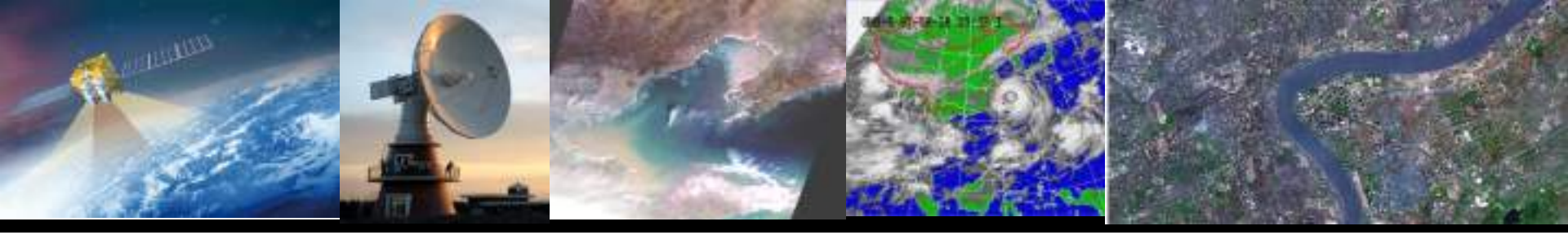


# 高分专项总体部署及
# 高分综合防灾减灾应用

## General Plan of China's High-Resolution Earth Observation System and Application in Disaster Risk Reduction


**赵文波**

**国家航天局 对地观测与数据中心**

**Earth Observation System and Data Center, CNSA**


2017 年 10 月

CHEOS

# 提　纲
# Outlines

## 第一部分 高分专项总体部署

**Section 1: General Plan of CHEOS**

## 第二部分 高分综合防灾减灾应用

**Section 2: CHEOS Data Application in Disaster Risk Reduction**

# 对地观测与数据中心简介
# Introduction to EOSDC-CNSA

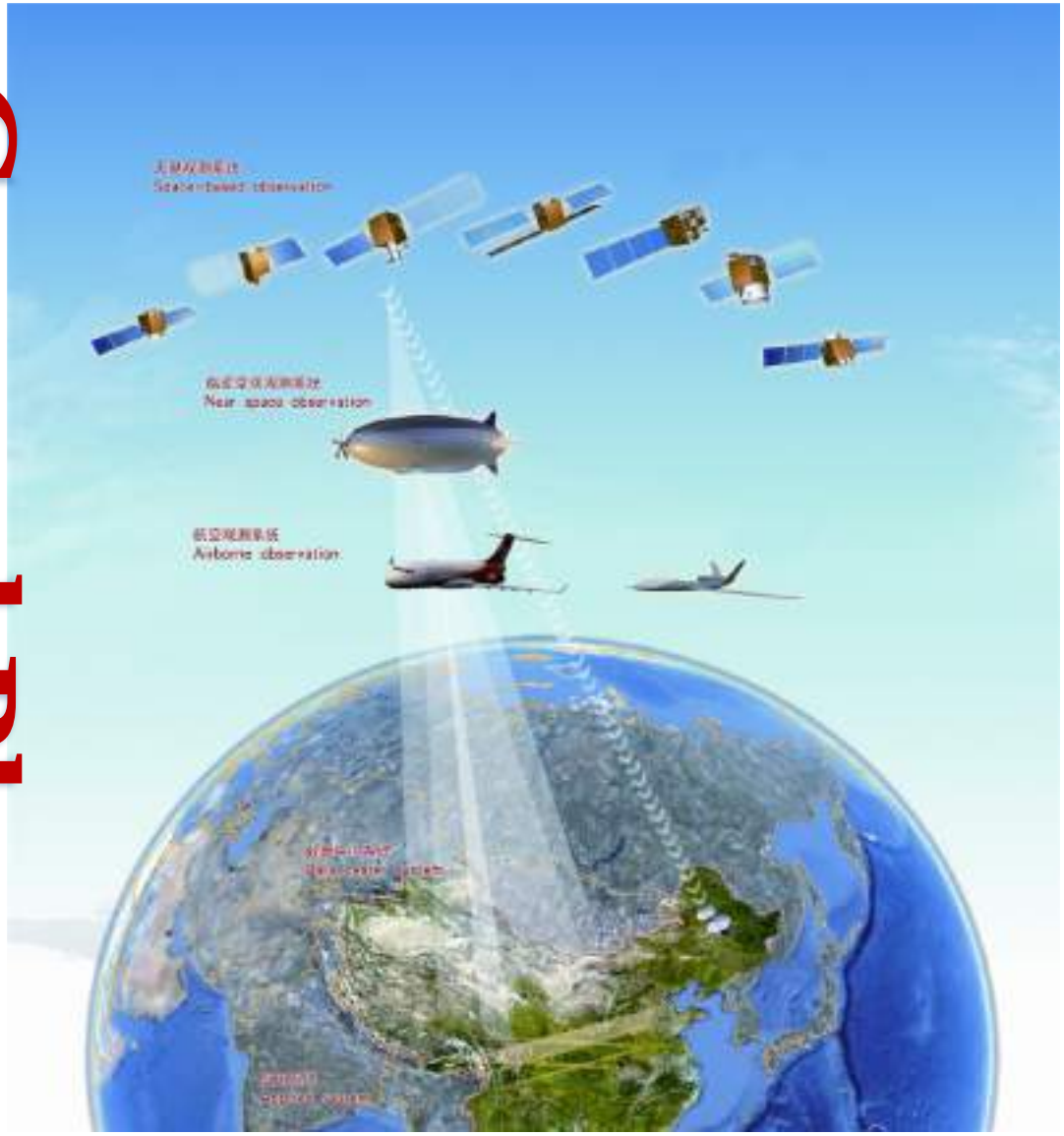
- 国家航天局对地观测与数据中心，主要承担高分辨率对地观测系统的具体组织实施，相关数据中心系统的建设、运行和管理工作。
- **Earth Observation System and Data Center of CNSA (EOSDC-CNSA) is charge of implementing the China's High-resolution Earth Observation System (CHEOS)，also related construction, operation and management of data center systems.**

# 高分专项简介
# Introduction to CHEOS

- 高分专项是16个国家科技重大专项之一；建设覆盖全球的全天候、全天时、高时空分辨率，高光谱分辨率的对地观测系统，促进国家空间信息产业发展，惠及国家社会经济发展。
- **One of National Science and Technology Projects; aiming to construct an advanced EOS with the global coverage, all-weather, all-day, high spatial resolution high temporal resolution, high spectral resolution; promote the development of space industry and its commercialization, benefit the economy and society.**

# 高分专项简介
# Introduction to CHEOS

## 总体方案 General Plan



## “天网”
**Space-net:**
**Satellites Projects**

## “数传”
**Data Transmission**

## “地网”
**Ground-net:**
**Ground Segment and Application System**

# 高分专项要解决的问题一
# Main Tasks of CHEOS: 1

## 1. 统筹高分数据源，提高数据自给率
## Unify CHEOS data sources，Improve data self-sufficiency

以前的五大系统
Former Five Main Systems

- 卫星系统 Satellite
- 运载系统 Launch vehicle
- 发射场系统 Launch Field
- 测控系统 Observing &controlling
- 地面应用 Ground Segment & Application

CHEOS Five Main Systems

高分的五大系统

- 天基系统 Space System
- 航空系统 Aerial system
- 平流层系统 Stratospheric system

“数据源” Data Sources

软环境建设 Soft Environment

- 地面系统 Ground Segment
  - ✓运管控 Operating…
  - ✓数据接收处理分发 Data Receiving
  - ✓定标场 Calibration & Validation
- 应用系统 Applications
  - ✓共性应用 Common Application
  - ✓行业应用 Government Branch
  - ✓省域应用 Provincial Branch
  - ✓产业应用 Indutrialization

# 高分专项要解决的问题一
# Main Tasks of CHEOS: 1

## 建立卫星“数据型谱”，不同需求有不同的分辨率要求

**Series of Satellites，Applications Demands Different Payloads & Resolution**

统筹高分数据源
Unify CHEOS data sources

高分“数据型谱”
CHEOS Satellites

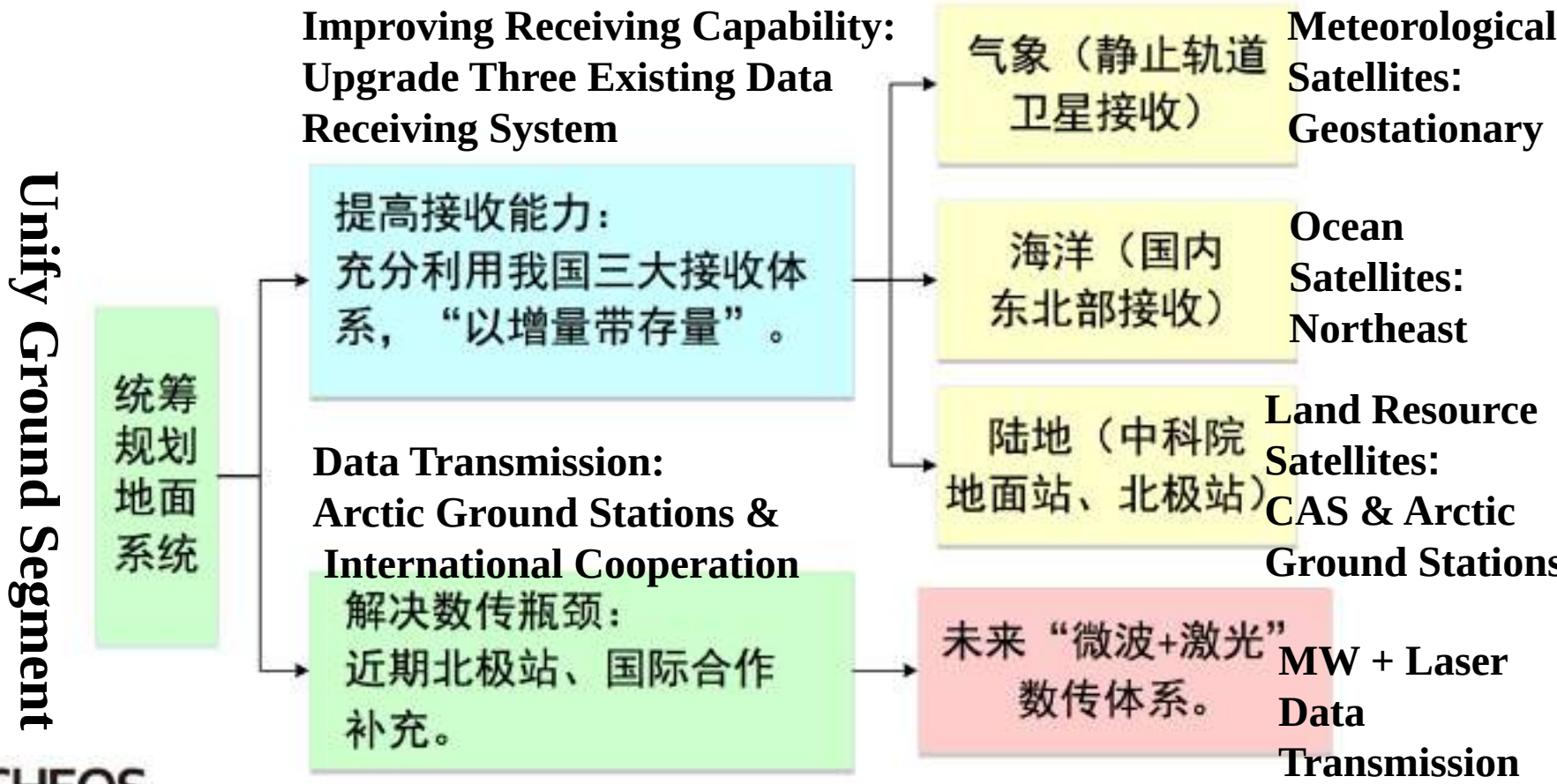
空间分辨率（1米/4米，2米/8米，16米、50米、…）
Spatial Resolution (1m/4m ,2m/8m, 16m ,50m,…)

时间分辨率（秒级、每天、每月、每季度…）
Temporal Resolution (seconds , daily, monthly, Seasonal,…)

光谱分辨率（可见光、红外、微波、高光谱、…）
Different Spectrum ( visible, NIR, MW, hyperspectral,…)

# 高分专项要解决的问题二
# Main Tasks of CHEOS: 2

## 2. 统筹规划地面系统，以增量带存量
## Unify Ground Segment，Upgrade Existing Facilities

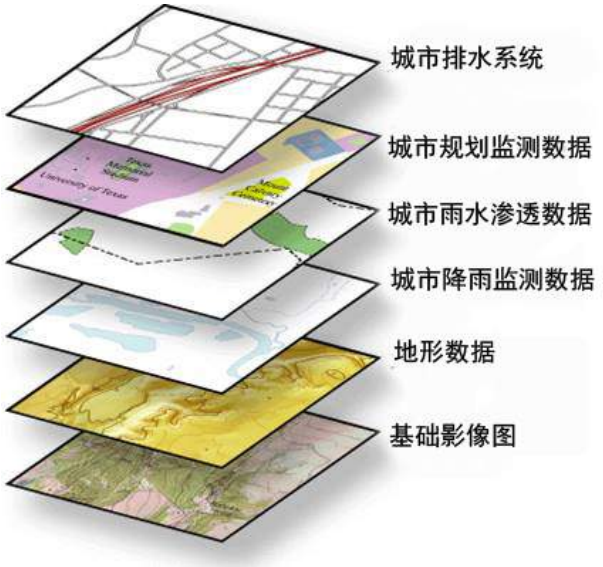


# 高分专项要解决的问题三
# Main Tasks of CHEOS: 3

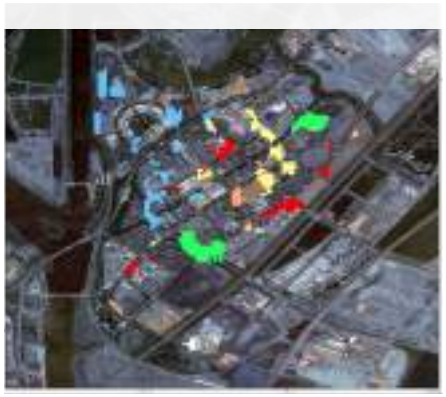
## 3. 创新应用模式，实现由定性向定量应用跨越

## Creation of New Application Mode，Qualitative to Quantitative Application

**Information retrieval + overlay mode：Remote Sensing Image can be background of socio-economic data, illustrate the connection between different information, and support decision making. By using these methods, more quantitatively estimation of surface parameters, and jump from research in lab to routine operating service, and development of space industry**




综合叠置分析



天津生态城内涝风险预警，颜色从青到红，表示内涝风险增高。

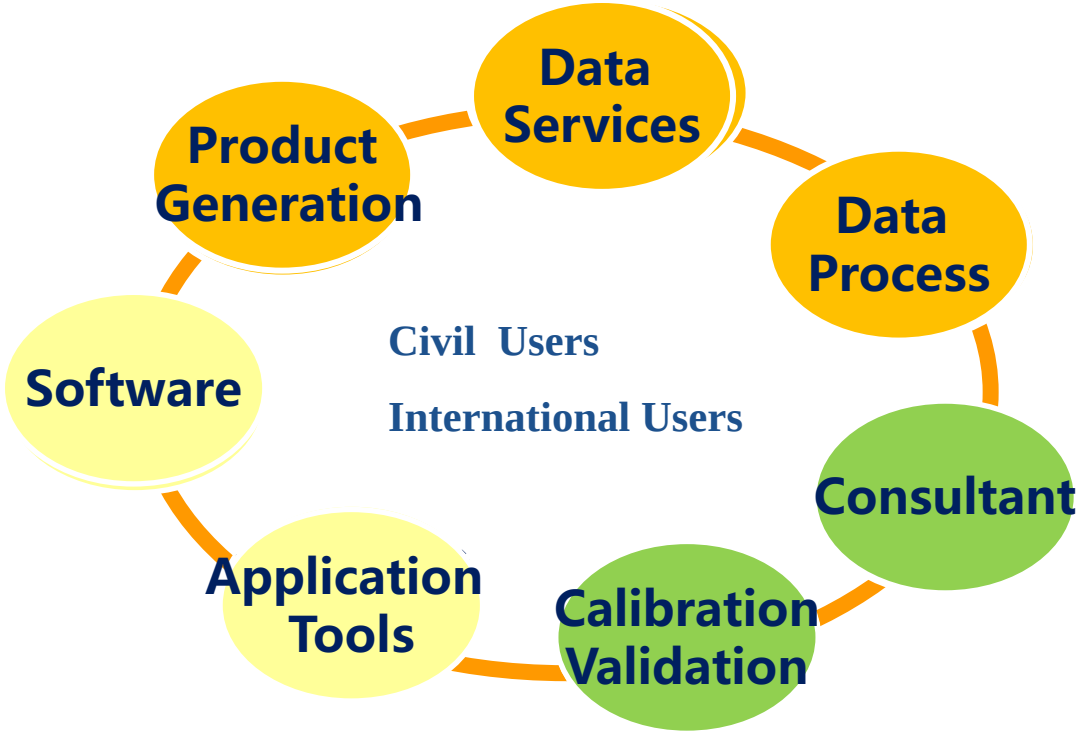
**Tianjin ecological city waterlogging risk warning, indicating waterlogging risk high(red) to low(green).**

# 高分专项要解决的问题四
# Main Tasks of CHEOS: 4

## 4. 构建应用体系，打造百亿规模的空间信息产业

**Systematize Applications, Initiate a 10 billion space information industry**

- Common Application
- Government Branch Application
- Provincial Branch Application
- Public Application
- International Application



# 高分卫星应用总体部署一
# General Plan of Application: 1

## 1. 创新体制机制，编制应用推广总体方案
### New Mechanism, Generation Plan for Application Promotion

**In July, 2015, finish this generation plan, bring up the idea of "Ten key elements". CHEOS should expand the depth and width of application, support the government branch's main routine operating service and provincial branch's governing capability.**


**Goal : Serving the governing capability of the Nation**

**Breakthrough : development of provincial branch, international**

**Fulcrum : Systems of technology & industry**

**Ensurance : Data Policy and standards for application**

**Basis : Sharing Platform & industry alliance & mass entrepreneurship**

# 高分卫星应用总体部署二
# General Plan of Application: 2

## 2. 印发指导意见，加速高分卫星应用推广
## Published guidance notes to accelerate application

**Dec 2016, after more than a year of practice, the guidance notes to accelerate application is issued, which is also according to the general plan of CHEOS. This is also the first officially released "ten key elements" idea, aiming to better guide and lead the application, push application of the provincial branch and CHEOS's industrialization application. It also serve the implementation of "civil-military integration", "One Belt And One Road" strategy.**


国家国防科技工业局高分观测专项办公室文件

关于印发《高分辨率对地观测系统重大专项数据应用推广指导意见》的通知

# 高分卫星应用总体部署三
# General Plan of Application: 3

## 3.以解决制约产业化发展问题为导向，颁布数据政策

## Change data policy to solve problems that restricting industrialization development

Aug, 2015, *Temporal Provisions of CHEOS Data* is issued. Optical data with spatial resolution not better than 0.5 m and microwave data not better than 1 m are open to the public, channel of distribution are expanded, therefore set up effective mechanism of data sharing data and applications. During the foundation of national ability for data and products generation, every aspects of the CHEOS data application are connected.


国家国防科技工业局高分观测专项办公室文件

关于印发《高分辨率对地观测系统重大专项卫星遥感数据管理暂行办法》的通知

# 4.填补空白，发布《高分数据应急获取工作机制和流程》

## Issued standardized workflow and emergency mechanism

Issued in April, 2017

EOSDC managed the emergency practice for many times, one of the most important achievement is quick response of the whole CHEOS satellite data workflow within one hour. Another one is establishment the GF - 4 satellite meteorological disaster quick response mechanism, when the typhoon comes, GF-4 would be able to provide image within 10 minutes after its imaging. Moreover, LEO satellite data will be submitted to users within 2 hours.

国家国防科技工业局高分观测专项办公室文件

科工高分办〔2017〕2号

关于印发《高分专项遥感卫星
应急数据获取工作机制和流程》的通知

各有关单位：

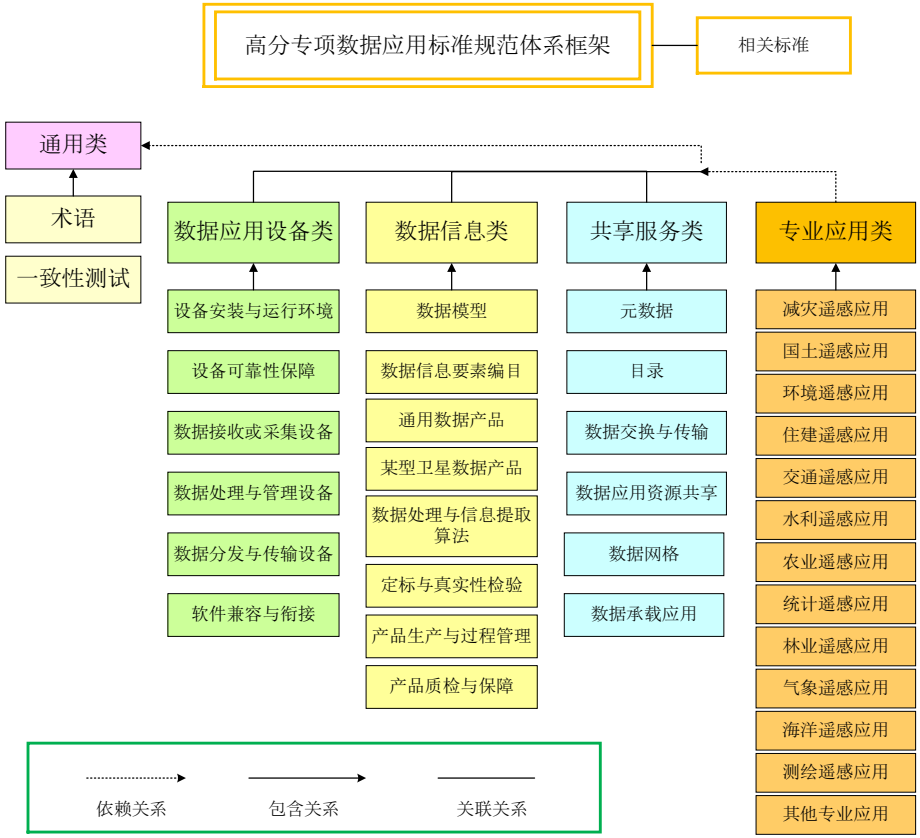
为充分发挥高分专项遥感卫星在重大自然灾害、国家权益维护、重大环境事件以及各类突发公共事件等应急决策支撑作用，更好地为高分专项用户提供及时高效的空间信息应急服务，我办依据《高分辨率对地观测系统重大专项实施方案》科工计〔2011〕1284号）、《高分辨率对地观测系统重大专项实施管理暂行办法》（科工高分〔2012〕426号）、《高分辨率对地观测系统重大专项卫星遥感数据管理暂行办法》（科工高分办〔2015〕2号）、《高分辨率对地观测系统重大专项地面系统运行管理办法》（科工高分办〔2017〕1号）、《高分辨率对地观测系统重大专项卫星工程在轨测试工作流程（试行）》（科工高分办〔2015〕3号）、《国家

—1—

# 高分卫星应用总体部署五
# General Plan of Application: 5

## 5. 以“走出去”为引领，发布首批急需的数据应用标准
## Release most needed standards data application

A joint working group with members from different government departments and different industries are responsible for standards drafting, which take coordination between best users, innovation leading and promotion of technology into consideration.
First 53 Standards is achievement of CHEOS data application standardization, marks a rapidly growth of remote sensing industry.



# 高分卫星应用总体部署六
# General Plan of Application: 6

## 6. 统筹资源集聚成果，创建高分应用综合信息服务共享平台
## Integrated information & service sharing platform of application

March 10th 2016, *The comprehensive information and service sharing platform of CHEOS* is launched. This platform connected 18 government departments and 11 provincial branches, has been named most excellent achievement and "one-stop" service station of CHEOS. This platform is an example of innovation driven result, and a practical exploration.

# 高分卫星应用总体部署七
# General Plan of Application: 7

## 7. 布局应用体系，指导省级中心五大能力建设
## Guide provincial centers with “five key capacities”

In order to promote application of CHOES data in provincial regions, 30 provincial centers nationwide are established. Remote Sensing data application system and space information industrialization are promote through there branche.

# 高分卫星应用总体部署八
# General Plan of Application: 8

## 8. 编制高分卫星应用国家报告，引领新的发展模式
## National report on application of CHEOS

**April 17, 2017 the *National report on application of CHEOS* has been publish. The media, such as the People‘s Daily and Economic Daily, marked it ” latest achievement of CHOES satellite data application, advanced the ability of supporting national management, A milestone in the field of remote sensing application in China!**


**应用领域的里程碑事件！˝ 。**

# 高分卫星应用总体部署八
# General Plan of Application: 8

## （1）综合卷

## Volume One: Comprehensive Application

This volume contains totally 111 pages, including four parts: general plan of CHEOS, the construction of data receiving capacity, national comprehensive application, and the key technologies of common application. Among them, the state-level integrated application are divided into 9 fields, also initiate the discussion of how CHEOS satellite application supports national decision-making.

# 高分卫星应用总体部署八
# General Plan of Application: 8

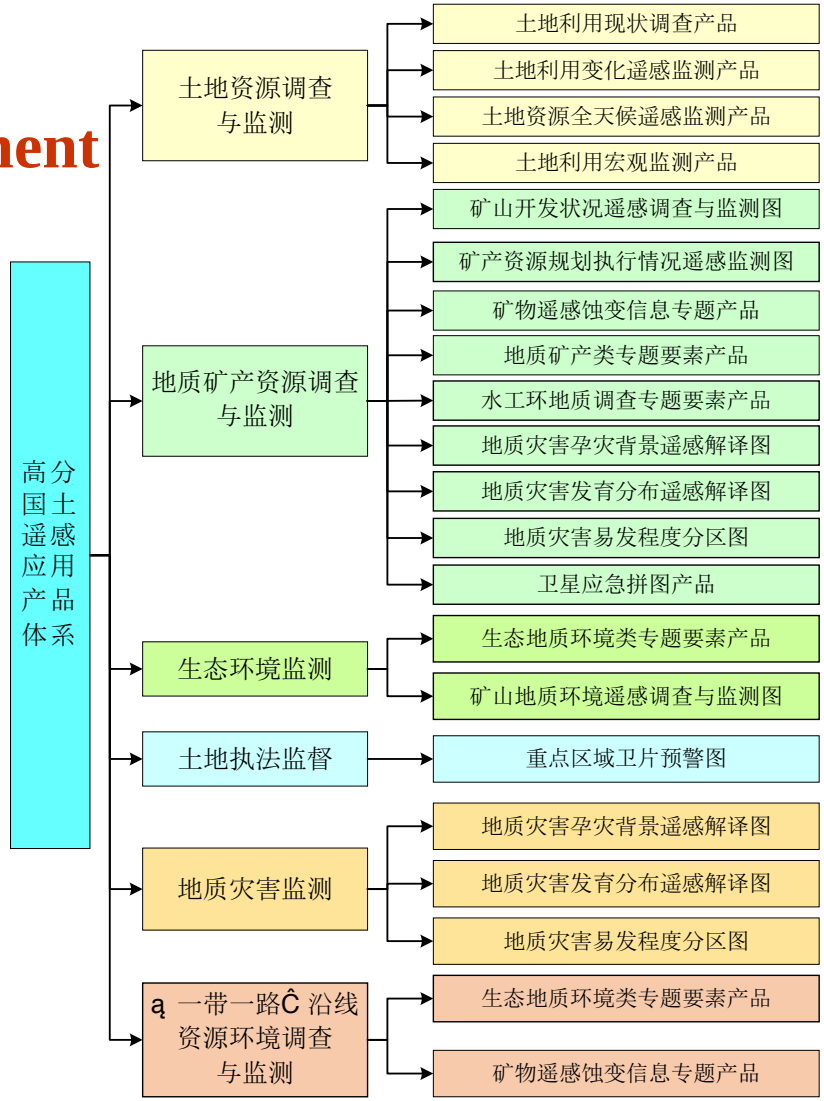
## （2）行业卷
## Volume Two: Application in government Departments

This volume contains totally 313 pages, all about application from 16 government departments, including: the Ministry of Land and Resources, State Oceanic Administration, Ministry of civil affairs (Committee of Disaster Reduction), the Ministry of Environmental Protection, the Ministry of Agriculture, State Bureau of Surveying and Mapping, Ministry of Housing and Urban-rural Development, National Development and Reform Commission, Ministry of Transport…

# 高分卫星应用总体部署八
# General Plan of Application: 8

## （2）行业卷
## Volume Two: Application in government departments

**According to the 9 fields of state-level comprehensive application in volume one, application in each government department is also sorted and classified. Based on the catalog, it has been emphasize that how CHEOS remote sensing data improved operating application in each government department. CHEOS remote sensing data now plays an irreplaceable role .**



# 高分卫星应用总体部署八
# General Plan of Application: 8

## （3）地方卷

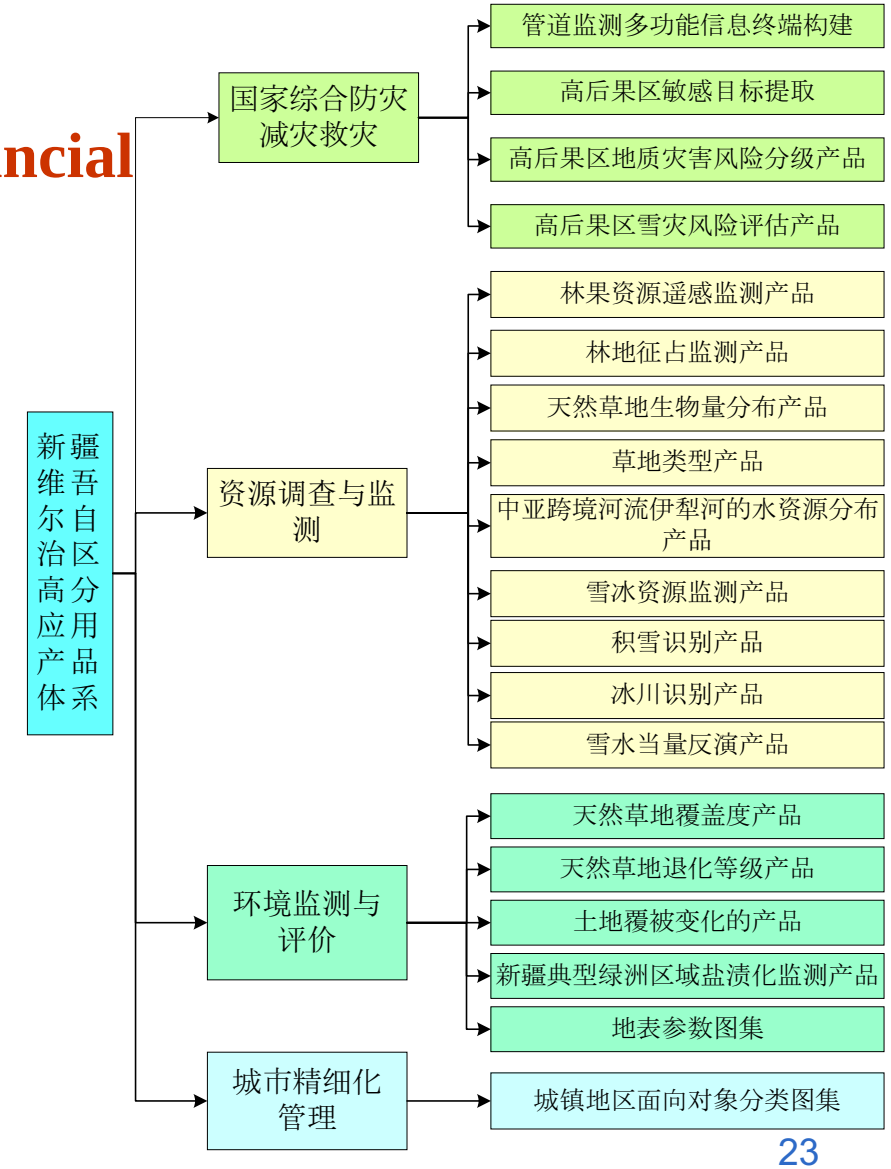
## Volume Three: Application in provincial branch

This volume contains totally 281 pages, including brief application report from 25 provincial center, such as Xinjiang, Heilongjiang, Hebei, Hunan, Beijing, Gansu, Shaanxi, Henan, Hubei, Sichuan, Yunnan, Guangxi, Zhejiang, Anhui, Shanxi, Jiangxi, Jilin, Qinghai and Guangdong, Shanghai, Liaoning, Fujian, Tibet, Inner Mongolia, Ningxia.

# 高分卫星应用总体部署八
# General Plan of Application: 8

## （3）地方卷
## Volume Three: Application in provincial branch

**Focus on six direction of promotion: the provincial resources investigation and supervision, environmental management and protection, urban planning and the refined management, provincial and county satellite comprehensive application, support “civil-military integration” and “One Belt And One Road” and other national development strategy, "Internet + CHEOS remote sensing data+" application for industrialization.**



# 提　纲
# Outlines

## 第一部分 高分专项总体部署

## Section 1: General Plan of CHEOS

## 第二部分 高分综合防灾减灾应用

## Section 2: CHEOS Data Application in Disaster Risk Reduction

# 国家级综合应用领域
## State-level comprehensive application

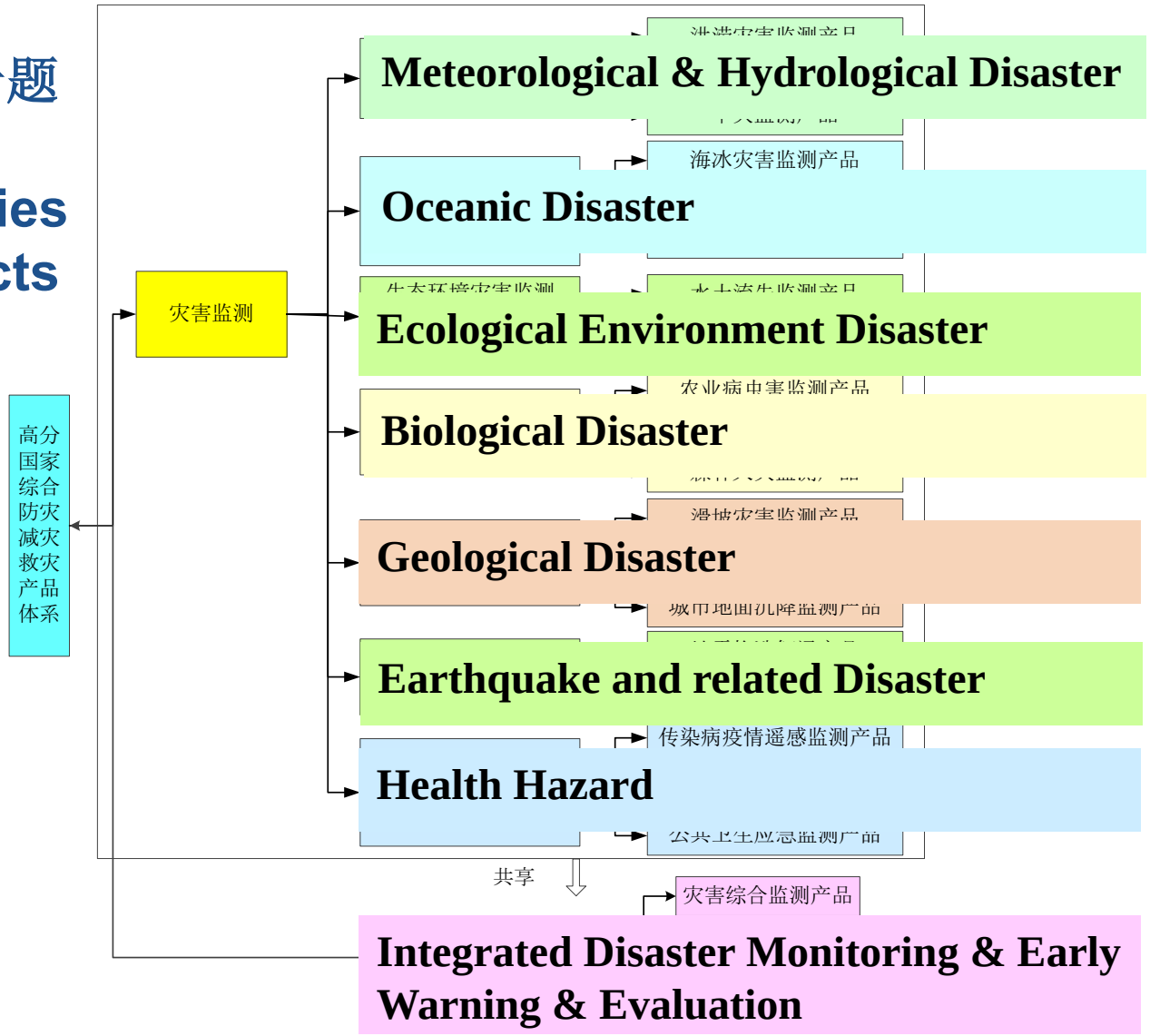
State-level comprehensive application

高分卫星国家级综合应用领域

| | |
|---|---|
| 保障国家安全 | National security |
| 国家全球利益维护 | Global interest maintenance |
| 国家战略规划支撑及重大工程监测 | National strategy support |
| 国家综合防灾减灾救灾 | National comprehensive disaster reduction |
| 资源调查与监测 | Resources investigation & monitoring |
| 环境监测与评价 | Environment monitoring & evaluation |
| 城市精细化管理 | Urban refined management |
| 执法监督 | Law enforcement and supervision |
| 国际合作与地球系统科学研究 | International cooperation & Earth system analysis |

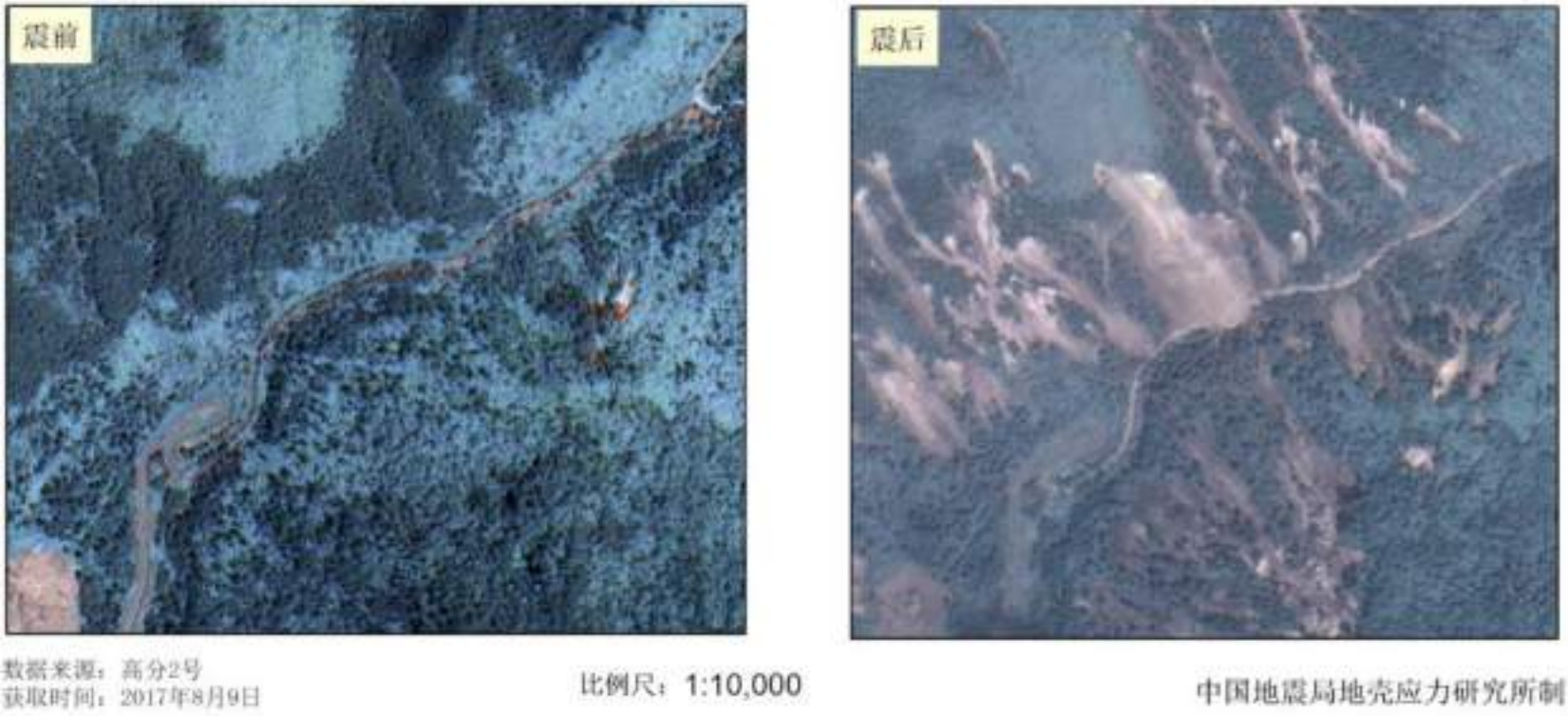
# 领域4 国家综合防灾减灾救灾
# 4th Field : National Disaster Reduction

8类22种专题产品
8 categories
22 products



# 九寨沟8月8日晚地震灾害监测

## Earthquake disaster monitoring in Jiuzhaigou Valley on 8th August




基于GF-2卫星8月9日数据，地点为九寨沟县301省道，震后影像中可见明显滑坡体阻塞道路。

GF-2 data of August 9th, the location is was 301 provincial road in Jiuzhaigou Valley.

# 九寨沟地震灾害监测——道路通行能力监测

## Earthquake disaster monitoring: Damage of roads

# 九寨沟地震灾害监测——房屋受损情况监测

## Earthquake disaster monitoring： Damage of houses

基于GF-2卫星8月9日数据，地点为九寨沟县漳扎，红色区域为滑坡，黄色为疑似受损房屋。

Red for landslide; yellow for damaged houses.

基于房屋道路监测以及伤亡人数等多元信息研判，四川省启动一级响应，国家启动三级响应。

Based on the analysis of multiple information, such as casualties, house and road damage monitoring, Sichuan province announced level one disaster response of the province, and the state initiated the level three disaster response.

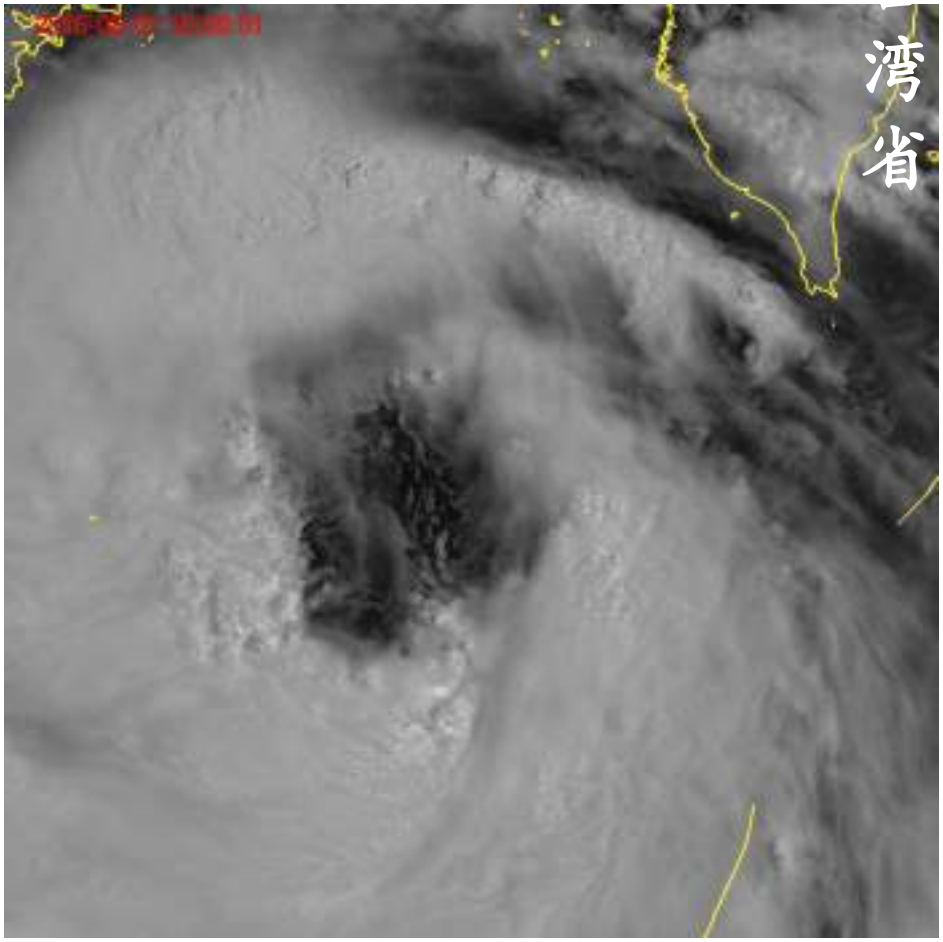
# 九寨沟地震灾害监测—著名景观破坏情况

## Earthquake disaster monitoring: Landscape damage


九寨沟景区内“火花海”景点在地震中受到严重破坏，叠瀑景观出现决口，两岸塌方，湖底显露。

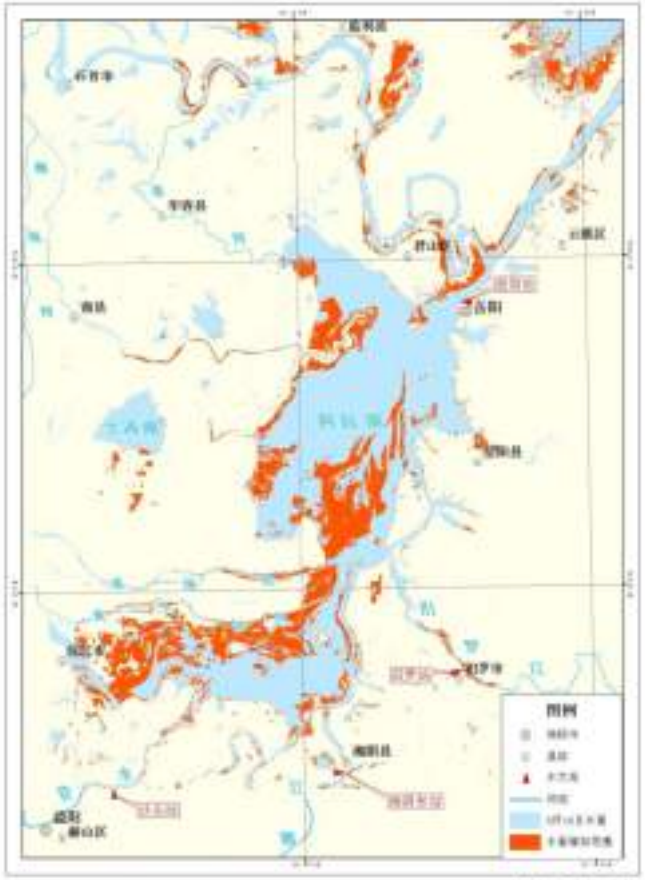
The famous scenic spot "spark sea" was severely damaged in the earthquake, the folding waterfall landscape, the two sides collapsed, the lake bottom revealed.

# 高分四号气象水文灾害监测
## Meteorological hydrological disaster monitoring

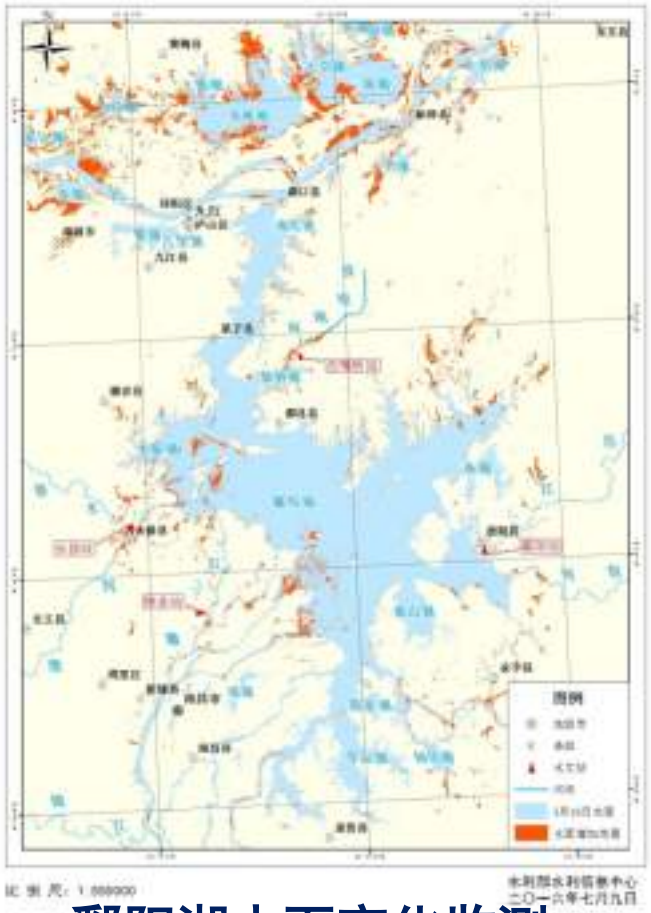



**July, 2017, National Satellite Meteorological Center using GF-4 satellite monitored Typhoon “Nida”. The details and evolution characteristics of the typhoon center can be accurately observed, that can be used to improve the precision of the typhoon positioning and intensity determination, and improve forecast accuracy of typhoon path. Assessment of the typhoon influence area reaches magnitude of 10 km, support the reduction of transmission population of hundreds of thousands, greatly reduce the cost of disaster reduction.**

# 高分气象水文灾害监测——洪涝灾害监测
## Meteorological hydrological disaster monitoring



洞庭湖水面变化监测
Dongting Lake



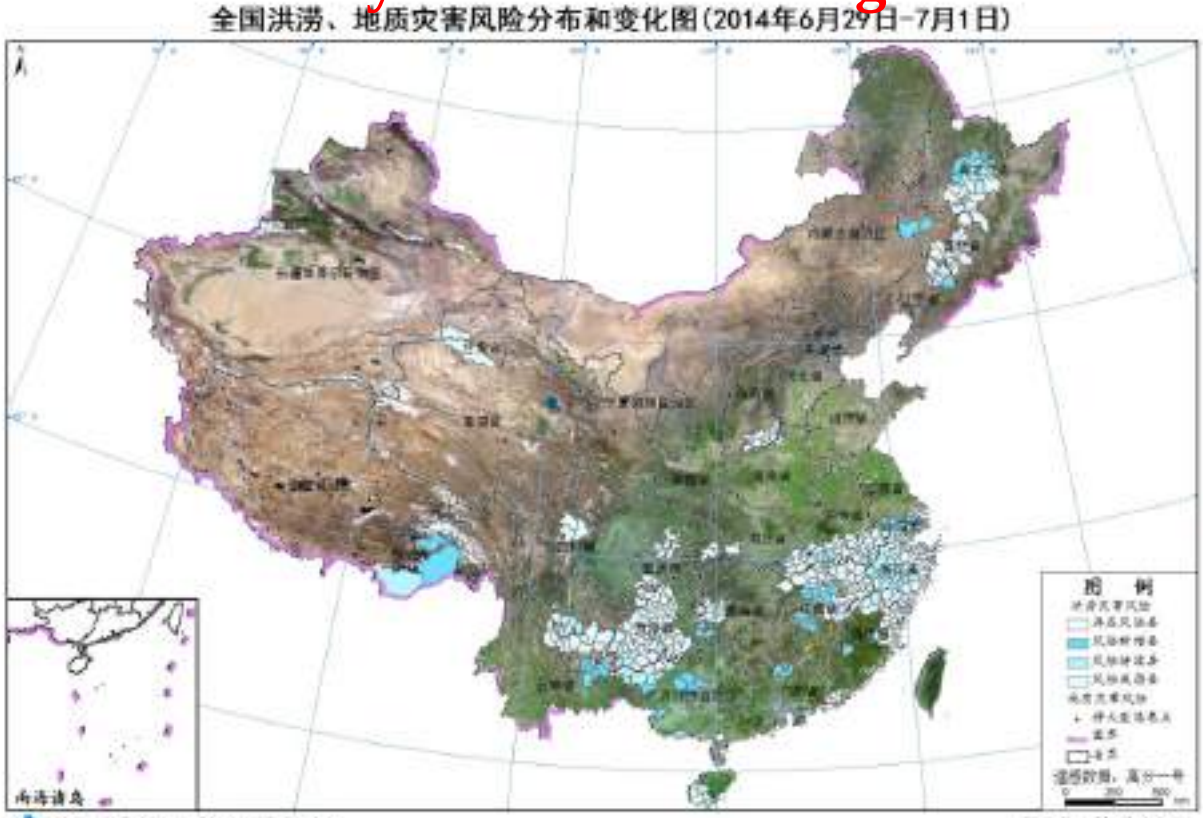
鄱阳湖水面变化监测
Poyang Lake

Using GF-1, GF-4 satellite images, monitored Dongting Lake and Poyang Lake of the Yangtze river basin, water surface increase between July 8th when flood occurs on July 8, and before flood (May 16th ).

# 森林灾害监测 Forest disaster Monitoring


# 灾害风险动态监测一张图

## Disaster risk dynamic monitoring

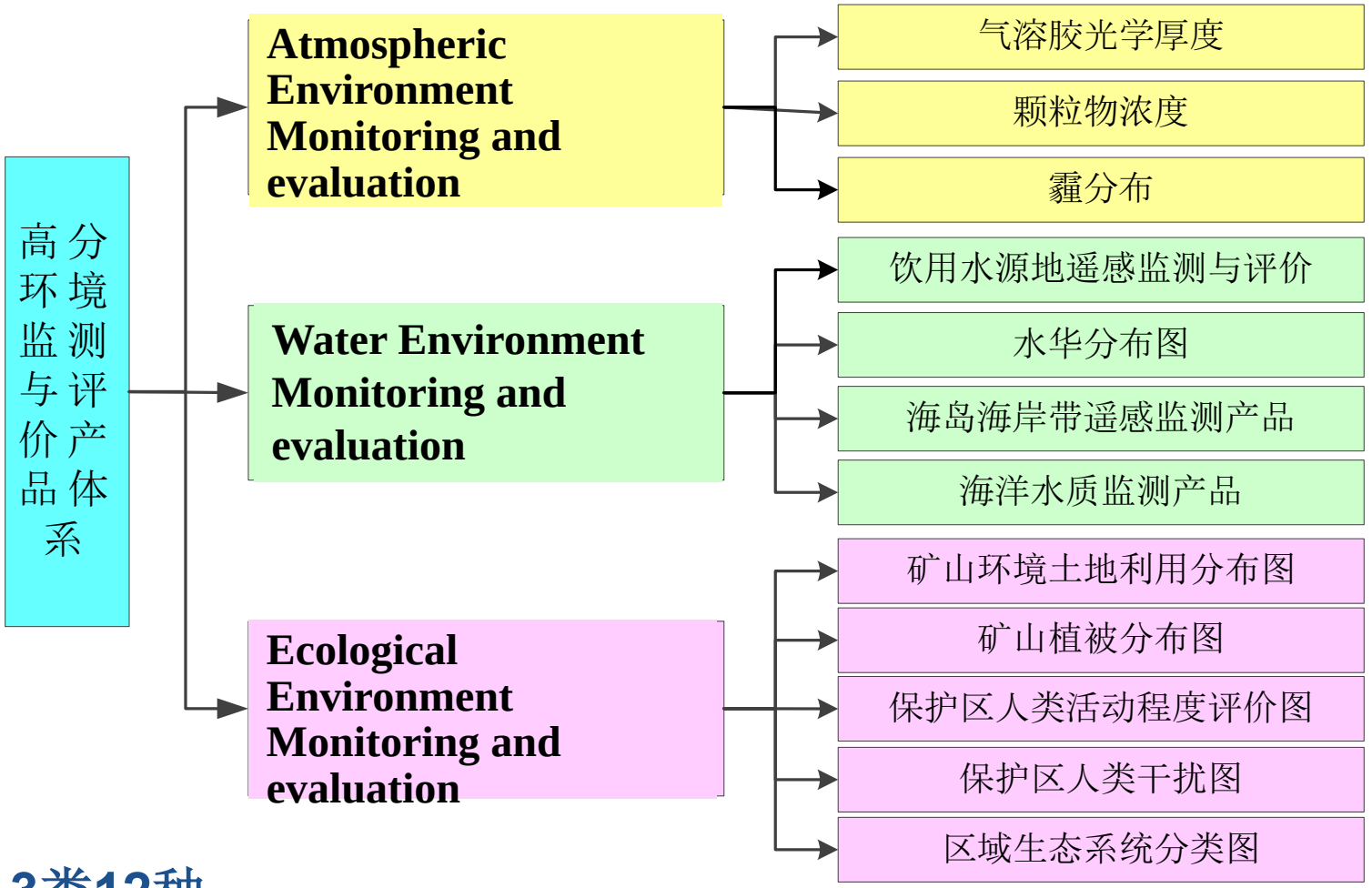



综合国土、环境、气象、水利等部门的监测成果，每天形成一张全国灾害风险变化图。

Combine monitoring dynamic information from Ministry of Land and Resources, Ministry of Environmental Protection, China Meteorological Administration and Ministry of Water Resources, upgrades this national disaster risk variation map daily

# 领域6 环境监测与评价

## 6th Field : Environment Monitoring & evaluation

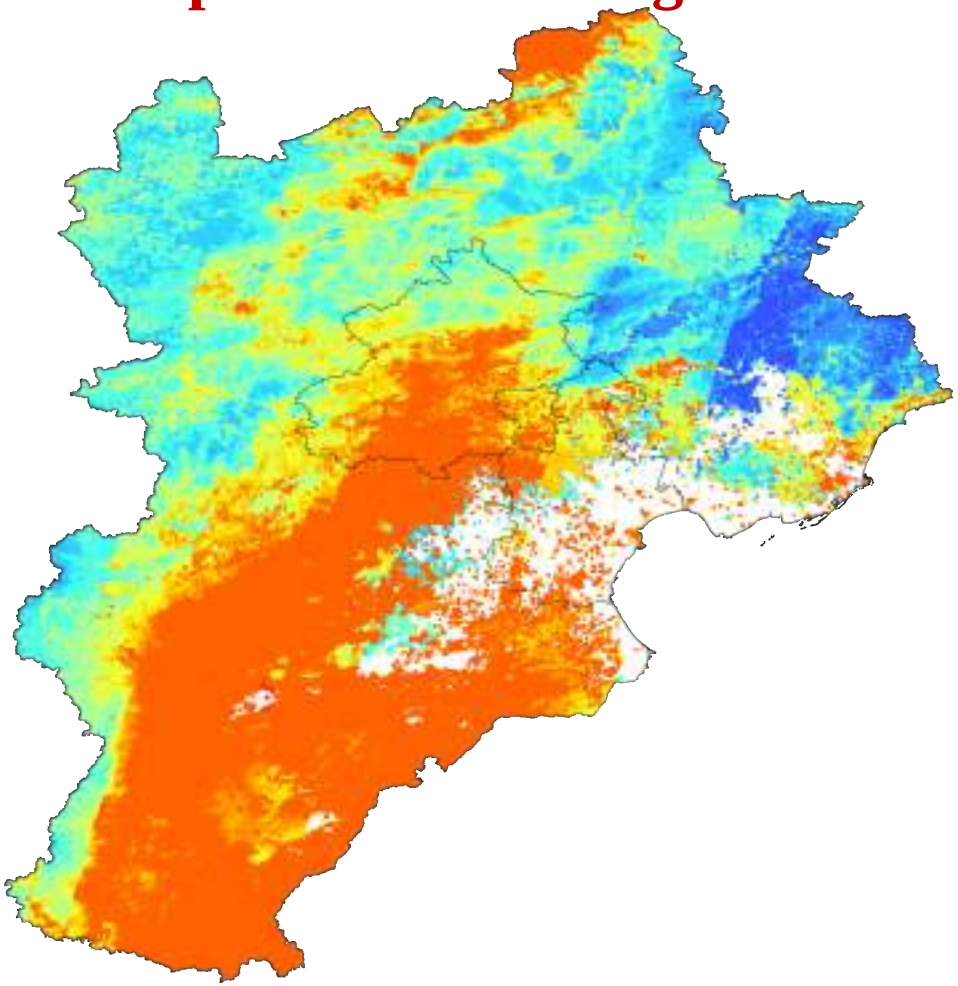



**3类12种**

**3 categories 12 products**

# 京津冀大气环境监测

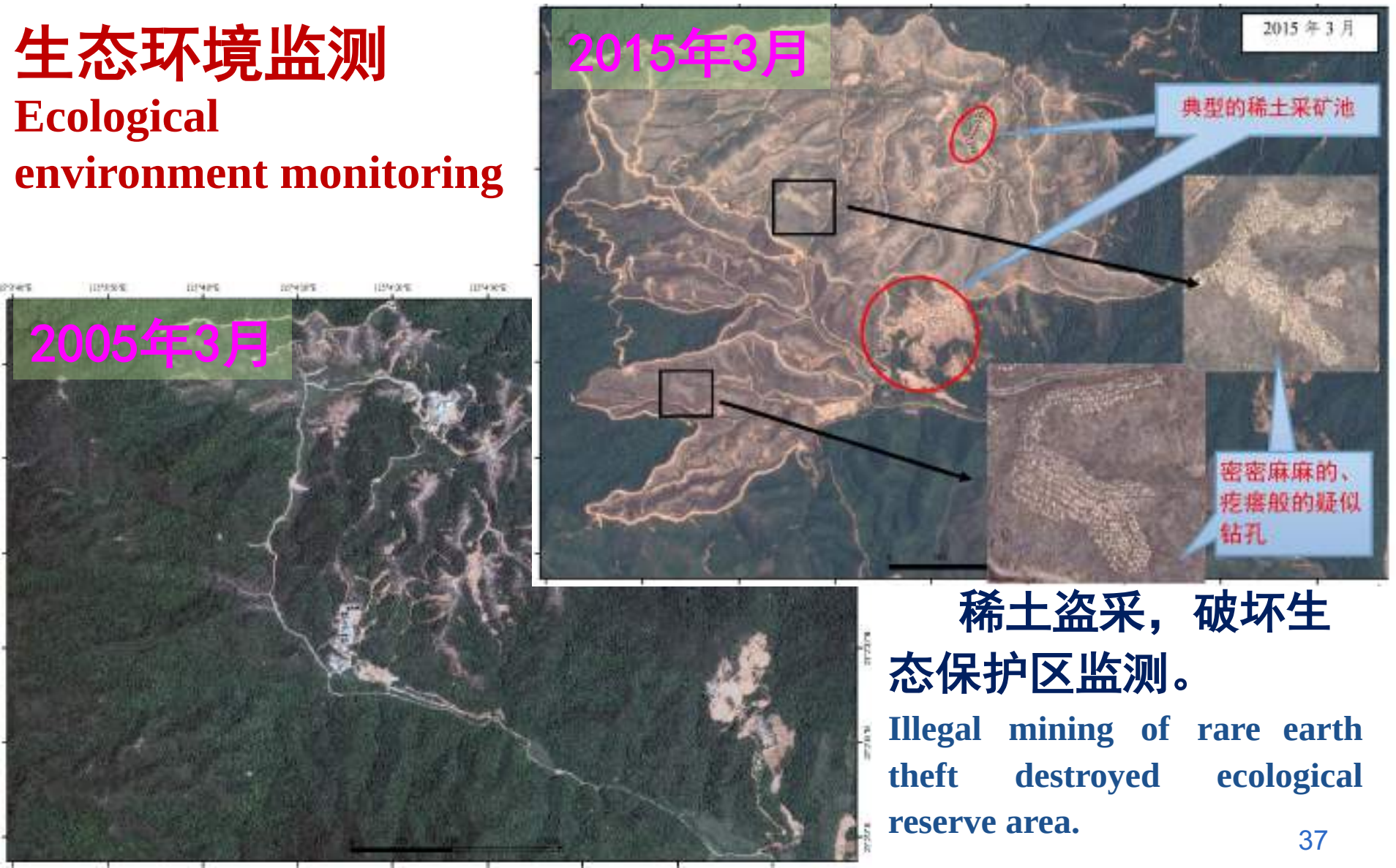
## Atmospheric monitoring of the Beijing-Tianjin-Hebei region



基于GF-1卫星影像，对京津冀地区空气质量开展了持续监测。

Using GF-1 satellite data, continuously monitor the air quality in Beijing-Tianjin-Hebei region.

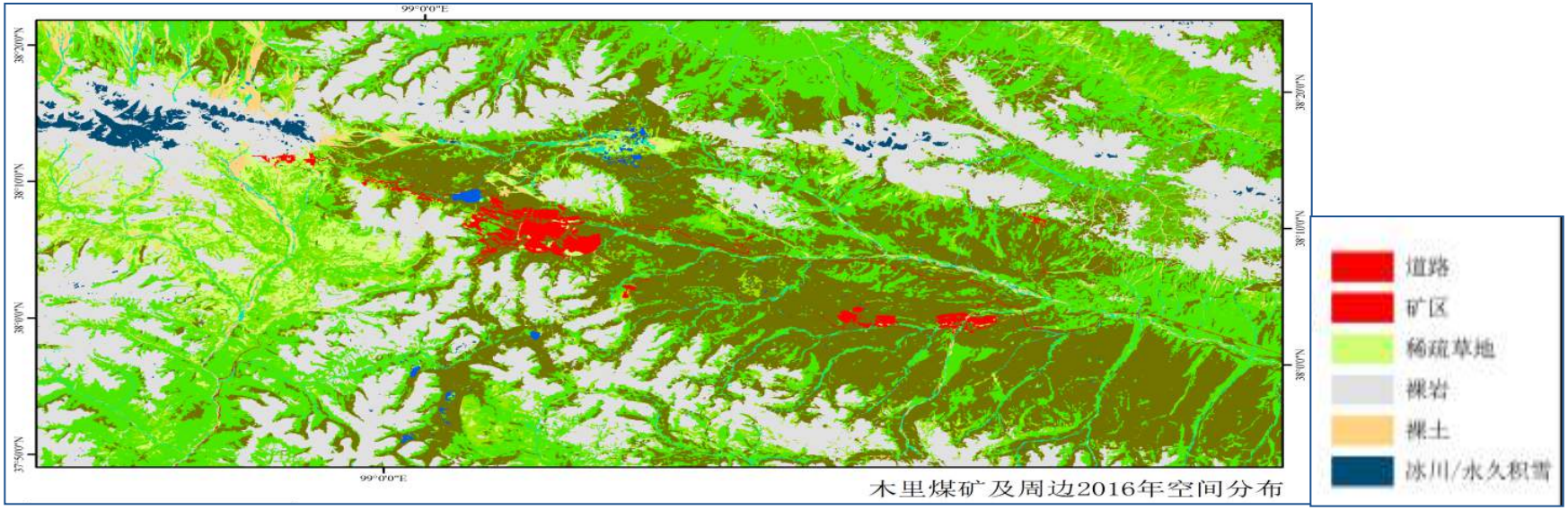
# 生态环境监测
## Ecological environment monitoring




稀土盗采，破坏生态保护区监测。

Illegal mining of rare earth theft destroyed ecological reserve area.

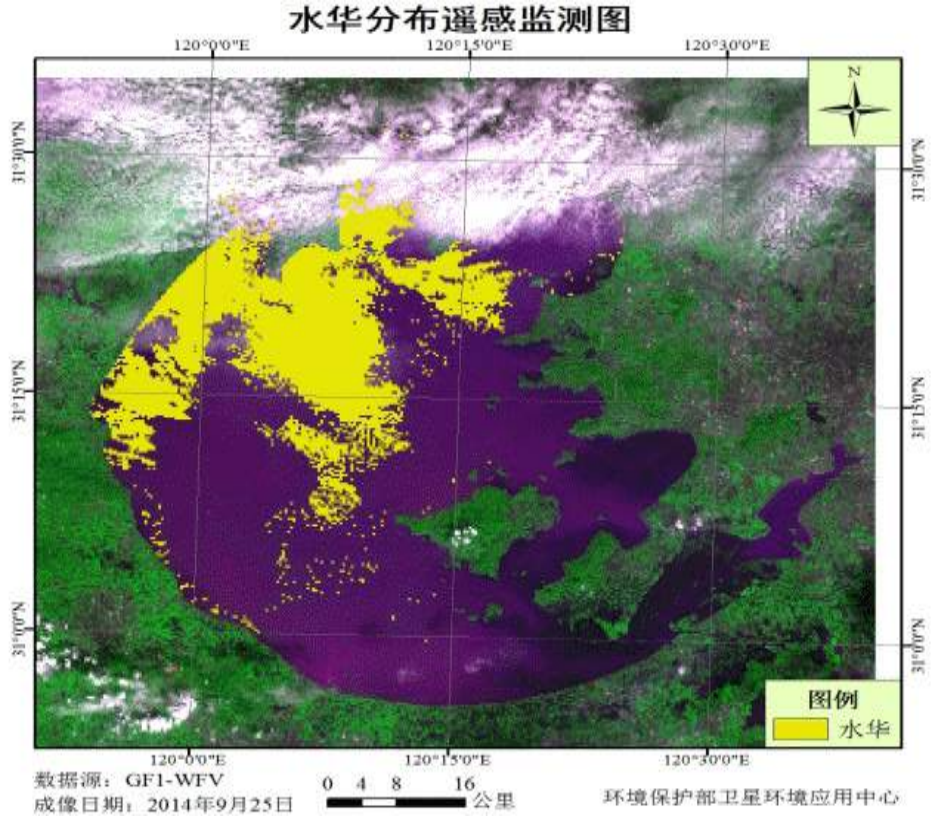
# 祁连山生态环境监测
# Ecological environment monitoring of Qilian Mountain




基于高分数据的祁连山煤矿开采及其周边环境影响调查与监测。

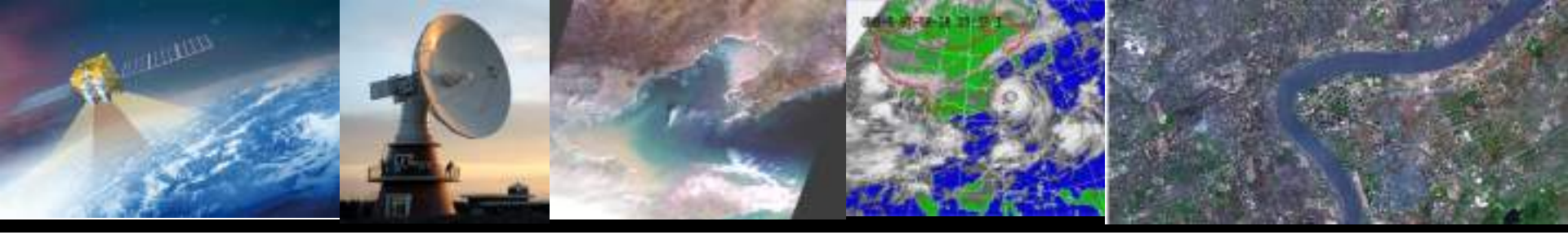
The investigation and monitoring of Qilian Mountain coal mine and its surrounding environment based on CHEOS data. Red for coal mine.

# 水环境监测
## Water environment monitoring




基于GF-1卫星影像，对太湖水华分布开展了持续监测。

Based on GF-1 satellite image, continuous monitoring of the water blooms distribution in Taihu Lake.



# 谢谢！

Thanks for your attention！