

遥感赋能自然资源调查监测 Remote Sensing Empowers Natural Resources Survey and Monitoring

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Monitoring p u S



01 Demands

02 Applications

03 int'l cooperation

Demands from CGS-Initiated Programs











About CGS

China Mineral Resources 2016

read more >>







Programs:

- ◆ Regional Geology and Earth System Survey
- ◆ Mineral Resources Survey and Assessments
- Geohazards Investigation, Monitoring and Assessments
- ◆ Geo-ecological Environment Investigation and Assessments
- ◆Water Resources Investigation, Monitoring and Assessments
- **◆Territorial Space** Evaluation
- ◆ Marine Geological Survey

Requirements for Remote Sensing





Sustainable Monitoring

Unified standards

Mature technical system

Long-term data consistency

Timely dynamic response

Technical Capability

High precision Strong adaptability



03

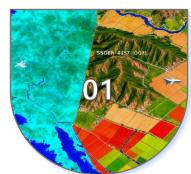
Cross-Scenario Application

Decision-support capability

Multi-field adaptation

Data Acquisition

No coverage gap
High reliability
Multi-source data compatibility





地质矿产遥感业务运行系统



任务管控



任务管控



数据采集



数据处理

Data Processing



解译制图

Interpret Charting



野外查验



共享服务

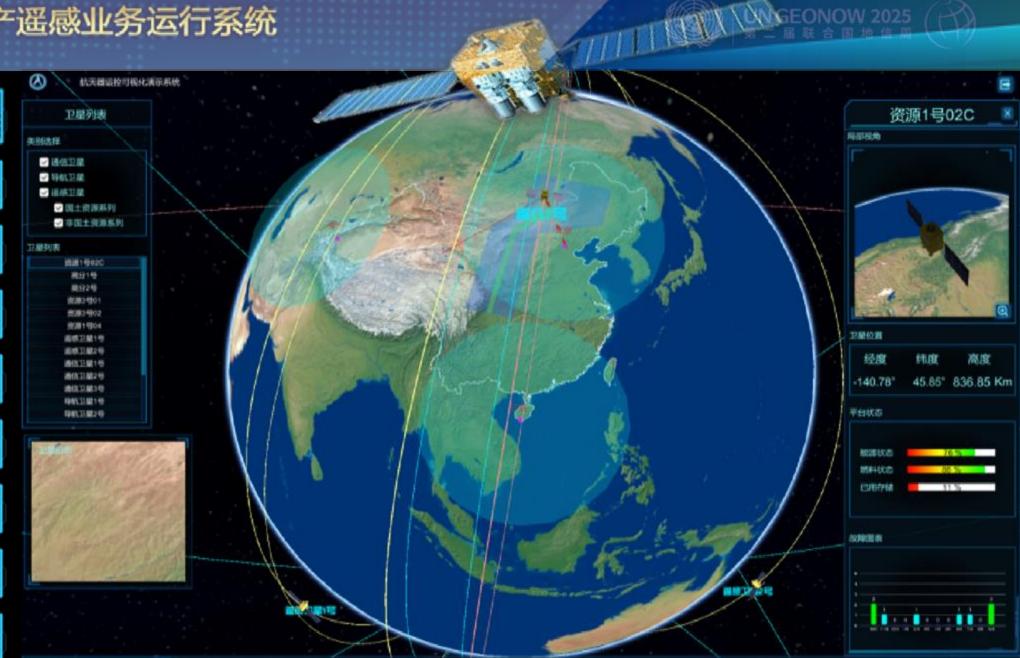


数据支撑

Data Support



运行管理



Space-Air-Ground data Guarantee system

High precision • High resolution • High dynamic









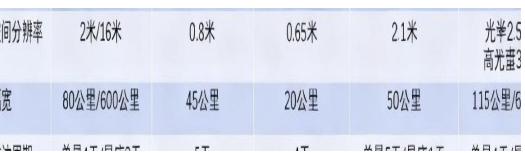


Aerial geology 1 (King of the air 350ER)

Aerial geology 2 (AC312 Heli)

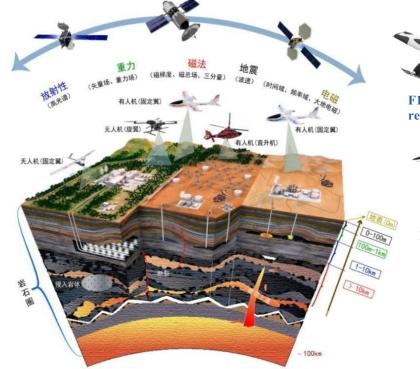
Aerial geology 3 (AC311A Heli)

Field support vehicle





- 3 aircraft
- 56 UAVs
- 7,000 instruments
- 5 million archival data scenes (5 PB)





F1000 fixed-wing remote sensing UAV



M210/310 Rotor UAV



CW-15/CW-30 vertical take-off and landing fixed-wing



Phantom 4 RTK



DJI Mavic 3

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01 Demands

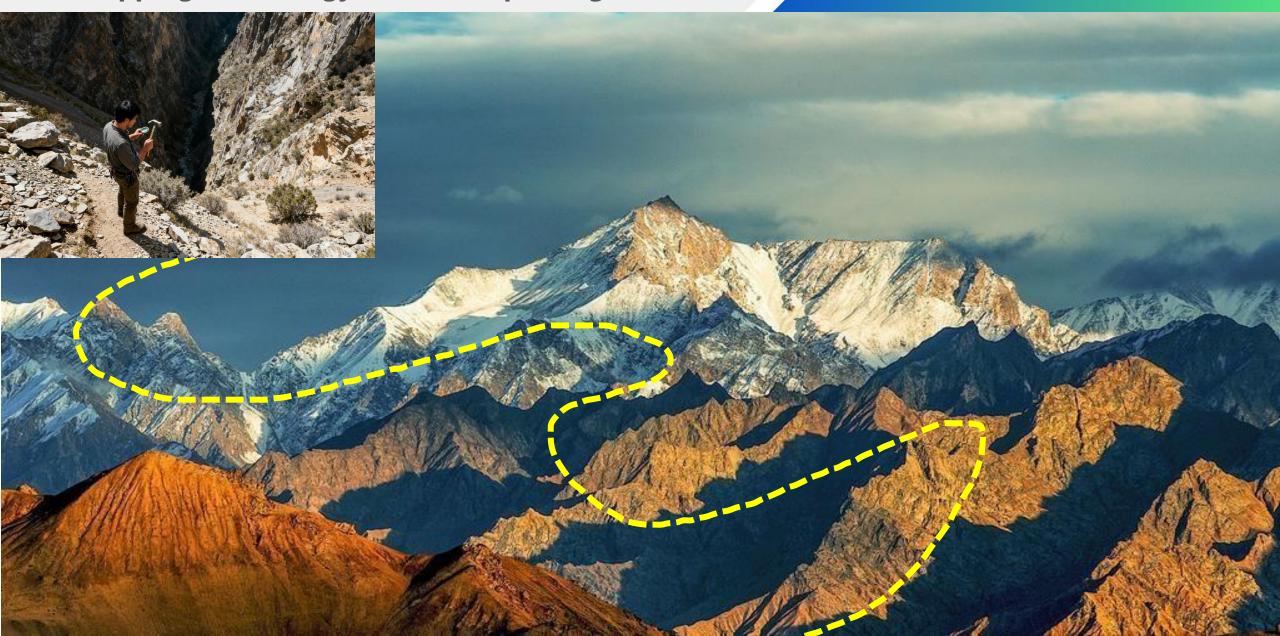
02 Applications

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1. Regional geological surveys

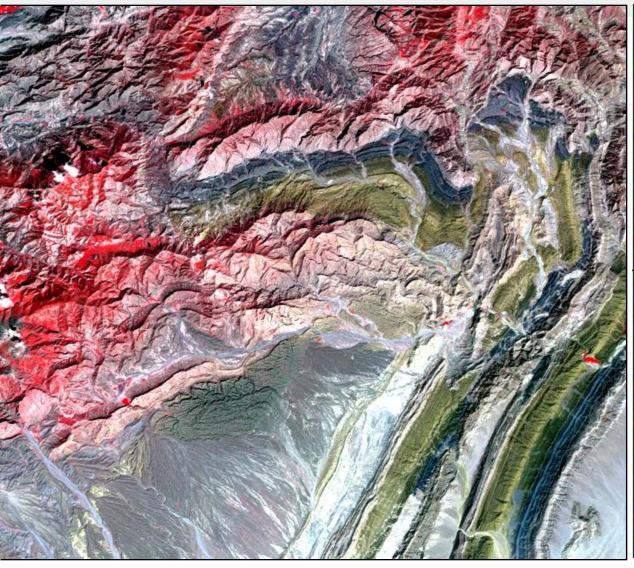
Pre-mapping technology drives the paradigm innovation



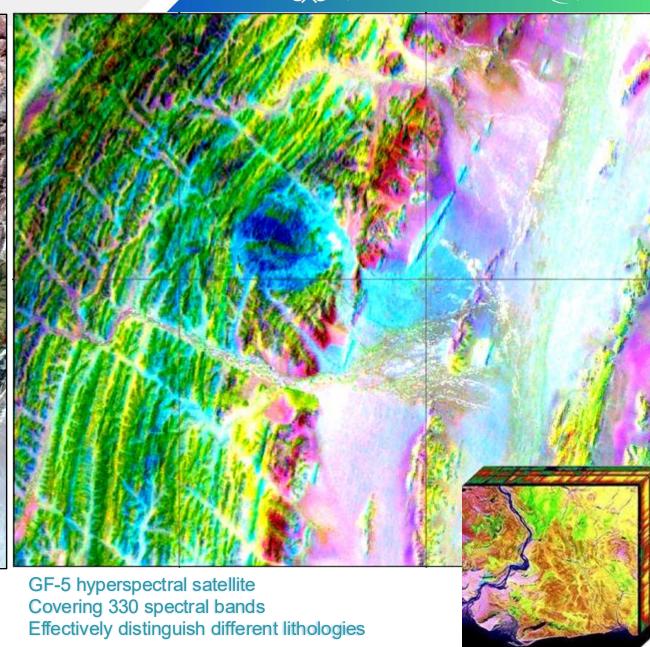


RS images supply abundant geological information





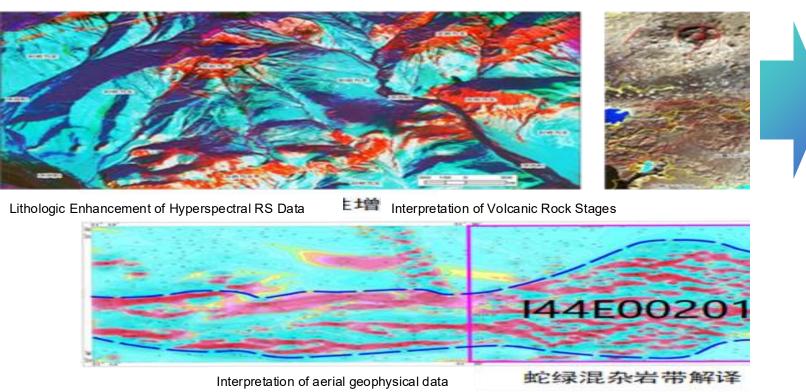
China's high-spatial-resolution satellites maximum spatial resolution of 0.2 meters Clearly display the boundaries of ground features



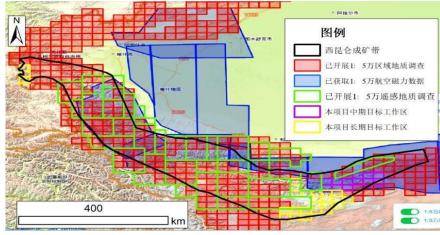


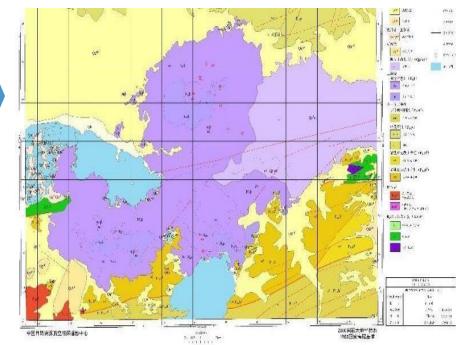
Remote Sensing-Geophysical Collaborative Pre-Mapping Method

- Shifting from the traditional model—primarily reliant on intensive fieldwork—to a new paradigm centered on remote sensing and geophysical exploration
- Applied in the Kunlun Mountains and other high-altitude, deeply incised metallogenic belts



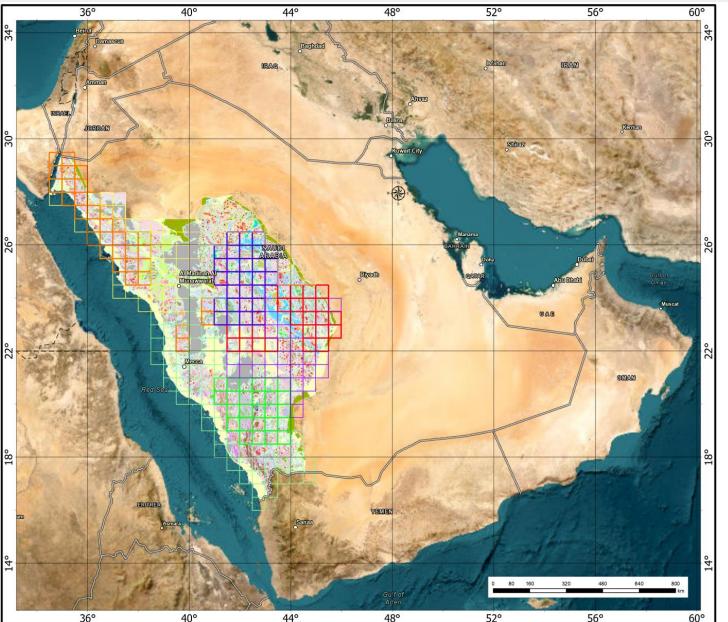




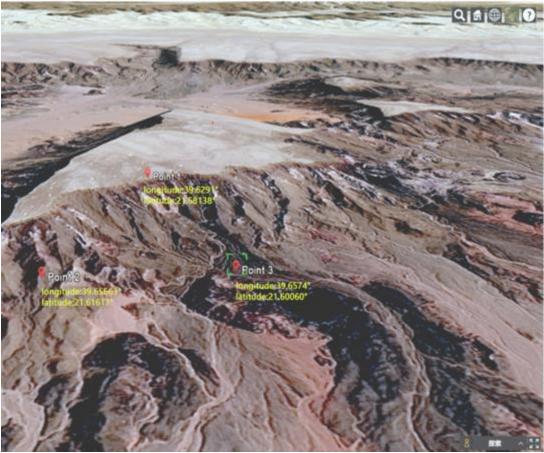


Detailed Geological Mapping of Arabian Shield (GMAS)



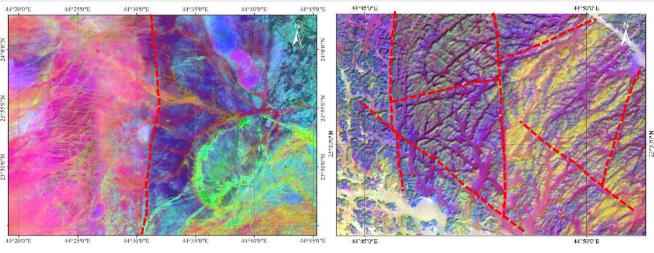


Geological Mapping of Arabia Shield(GMAS): 271 maps at a scale of 1:100 000 covering a total area of 790 000 km².



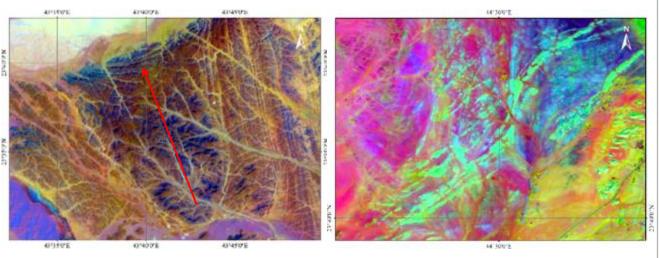
Geological Information in GF-5 Hyperspectral Imagery (Arabian Shield)





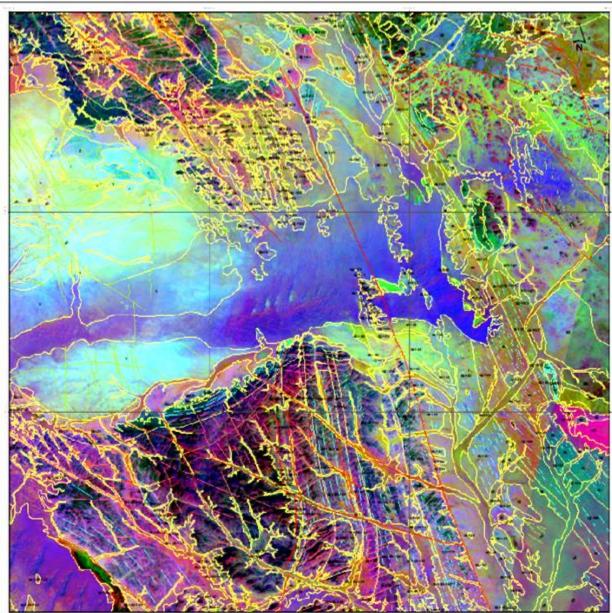
Large-scale reverse fault

NW-ENE-N-trending faults



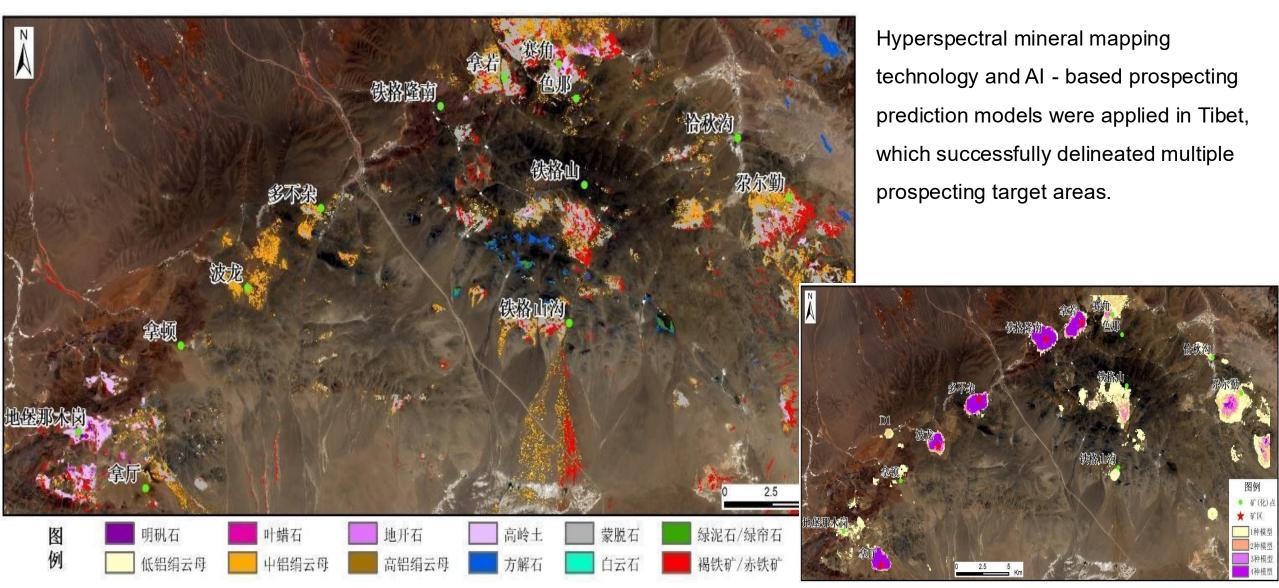
Fold structure

Dikes



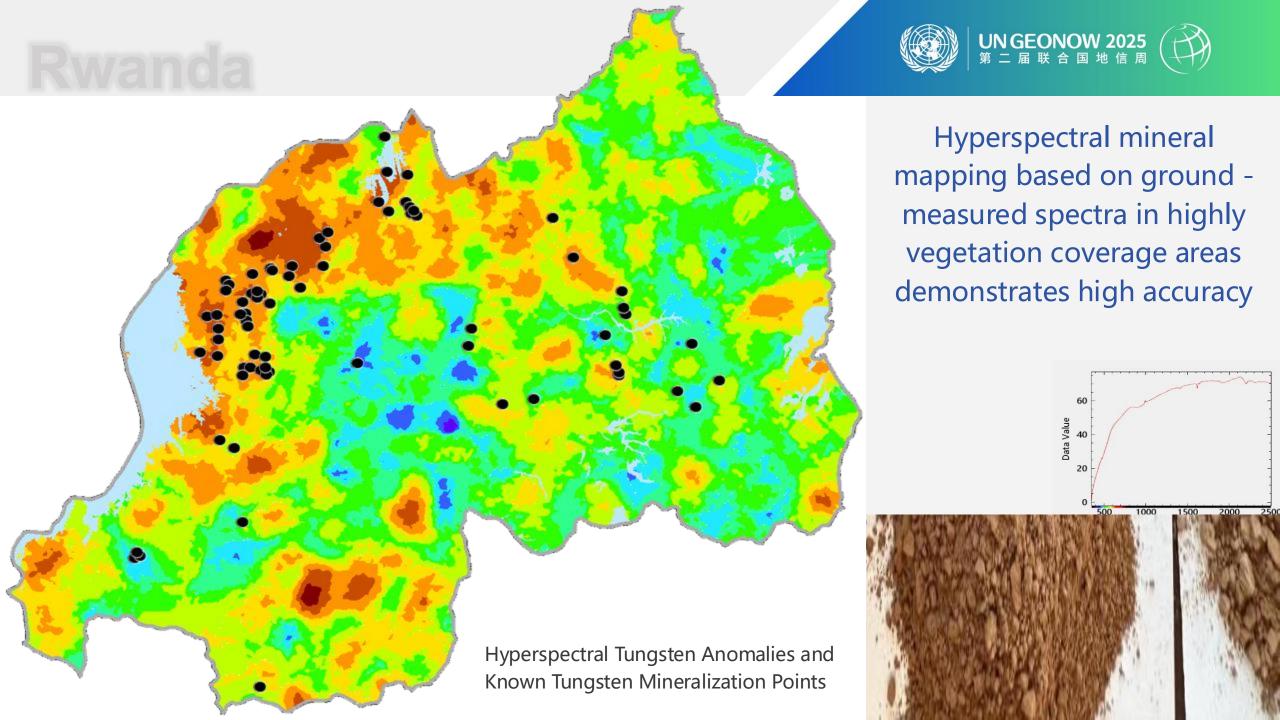
2. Mineral Resources survey Supports rapid delineation of prospecting targets





Hyperspectral mineral information extraction of GF-5 satellite

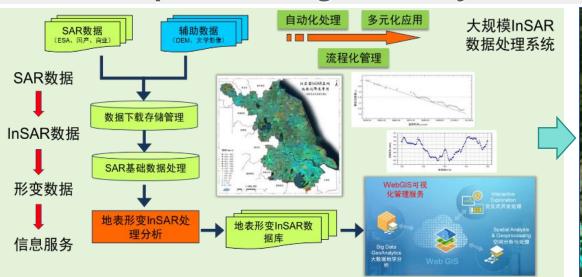
Prospecting mine target



3. Geohazards Investigation

To Improve Geological Safety Services





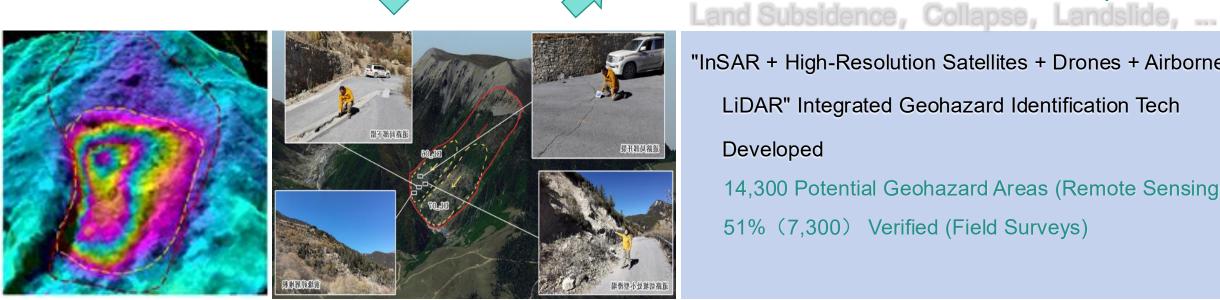
地面 Lidar **GNSS** 现场监 测预警 GBSAF

Efficient computing processing



Comprehensive analysis and identification

Ground investigation and exploration



"InSAR + High-Resolution Satellites + Drones + Airborne LiDAR" Integrated Geohazard Identification Tech Developed

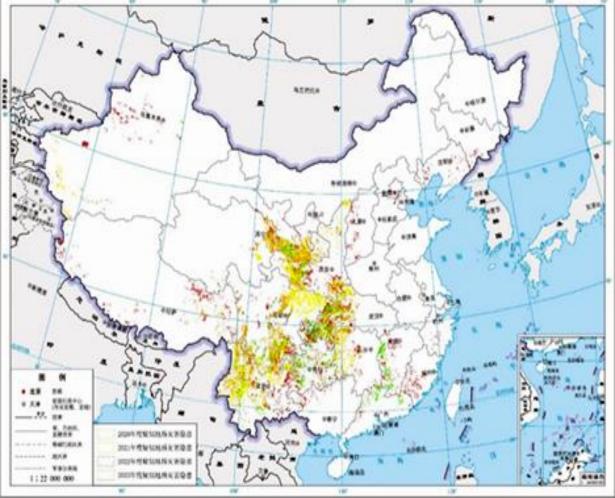
14,300 Potential Geohazard Areas (Remote Sensing); 51% (7,300) Verified (Field Surveys)

44,000 Potential Hazards Identified (last 4 years)

150+ Emergency Investigations

4 million km² (17 provinces) covered –

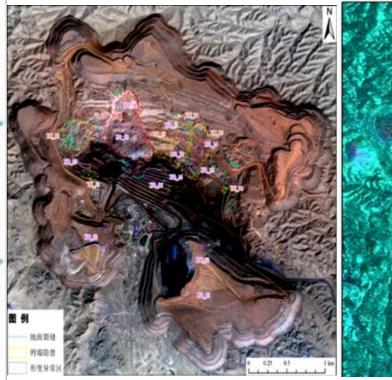
Data for early warning and comprehensive management



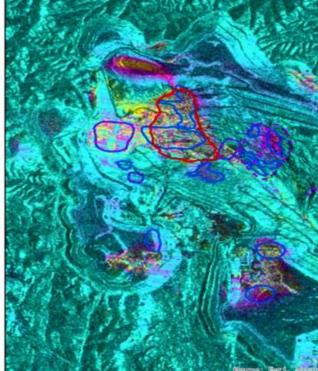


2-Hour Response Mechanism

2023 Alxa Left Banner Open-Pit Coal Mine Collapse:

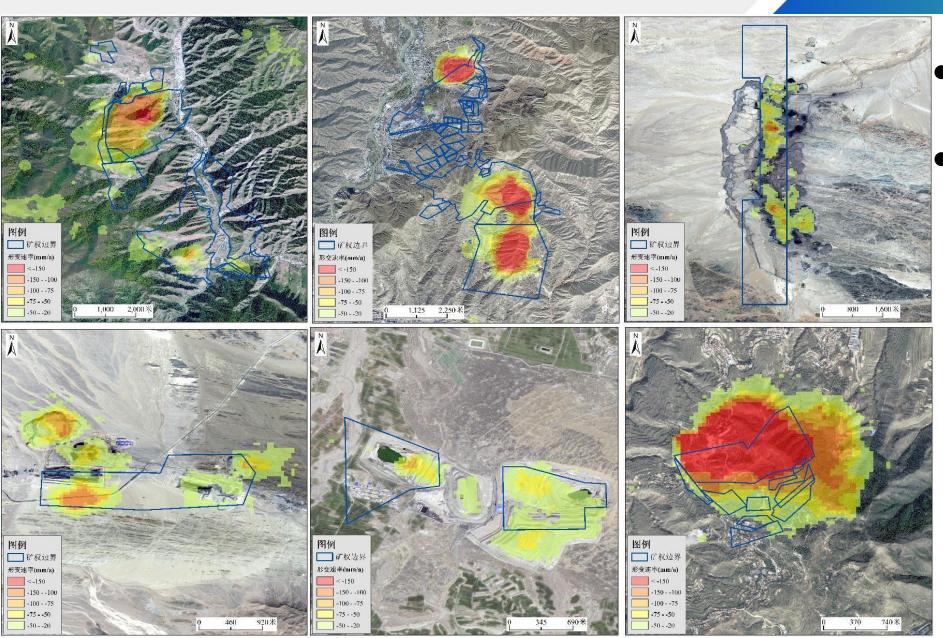


High-resolution remote sensing interpretation of collapse



InSAR deformation monitoring



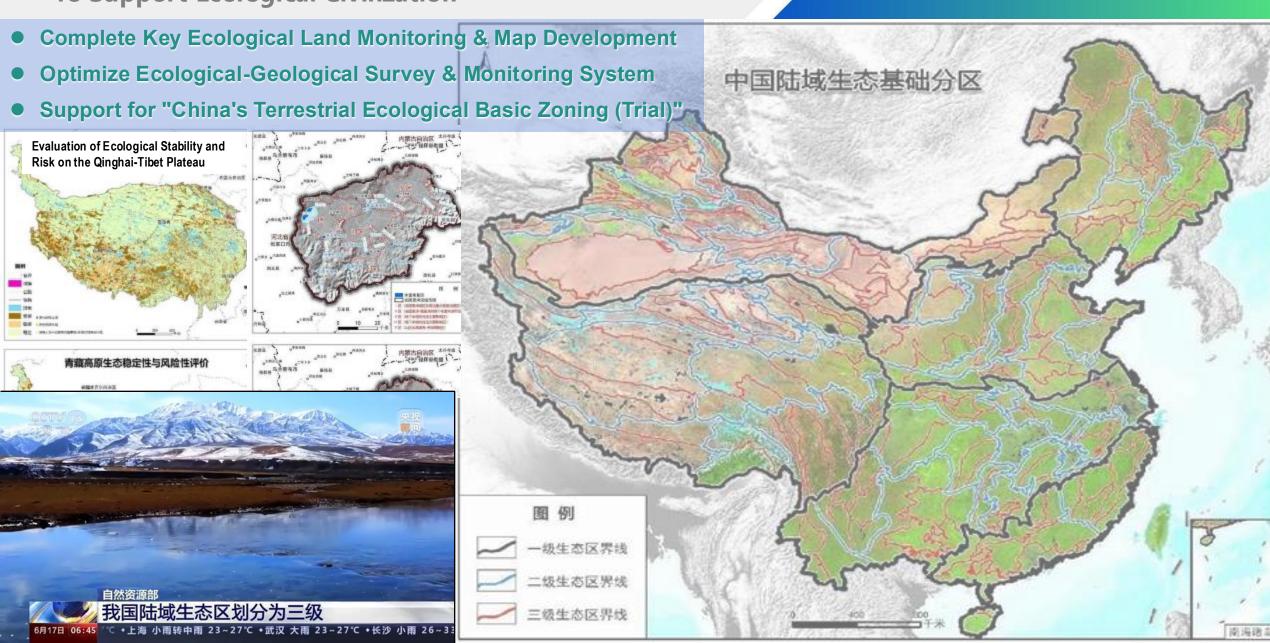


- Built National Mine InSARSystem
 - Monitored Surface Deformation in Major Large-Scale Mines Across China – **Delineated Subsidence** Areas, Identified Goaf Deformation, and Grasped Goafs' Long-Term Dynamic Subsidence & Collapse Features

4. Ecological-Geological Environment

To Support Ecological Civilization

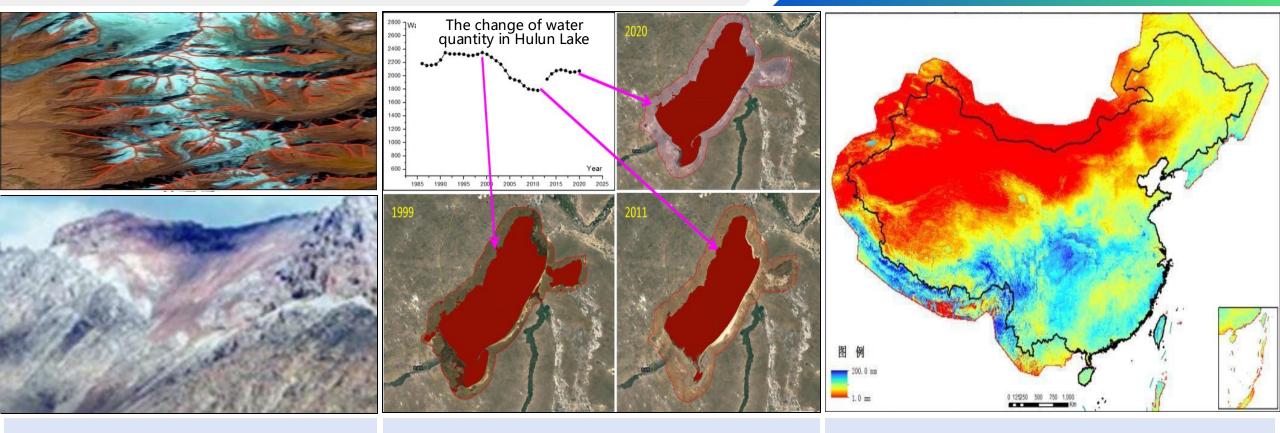




5. Water Resources Investigation

Support Water Security & Aquatic Ecosystem Protection and Restoration





Glacier Survey

Regional survey of glacier thickness and ice reserves – supports water resources management on the Qinghai-Tibet Plateau

Lake survey

The hydrological survey of Hulun Lake on the Inner Mongolia Plateau – supports the ecological protection and management of arid-zone lakes

National Evapotranspiration Inversion

Precipitation and evapotranspiration
estimation – providing data for research on
the evolution trend of China's water
resources

6.Monitoring of National Mine Development Status

Promoting the High-quality Development of Green Mining Industry



Highly concealed illegal mining activities (hard to supervise traditionally)













Achievements (Since 2006)



Over 210,000 maps of suspected illegal sites

Facilitated rectification of 80,000+ illegal mining operations





Extended Progress (Since 2021)



Verified 900,000+ acres of land for mine ecological restoration

Provided decision-making data for deploying & supervising major national mine ecological restoration projects



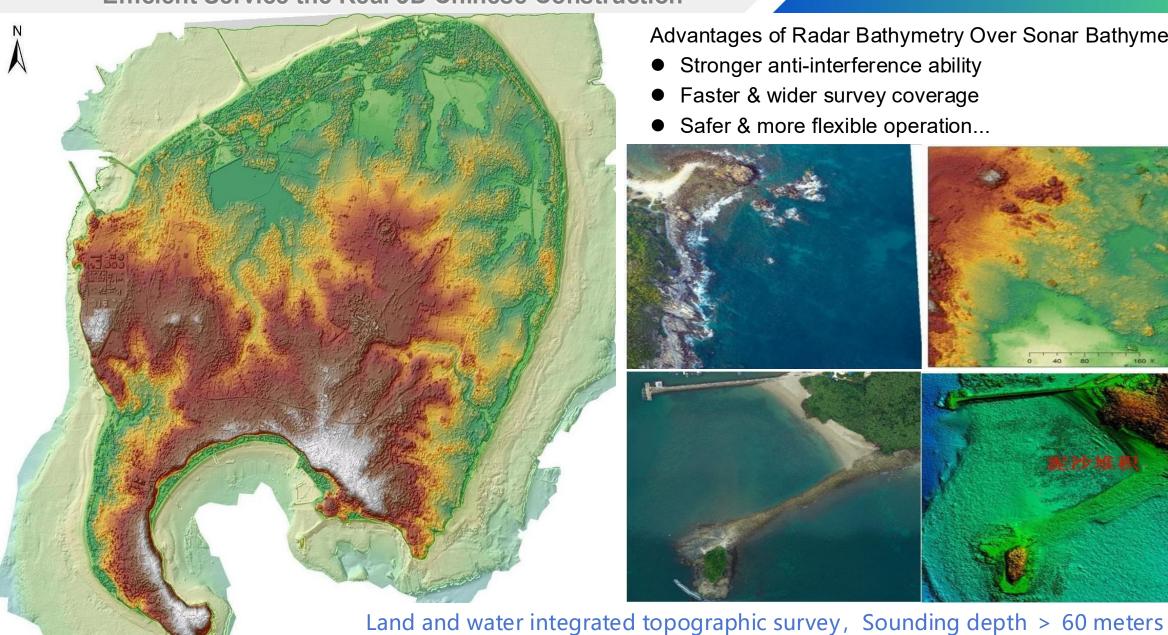


Before and After Mine Environmental Restoration and Governance

7. Marine Geological Survey

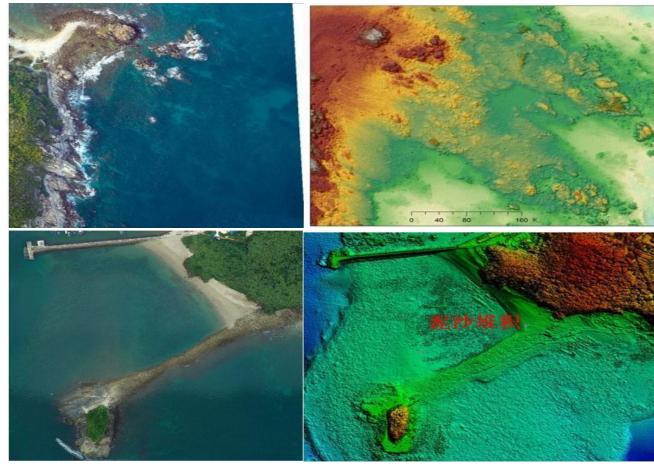
Efficient Service the Real 3D Chinese Construction





Advantages of Radar Bathymetry Over Sonar Bathymetry:

- Stronger anti-interference ability
- Faster & wider survey coverage
- Safer & more flexible operation...



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Collaboration in Geological Remote Sensing with Over 20 Countries' Survey Bodies

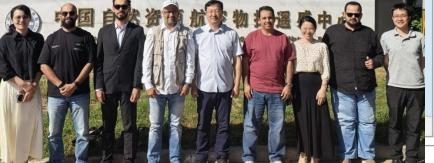














谢 谢 Thanks

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