Use of Satellite Data in Emergency Situations in China

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22 May. 2014, Guangzhou, China

CGMS

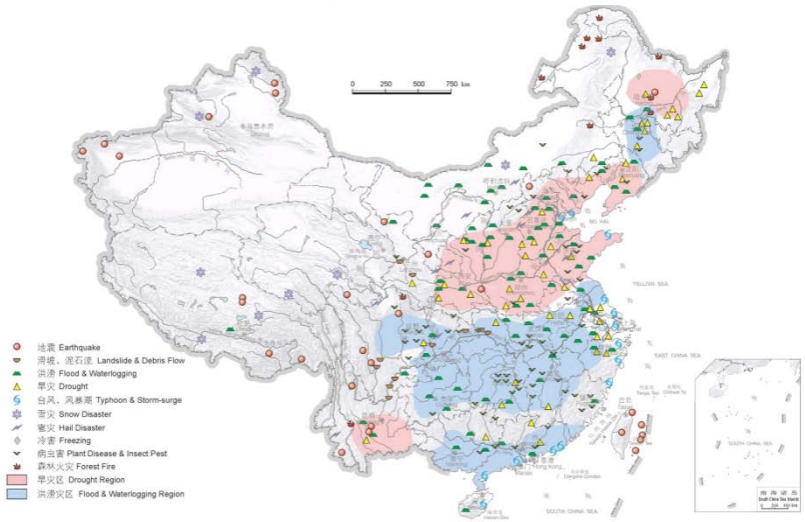
NSMC

Outline

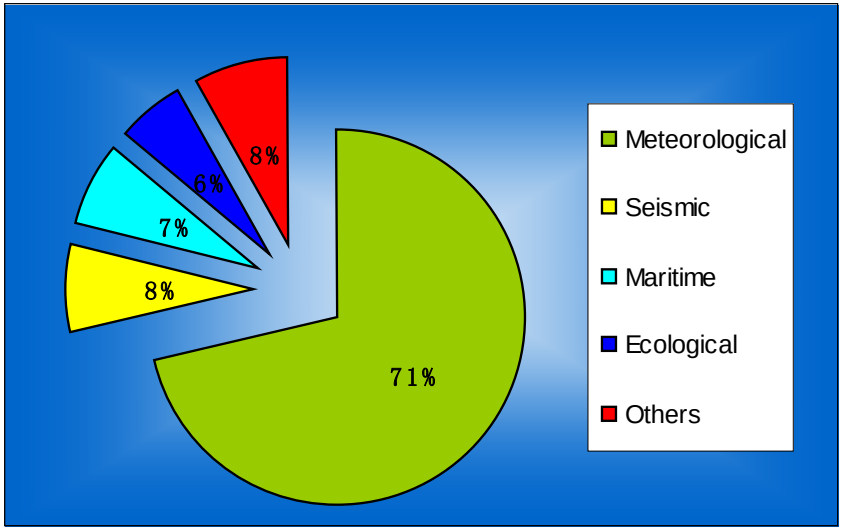
- Emergency Response to natural disasters in China
- Use of Satellite data in Emergency Situations in China
- Suggestions

Emergency Situations in China

Natural disaster



Major Natural disasters Map in China

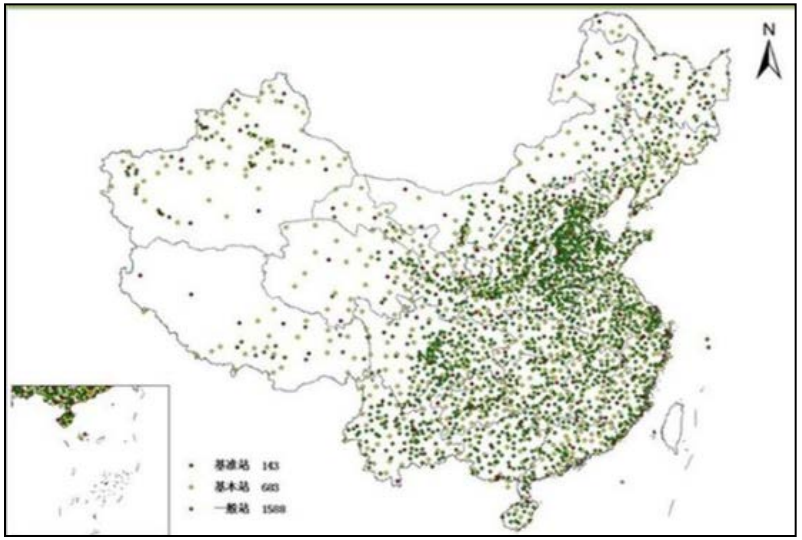


Economic loss of different disasters

Emergency events in China

Meteorological Observation Network

- Ground stations
- Doppler Radars
- Meteorological satellites



Ground station network

New generation Doppler Radars network

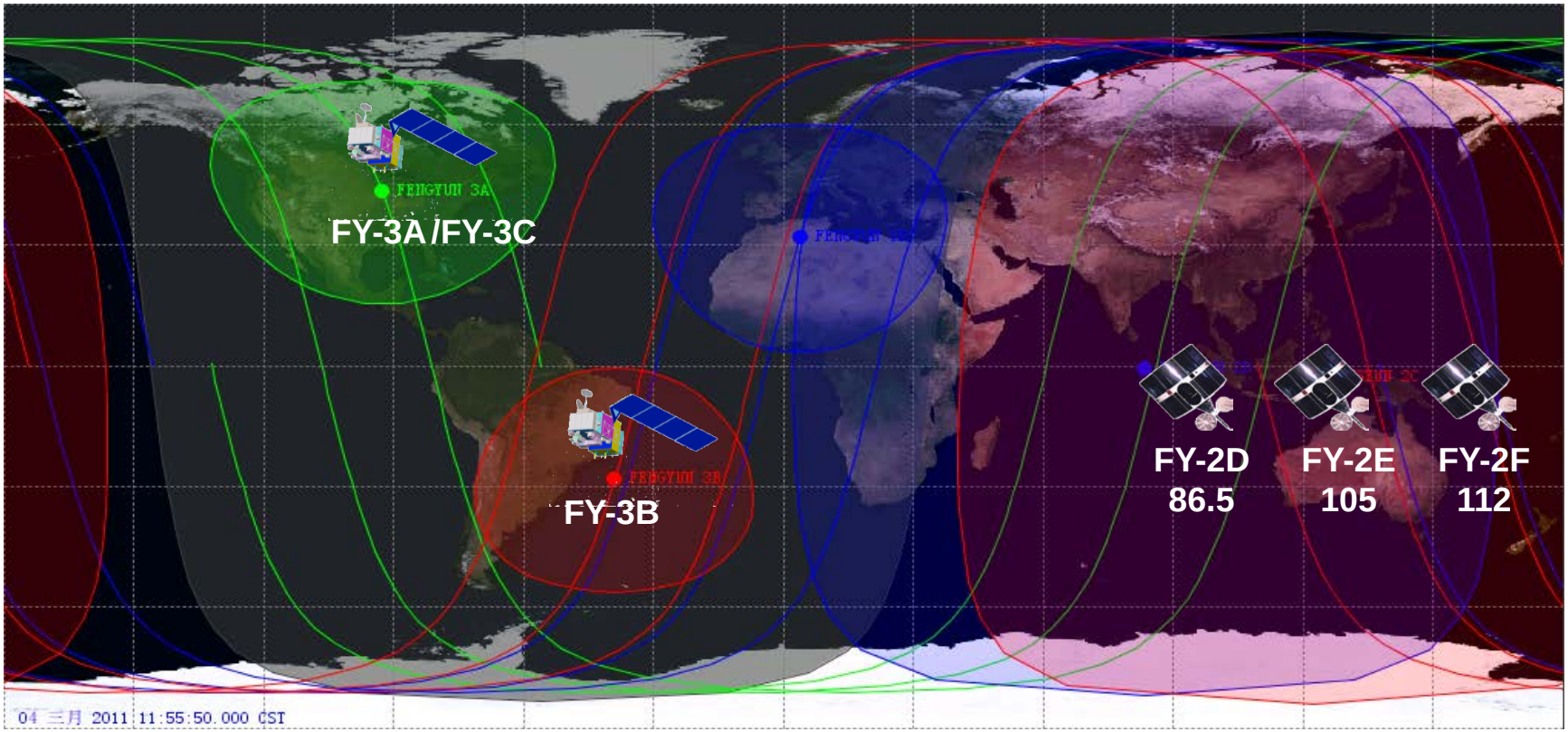
In the west of China, the natural disasters happened frequently, but the ground stations and radar sites are quite scarce and not enough in this large area.

The advantages of satellite data in emergency events

- ✓ Full area coverage
- ✓ High spatial-temporal resolution
- ✓ Plentiful observation information

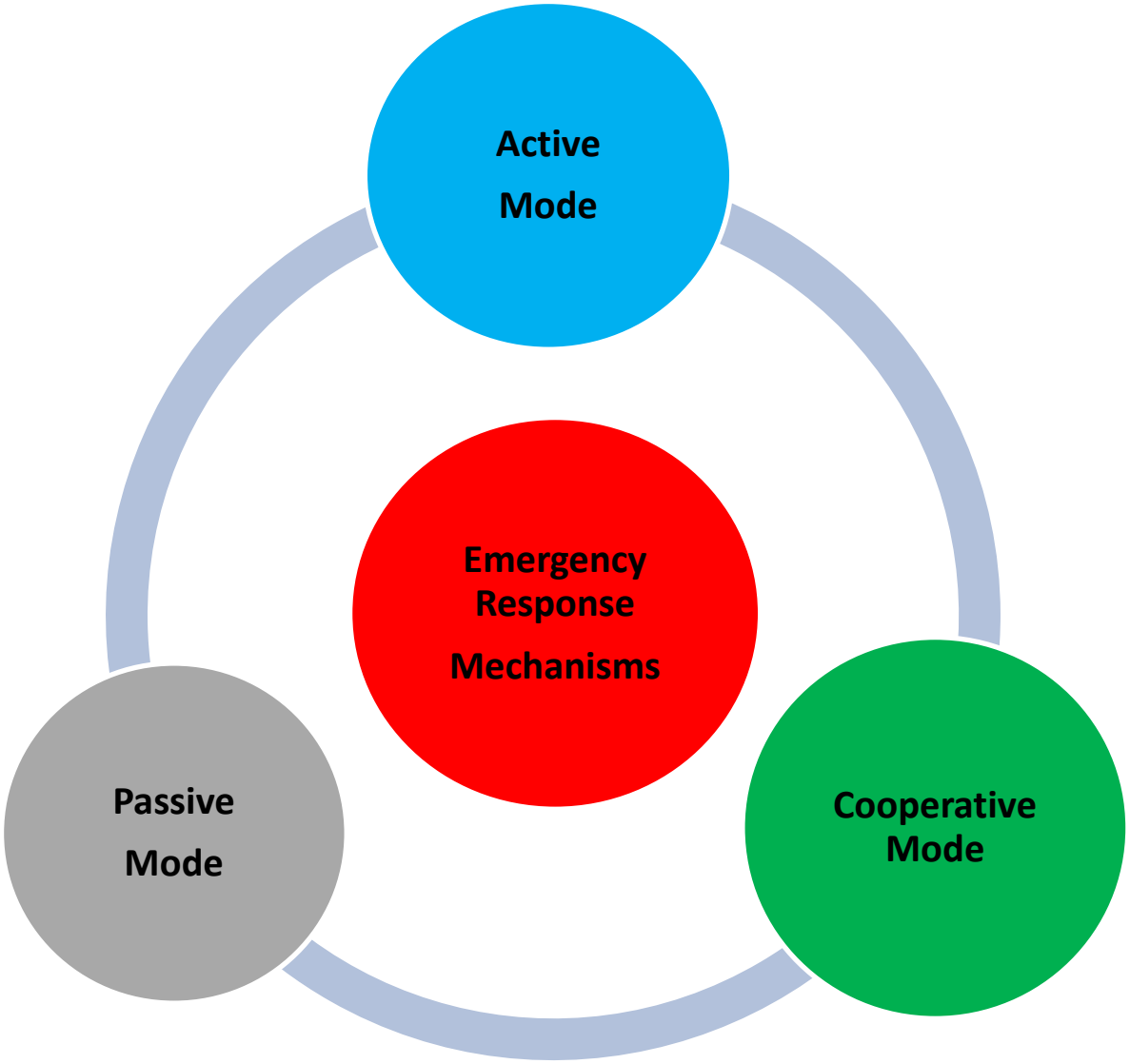
The Observation and Data service of FY Satellites

- Global observation---FY-3 series
- High frequency and Specific regional rapid scan mode- ---FY-2 series
- Real-time data dissemination via CMACast ,Website ….



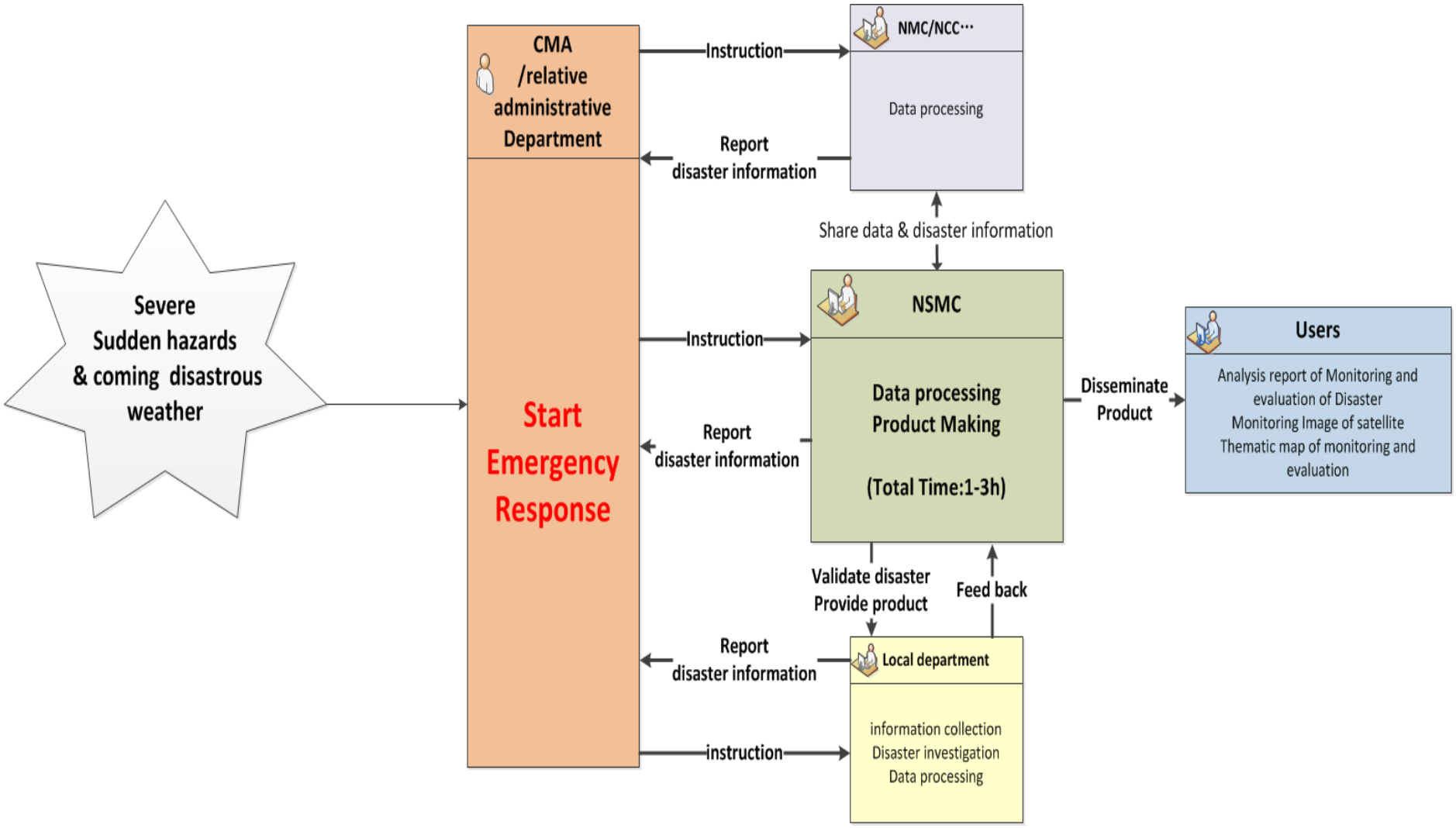
Use of Satellite data in Emergency Situations in China

Multi-mode emergency response mechanisms



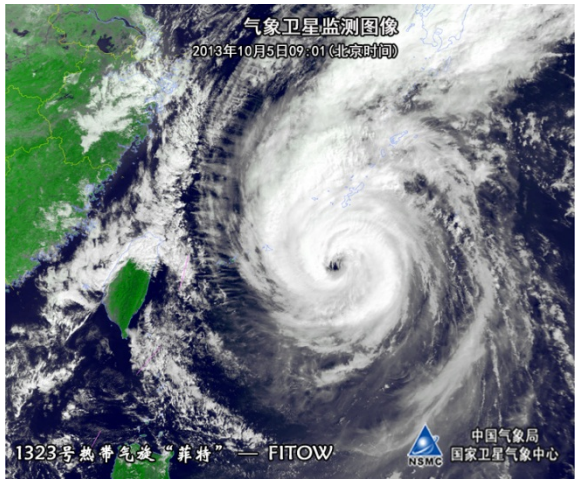
Passive Emergency Response Mode

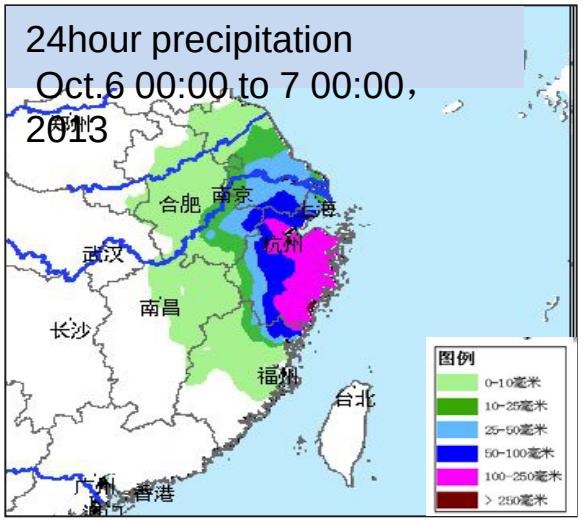
Users Requirement → **Prepare Data** → **Distribute Data and Products**



Passive Emergency Response Mode
—— Typhoon FITOW (No.23,2013)

FITOW landed to Fujian province on Oct. 7th , brought heavy rainfall and disasters.

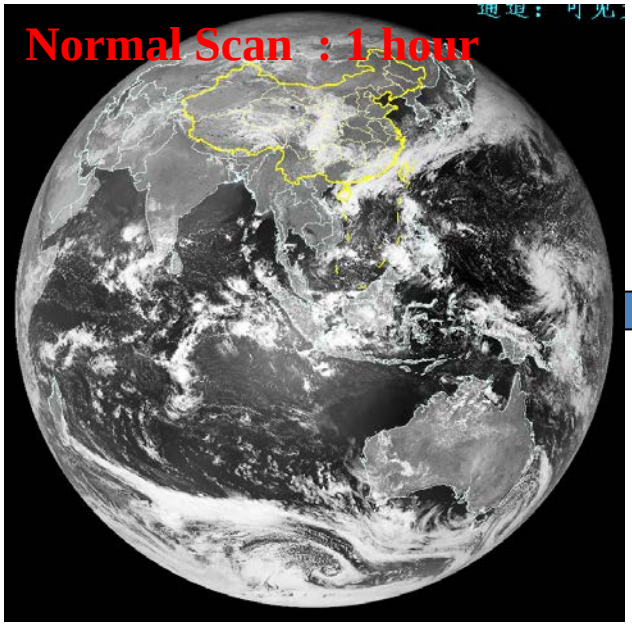


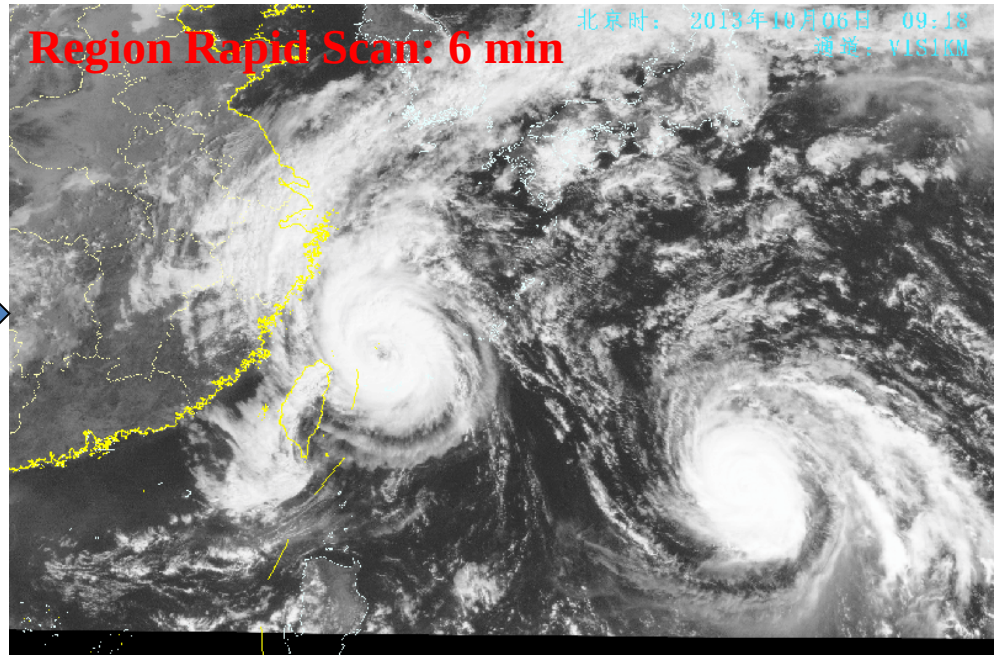


CMA start emergency response II

FY-2F Observation mode adjustment for FITOW

NMC request Rapid Scan mode → **NSMC adjust FY-2F observation to Regional Rapid Scan (RRS) — within 1 h**

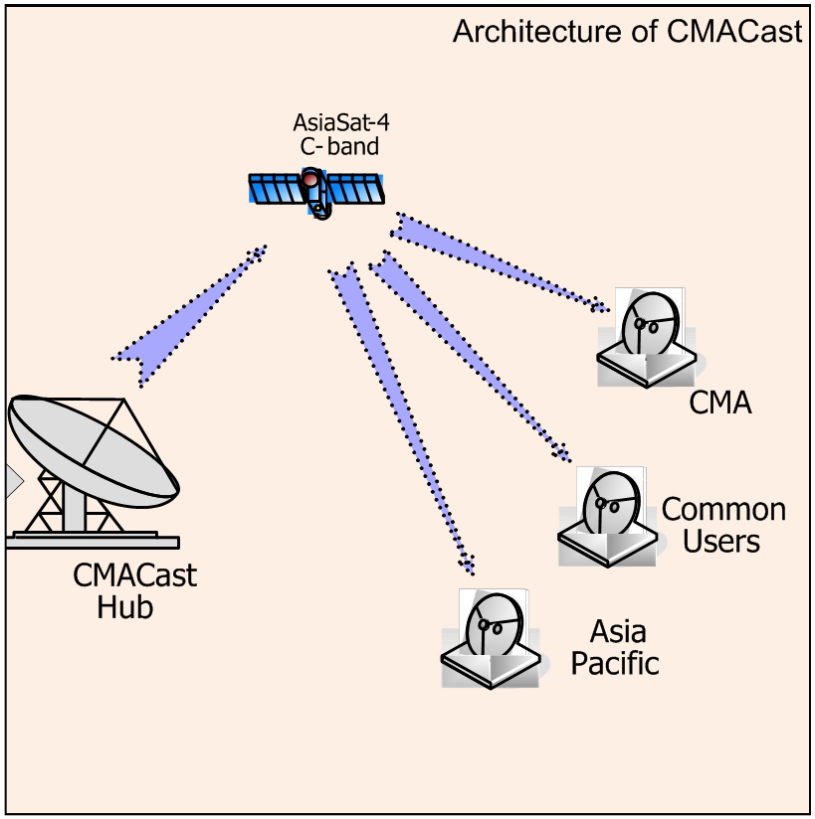




- Improving the accuracy of Typhoon center location.
- Enhancing the time effectiveness of typhoon position in 10-15 minutes.
- Promoting the precipitation forecasting accuracy.

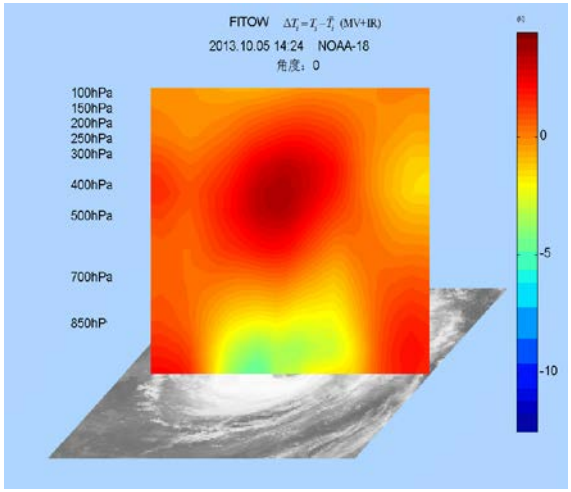
Rapid Data Distribution for FITOW

- **FY-2F RRS data compressed from 200M to 10M**
- **Broadcasted through special channel of CMACast**
- **Users receive data no more than 2 min.**

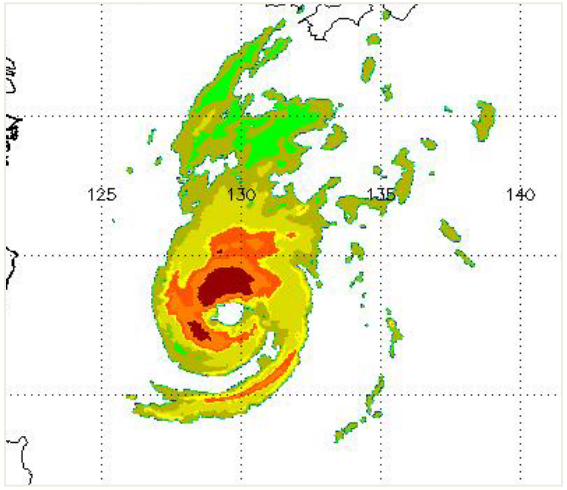


Compositive analysis for FITOW

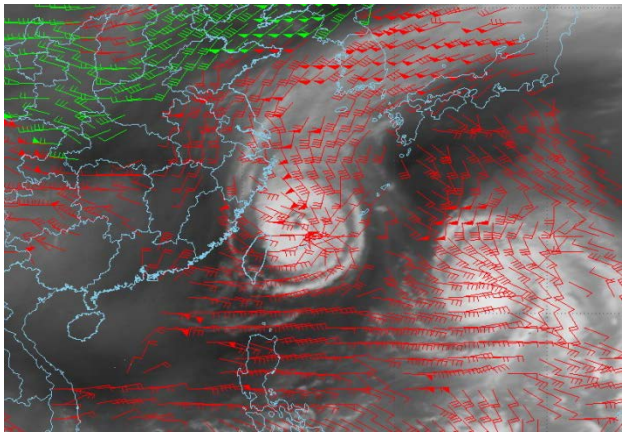
NSMC supply compositive analysis products for typhoon forecasting



Three-dimension thermal structure



Precipitation estimation

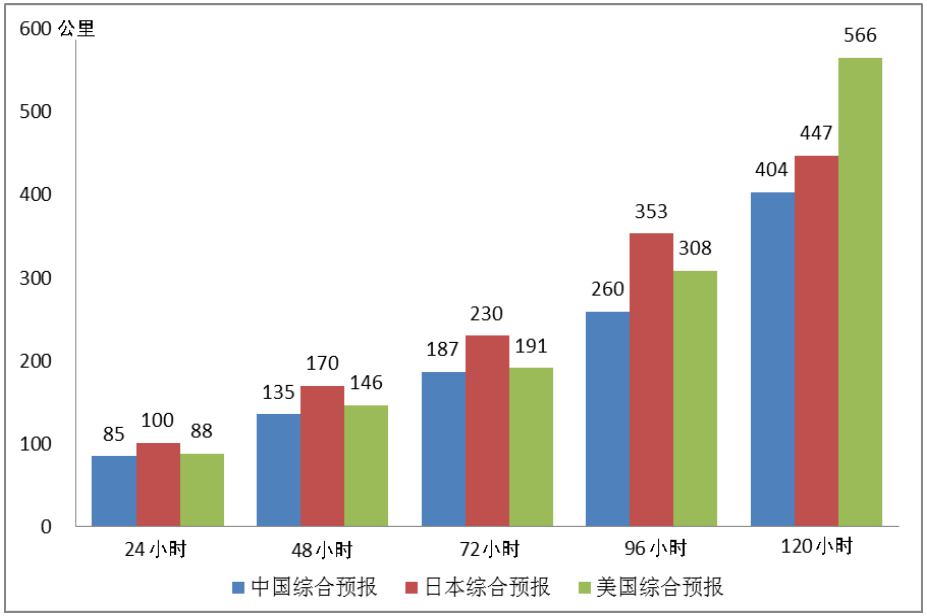


Atmospheric motion vector

Passive Emergency Response Mode in 2013

- **During 2013, CMA started 22 times passive Emergency response for severe weather events (typhoon, rainstorm and earthquake).**
- **Meteorological Satellite provided powerful support.**
- **24h forecasting error of typhoon reduced to 85km.**

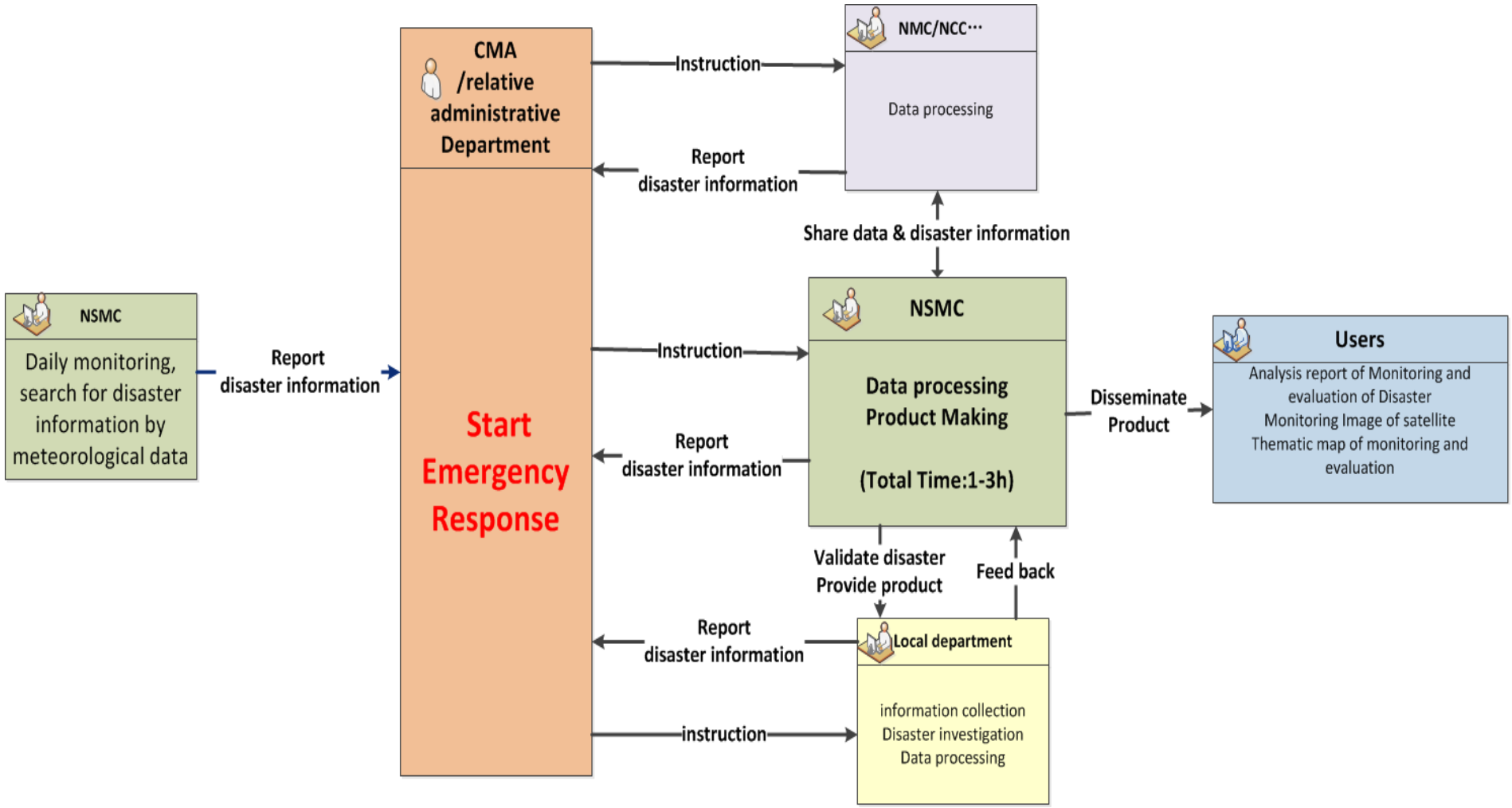
Date	Possive Emergency of CMA
25-27, May	Rainstorm III
26-28, June	Rainstorm III
1-3, July	Typhoon III
8-10, July	Rainstorm III
11-14, July	Typhoon II
16-19, July	Rainstorm III
18-19, July	Typhoon IV and Rainstorm III
1-2, August	Typhoon IV
12-15, August	Typhoon II
12, August	Rainstorm IV
21-22, August	Typhoon III
19-22, September	Typhoon II
29-30, September	Typhoon IV
4-7, October	Typhoon II
12-15, October	Typhoon III
1-5, November	Typhoon III
8-11, November	Typhoon III
20, April	Earthquake III
22-25, July	Earthquake III



Forecasting distance errors comparison

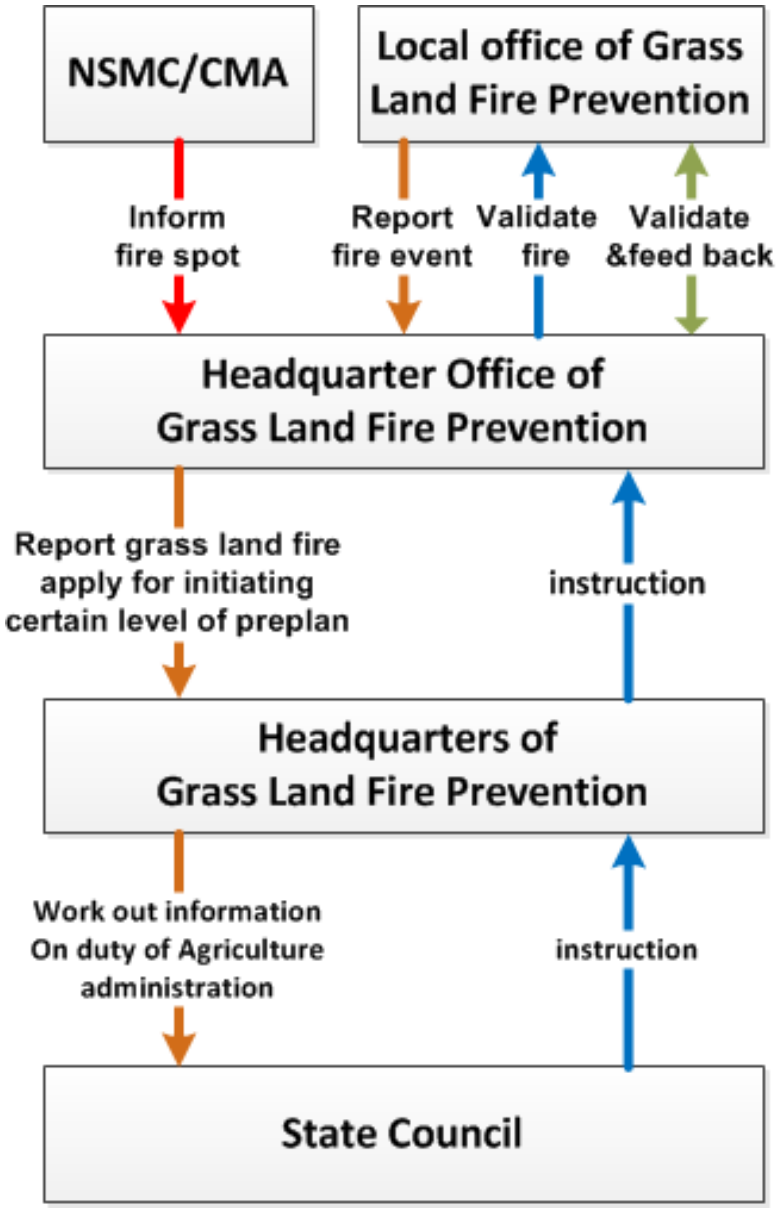
Active Emergency Response mode

Daily monitoring ⇨ detect disasters ⇨ start emergency response ⇨ products distribution

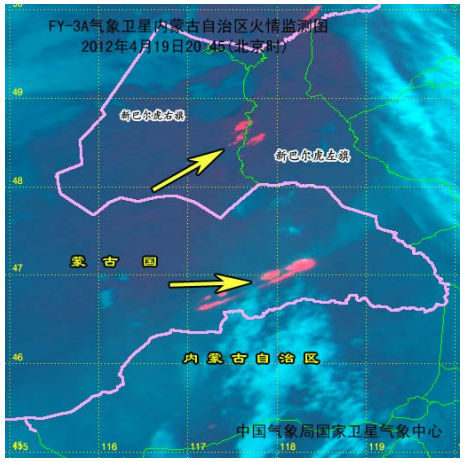


Generally, The whole information preparation is no more than 3 hours.

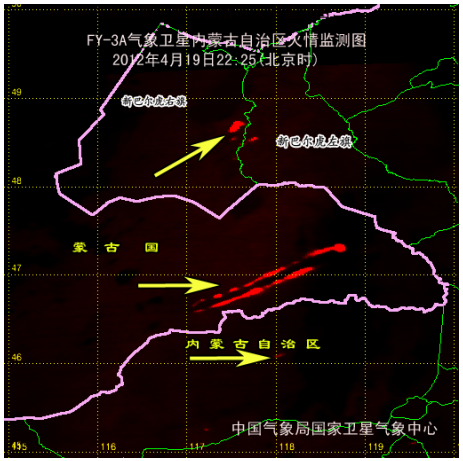
The preplan of grass land fire emergency response in Agriculture Ministry



Grass land fire Emergence Response to a big grass land fire April 19, 2012

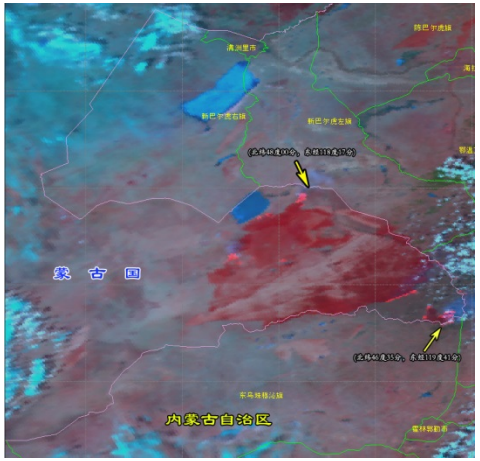


20:46 of April 19



22:25 of April 19

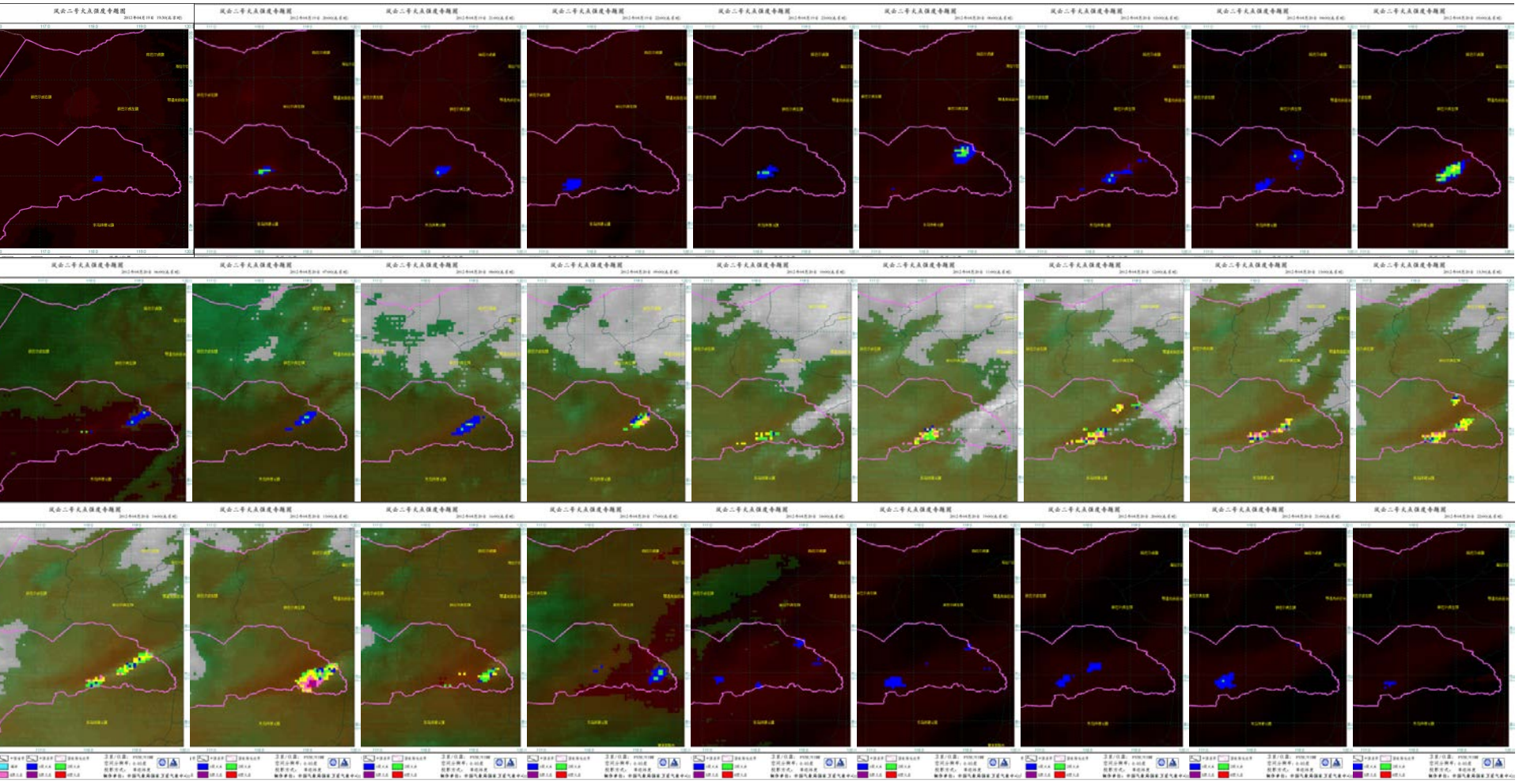
13:33 of April 20

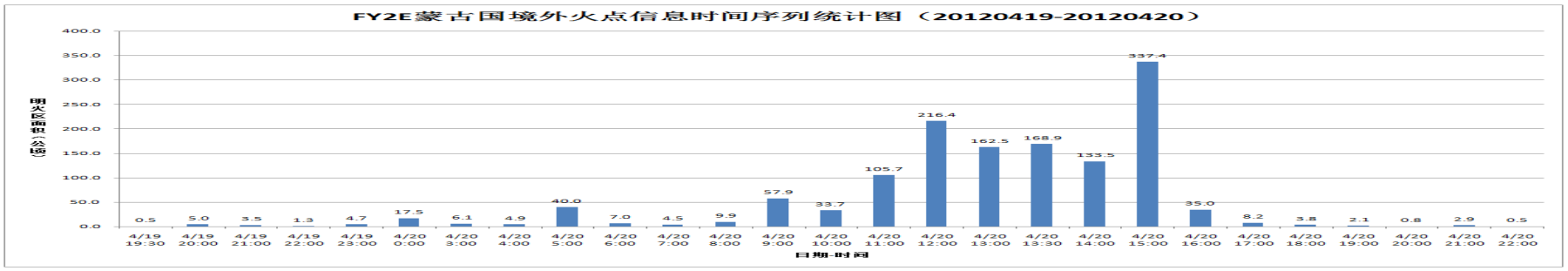


13:14 of April 22

FY-3A found a big grass land fire in the east part of Mongolia, it spread very fast, 2 hours later, it was quite close to the boundary. NSMC soon informed the grass land fire prevention office, they start the emergency response immediately , then the local fire fighting department received the instruction and went to the boundary to prevent the fire spreading.

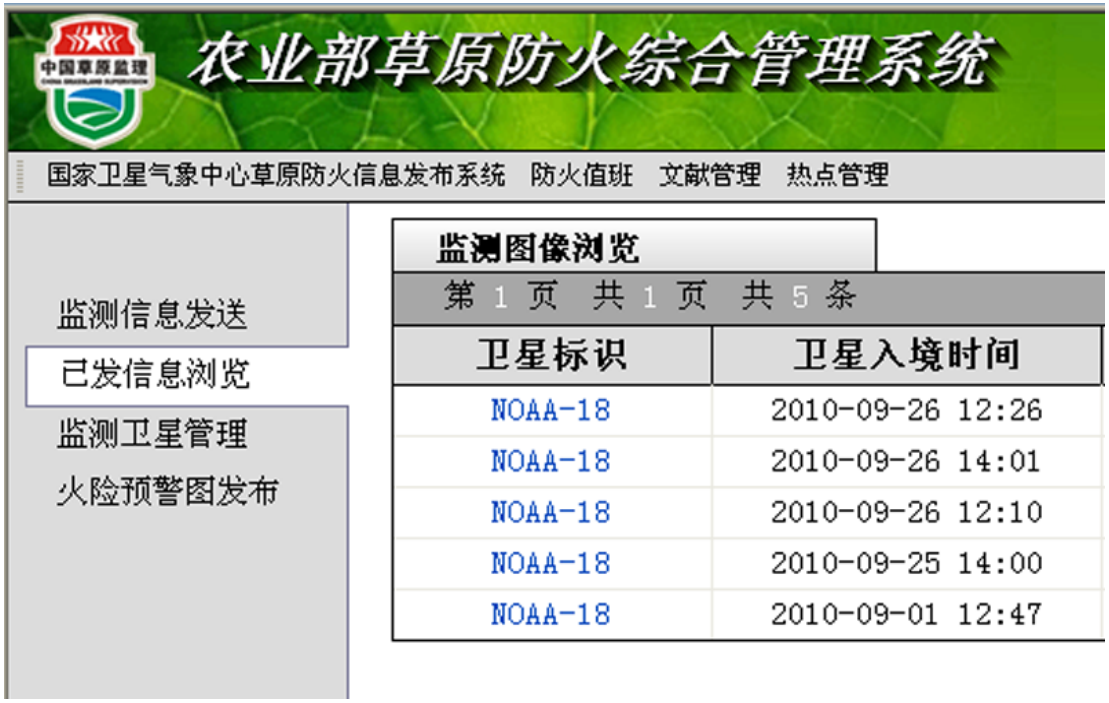
FY-2E monitor a grassland fire in one hour frequency (April 19 to 20)





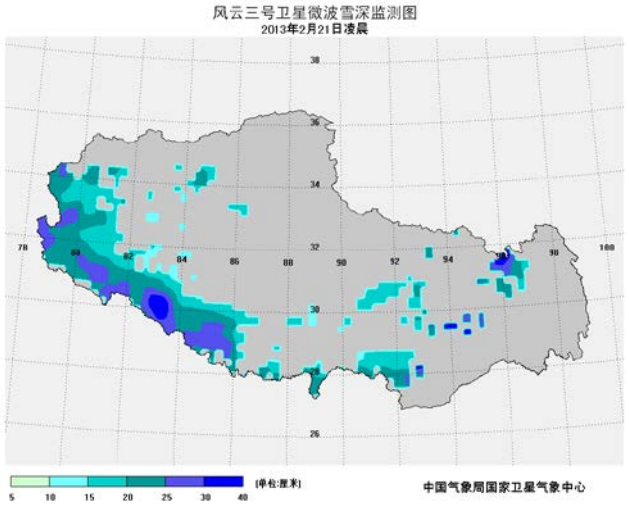
Distribution of satellite information for emergence response

During the emergence response, the monitoring result of meteorological satellite was distributed to the website of Management system of Agriculture Ministry for grass land fire prevention.

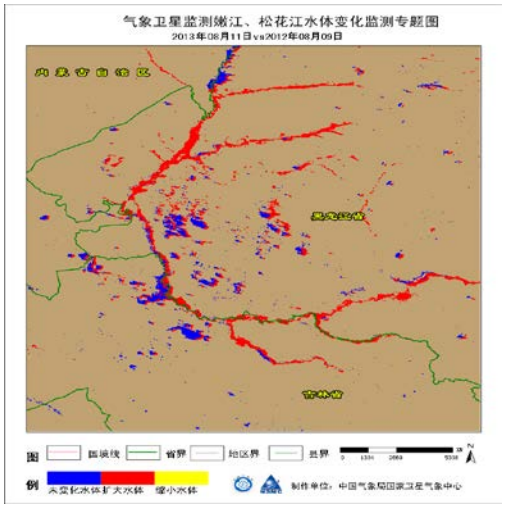


Meteorological satellite plays a significant role in the emergency response of grassland fires . It was estimated, since the beginning of this century, the loss caused by grassland fire on China reduce about 400 million RMB .

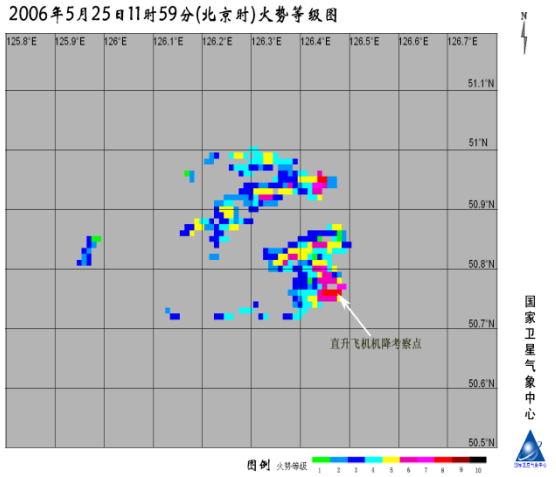
Thematic Products in Active Mode of Emergence Response



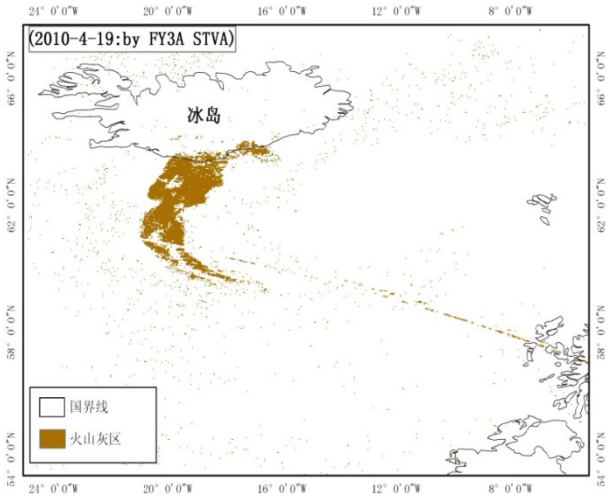
Snow storm monitoring



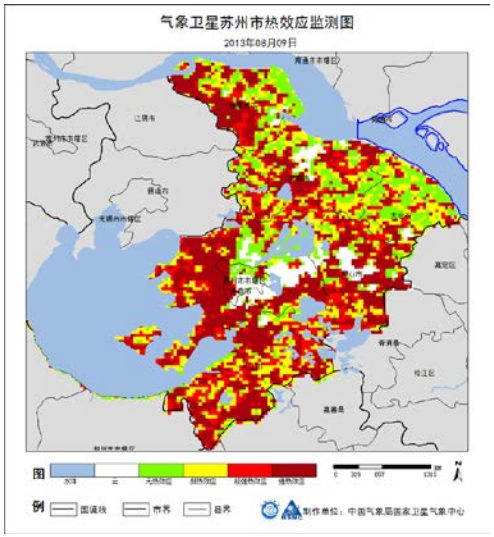
Flood monitoring



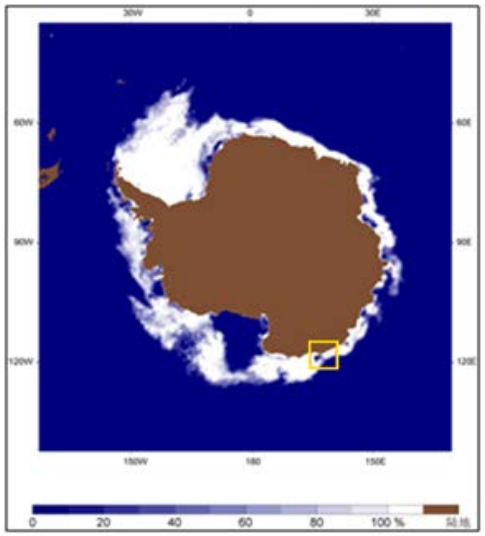
Forest fire intensity



Volcano ash clouds



High temperature weather

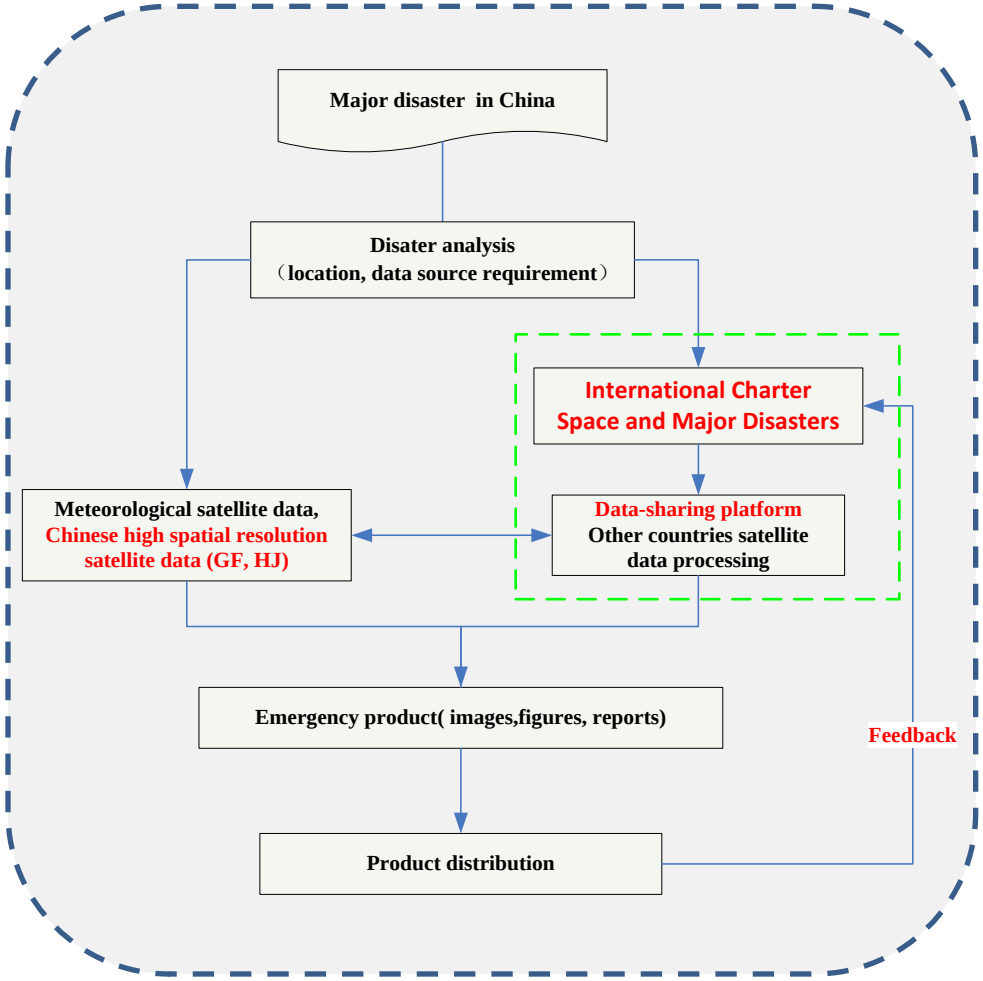


Sea ice in South Pole

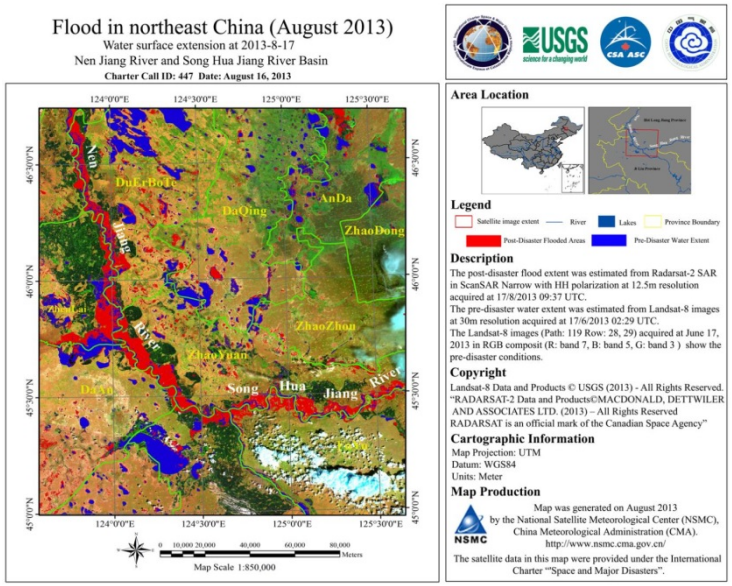
Cooperative mode

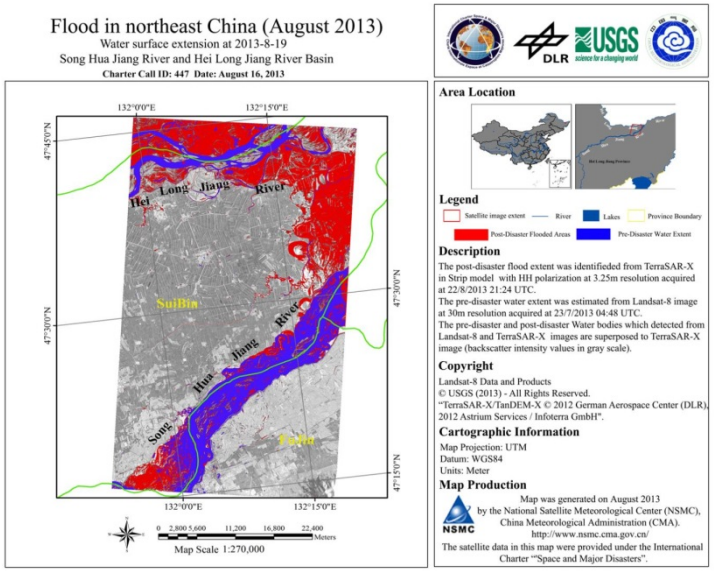
International Charter Space and Major Disasters

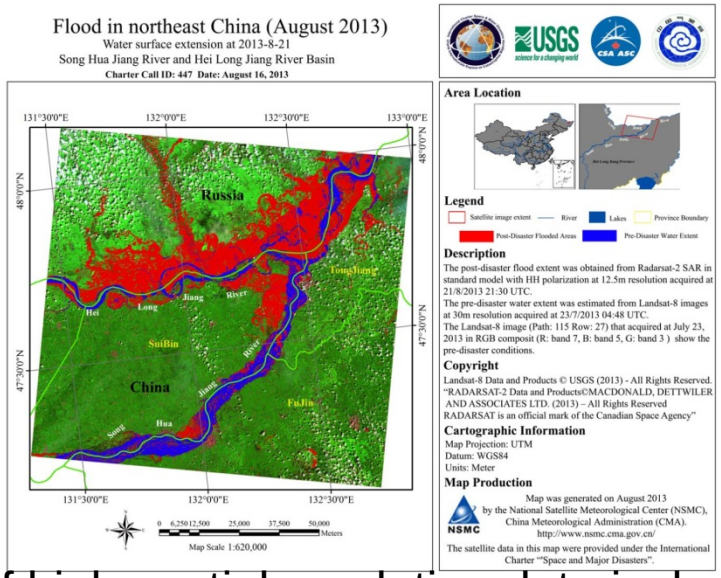
Responding time (<12 hours)

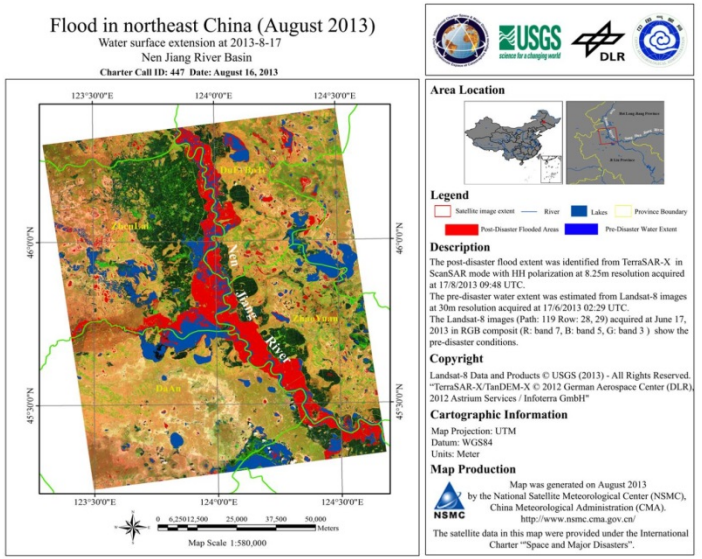


Quickly response to The flood in Heilongjiang province in 2013



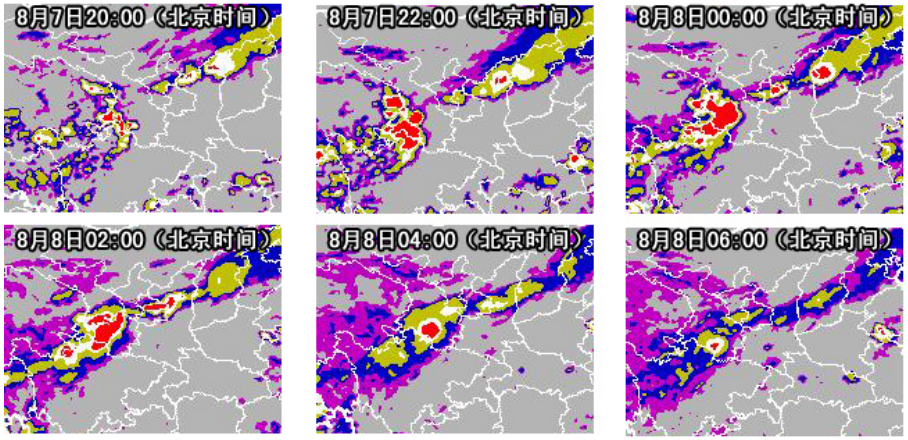


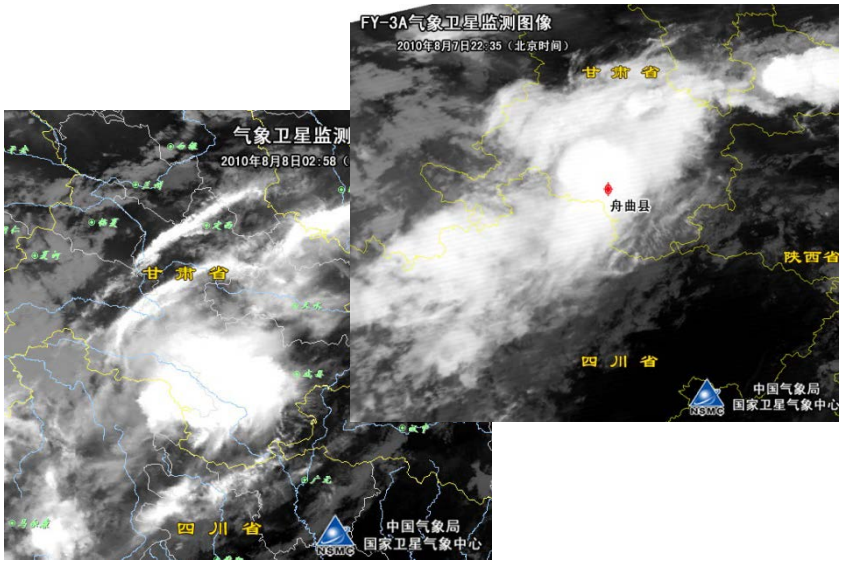


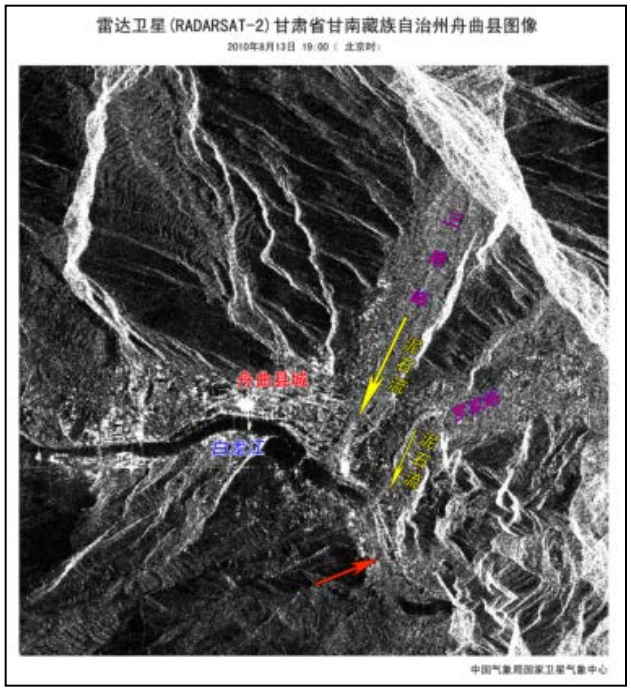


Lots of high spatial resolution data,including Landsat-8, RADARSAT-2, TerraSAR-X, RISAT-1 Landsat-8 be used.

Quickly responding to the Mud-rock Flow in Zhouqu County ,west of China



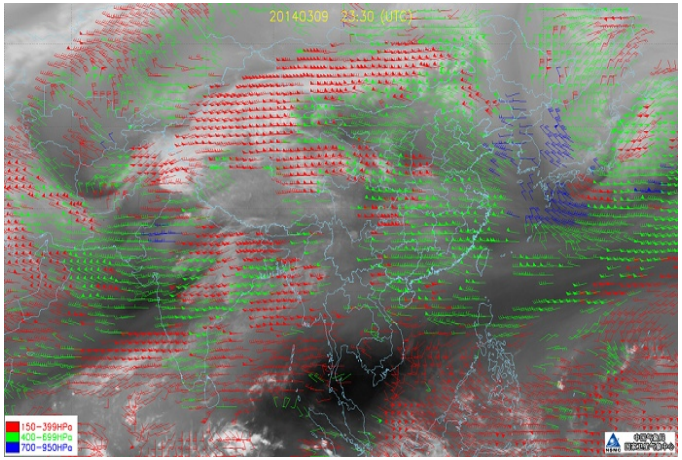


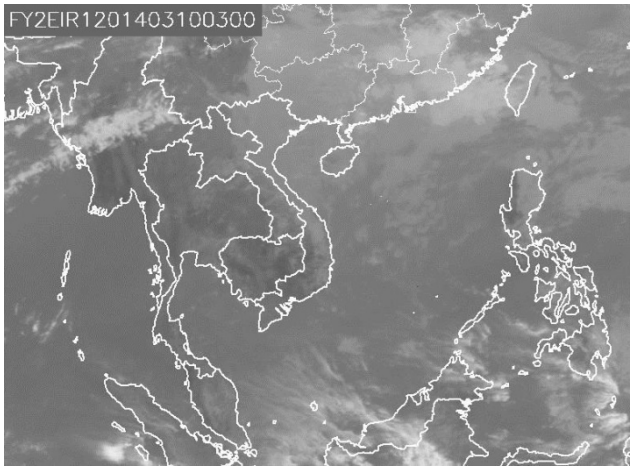


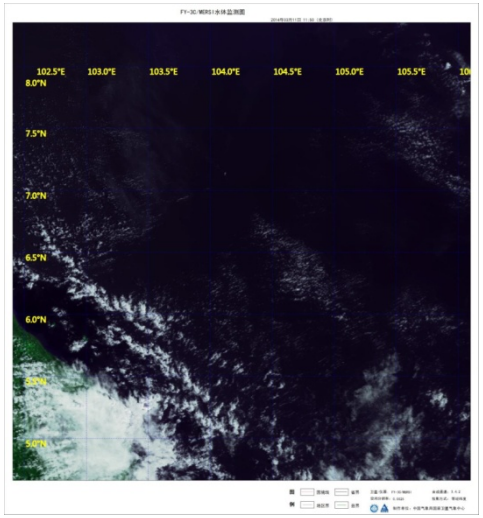
Barrier lake

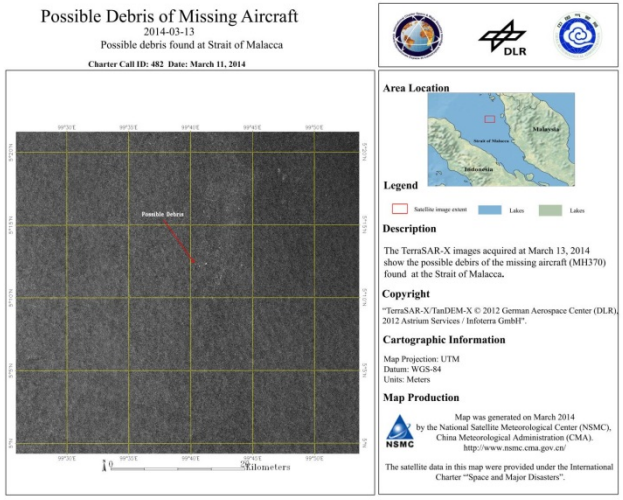
Mud-rock flow body

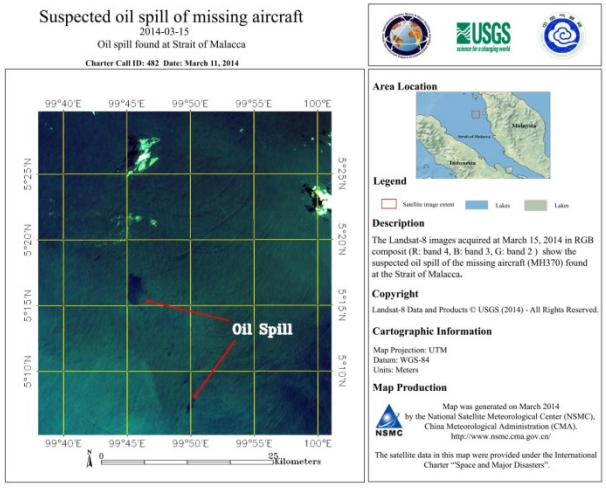
Quickly responding to the event of missing Malaysia Airlines Flight 370

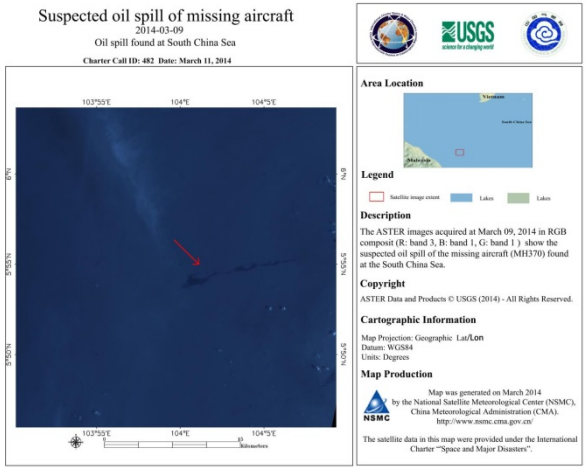












Using the TerraSAR-X, Landsat-8, and ASTERimages to detect the oil spill and possible debris of the MH370.

Suggestion

Disadvantages of current emergency response modes

National issue

- Products are quite simple
- Data transmission ability is insufficient

International issue

- Who wants it?
- What do they need?
- How to get it?

The issue of international cooperation in typhoon HAIYAN

Established Emergency mode ⟷ **Users requirement when global disasters happened**

Super typhoon HAIYAN landed to the northeast Vietnam at 04:00 on November 11, 2013 , it brought great disaster to Vietnam.

24 h before landing

Emergency mode

Passive emergency mode

FY-2F 6 min RRS

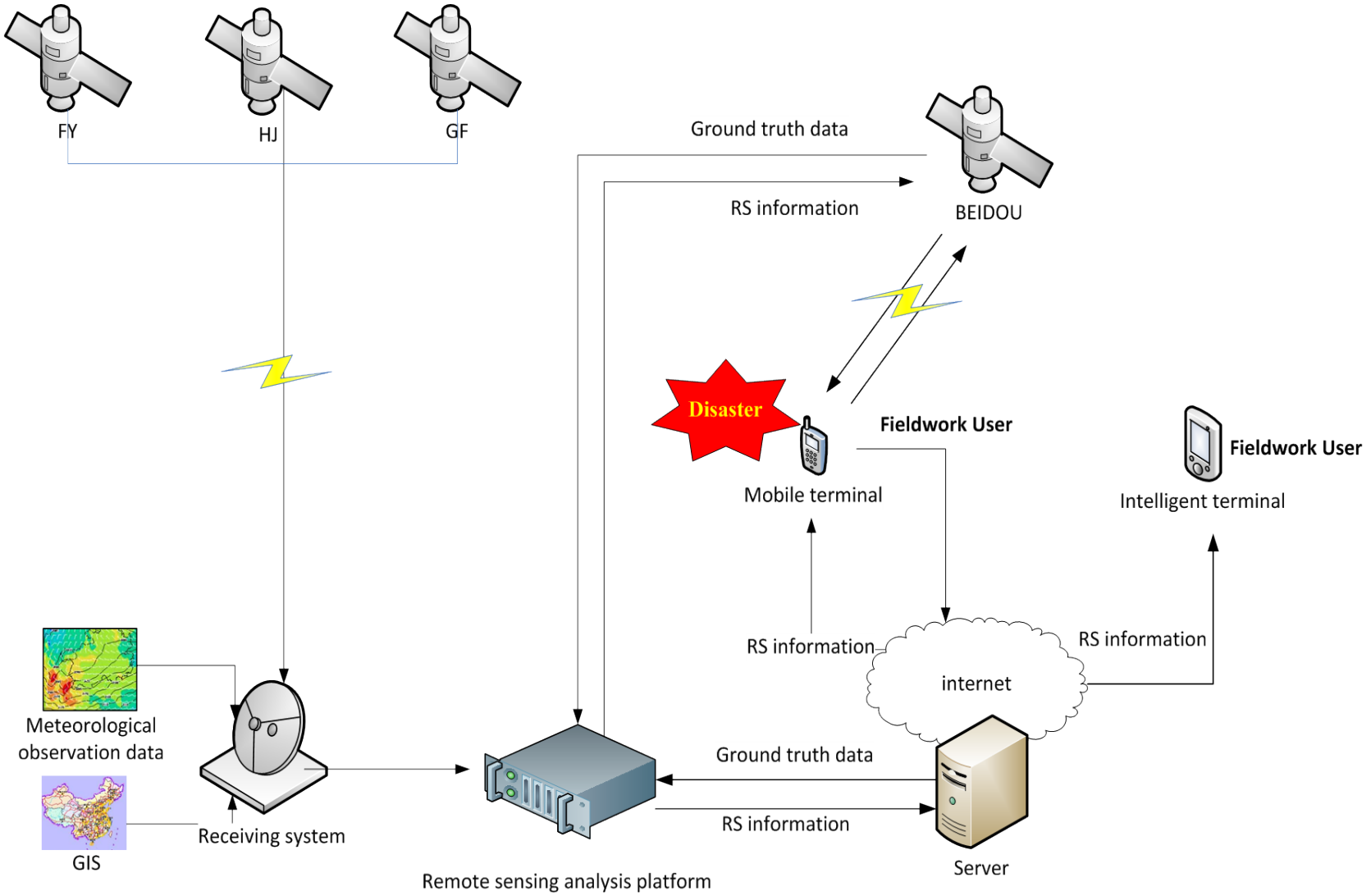
WMO：FY-2F data transmission requirements to Vietnam

Failed for real time data transmission

HAIYAN intensity and position mornitoring and forecasting

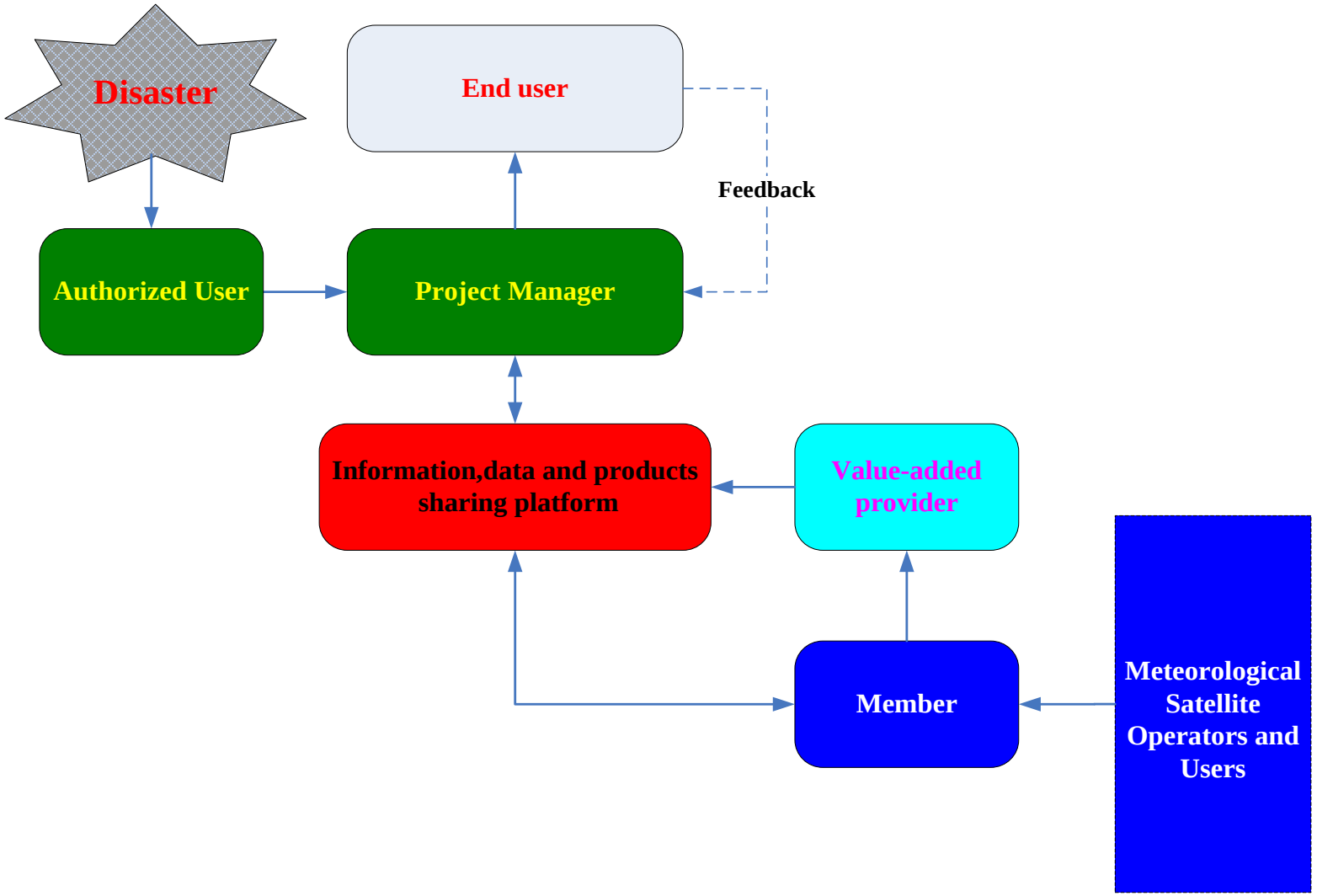
Exchange TC information by Email

Future plan for enhancing data transmission ability in China



Mobile terminal will be used for receiving satellite information.
More professional information will be developed to the features of specific disasters.

International disaster emergency response mechanism of meteorological satellite



Thank you