



Space-based Rapid Mapping for Emergency Management

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National Disaster Reduction Center of China

Nov 8 , 2012





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Introduction

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RM Technology and Experience

3

Future Work





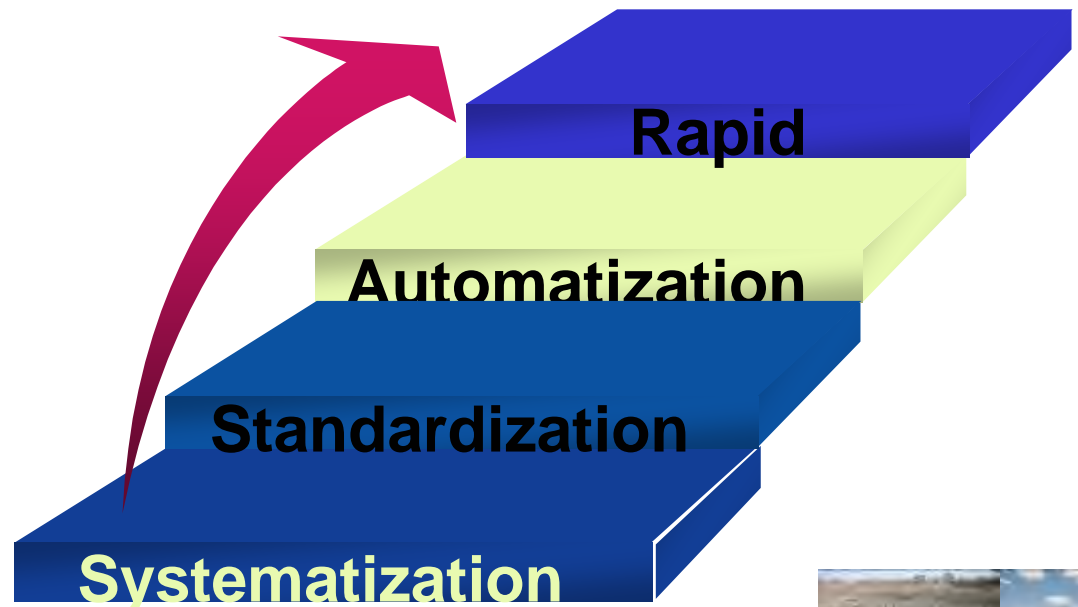
1. Introduction





1.1Defination

- Emergency-Management-Oriented rapid mapping is to describe the latent risk, extent and degree of the disaster using the GIS and RS data in a short time.
- The damage assessment includes loss of life, property, infrastructure and environment, together with the social and economic disruption.
- Its mission is to improve our capability to prepare for, protect against, respond to, recover from, and mitigate hazards.





1.2 Objectives

- The RM work utilize existing resources and business system of China and focus on global disaster events.
- The elaborated rapid mapping products are useful for decision aid for weighing up intervention logistics, and provide an easier localization of affected areas for emergency units.
- Rapid, efficiency and objective, accurate
- local service and international service
- Technology development and publication extent

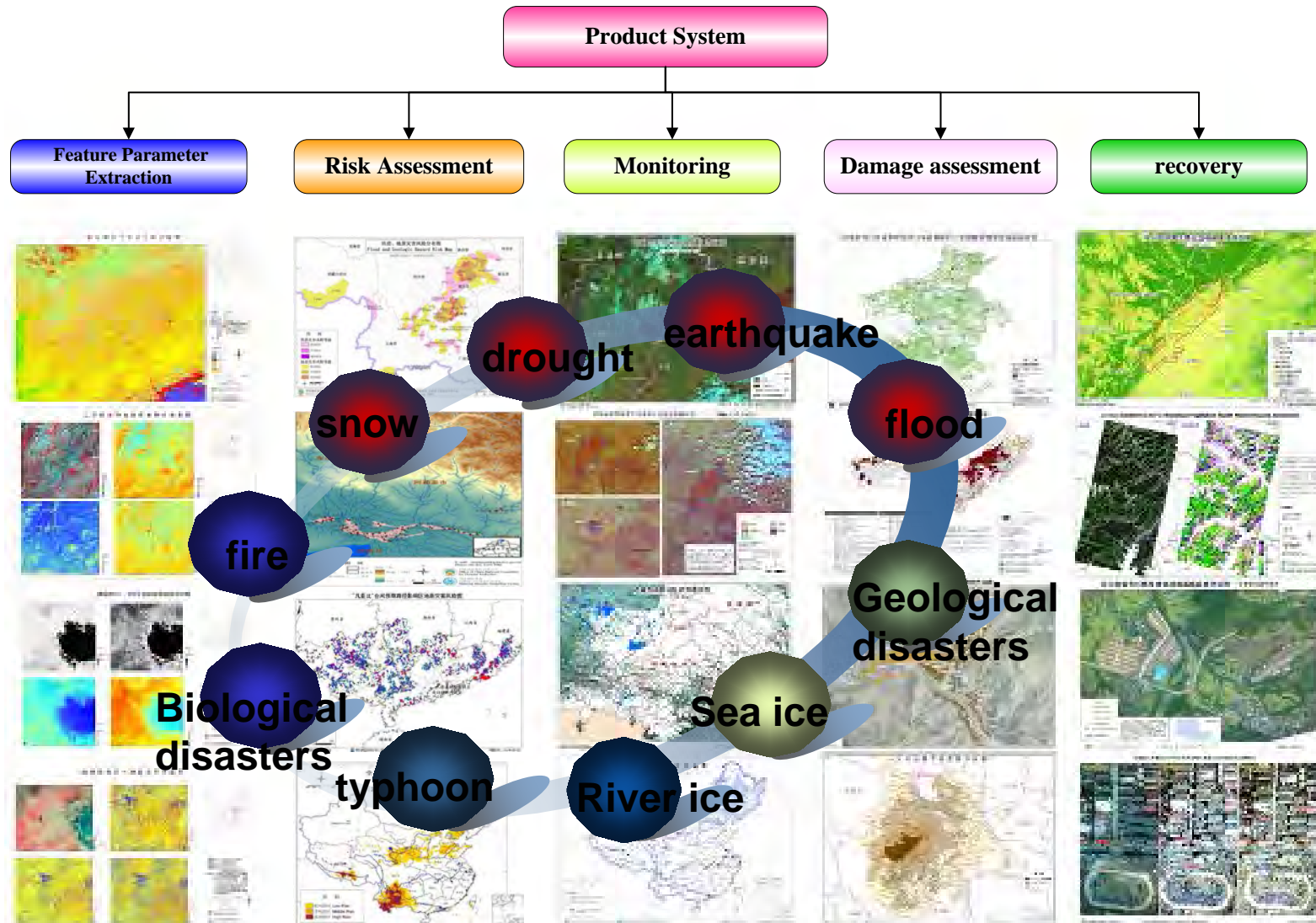
1.3 Operation framework

- Build up the alliance organization
mode : 'small core, great network'
- Operation mechanism of:
'open, efficient, joint, collaboration'





1.4 Product System



EM stage: mitigation—preparedness—response--- recovery





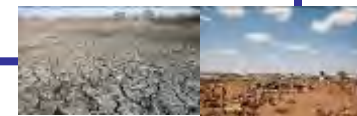
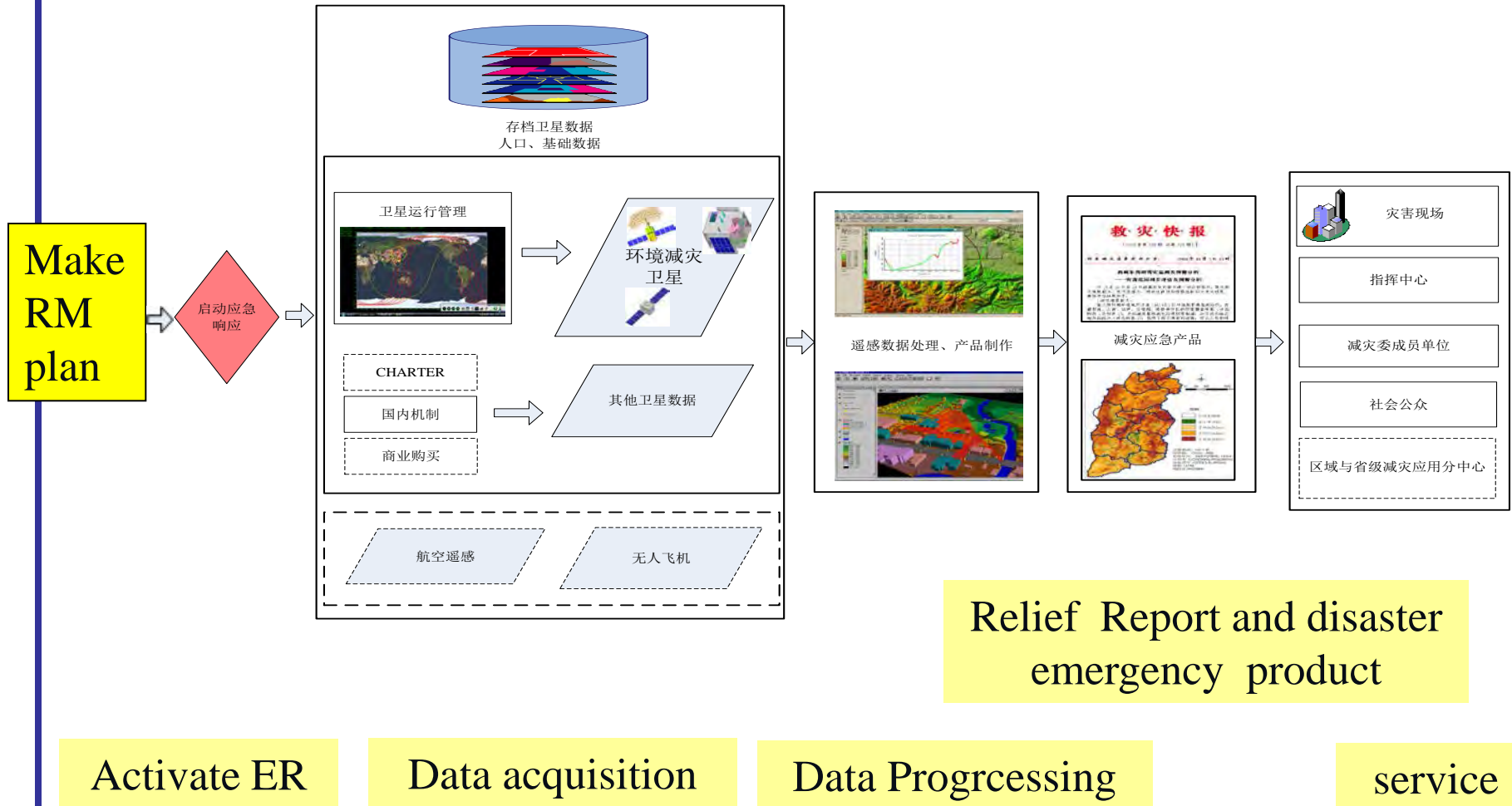
2. RM Technology and Experience

-----take Yiliang earthquake as an example





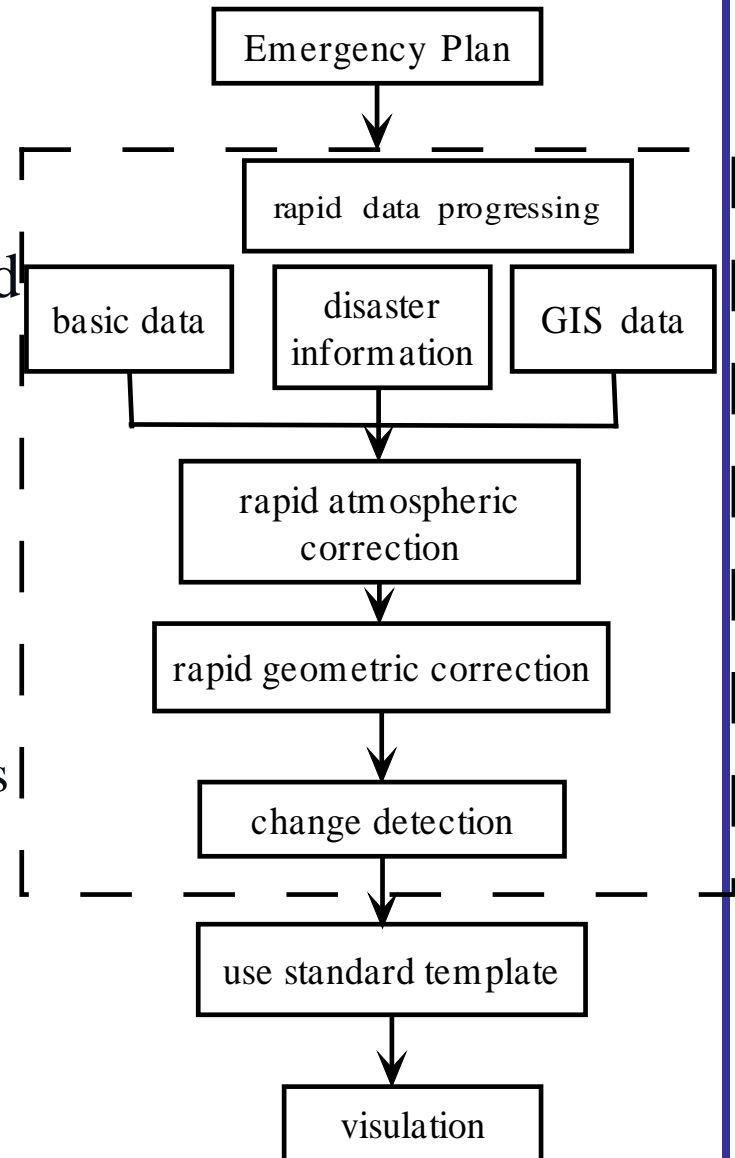
Build up working Regulation





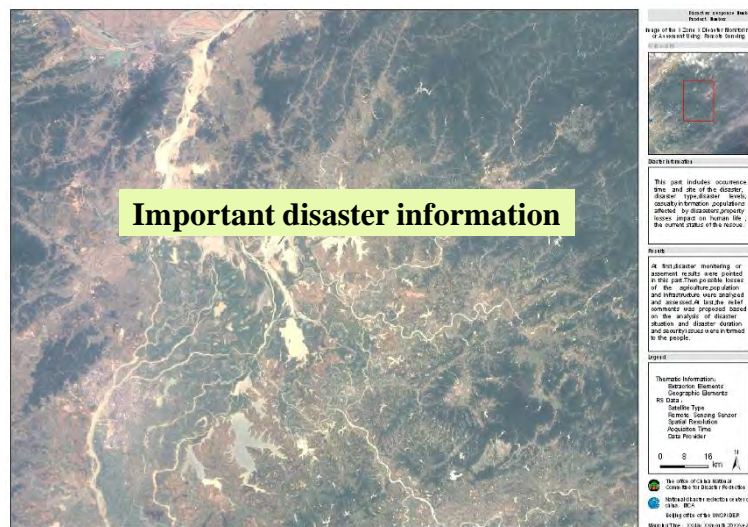
2.1 Methods and Technical route

- According to the different disaster type and different disaster stage build up the technical process of RS data
- Make the RM emergency plan
Why? What? Who? How?
- Compile the rules and index of RS data progressing
Transform the Expert knowledge to the rules and indexes that can be identified by the computer
- Make the standard template



2.1 Methods and Technical route

product template in Chinese and English





2.2 Activate RM

On 7 September 2012, a series of earthquakes occurred in Yiliang, Zhaotong, in the southwest Chinese province of Yunnan. The two main shocks occurred at 11:19 and 12:16 local time (03:19 and 04:16 UTC).

- The earthquakes left 81 people dead and 821 injured. At least 100,000 people were evacuated and more than 20,000 houses were damaged.
- The quakes caused landslides that blocked roads in the area of the hardest hit region, the town of Luozehe in Yunnan Province, as well as cutting off utilities and communications. The affected areas are densely populated and mountainous

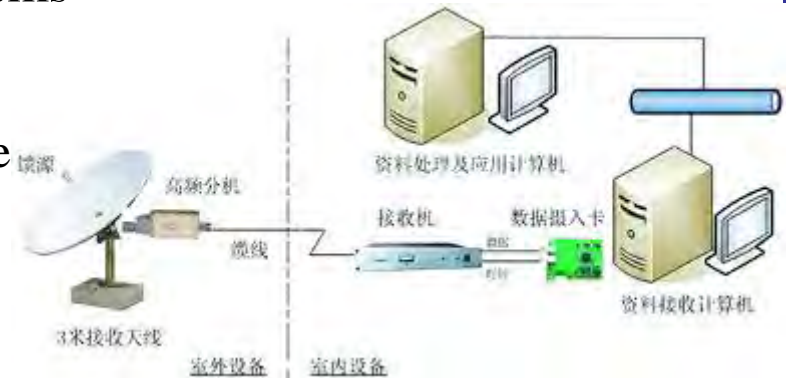




2.3 Rapid Data Acquisition

(1) Domestic Data Acquisition Mechanisms

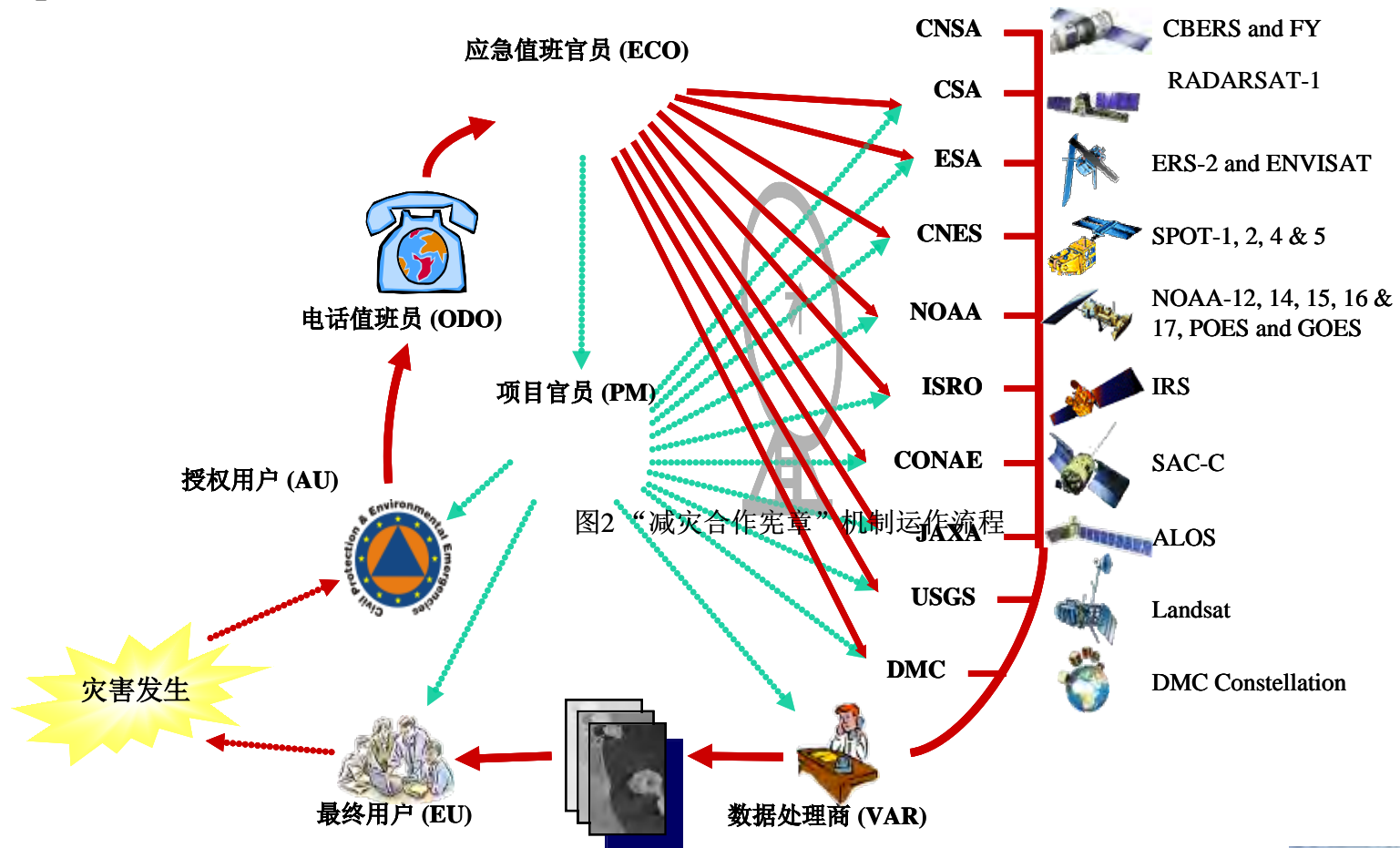
- Establish meteorological satellite data sharing mechanism and receive meteorological satellite data using the Digital Video Broadcasting - Satellite(DVBS)
- Sign an special agreement with Center for Earth Observation and Digital Earth, Chinese Academy of Sciences to establish data sharing service
- Commercial order;
- Download from the internet





(2) International Data Acquisition Mechanisms

- China joined the Charter formally on May 24 2007. The NDRCC acts as the Authorized User(AU) and Project Manager(PM) of the mechanism. RS data and GIS data can be acquired.





Data List (22:30, 10th September, 2012)

Sensor	Date of Pass	Quantity	Data Source	Acquisition Time	Download Ways
IRS_Cartosat 1	8 th September, 2012	9	UN-SPIDER, ISRO.	8:00, 9 th September, 2012	UN-SPIDER-ftp
Worldview	8 th September, 2012	22	UN-SPIDER, DigitalGlobe	21:00, 9 th September, 2012	DigitalGlobe-ftp
Worldview	19 th February, 2010	12	UN-SPIDER, DigitalGlobe	16:00, 10 th September, 2012	DigitalGlobe-ftp
P5	8 th September, 2012	6	UN-SPIDER, NRSC	17:30, 10 th September, 2012	NRSC-ftp
IRS-Cartosat 2	8th September, 2012	7	UN-SPIDER, ISRO.	22:30, 10th September, 2012	UN-SPIDER-ftp
TOTAL		56			

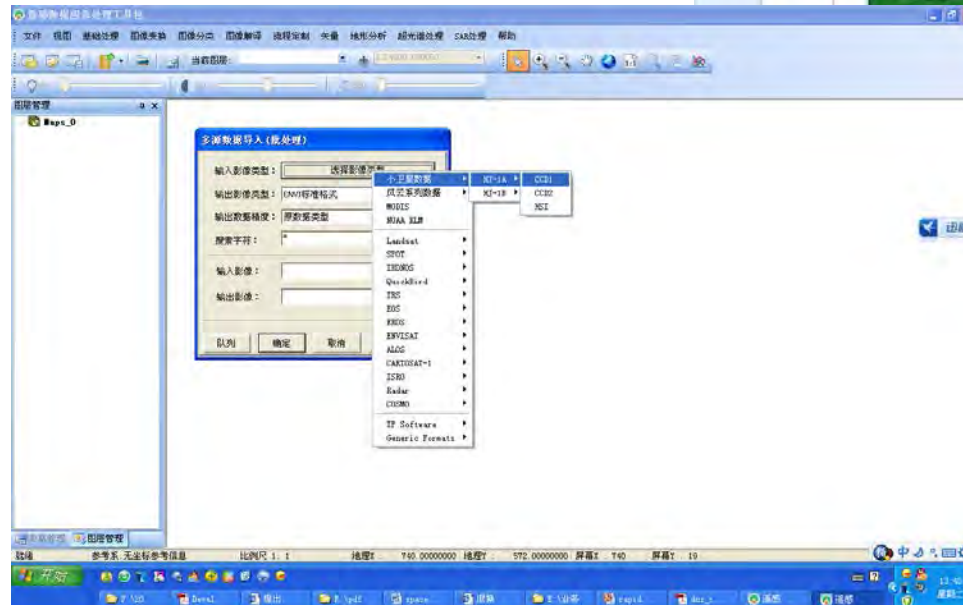
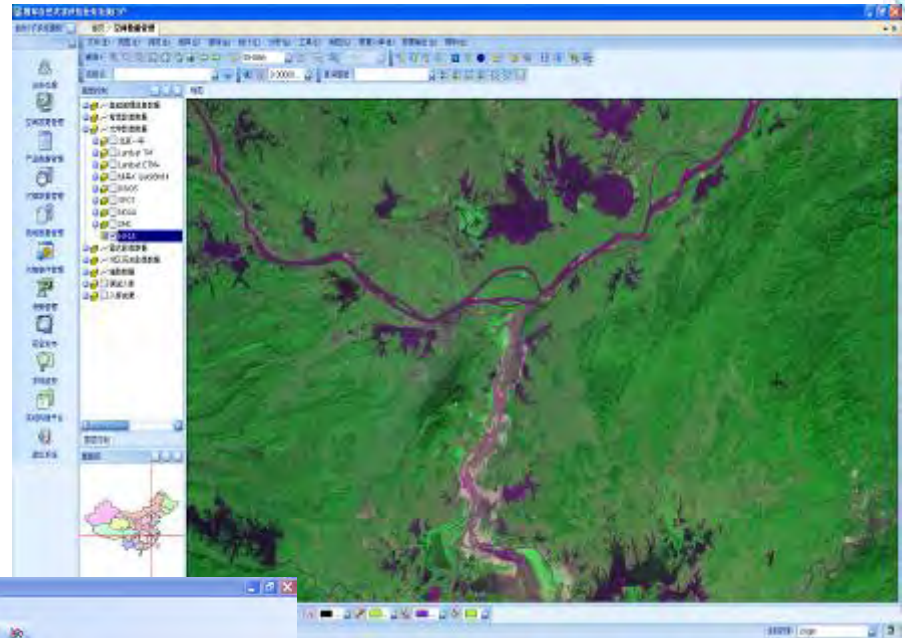
- UN-SPIDER Beijing Office: Provide the RS data, agricultural, social and economic and the other thematic information.



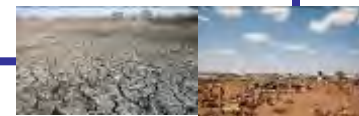


2.4 System and Software

- Management and operation system of HJ-1 satellite
- Natural disaster assessment of China system
- Rapid mapping software
- ENVI, ARCGIS, ERDAS



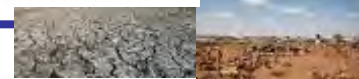
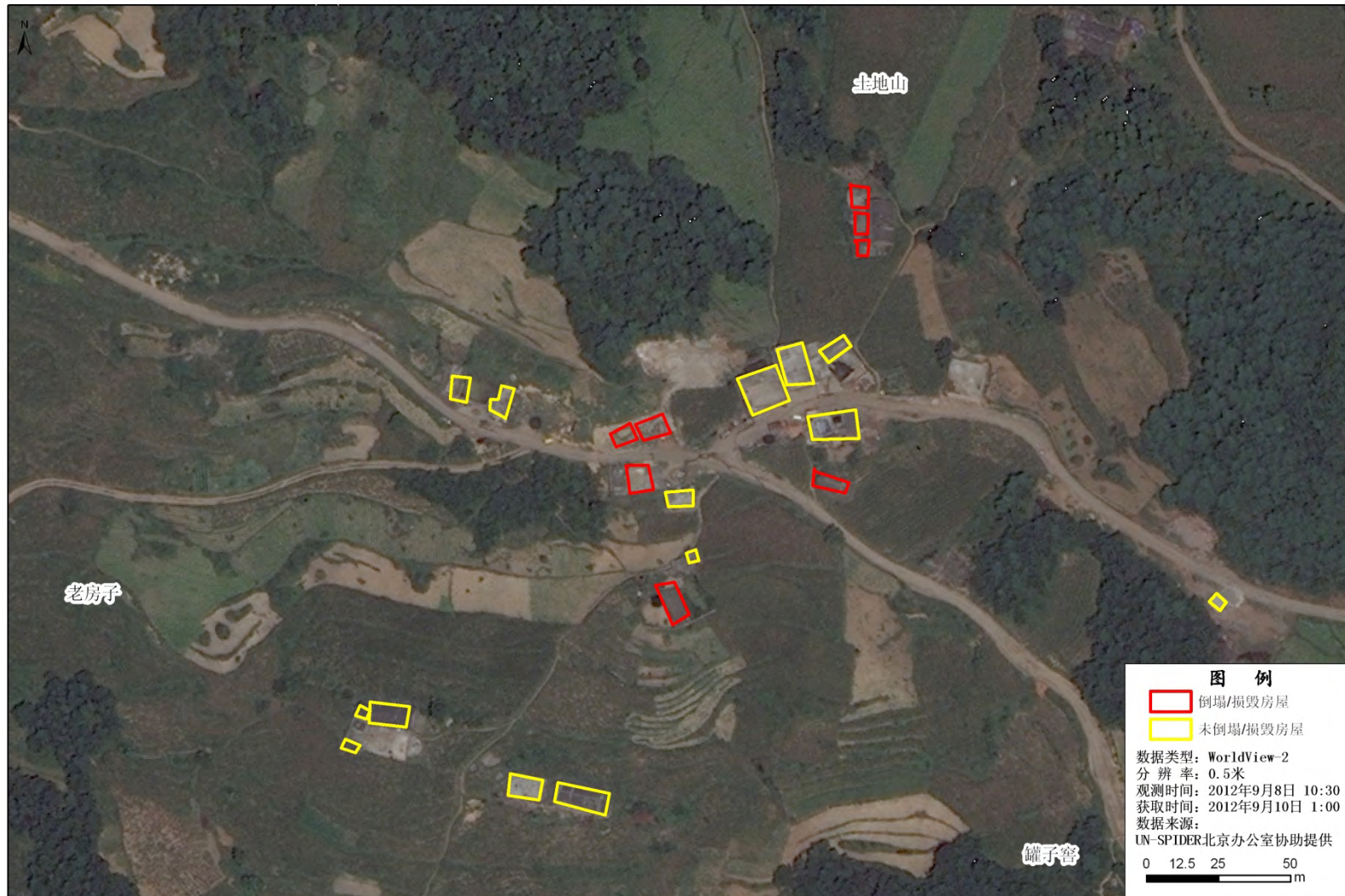
RS data progressing for emergency





2.5 Product-buildings

云南彝良地震灾区房屋倒损情况监测图(1)





2.5 Product-buildings

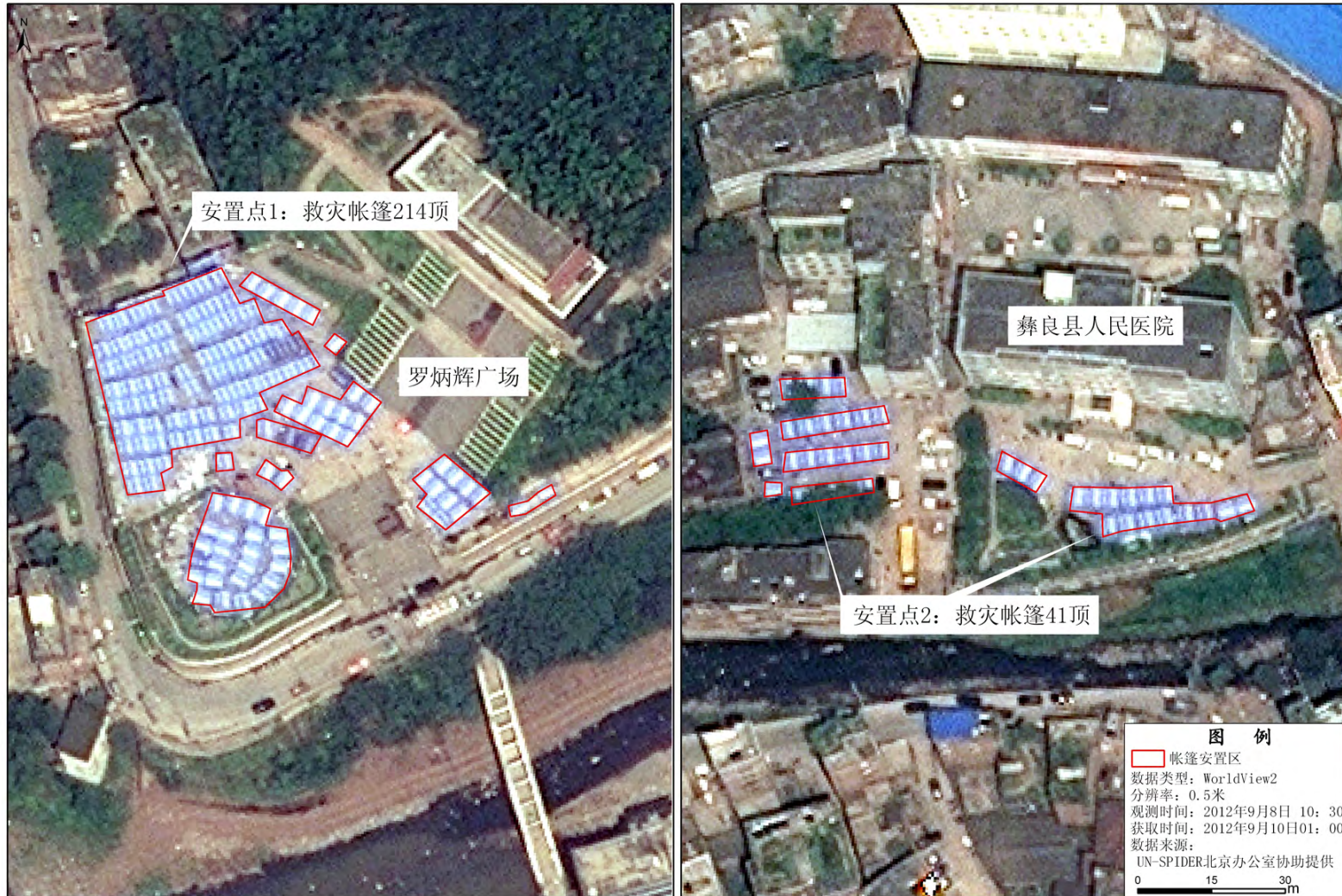
云南彝良地震灾区房屋倒损情况监测图(2)





2.5 Product-tents

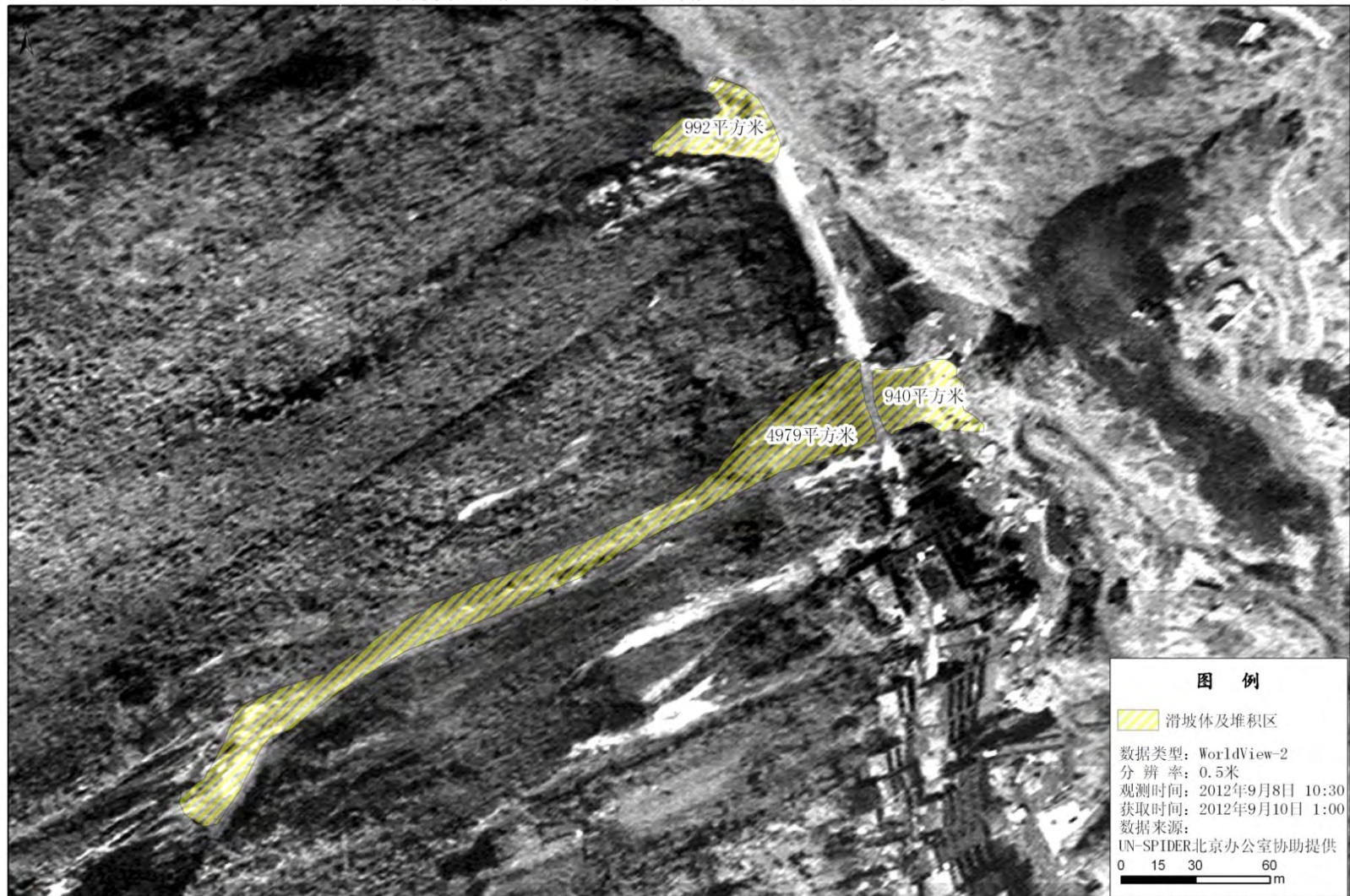
云南彝良地震灾区帐篷安置监测图





2.5 Product-Collapse and landslide

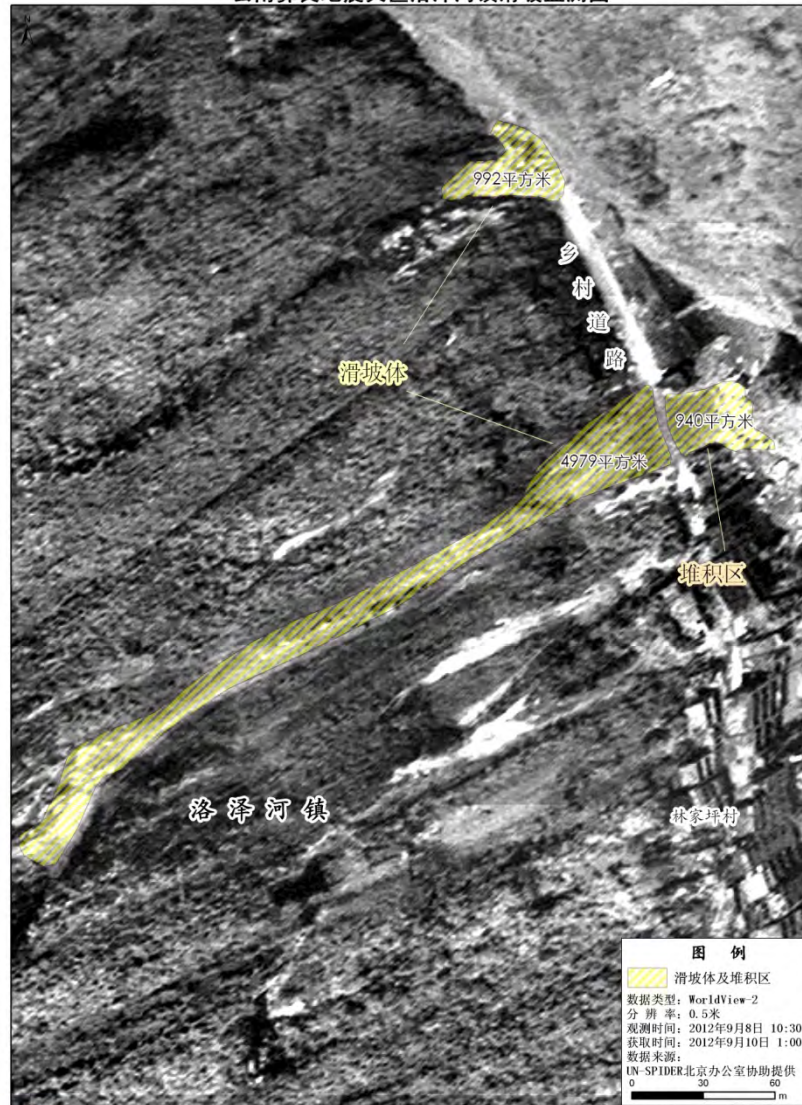
云南彝良地震灾区洛泽河镇崩塌滑坡及其影响监测图



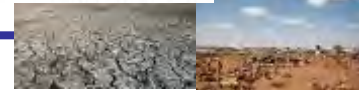
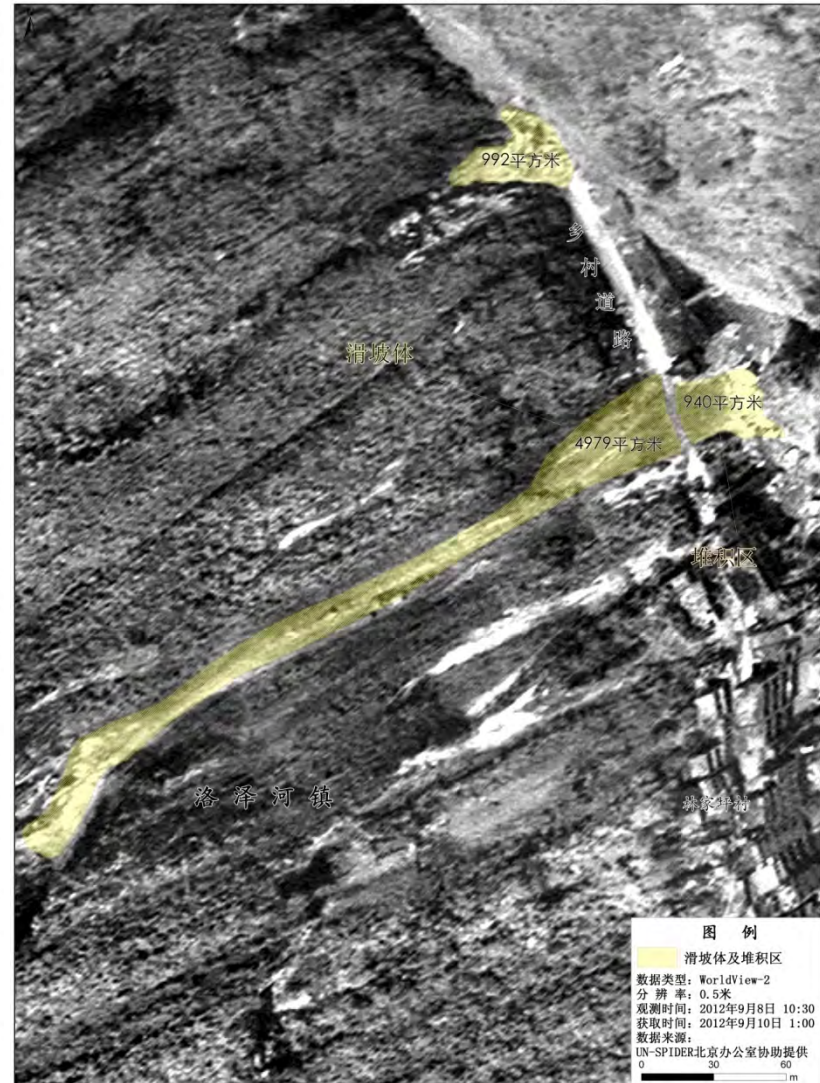


2.5 Product-Collapse and landslide

云南彝良地震灾区洛泽河镇滑坡监测图



云南彝良地震灾区洛泽河镇滑坡监测图





2.5 Product-effect on road

In Zhaotong, 96 highways were cut off by the earthquake. According to the Communications Bureau of Zhaotong Prefecture, frequent aftershocks and landslides could cut off restored road access.





2.6 Domestic Service

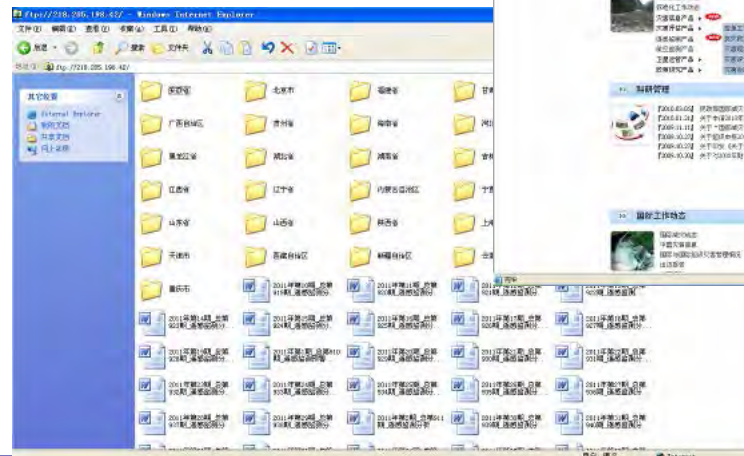
(1) Users

- National decision-making department of disaster relief office of national committee for disaster reduction
Ministry of Civil Affairs of the people's republic of China
NDRCC
- Member of National Committee for Disaster Reduction
- Local department of disaster relief
- Public
- Scientific research
- Media



(2) Service Mode

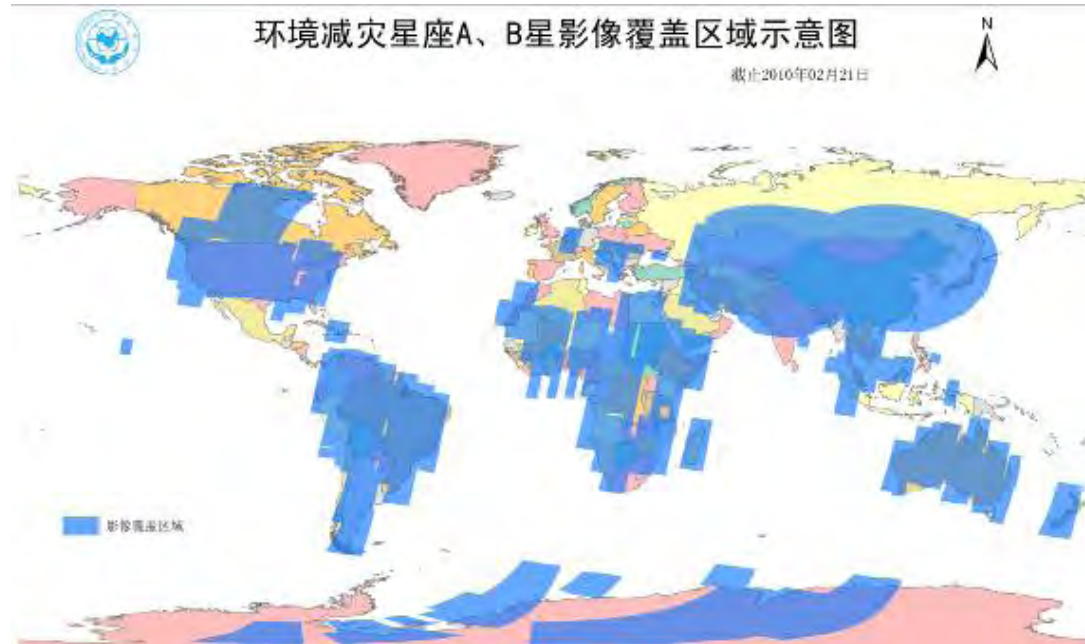
- Website
- E-mail
- ftp





2.7 International Service

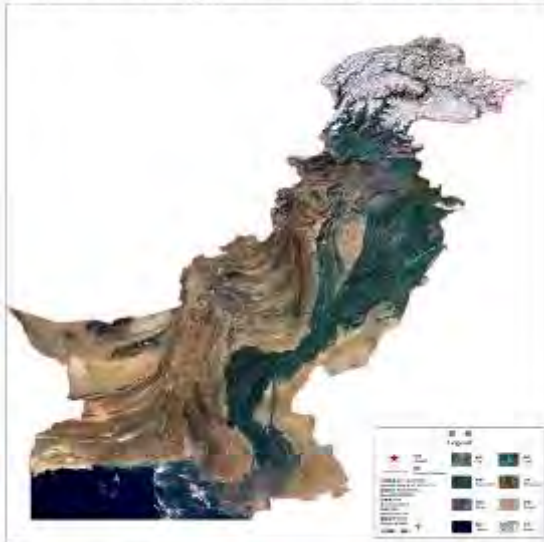
- Cooperate with the Beijing office of UNSPIDER and Provide the rapid mapping service for the international nature disaster using the research institutions and department of China
- Help the stricken countries to activate the request the services of the International CHARTER Space and Major Disasters.
- Drought risk assessment and monitoring on Africa using HJ-1 data relying on the international center for drought risk reduction.





(1) Remote Sensing Image

巴基斯坦伊斯兰共和国卫星影像图
HJ-1 Satellite Image of the Islamic Republic of Pakistan



中国资源卫星应用中心
China Resource Satellite Application Center

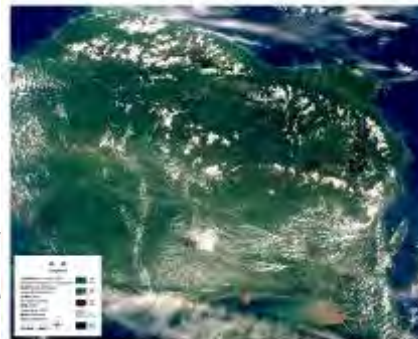
蒙古国卫星影像图
HJ-1 Satellite Image of Mongolia



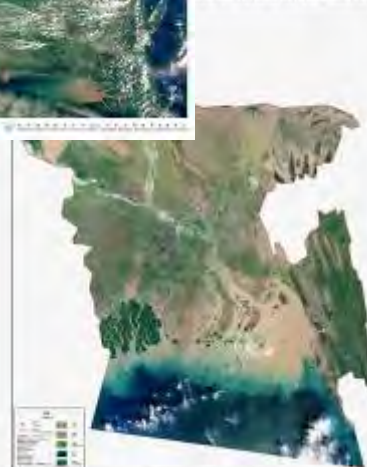
泰王国卫星影像图
HJ-1 Satellite Image of the Kingdom of Thailand



印度尼西亚共和国极乐鸟半岛卫星影像图
HJ-1 Satellite Image of Celebes in the Republic of Indonesia



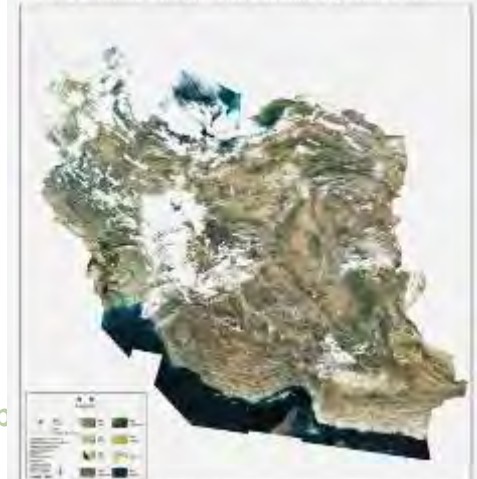
孟加拉国卫星影像图
HJ-1 Satellite Image of Bangladesh



秘鲁共和国伊卡卫星影像图
HJ-1 Satellite Image of Ica in the Republic of Peru



伊朗伊斯兰共和国卫星影像图
HJ-1 Satellite Image of the Islamic Republic of Iran



India, Mongolia, Indonesia, Bangladesh, Iran, Peru

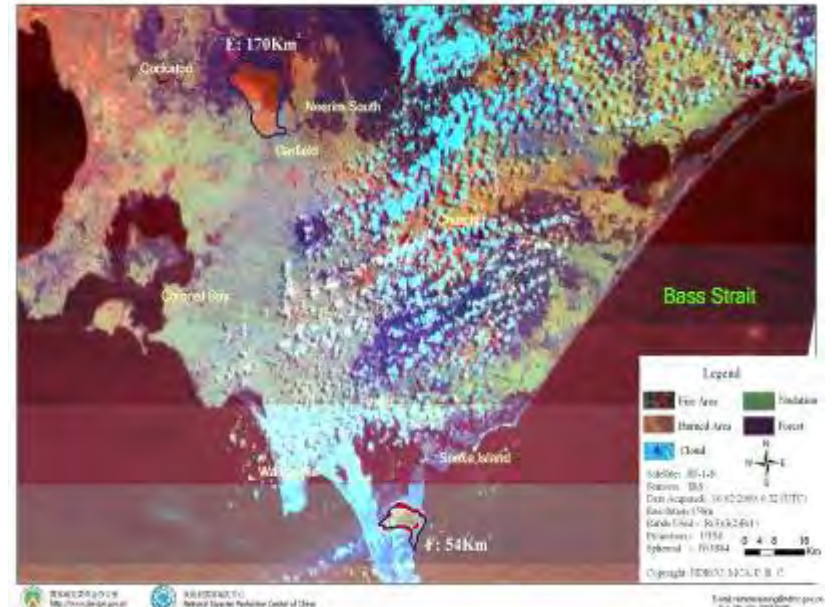


(2) Fire in Australia

Feb.16,2009-Fires Assessment in Southeast Australia Using BJ-1 Satellite Data



Feb. 16, 2009-Fires Assessment in Southeast Australia Using HJ-1 Satellite Data



Mr. Wang
Minister of Natural Resources and Environment of China
Beijing 100000
People's Republic of China

Dear Mr. Wang,

I am writing to you to thank you, and through you, to thank other Chinese agencies and the Chinese government, for your wonderful support for fire fighting over the last few weeks in Victoria, Australia, by providing fire-fighting aircraft, equipment and supplies.

Thirty victims died because of the fires, from the Victorian bushfires to people, property and the natural environment is lost. The tremendous support Australia has received from China in assisting your country has demonstrated to us the potential for great gains to be made in a growing the Australia-China friendship. "A friend is not a friend in need."

I am pleased that the Chinese Ministry of Foreign Affairs, Ministry of Science and Technology, Ministry of Civil Affairs, and Chinese Academy of Sciences were involved in an on-site inspection of the bushfires in Victoria, Australia, and the Ministry of P.R. China in Australia were in a position to quickly respond to our request.

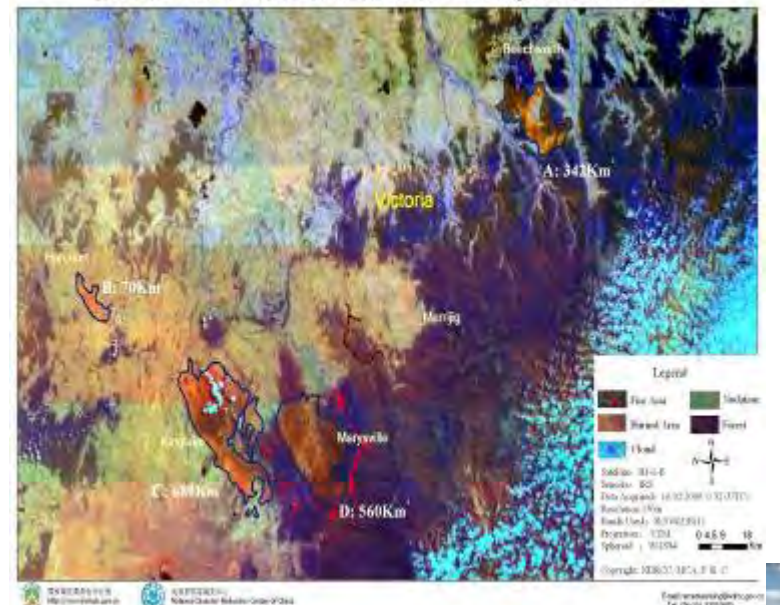
As a result of the visit, CHINA has the honor to send the Chinese Academy of Sciences, Ministry of Science and Technology and the Ministry of P.R. China in Australia to assist in the fire fighting in Victoria, Australia.

For a great relief that Victoria is now under the influence of good weather conditions and all the people in Victoria are now safe. I thank you again for your support for the fire-fighting in Victoria, Australia.

Yours sincerely,

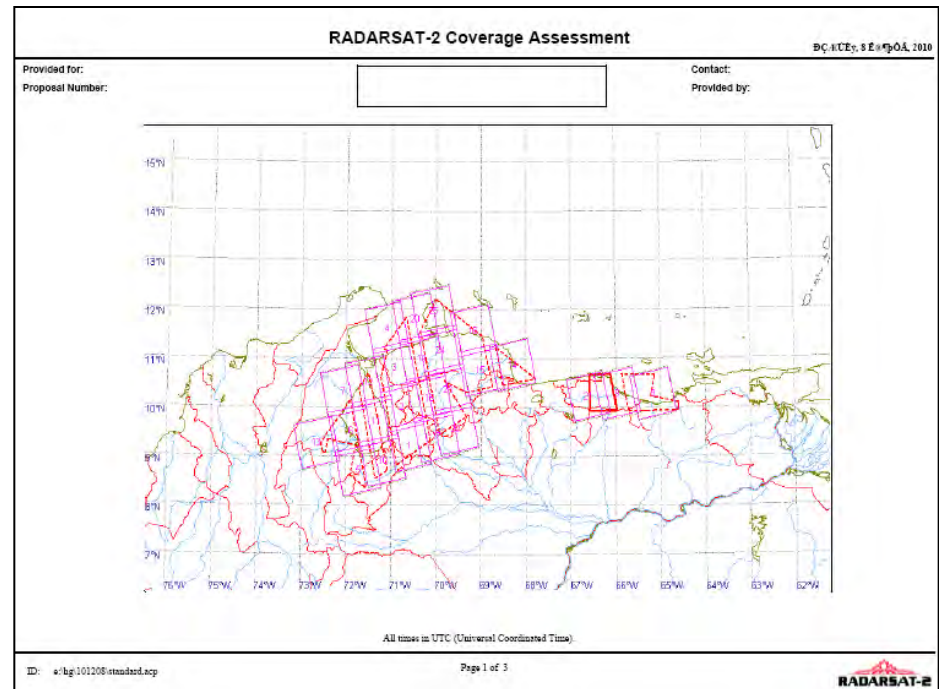
Mr. Wang
Minister of Natural Resources and Environment of China

1. Mr. Wang, Minister of Natural Resources and Environment of China, Beijing 100000, People's Republic of China.



(3) Flood in Venezuela

- According to Venezuela's relief needs, the international service mechanism of HJ-1 satellite was launched and the satellite monitoring plan was made on Dec 6, 2010.
- 11 monitoring stripes were planned and 31 HJ-1 images were provided to the Venezuela during the flood.
- At the same time, the other high spatial resolution RS data was provided to the Venezuela by the CHARTER mechanism and commercial order with the help of NDRCC.





(3) Flood in Venezuela, Pakistan, Bolivia, Bangladesh and Thailand

Flood Area Monitoring Map in Venezuela



Flood Area Monitoring Map in Venezuela



2010年巴基斯坦洪涝淹没范围监测图



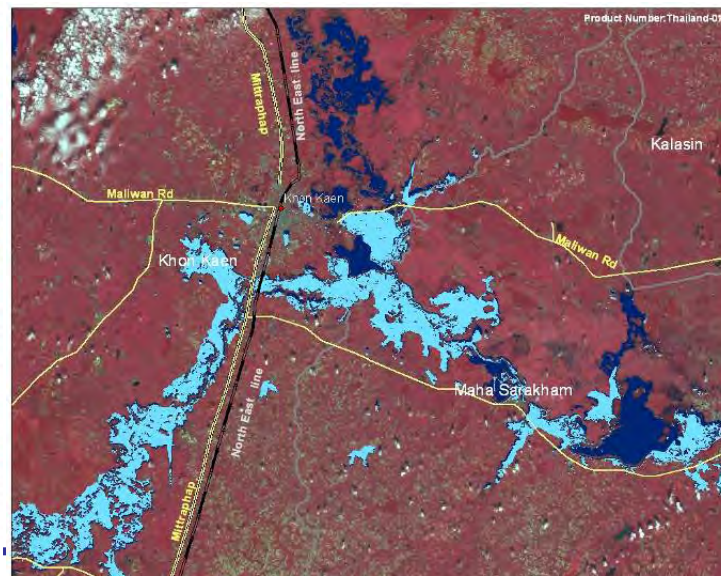
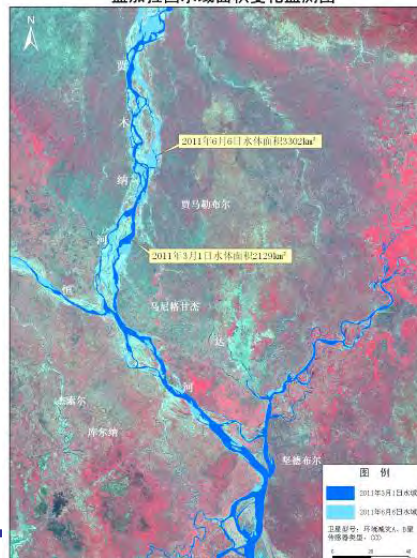
巴基斯坦水体面积变化监测图



HJ-1 Image in the North of Bolivia

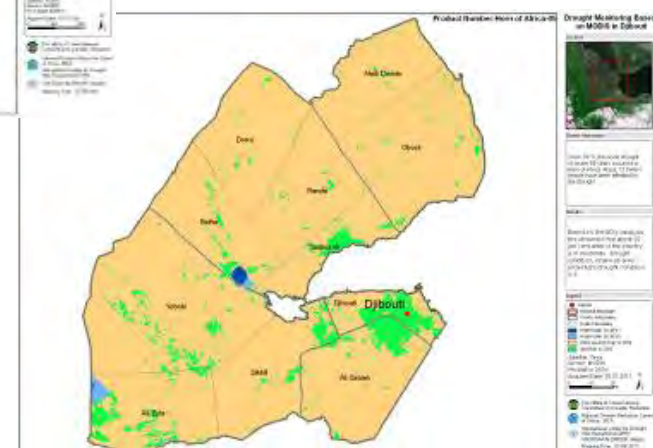
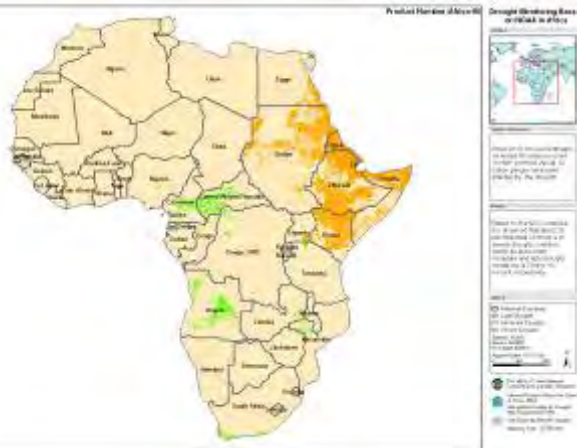
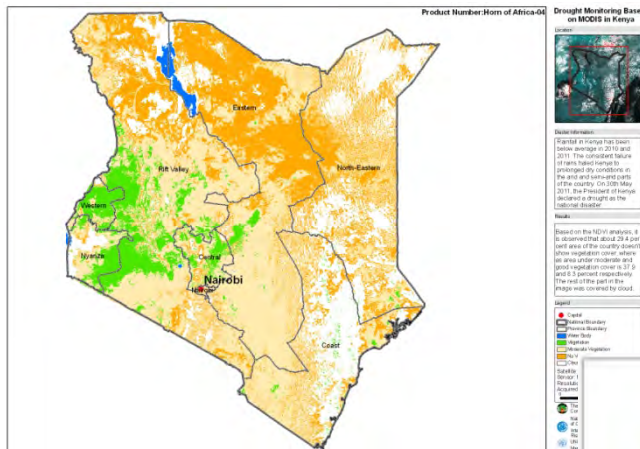


孟加拉国水域面积变化监测图



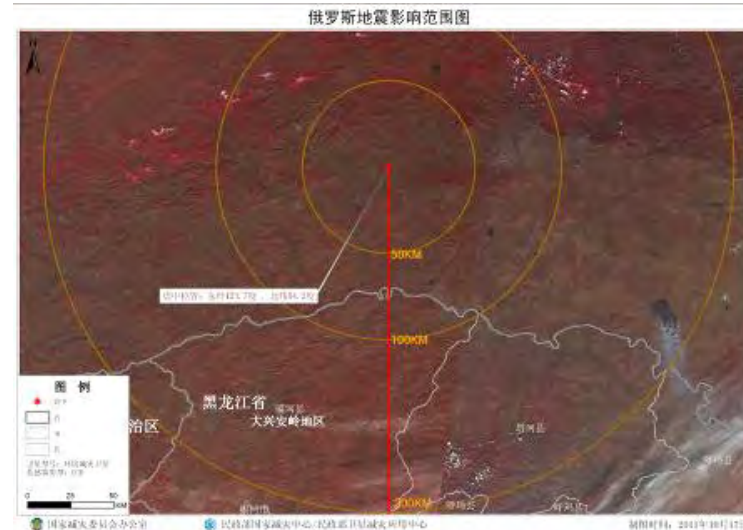
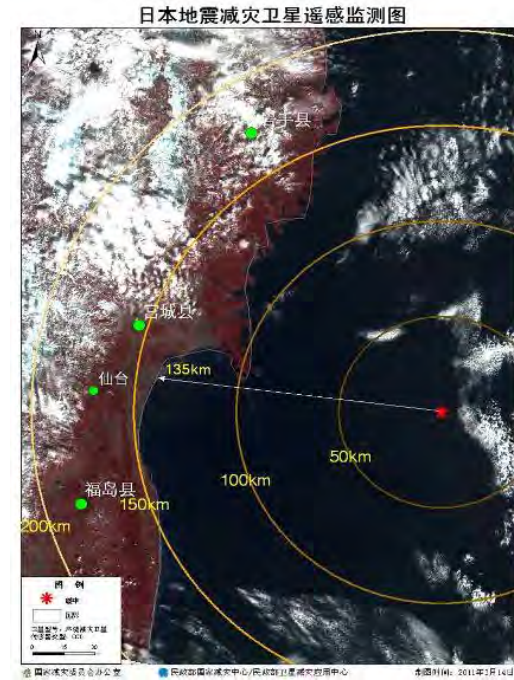
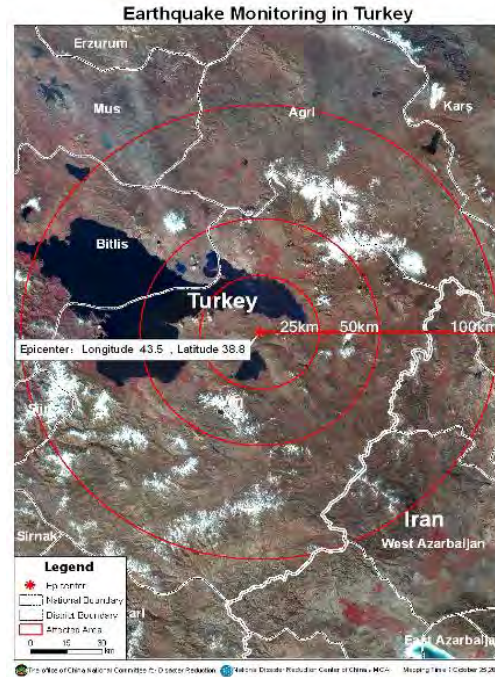


(4) Drought monitoring in the horn of Africa





(4) Earthquake





Future work

The most Challenges is time delay

- Collect the fundamental GIS data and thematic data
Agriculture data, Meteorological data, boundary data, and so on
- Get the high spatial resolution RS data as quickly as it can using all of the method we can
- Enhance Staff training
- Develop Intelligent Software



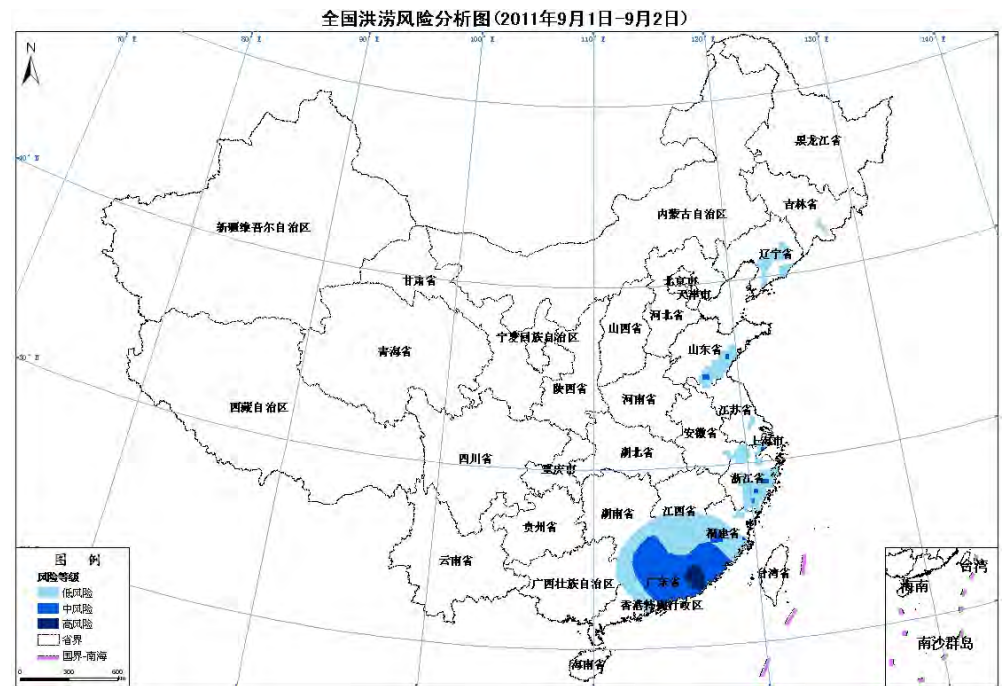


Thanks for your attention!



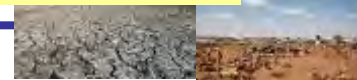


(1) Disaster risk assessment-early warning



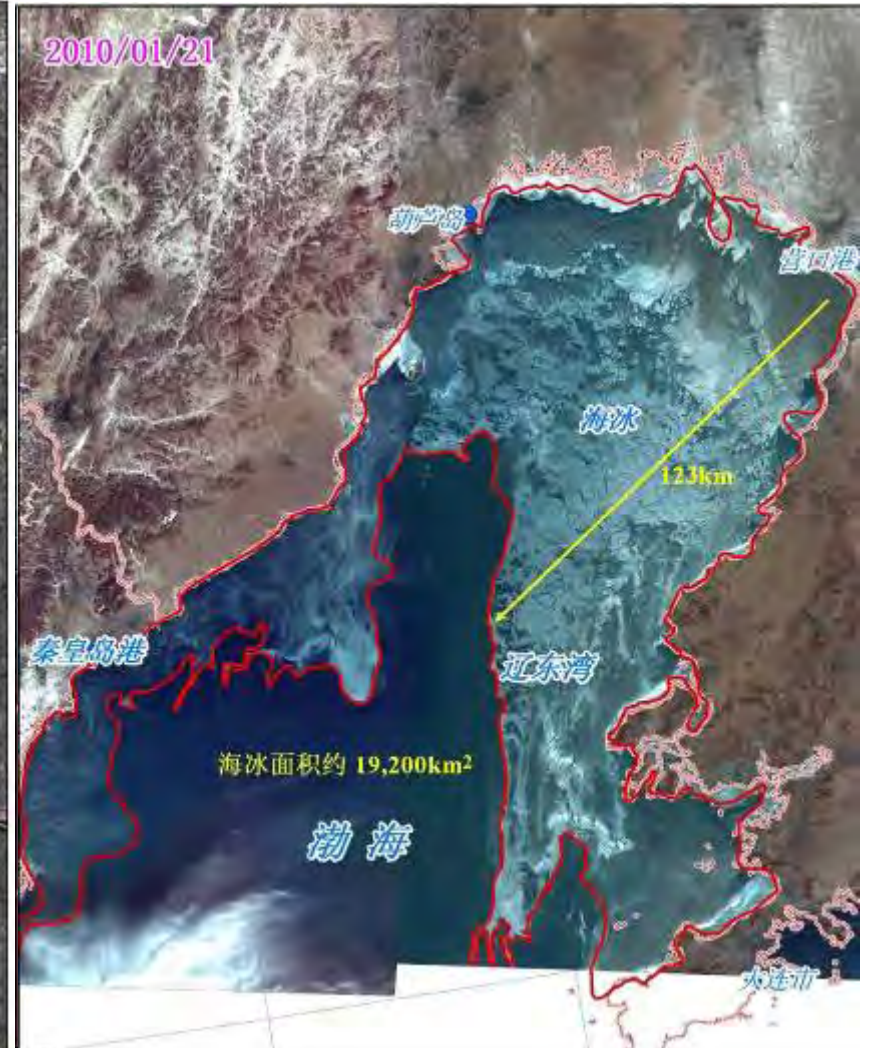
国家减灾委员会办公室 民政部国家减灾中心 民政部卫星减灾应用中心 制图时间: 2011年11月12日

prevent hazards from developing into disasters or reduce the effects of disasters





(2) Disaster Monitoring- extent



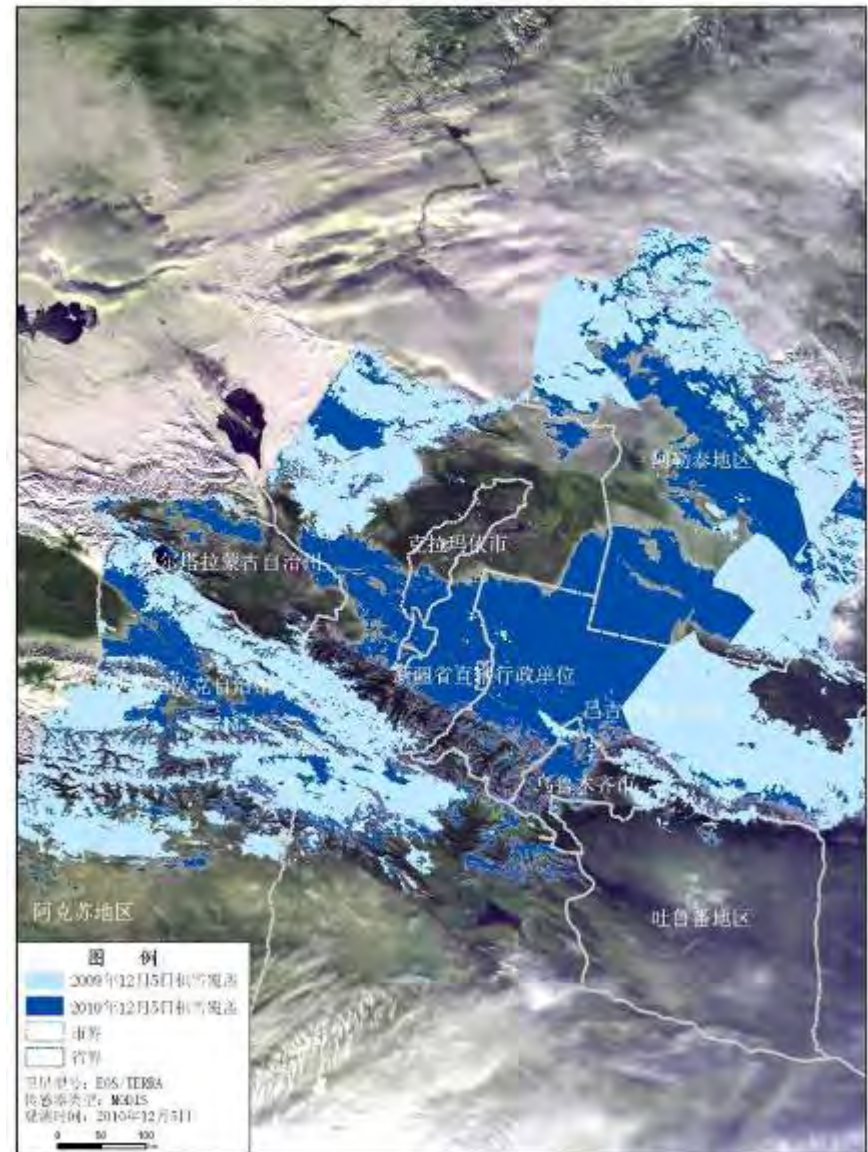
ensure effective coordination and the enhancement of capabilities of concerned organizations to prevent the disaster



(2) Disaster Monitoring- location



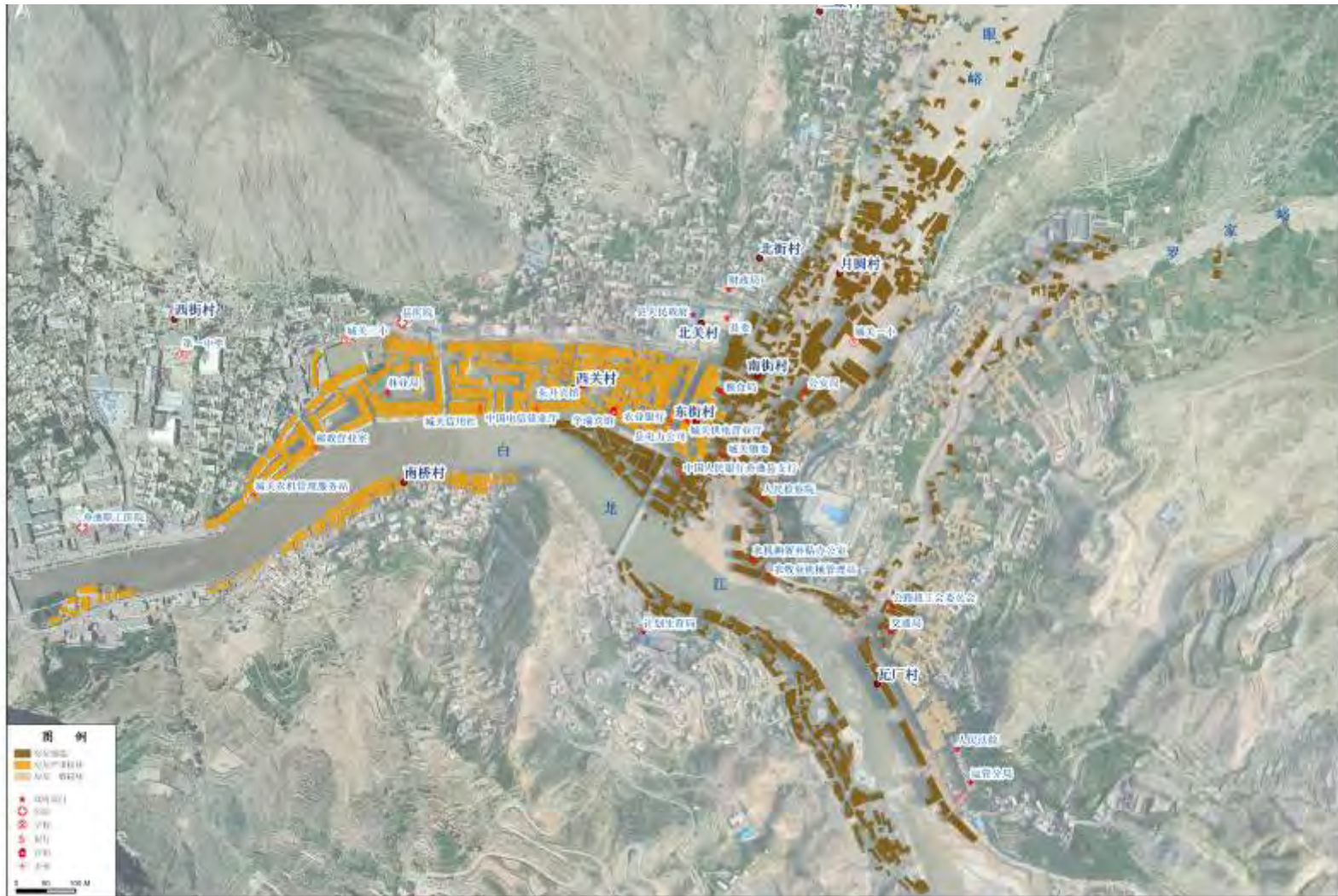
新疆地区积雪覆盖变化图（12月5日）





(2) Disaster Monitoring- degree

The collapse and damaged house in Extra-large-scale Debris Flow Disaster of Zhouqu





(2) Disaster Monitoring- buildings

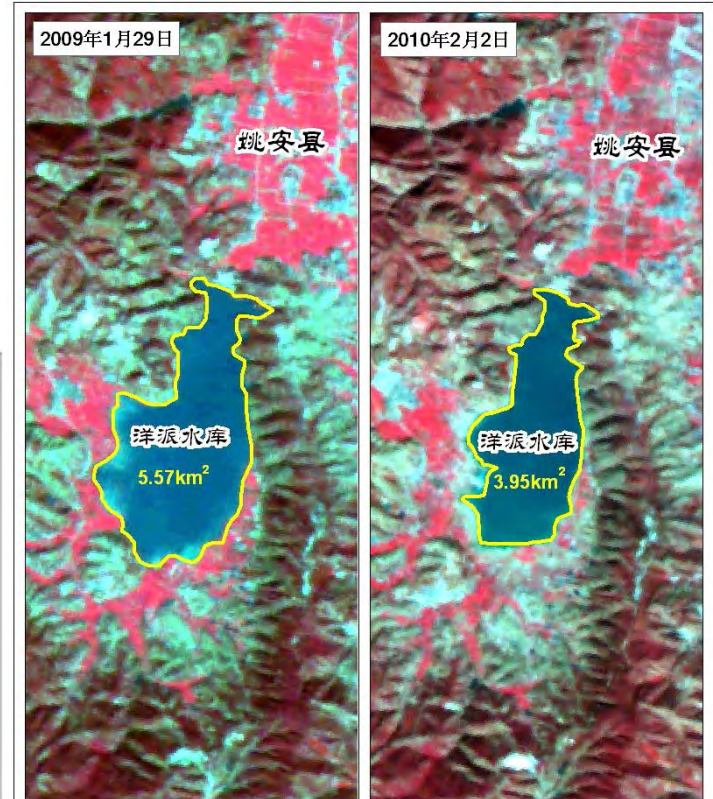
赏建路附近倒损房屋监测图





(2) Disaster Monitoring- important features

- Large-scale landslide
- barrier lake
- Reservoir
- Lake





(2) Disaster Monitoring- shelter

- Shelter location--the disaster begging stage
- Tents number
- Temporary housing

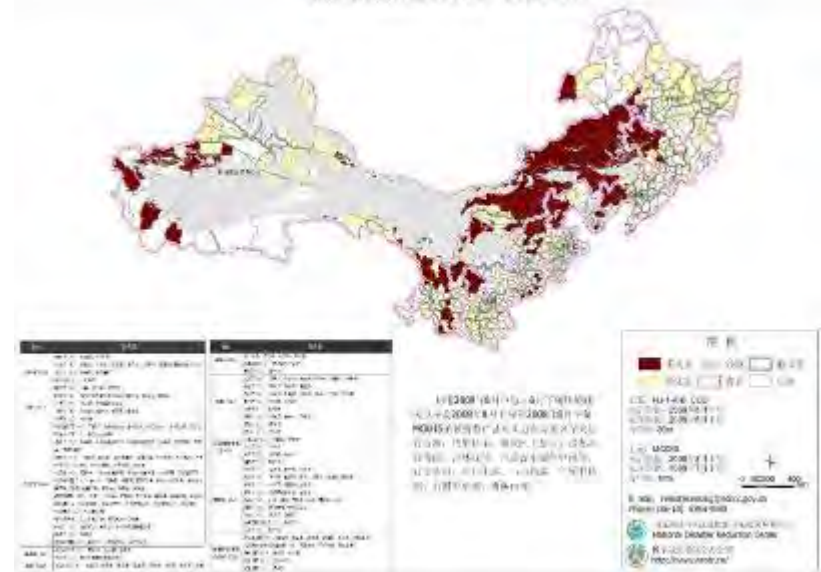




(3) Disaster damage assessment

- Assess the damage extent and range the damage level of the different region
- Assess local property and infrastructure damage, including collapse and loss of the houses, loss of the Agricultural land, the road and the other infrastructure
- Assess the need for national assistance.

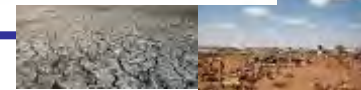
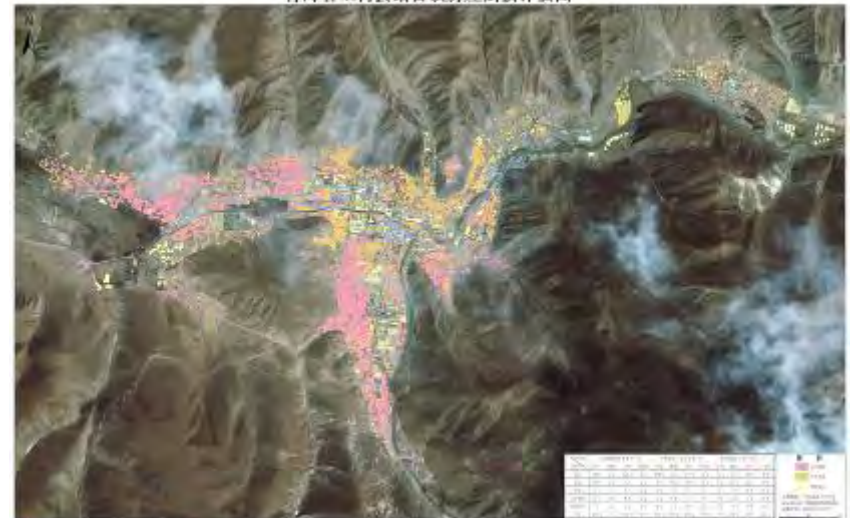
我国北方部分地区旱灾遥感监测评估



舟曲特大山洪泥石流灾害范围评估图



青海省玉树县结古镇房屋倒塌评估图





(4) Recover and reconstruction

- Ecological Restoration
- House Rebuilding
- Infrastructure reconstruction

