



Strategic Framework and Practice of Sichuan Provincial Emergency Surveying and Mapping

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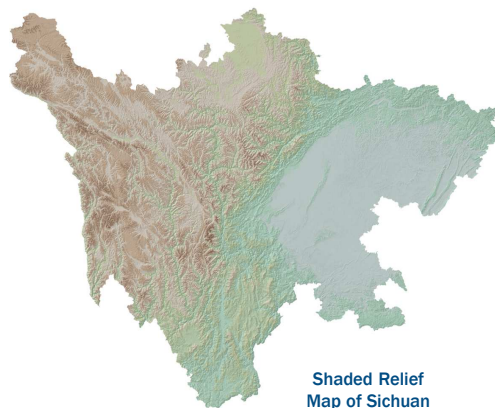
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1. Background

Sichuan province is located in the west of China which is in the transitional zone between Qinghai-Tibet plateau and the middle and lower reaches of Yangtze River plain with an area of 486,000 square kilometers and a population of more than 90 million

The topograph of Sichuan is complex and vary from east to west. The eastern region are basin and hills where elevations are between 500-2000 meters while the western region are plateaus and mountains where elevations are over 4000 meters. This has formed the famous Sichuan Basin.



Shaded Relief
Map of Sichuan

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1. Background

Due to its special topography, Sichuan has a rich tourist resources and 5 are listed in the UNESCO world heritage list.



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1. Background

Earthquake fault zone

Also because of its complex topography, Sichuan is the main geological disaster area.

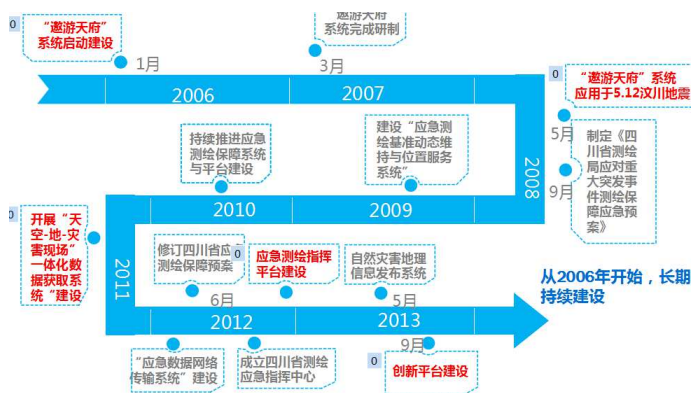
The three major earthquake fault zones in Sichuan are in the form of Y.

Sichuan has suffered from earthquake, debris flow, floods and other kinds of geological disasters.



1. Background

After Wenchua earthquake in 2008 where about 80000 people died, Sichuan bureau of Surveying mapping and Geoinfomaton (SCBSG) began to establish a new emergency surveying and mapping security system using advanced GIS technology to improve the ability of emergency response.



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2.1 Governance and Policies



The Chinese Governments at all levels have attached great importance to emergency surveying and mapping .

Related laws and regulations have been made:

1. The Emergency Response Law of PRC
2. The Surveying and Mapping Law of PRC (It was second revised in 27 April 2017)
3. The Mapping Results Management Regulations of PRC

Other related planning includes:

- ✓ Disaster Prevention and Mitigation Planning(2016-2010)
- ✓ Emergency Response Pre-plan
- ✓ The Medium and Long Term Plan for Fundamental Surveying and Mapping (2016-2030)
- ✓ The Thirteen Five -Year Plan for Surveying Mapping and Geoinformaton(2016-2020)

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2.1 Governance and Policies

The thirteen Five -Year Plan for Surveying Mapping and Geoinfomaton

In the Thirteen Five -Year Plan for Surveying Mapping and Geoinfomaton, both NASG and SCBSG have proposed that emergency surveying and mapping construction is one of the key tasks in the futrue work.

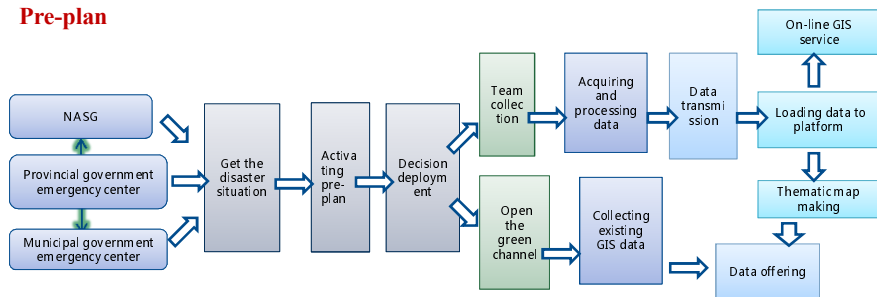
Geographic Information exchange and sharing management measures of Sichuan province

In Januray 2017, Sichuan provincial government officially issued the Geographic Information exchange and sharing management measures of Sichuan province. It is required that the provincial surveying and mapping administrative department shall responsible for the whole provincial geoinformation exchange and sharing, including making standards and specifications for the provincial geoinformation public service platform. Surveying and mapping adminstrative departments above county level should establish emergency response mechanism, make emergency pre-plan and offer timely high precision navigation positioning, aerospace remote sensing image , geoinformation data and other services.

2.2 Awareness Raising and Capacity Building

SCBSG has put emergency surveying and mapping work in a very important position and regards it as the key point to serve provincial government. The first provincial emergency surveying and mapping response pre-plan was made in 2008, and it was revised in 2015. The pre-plan has defined the coordinated response mechanism and procedure of data acquisition, processing, distribution and services

Pre-plan



Procedure of emergency response

2.2 Awareness Raising and Capacity Building

Capacity building

Sichuan provincial emergency capacity building mainly around three aspects:

- Emergency data acquisition
- Emergency database construction
- Emergency command and dispatch

Through the capacity building, it is aimed to establish a sky-earth integrated, flexible and connective emergency surveying and mapping system



2.2 Awareness Raising and Capacity Building

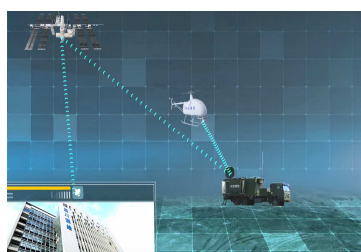
All-weather emergency monitoring



Automated rapid mapping



Real-time information transmission



Efficient command decision



2.2 Awareness Raising and Capacity Building

Sichuan provincial emergency surveying and mapping security system is consisted of one database, three centers and one system.



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2.2 Awareness Raising and Capacity Building

One database means the high resolution Geodatabase for disaster prevention and control .The database contains high resolution aerial photograph and satellite image, topographic map and thematic map used for geological disaster control.



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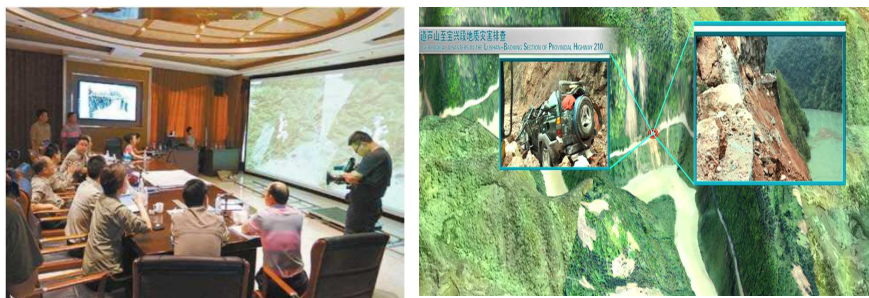
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2.2 Awareness Raising and Capacity Building

Three centers includes: one technology research center, one emergency safeguard center and one emergency command center

3. Emergency Command Center for Surveying and Mapping

The command hall is about 200 square meters, and can hold 100 people. It is equipped with teleconference system and a 3D emergency command platform. The on-site information can be transmitted to the command center and loaded to the platform for remote decision and command.

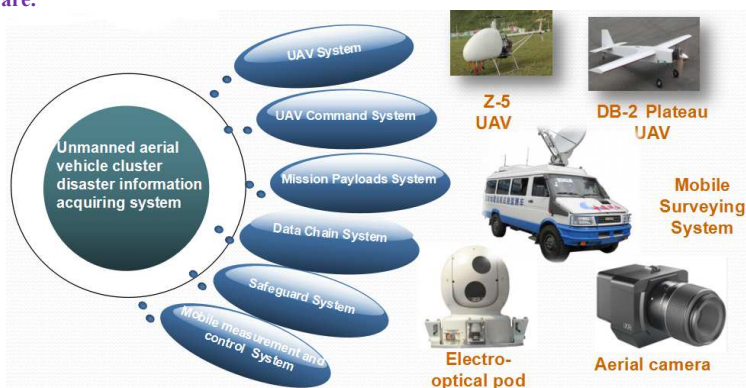


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2.2 Awareness Raising and Capacity Building

One system means Unmanned Aerial Vehicle (UAV) cluster disaster information acquiring system. The system aims to acquire disaster information in a timely, efficiently, accurately and comprehensively way. It integrates Emergency Surveying and Mapping UAV Platform, 36 sets of multi dimension and multi source earth observation hardware, and 8 sets of software.



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2.2 Awareness Raising and Capacity Building

(2) National Emergency Surveying and Mapping Capabilities Constructon

Another important capacity buildig is that NASG launched a project of National Emergency Surveying and Mapping Capabilities Construction in March 2017 . The total investment of the project is 800 million yuan, and it will last for 3 years.

SCBSG is one of the key members of the project.



2.2 Awareness Raising and Capacity Building

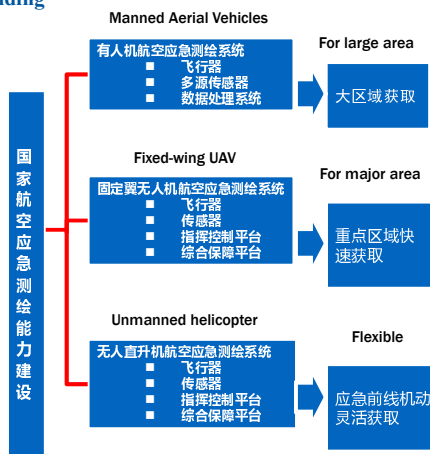
The project includes four kinds of capacities building

(1) National aviation capacity building for emergency surveying and mapping

Through this capacity building, 12 emergency aviation bases will be set up across the country. Each base will be equipped with multiple sets of manned aerial vehicles, medium-endurance and short -endurance fixed-wing UAV as well as unmanned helicopter.

Sichuan is one of the aviation bases.

This will greatly improve the ability of on-site emergency information acquiring .



2.2 Awareness Raising and Capacity Building

(2) Capacity building of national support teams for emergency surveying and mapping

Emergency support teams are mainly responsible for front-line emergency reconnaissance tasks. 3 emergency support teams and 9 squads will be set up cross the country. Each team will be equipped with one multi-function shelter, one life support vehicle and one set of resource storage management system. SCBSM is one of the emergency teams.



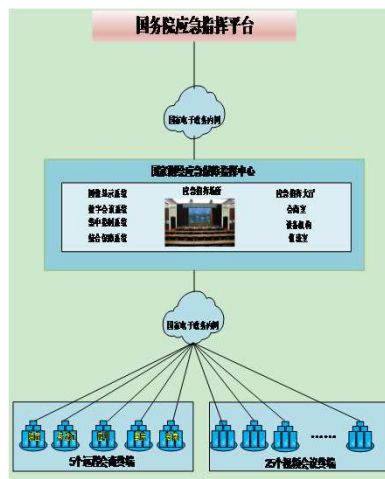
2.2 Awareness Raising and Capacity Building

(3) Capacity building of national emergency surveying and mapping command center.

The command center will be equipped with:

- One Emergency Rapid Data Processing System,
- One Emergency Rapid Map Printing System,
- One Emergency Rapid Information Service System,
- One Emergency Data Storage Management System
- One Emergency Command and Dispatch System.

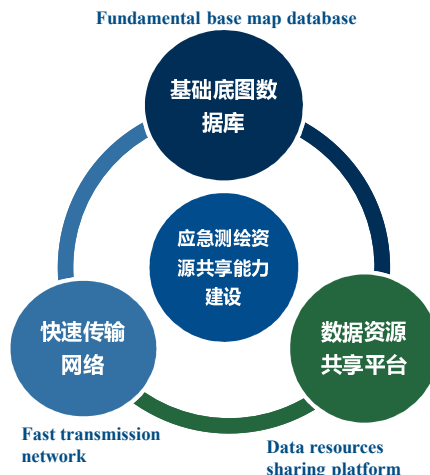
The command center is located in Beijing. On one hand it is connected with the emergency command platform of State Council, on the other hand, it is connected with 5 remote consultation terminals and 25 video conference terminals through e-government intranet to offer emergency geospatial information services for national government and emergency management and rescue departments .



2.2 Awareness Raising and Capacity Building

(4) Capacity building of national emergency data resources sharing

It will finally establish a fundamental base map database, a fast transmission network and a data resources sharing platform. Through the data sharing platform, it will realize 7*24 hours data sharing with emergency office of the state council and major ministries through E-government intranet.



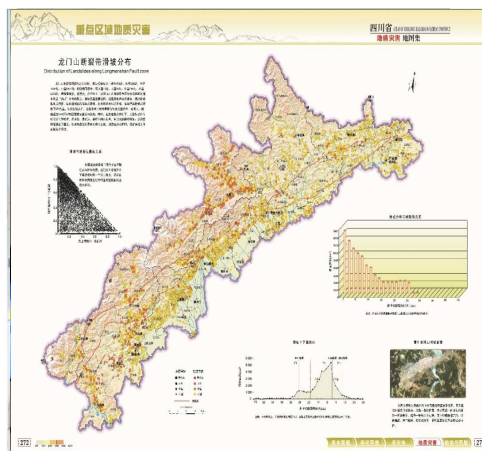
2.3 Data Management

During the Twelfth Five-Year (2011-2015), Sichuan Bureau invested 650 million yuan to build Sichuan Geographic Information Public Service Platform.

By completing the tasks of :

- Spatial positioning datum construction
- Aerospace remote sensing image acquiring
- Geospatial information producing and updating
- Provincial geographic condition monitoring
- Geospatial information service system construction
- Geological disaster prevention and control map producing

The geospatial information resources of Sichuan province have been greatly enriched.



2.3 Data Management

Sichuan Geomatics Center is responsible for managing and maintaining the provincial fundamental geospatial database, geospatial information sharing and data distribution.



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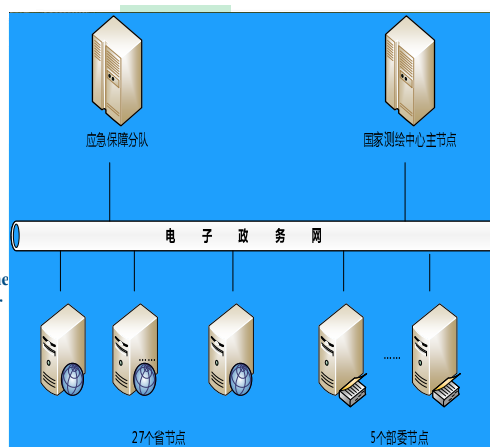
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2.3 Data Management

The illustration describes the process of data management through:

- Data processing system
- Database management and query system
- Data distributionsystem

Sichuan provincial geodatabase is connected with national geodatabase and 27 other provincial geodatabase and 5 ministries database through the national geoinformation sharing platform to offer emergency data sharing and services.



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2.3 Data Management

Sichuan Geospatial Big Data Center is under construction. More and more thematic data for disaster prevention and mitigation will be added to the center through data exchanging and sharing. The cloud infrastructure for data storing, processing, computing, analysis, displaying will be even powerful.



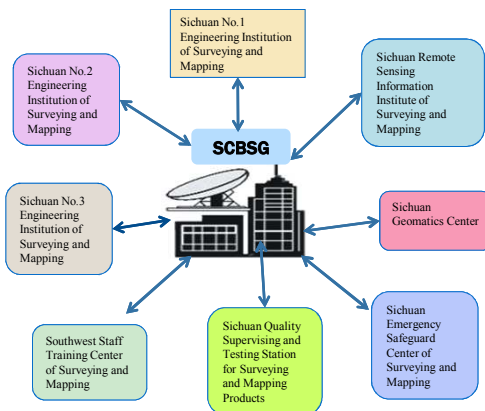
Policy and Standards

Data updating and sharing mechanism

2.4 Common Infrastructure and Services

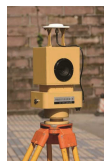


SCBSG has 8 subordinate units with 2100 employees including more than 1300 professionals . It has formed a complete range of surveying and mapping service system covering geodetic surveying, photogrammetry and remote sensing, geographic information system and database management, underground pipeline surveying, engineering surveying, cadastral surveying, map compiling and publishing, surveying and mapping results management and supply, surveying and mapping products supervision and inspection, surveying and mapping technology education and training, etc.



2.4 Common Infrastructure and Services

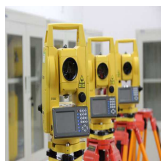
Data acquisition equipment



GPS



RTK



Measuring robot



Ground radar



Geological radar



Total Station



Detector



Level



Tilt aerial camera



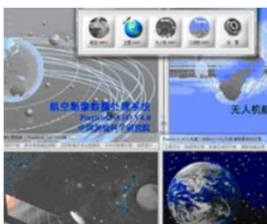
Digital aerial camera



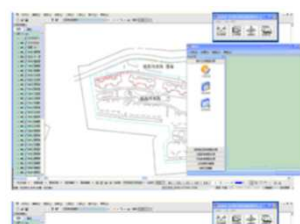
Mobile measuring vehicle

2.4 Common Infrastructure and Services

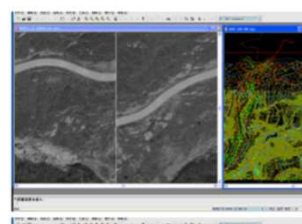
Data collecting and processing system



Pixelgrid



Geoway



VirtuoZo



Digital photogrammetry system
 StreetFactory
 SAR Mapping Station
 OneDataPro Editor

2.4 Common Infrastructure and Services

Data storage and management system, output device



Oracle storage and computing integrated machine



Disk array



Printing and scanning integrated machine



HP printer



Quick printer



Direct plate making machine



Color printing machine

2.4 Common Infrastructure and Services

Sichuan geoinformation public service platform

SCBSG has established Sichuan geoinformation public service platform which is a node of the national geoinformation public service platform ("Map World"). This platform has integrated all kinds of public geoinformation resources from provincial and municipal surveying and mapping administrative departments ,related governments, enterprises and institutions and etc. It offers authoritative, standard and unified on-line geoinformation services.



2.5 Resource Mobilization

Technical resources

SCBSG has set up four R&D platforms, two major alliances and one industry research institute which has formed the science and technology innovation platform and team. 32 industry experts including 5 academicians and 20 professors have been invited to the innovation platform and team. It has greatly improved the ability of emergency surveying and mapping , achievements transformation and industry development.

Four R&D Platforms

- Disaster Prevention & Mitigation Engineering Research Center
- Satellite Navigation and Location-Based Service Engineering Research Center
- National Geographic Condition & Environmental Resources Carrying Capacity Monitoring Engineering Research Center
- NASG Key Laboratory of Digital Mapping and Land Information Application

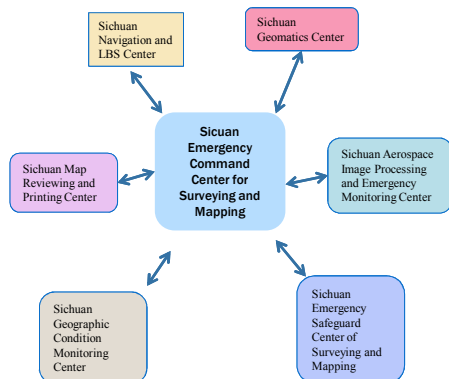
Two Major Alliances

- Sichuan Beidou Satellite Navigation Industry Alliance
- GIS Collaborative Innovation Alliances of Yangtze River Economic Belt

2.5 Resource Mobilization

Human resource

SCBSG has established expert technical teams from both inside and outside. From inside it has 6 expert teams majoring in different bussiness scopes.



From outside, SCBSG has cooperated with related univercities, enterprices, institutions, private comppanies and etc.

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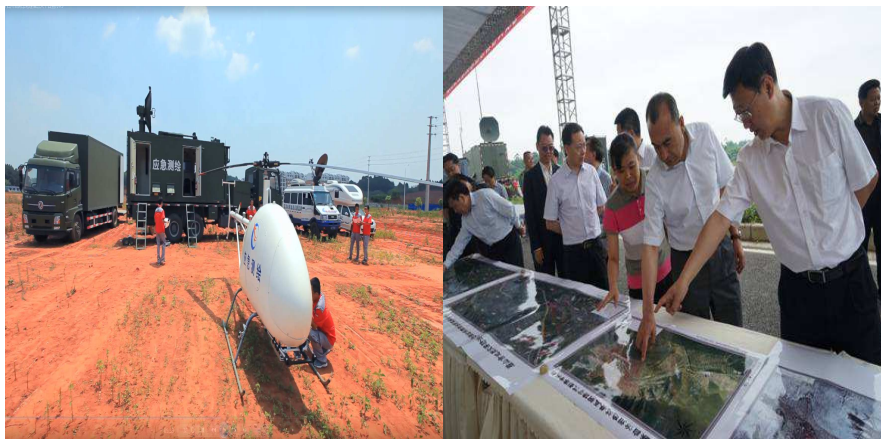
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3. Practice of Sichuan Provincial Emergency Surveying and Mapping

Emergency drills : In order to accumulate experience and improve the response ability, SCBSG will hold an emergency drill jointly with Sichuan provincial emergency office or municipal government every year.



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3. Practice of Sichuan Provincial Emergency Surveying and Mapping

Sichuan provincial emergency surveying and mapping has played a major role in several serious disasters relief during its construction. Especially “4.20” Lushan 7 magnitude earthquake, some guests may remember that Chengdu Forum on UN Global Geospatial Information Management in 2013 was postponed because Lushan earthquake happened just 1 day before the forum.



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3. Practice of Sichuan Provincial Emergency Surveying and Mapping

In Lushan earthquake relief, about seven hours after the earthquake, high resolution aerial images covering the major disaster area were obtained. Within 16 hours Lushan earthquake geoinformation publish platform was developed to offer geoinformation services for all level governments and public.

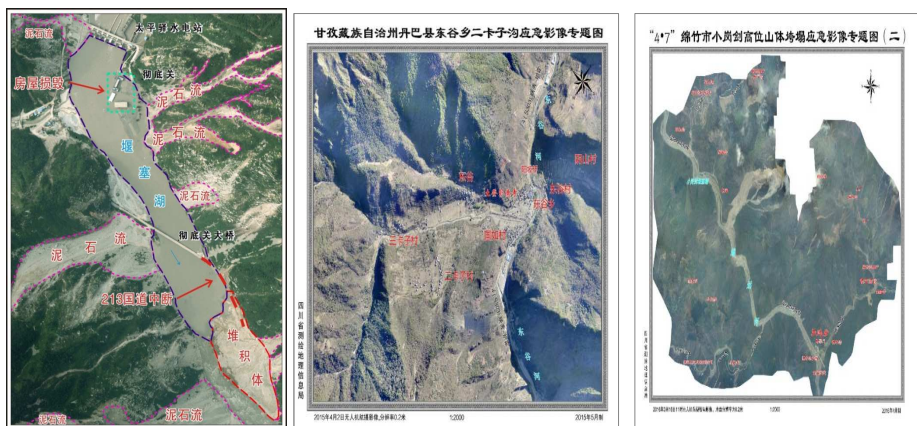


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3. Practice of Sichuan Provincial Emergency Surveying and Mapping

The system has also been tested in “6.18” flood, “11.12” Kangding earthquake and Miangyang mountain collapse relief



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4. Challenges

Sichuan Emergency Surveying and Mapping is getting more and more mature after several years construction and practice. It is expected to be further improved after National Emergency Surveying and Mapping Capabilities Construction

However there are still some challenges we have to continuously working on:

1. **Data sharing and exchanging mechanism : the conflict between data security and data sharing**
2. **Technology support for disaster prevention & mitigation such as big data and cloud computing technology for disaster information fast interpretation, evaluation, monitoring and early warning .**

4. Conclusions

There is an old chinese saying that: the sparrow is small but complete.

The stratege framework and practice of Sichuan provincial emergency surveying and mapping may provide a guidance and reference for the implementation of the UN-GGIM stratege framework

To implement UN-GGIM stratege framework, it is suggested to

- **Establish a global coordinating mechanism**
- **Make rules to regulate data sharing measures and procedures**
- **Build a global cloud platform for emergency data sharing and services**
- **Practice and test the stratege framework**

4. Conclusions



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Thank you for your kind attention

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