

Emerging Needs, Challenges and Response Strategy

——Development of Integrated Observing Systems in China

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Outline

I. Current Status

II. Emerging Needs and Challenges

III. Strategies and Actions



CMA Meteorological Observing System

Well constructed systems

- **Meteorological Satellite**
- **Weather Radar Network**
- **Upper Air Observation Network**
- **Surface Observation Network**



Meteorological Observing System

- Satellite System
- New Generation Doppler Radar System : 164
- Upper-air Sounding System: 120
- National Observation Station: 2419
- Regional Weather Station: 31982
- GPS/Met Receiver System: 476
- Wind Profiler : 44
- Thunder & Lightning Detection Network: 293



Meteorological Satellite

Meteorological Satellites

China has successfully launched **11** meteorological satellites

- 6 polar-orbiting met. satellites
- 5 geostationary met. satellites

Current status:

Geostationary Satellite



FY2D 86.5° E

FY2E 105° E

FY2C 123.5° E
(Backup)

Polar Orbiting Satellite



FY-1D



FY-3A



FY-3B



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Emerging Needs and Challenges facing the Current Observing Systems

Emerging needs for observing system :

- **More refined needs from urban meteorological service**
 - **A variety of professional and tailored services : weather forecast、urban environment、health meteorology, urban operation, tourism, etc.**
 - **Needs for more refined and tailored meteorological observing systems;**
- **Special needs from the economic society**



Emerging Needs and Challenges facing the Current Observing Systems

- Agriculture
- Water Resources
- Transport
- Tourism
- Health
- Energy
- Forestry
- Oceanic

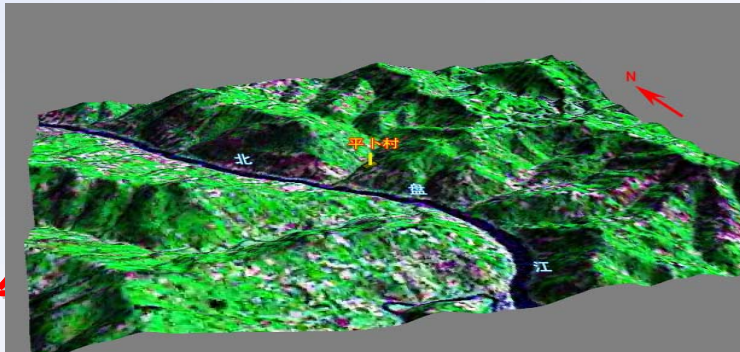
Needs for specialized observing systems



Emerging needs for observing system :

● Needs from meteorological disaster prevention and mitigation

- **Monitoring and early warning of the floods and geological disasters:** high density of AWSs and weather radars in vulnerable mountain areas and river basins ;
- **Opportunity:** a special investment from government, 15 billion for monitoring and early warning systems.
- **Jointly establish the monitoring and early warning systems** with such agencies as water resource, land and resources, etc ;



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Emerging Needs and Challenges facing the Current Observing Systems

New challenges :

- **Adaptation of observing systems to different meteorological service requirements ;**
- **Mechanisms for the national integrated observing systems establishment;**
- **Requirements for the integrated observing systems with high efficiency and high data quality;**



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Strategies

1. To develop the observing systems driven by meteorological service needs;
2. To explore the mechanisms for establishing the integrated observing systems;
3. To establish intensified management and operation systems for integrated observing systems ;
4. To develop standard systems for integrated observing systems;



1、Service Driven Observing Network

Regional (township-level)

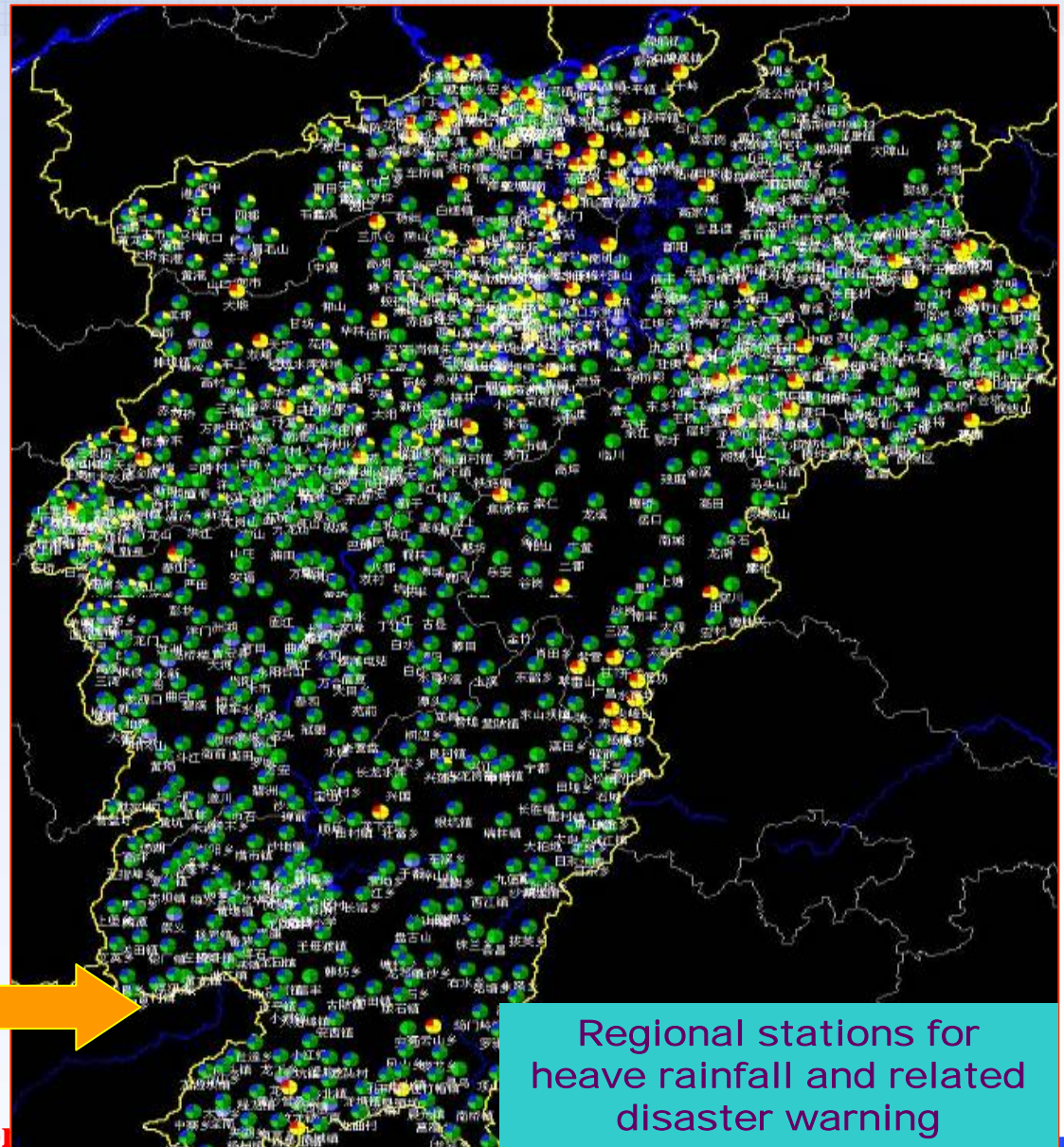
- heavy precipitation monitoring network



Issuing red
rainstorm warning
signal

On 1-2 July 2009:

rainfall reached 538.8mm
within 24 hours at a
township, *Jiangxi*
Province



Regional stations for
heavy rainfall and related
disaster warning

Service Driven Observing Network

Shanghai City Meteorological Observation Network



- Manned weather station: 12
- Automatic weather station: 220
- Island weather station: 20
- Doppler radar: 1+1
- Wind profiler: 8
- Lighting positioning system: 6
- GPS/Met :18
- Ship-based observing system: 1
- 100-meter observing tower: 13
- Portable observing system: 3+1+1
- In-situ monitoring: 16
- Satellite remote sensing: 9
- Atmospheric composition observation station: 7

Service Driven Observing Network

Agro-meteorological observing network

- 631 Agro-meteorological observing stations
- 1600 soil moisture observing stations
- In-situ investigation

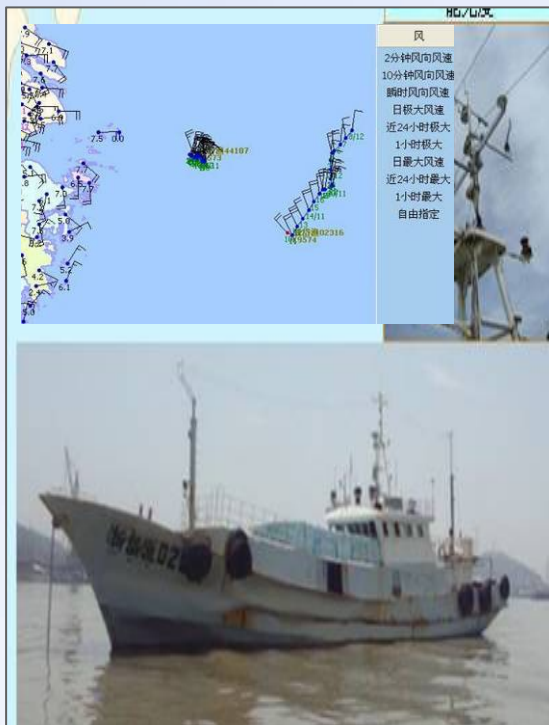


Service-driven Observing Network

Specialized Monitoring Network



Transportation Observation



Marine Observation



Tourism Observation



2、Mechanisms for integrated observing systems

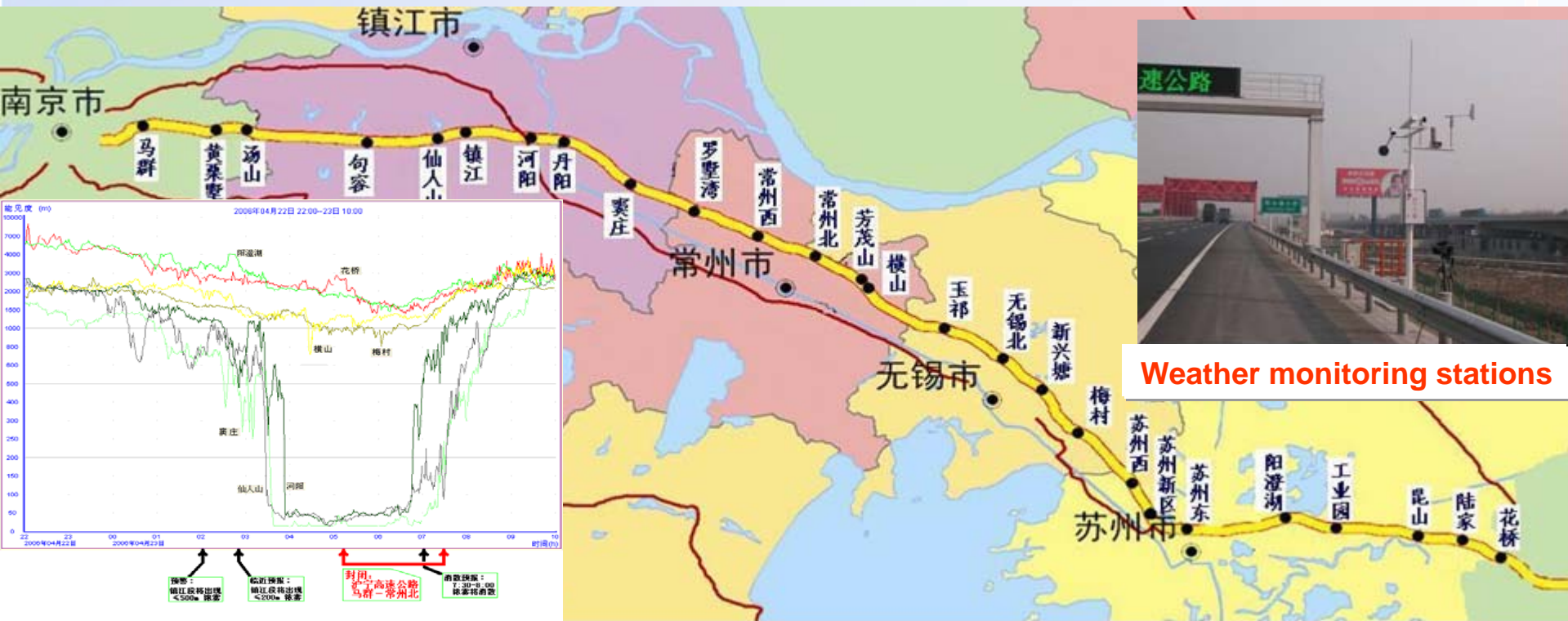
- **Observing systems owned by different sectors**
 - **Basic meteo-observing systems : meteorological services ;**
 - **Specialized observing systems : water resource, transportation, energy, etc. ;**
 - **Different ways to achieve the integration of observing systems**
 - **Observing systems investment by central government : agro-meteorology, energy meteorology, etc. ;**
 - **Observing systems invested by different stakeholders with unified planning: observing system for transportation ;**
 - **Observing systems developed by different sectors while sharing data with partners : hydrometeorology ;**
- **Needs for improved cross-agency communication and cooperation mechanisms**



A Pilot Project in Jiangsu Province

26 weather monitoring stations on the highway linking Shanghai with Nanjing, with an interval of 10km.

Invested and maintained by transport sector,
designed and running by meteorological service.





Development Plan of Integrated Observing Systems

- **Development plan driven by service: the 12th Five-year Plan**
 - **To develop the national climate and weather observing networks, regional meteorological observing networks, specialized meteorological observing networks, with quality control and quality assurance.**
- **Implementation methods : attraction of local investment by providing partial investment from the central government, cooperation with relevant agencies ;**



3、 Intensified Management and Operation Systems

- **Centralized management of observing systems**
 - Unified planning and design ;
 - Unified criteria and standards ;
 - Monitoring the operation of all networks;
 - Data sharing and comprehensive application;
- **Dept. of Integrated observing system of CMA in charge of the management**
- **Meteorological Observation Centre of CMA in charge of the operation**



CMA Meteorological Observation Centre (MOC) in 2002

Operations Monitoring and Maintenance system (ASOM)

客户端/Web Browser (IE/Firefox)

Atmospheric Observing Network Operations Monitoring and Maintenance System (ASOM)

站网信息管理
Sites
Database
Management

设备运行监控
System Status
Monitoring

探测数据监控
Real time Data
Monitoring

维护维修信息
管理
Maintenance

装备供应保障
业务信息管理
Logistics

数据总线

数据质量监
控Data QC

综合评估
Evaluation

监控信息发
布Info Issue

系统管理
System
Management

观测实景监控
Video Monitor

关系数据库
(Oracle/PostgreSQL)

空间数据库
(Oracle/PostgreSQL)

WebGIS

Web
Service

Radar/AWS/Upper-air Monitoring:

- ◆ Facility Status Monitoring
- ◆ Data Quality Control
- ◆ Operational Evaluation
- ◆ Extreme Weather Alarming
- ◆ Monitoring Information Release
- ◆ Hotline



4、Standardization System for Integrated Observing Systems

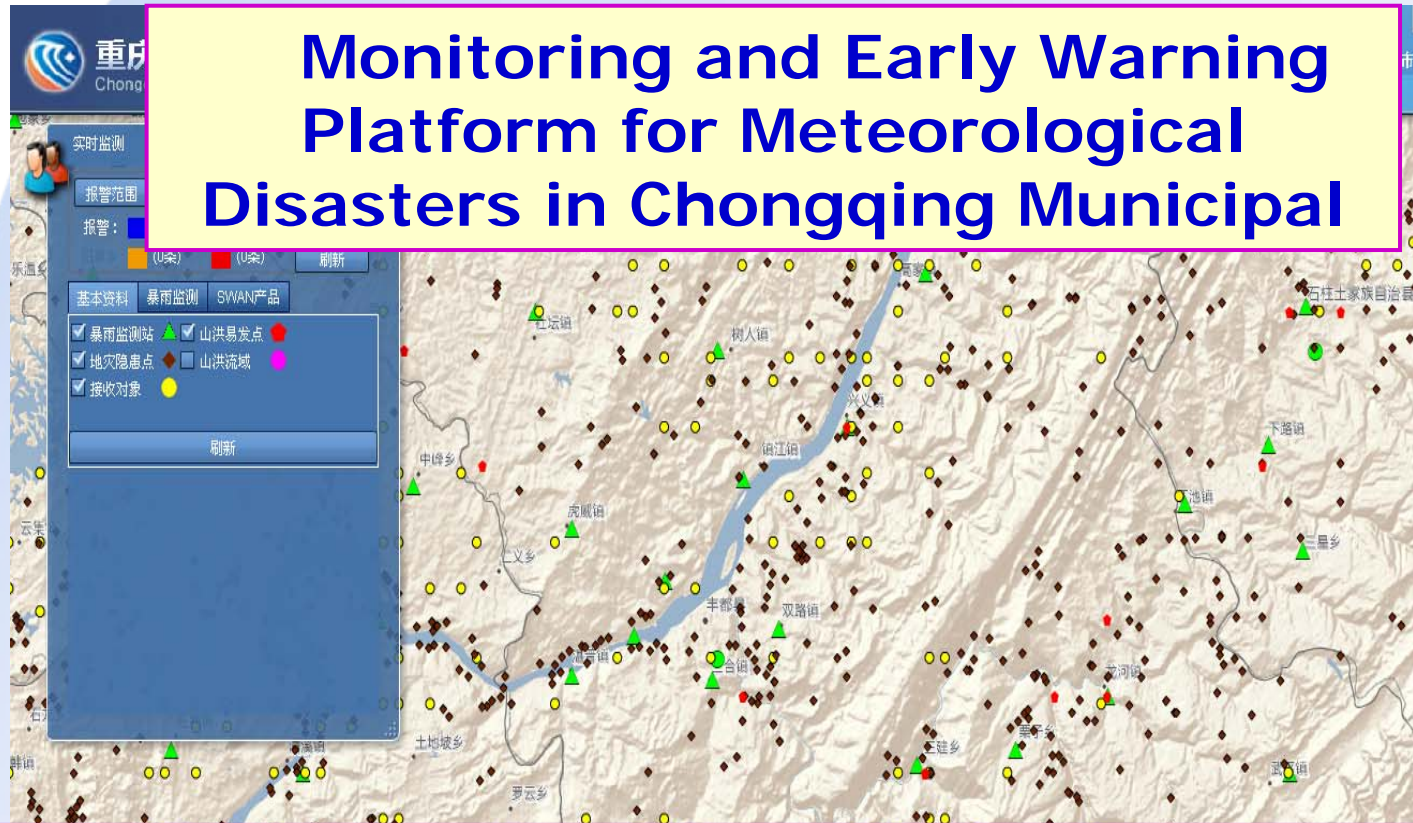
- **The meteorological facilities and observing environment standard law in 2011:**
 - National surface observation station
 - Weather radar
 - Upper air observation station
 - GAW station
- **The National Technical Standardization Committee on**
 - Meteorological observation instruments and methods in 2010
 - Satellite meteorology and space weather observation in 2009
 - Basic meteorological information in 2009
- **More efforts to be made in achieving the standardization of integrated observing systems**



Examples Showing the Real-time Monitoring and Early Warning of Floods and geological disasters

——Role of Integrated Observing Systems in Disaster Mitigation

Monitoring and Early Warning Platform for Meteorological Disasters in Chongqing Municipal



Legend:

- ✓ Green dots: the storm monitoring stations;
- ✓ Red dots: locations vulnerable to mountain floods;
- ✓ Brown dots: locations vulnerable to geological disasters;
- ✓ Yellow dots: the issuing authority.

Information included: 929 storm monitoring stations, 299 locations vulnerable to mountain floods and 16170 locations vulnerable to geological disasters. Warnings will be issued once the monitoring results reach the thresholds for heavy rain.

Conclusion

Key points for national integrated observing system:

- **Strategy for service driven observing systems development;**
- **Mechanisms for establishing the integrated observing systems;**
- **Intensified management and operation systems for integrated observing systems ;**
- **Standards for integrated observing systems;**



Thanks



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