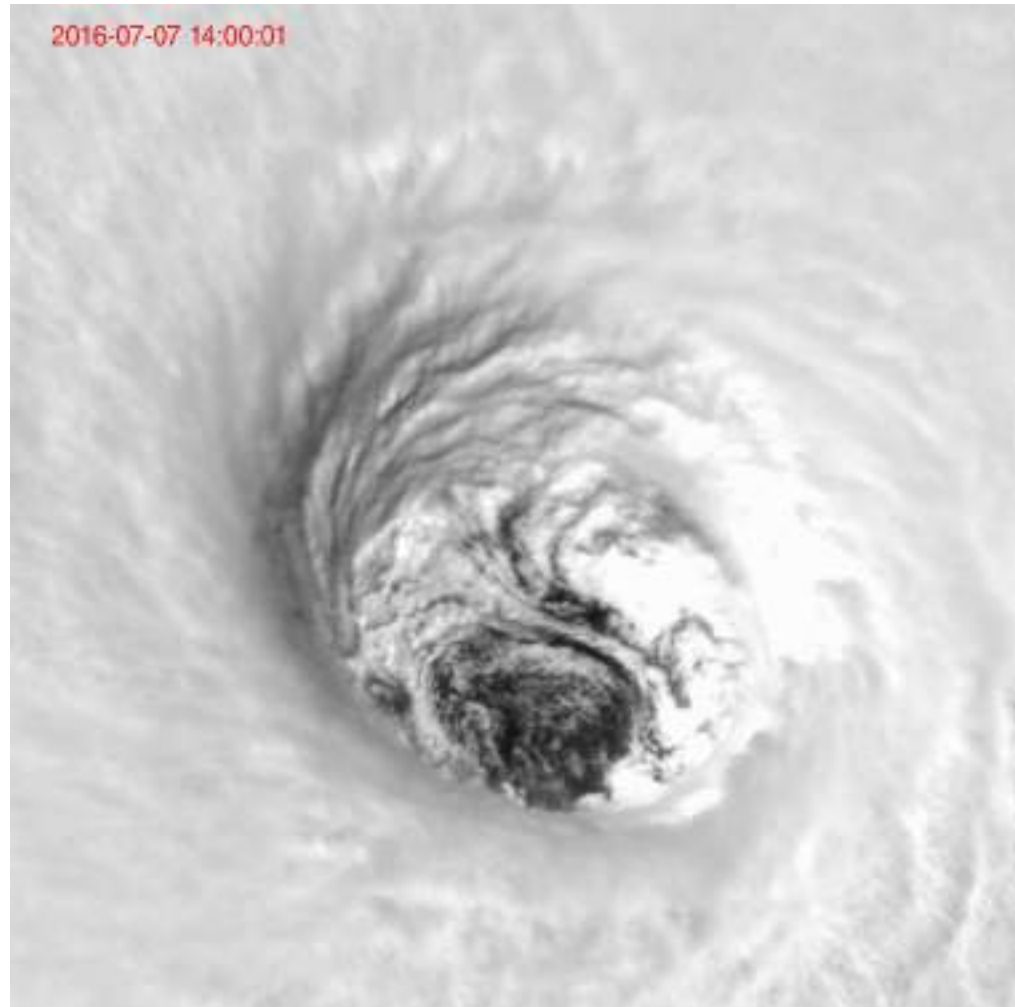
## 1. Observation

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■ Continuous observation  
focus on the eye of  
Typhoon

That would help to find  
out how typhoon evolves

Speed, move and  
estimated damage



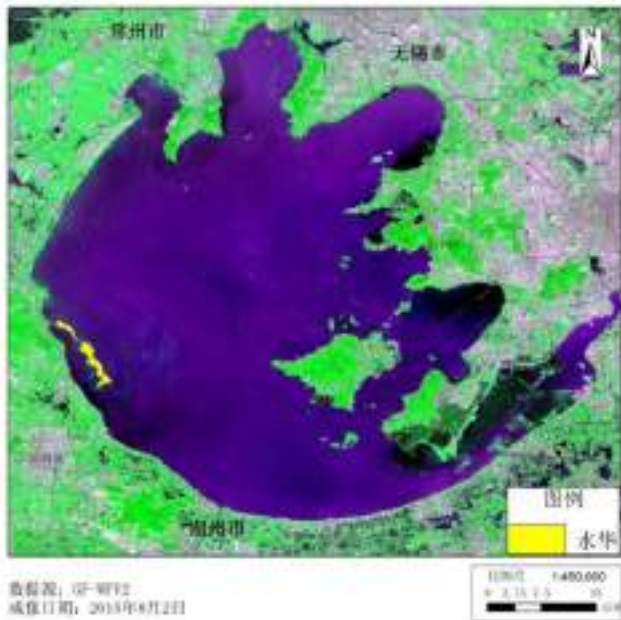


# Applications of CHEOS Data

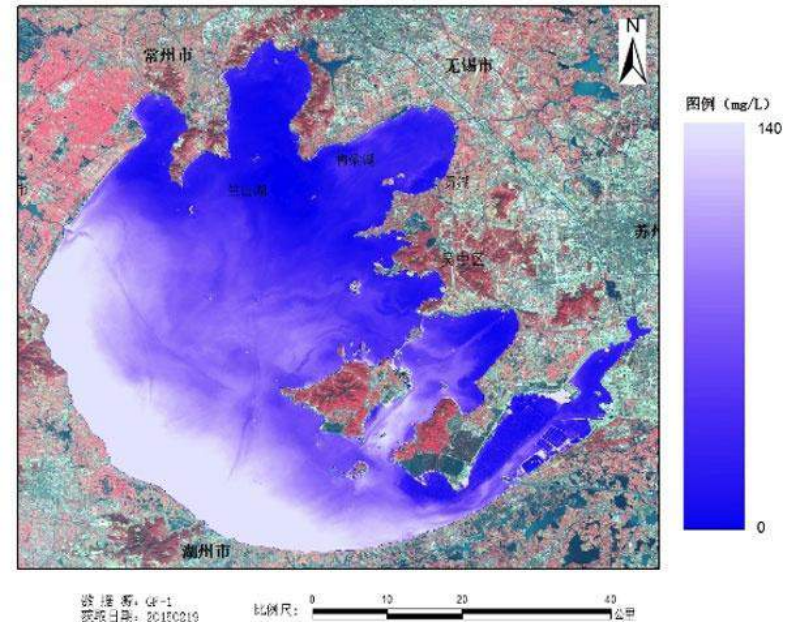


## 1. Observation

- 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.





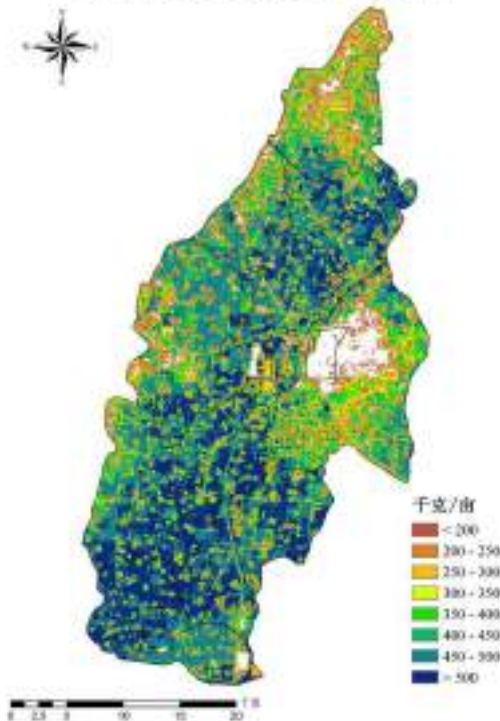
# Applications of CHEOS Data



## 2.Information

- Product of corps
- Ecological vulnerability
- Economic development level

2009年禹城市冬小麦单产分布图



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



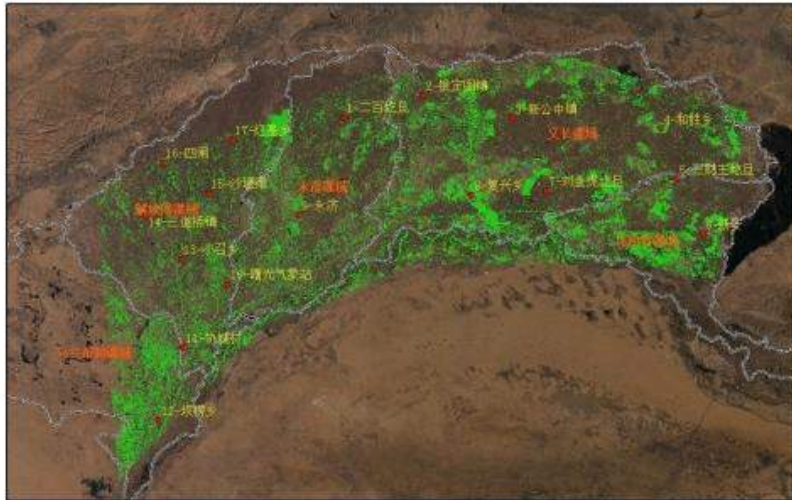
# Applications of CHEOS Data



## 2. Information

### ■ Irrigation area remote sensing monitoring product

河套灌区实际灌溉面积监测专题图（2014年4月28日）



数据类型: GF1  
获取时间: 2014.04.04 2014.04.28  
图例: 灌溉面积, 灌域边界线, 地面监测点  
中国水利水电科学研究院  
二〇一四年四月三十日

河套灌区实际灌溉面积监测专题图（2014年6月1日）



数据类型: 环境星  
获取时间: 2014.05.20 2014.06.01  
图例: 灌溉面积, 灌域边界线, 地面监测点  
中国水利水电科学研究院  
二〇一四年六月二十八日

**Actual irrigation area in April 28 2014.**

**Actual irrigation area in June 1 2014.**



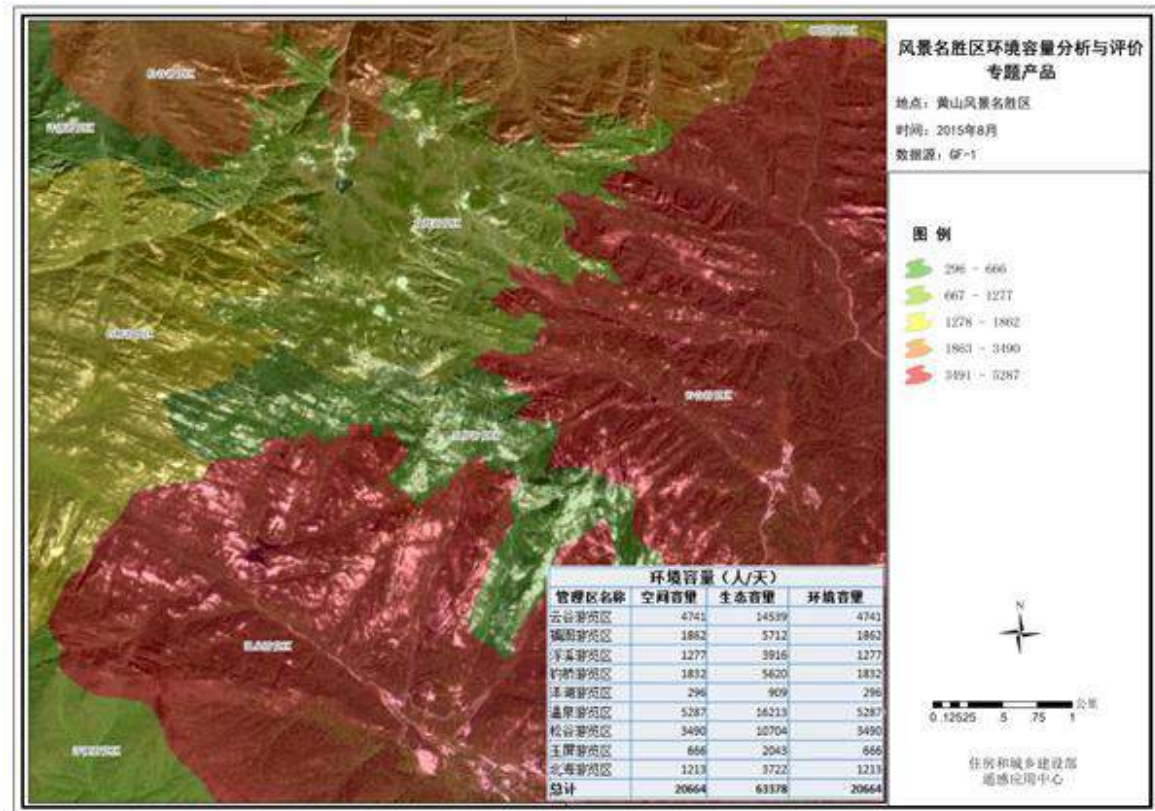
# Applications of CHEOS Data



## 2. Information

### ■ Analysis and evaluation of environmental capacity in scenic area product

### Evaluation of the environmental capacity of Mount Huangshan Scenic Area







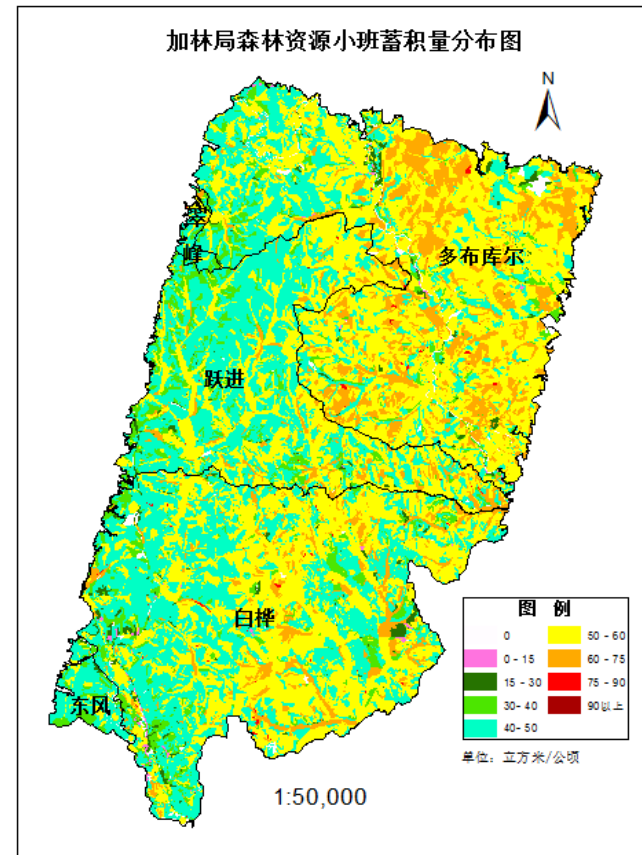
# Applications of CHEOS Data



## 2.Information

### ■ Provincial level forest volume distribution product

**Small spots forest volume  
distribution map of Jiagedaqi  
Forestry Bureau in southeast  
Greater Khingan Range**

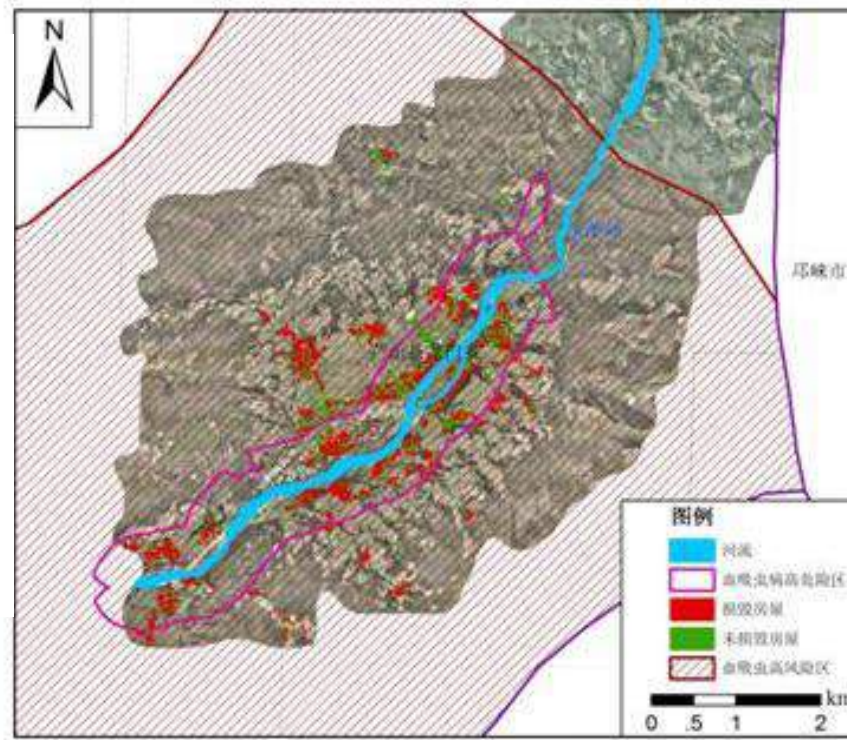




## 3.Decision

### ■ 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.





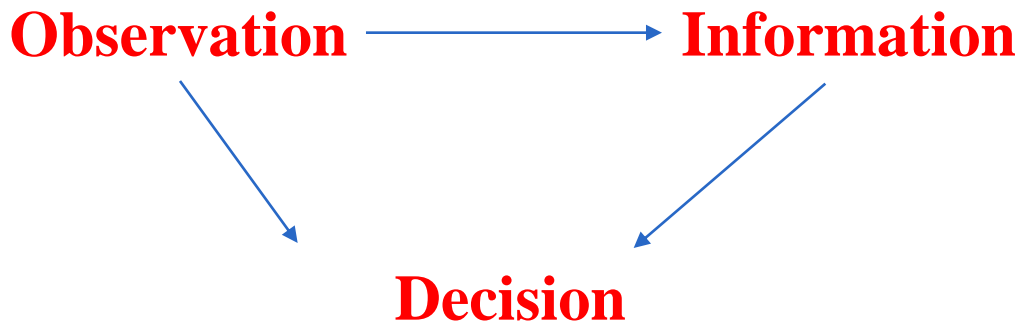
# Applications of CHEOS Data



## 3 Decision

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- All Information extract from remote sensing observation are aiming to assistant decision



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!**