Recent experience and practice for strong motion observation in china

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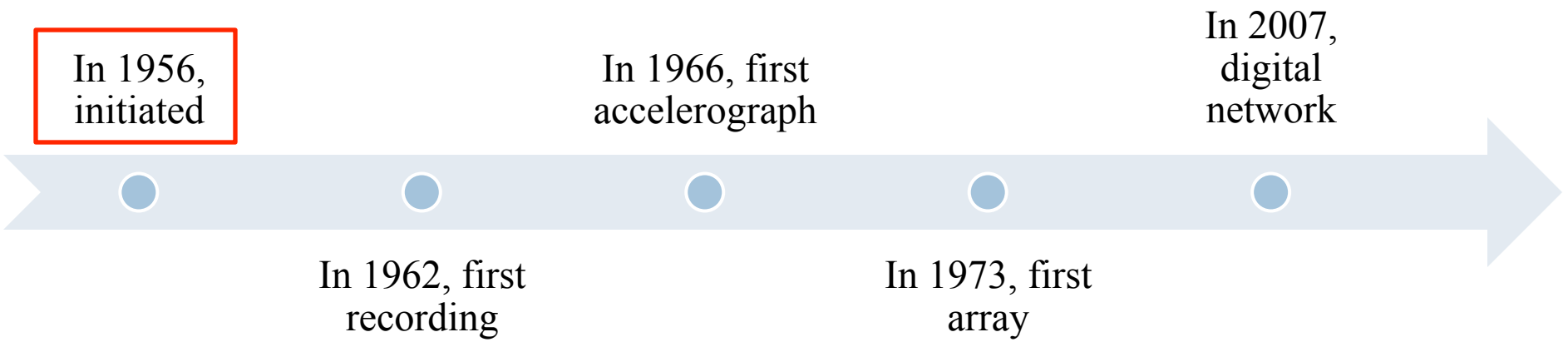
Outlines

- Advance in strong motion observation in China
- Experience of NSMONS in recent earthquakes
- Current practice and future plan

Advance in strong motion observation in China



Advance in strong motion observation in China

- Initiated by Pro.Liu Huixian
- Written in the “Outline of the national program for long- and medium-term scientific and technological development”
- Research group was founded

Advance in strong motion observation in China

In 1956, initiated

In 1962, first recording

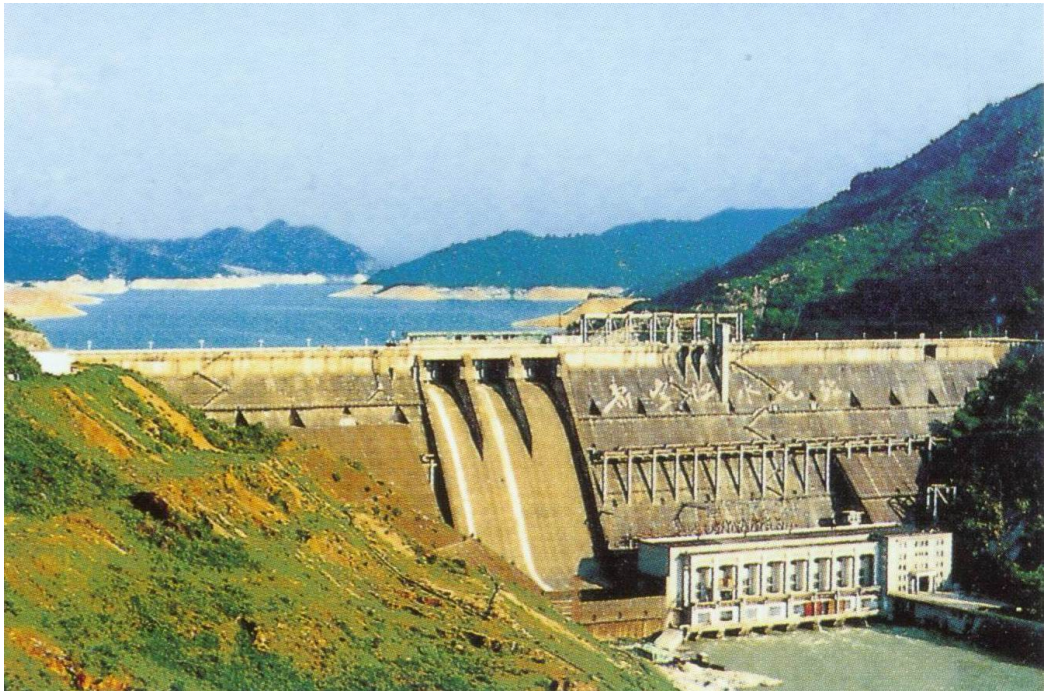
In 1966, first accelerograph

In 1973, first array

In 2007, digital network

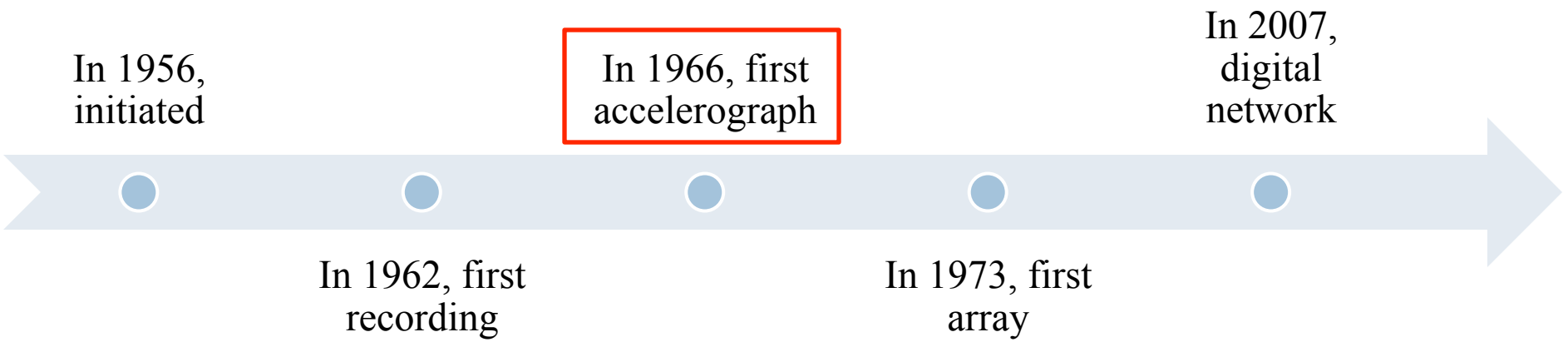
Advance in strong motion observation in China

- The first strong-motion measurement was carried out and the first recordings was obtained



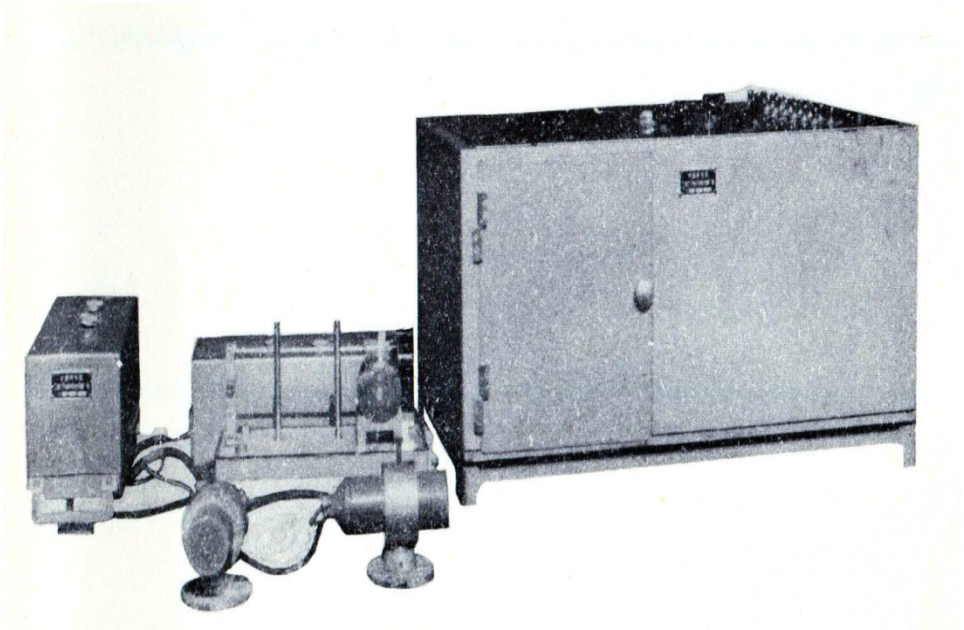
Xinfengjiang Dam in Guangdong Province

Advance in strong motion observation in China



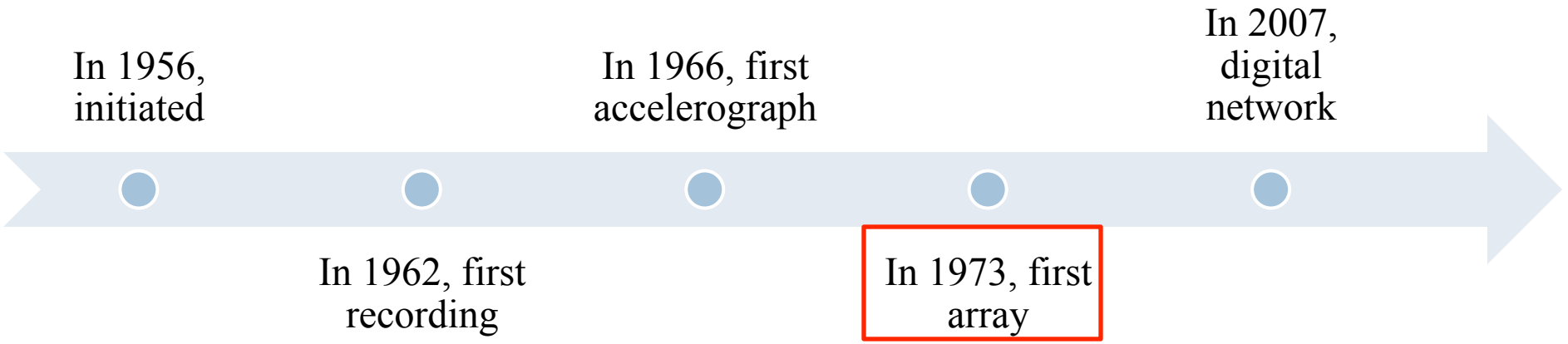
Advance in strong motion observation in China

- The first accelerograph in China was produced by IEM, CEA
- Mobile observation was carried out in Xingtai Earthquake firstly



RDZ1-12-66 galvanometric accelerograph

Advance in strong motion observation in China

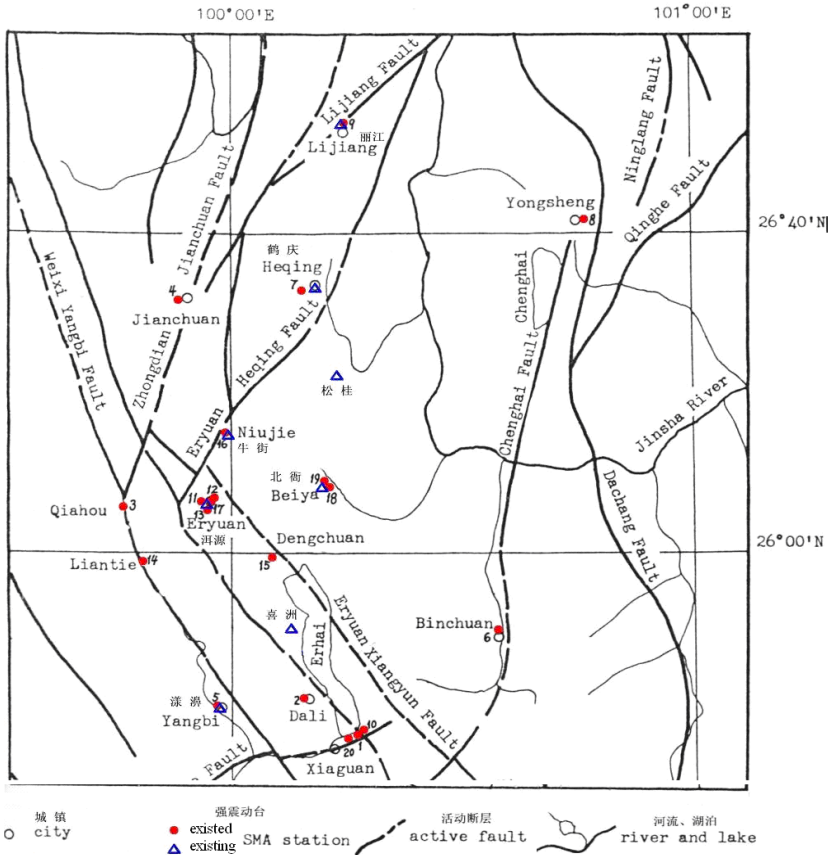


Advance in strong motion observation in China

- The first strong-motion observation array was installed
- China-US joint research on strong-motion observation began

Nanjing Yangtze River Bridge in Jiangsu Province

Advance in strong motion observation in China



West Yunnan Earthquake Field Array

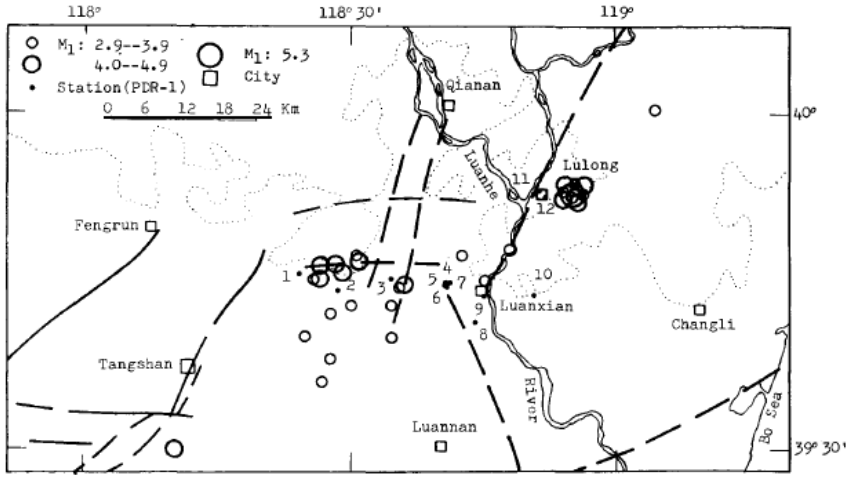
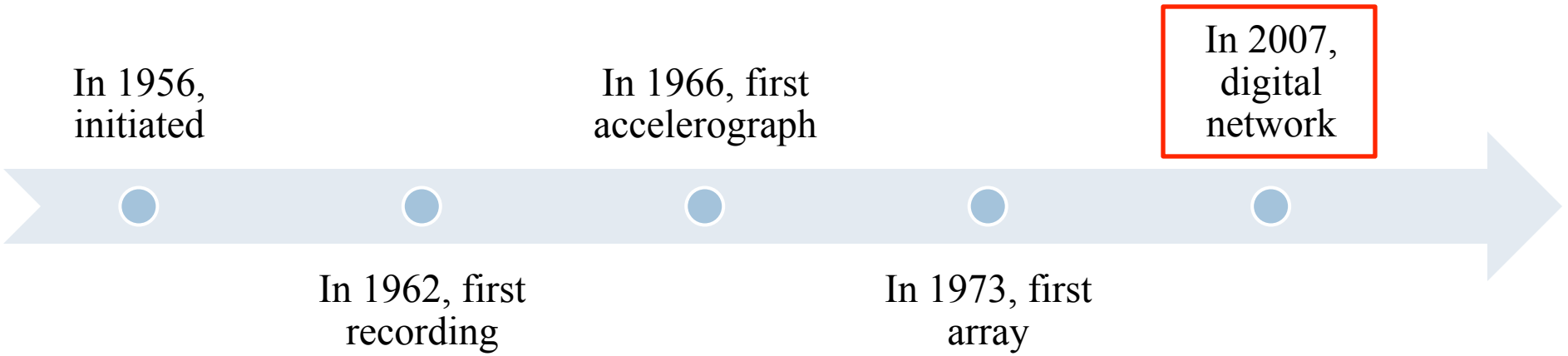


Fig. 1. Strong-motion accelerograph experimental array in Tangshan region and distribution of epicenters (1982.7–1983.3)
TS-01 Zhaogezhuang seismological station;
TS-02 Beijiadian refractory material factory;
TS-03 Leizhuang army office;
TS-04 Office of oil depot at Tuozitou;
TS-05 Business agency of oil depot at Tuozitou;
TS-06 Luanxian school of Communist Party at Tuozitou;
TS-07 Luanxian nurses' school at Tuozitou;
TS-08 Xiangtang seismological station;
TS-09 Luanxian seismological office;
TS-10 Shimen town office;
TS-11 Lulong seismological office;
TS-12 Lulong goods bureau.

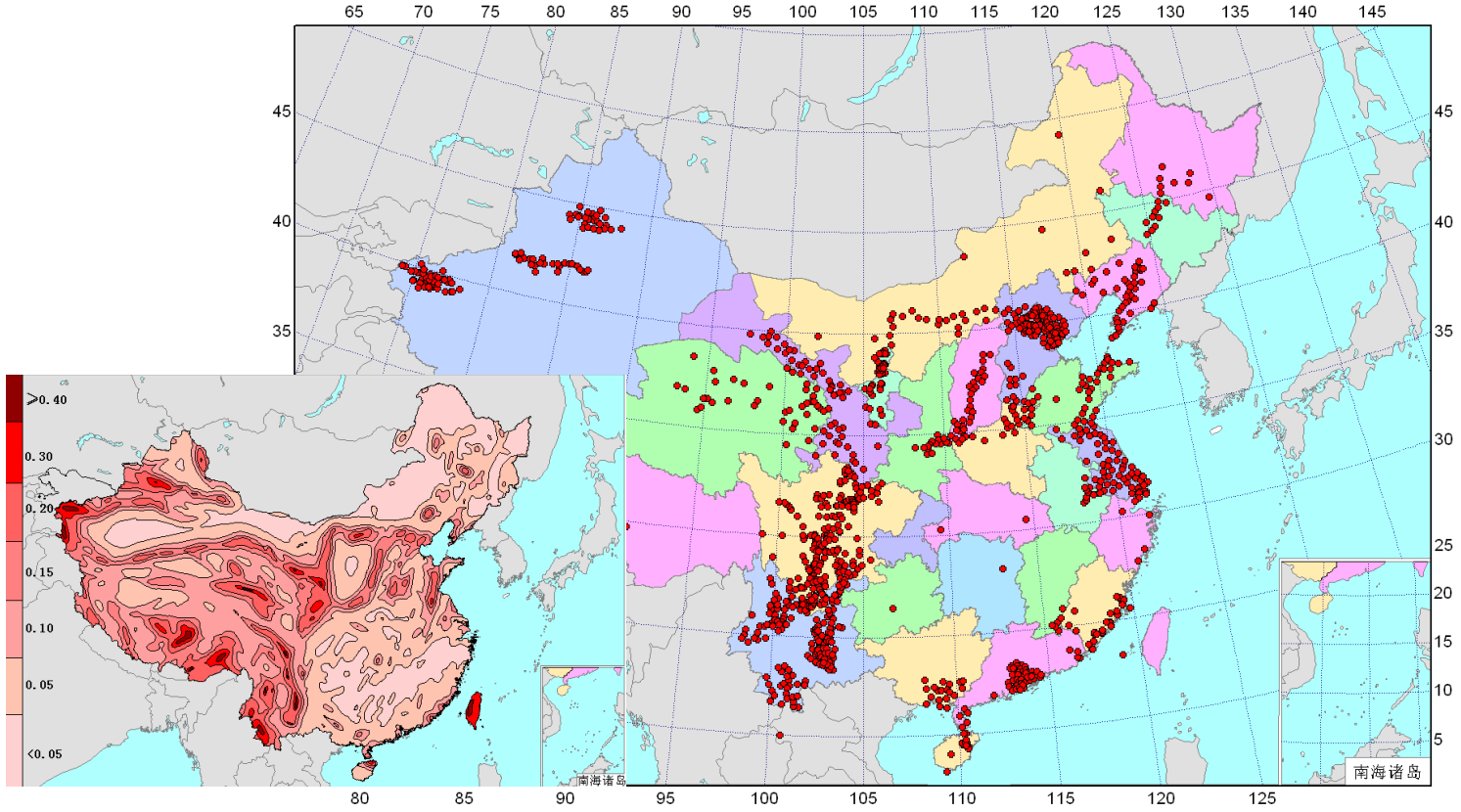
Tangshan experimental array

Advance in strong motion observation in China



Advance in strong motion observation in China

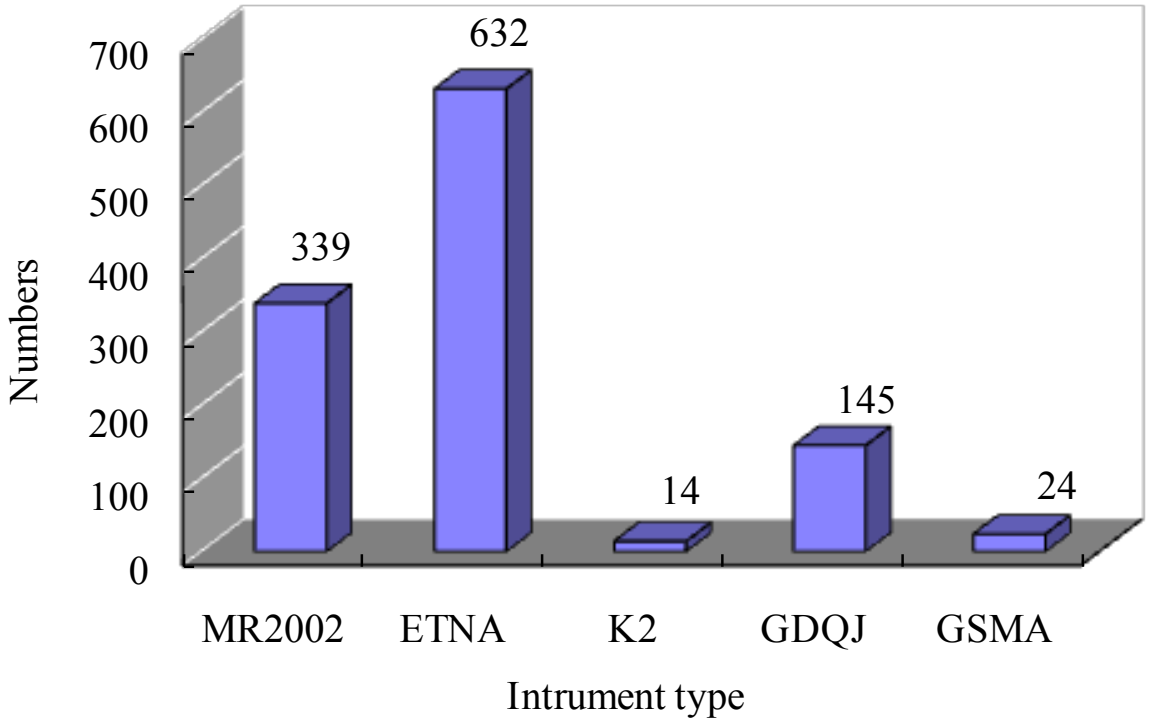
- In 2007, the digital National Strong Motion Observation Networks System (NSMONS) began trial operation in early 2007



1154 free-field stations

Advance in strong motion observation in China

- Instrument type of free-field stations



Advance in strong motion observation in China

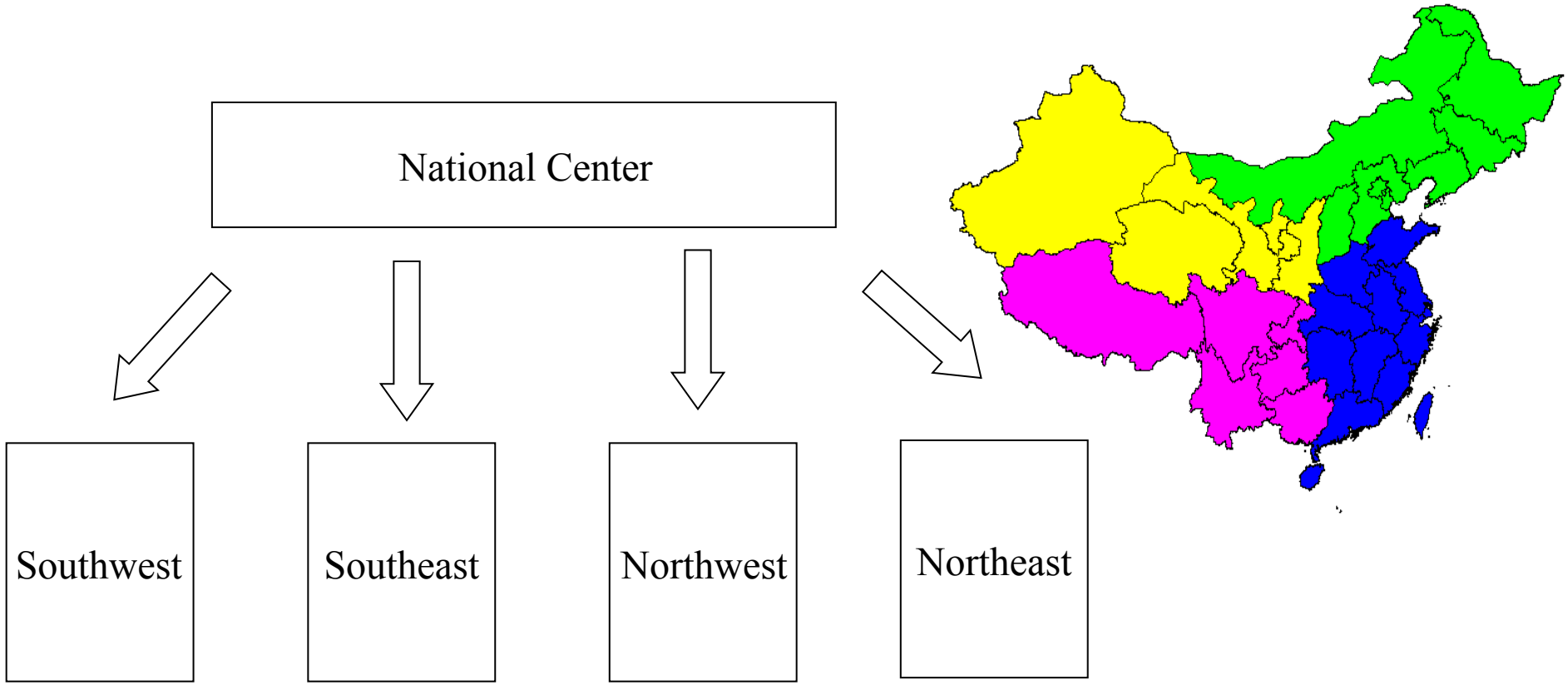
Special observation arrays	Array number	Number of stations (observation points†)	Location
Near-fault ground motion	1	30	Yunnan province
Ground motion attenuation	2	2×50	Gansu province and the Capital Region
Site effect	2	(2×8)	Yunnan province and Hebei province
Topographical effect	1	8	Sichuan province
Super- high-rise building	1	46	Shanghai city
Multi-story building	1	23	Beijing city
Long-span structure	1	46	Beijing city
Base-isolated building	1	14	Hebei province
Large bridge	1	23	Guangdong province
Large dam	1	21	Sichuan province

Note: † In all arrays for structure response observation, there are tri-axial records for each observation point

12 special arrays of NSMONS

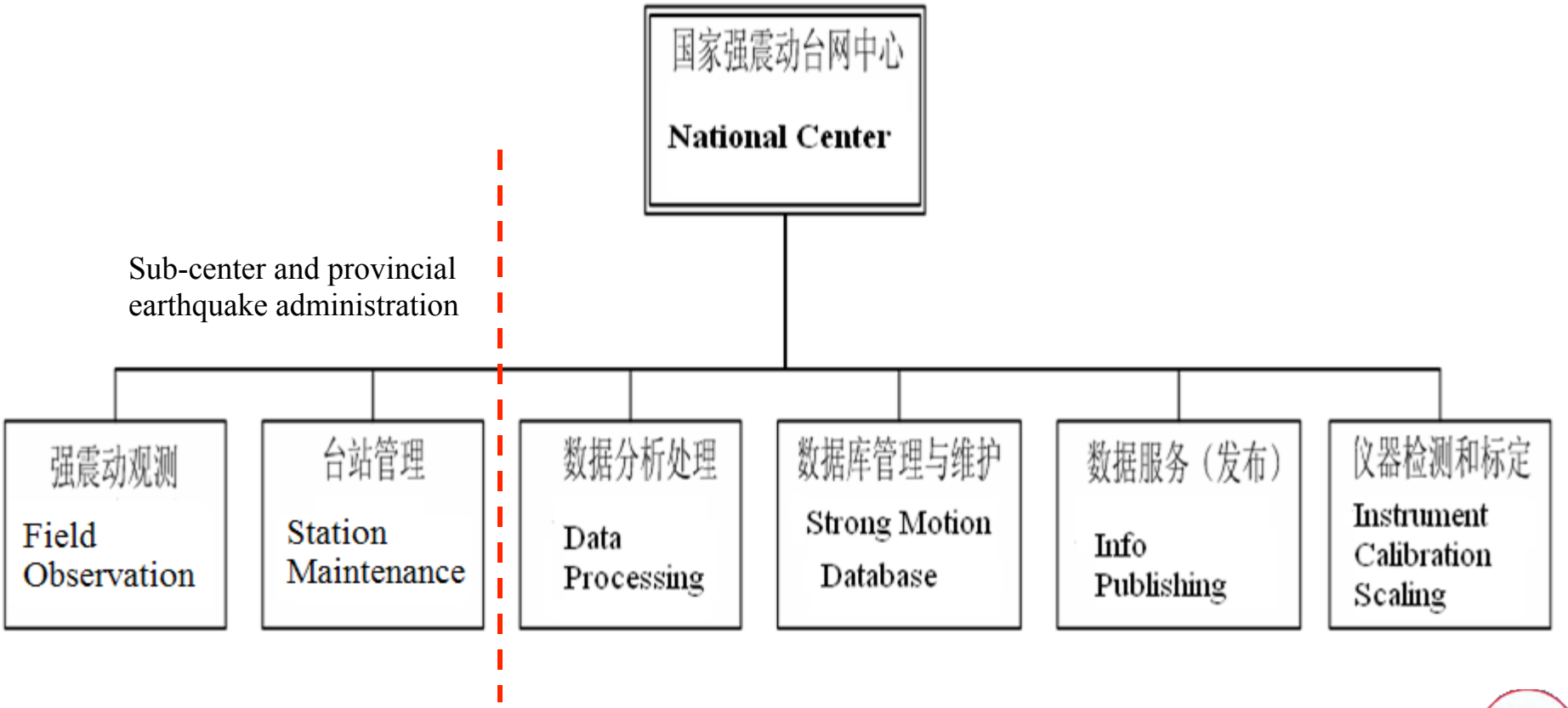
Advance in strong motion observation in China

- NSMONS management



Advance in strong motion observation in China

- National Center responsibility



Advance in strong motion observation in China

- NSMONS instrument calibration laboratory

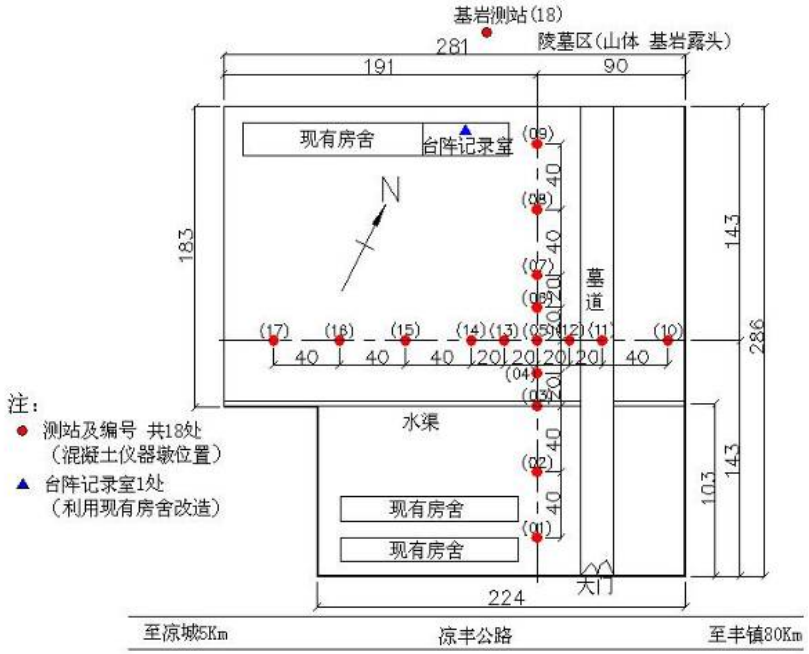
Advance in strong motion observation in China

- National center have 80 sets of backup instruments

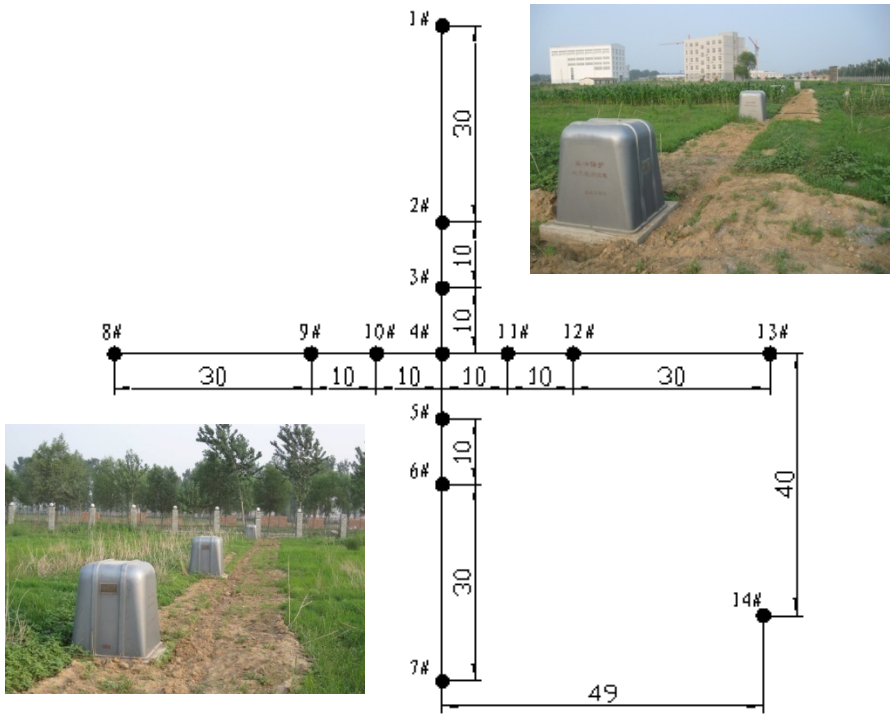
Instruments in Storage

Advance in strong motion observation in China

- Special array of National Center



Differential motion array in Liangcheng Town



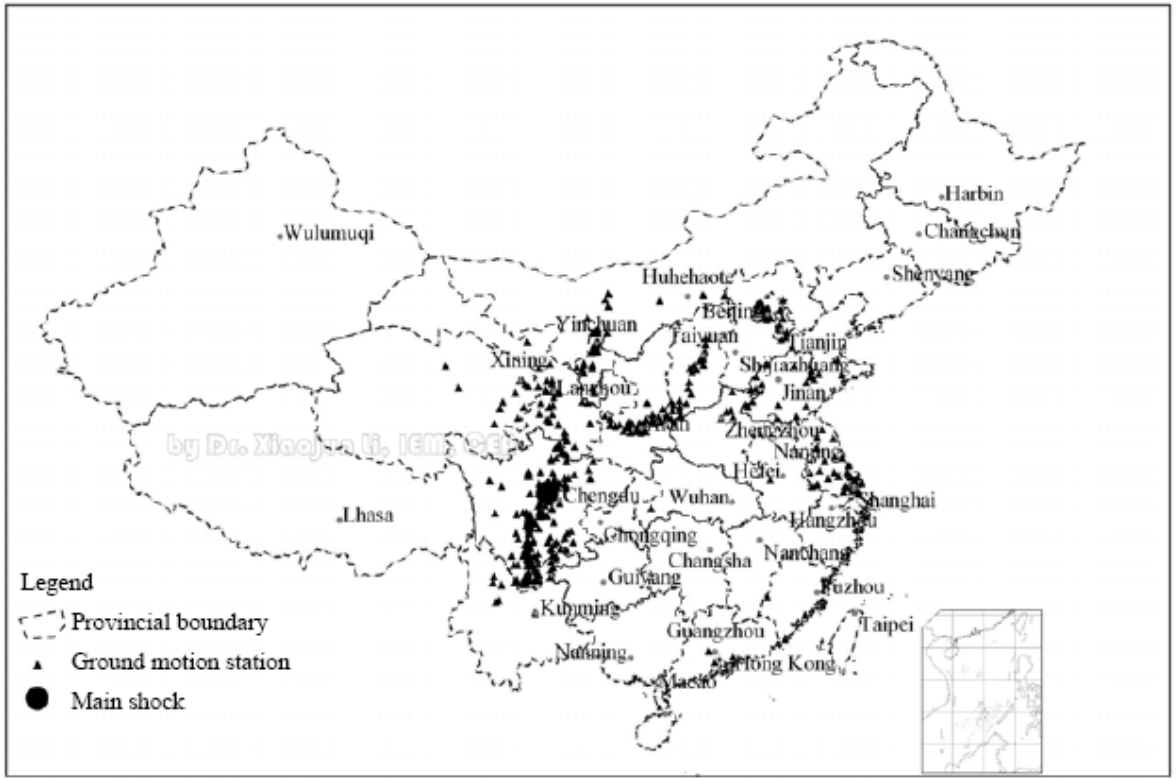
Differential motion array in my institute

Outlines

- Advance in strong motion observation in China
- Experience of NSMONS in recent earthquakes
- Current practice and future plan

Experience of NSMONS in recent earthquakes

- Wenchuan Earthquake



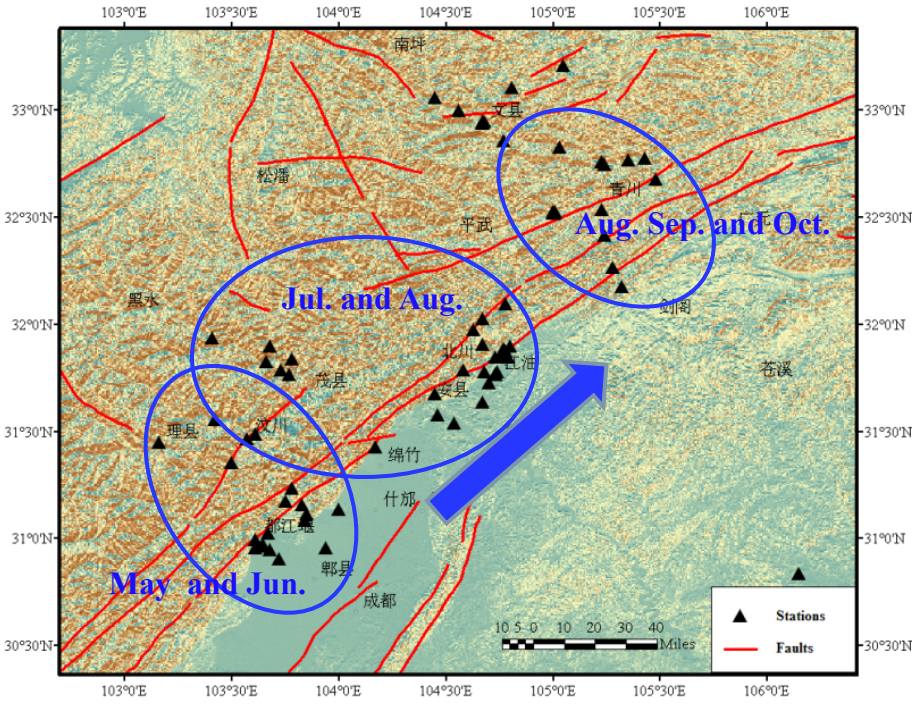
Stations which obtained the strong motion recordings in the main shock

Experience of NSMONS in recent earthquakes

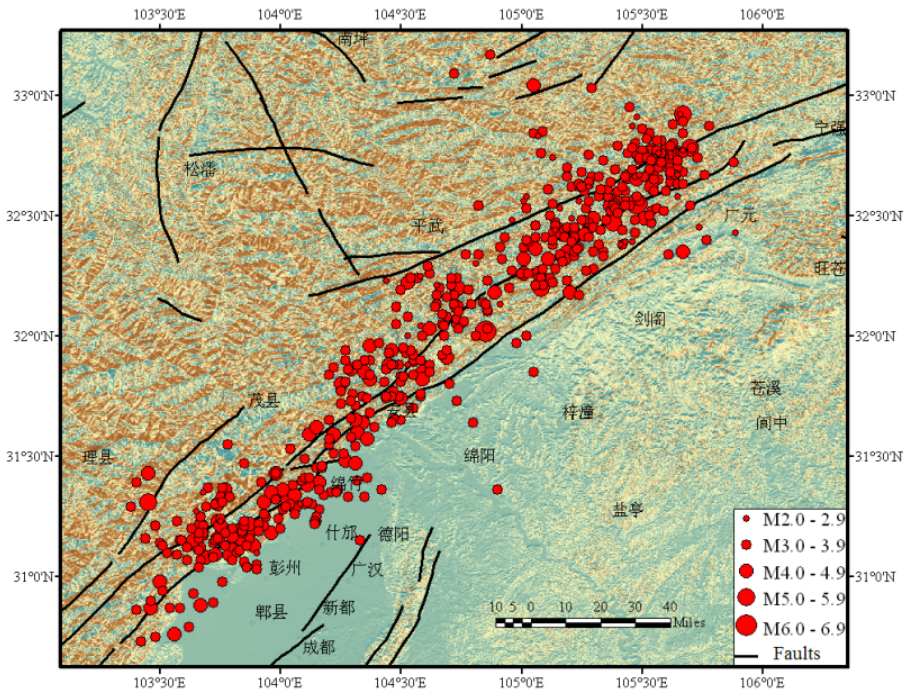
- The mobile and temporal strong motion observation for Wenchuan Earthquake

Experience of NSMONS in recent earthquakes

- The mobile and temporal strong motion observation for Wenchuan Earthquake

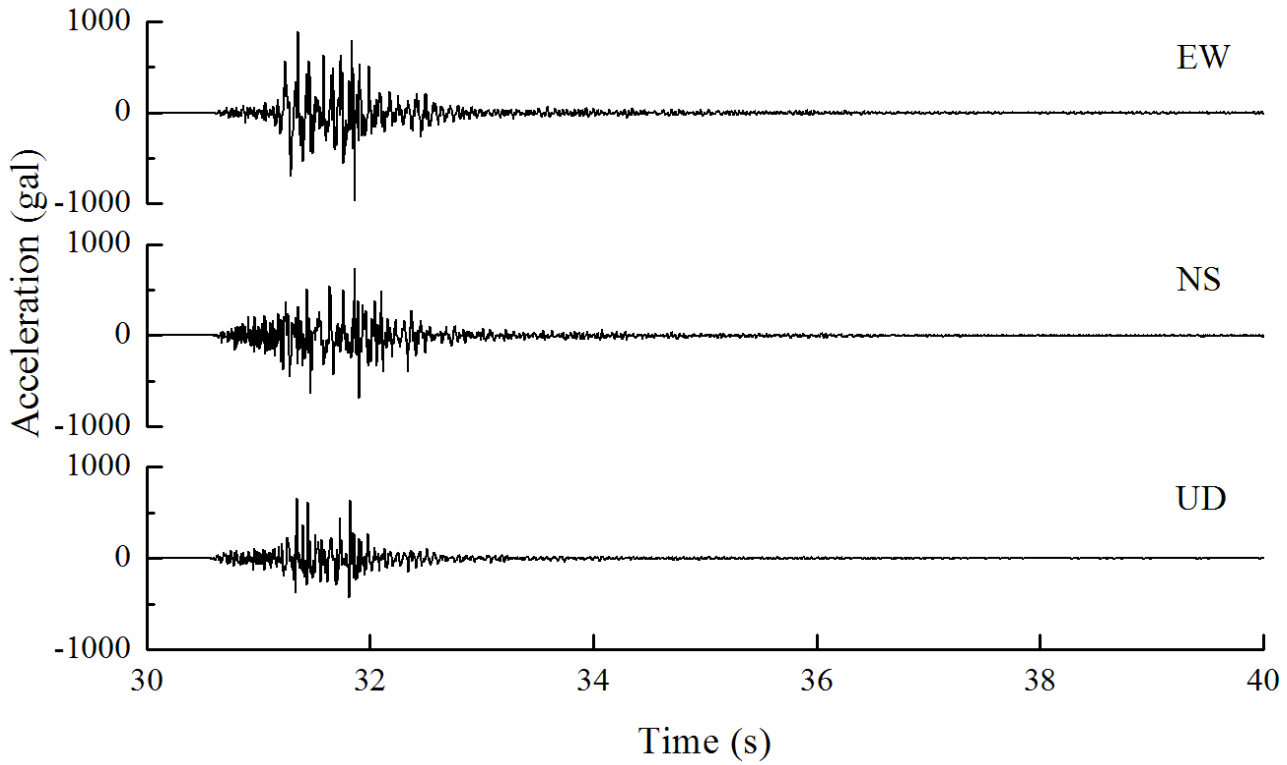


92 sites had been measured



600 aftershocks in which we obtained recordings

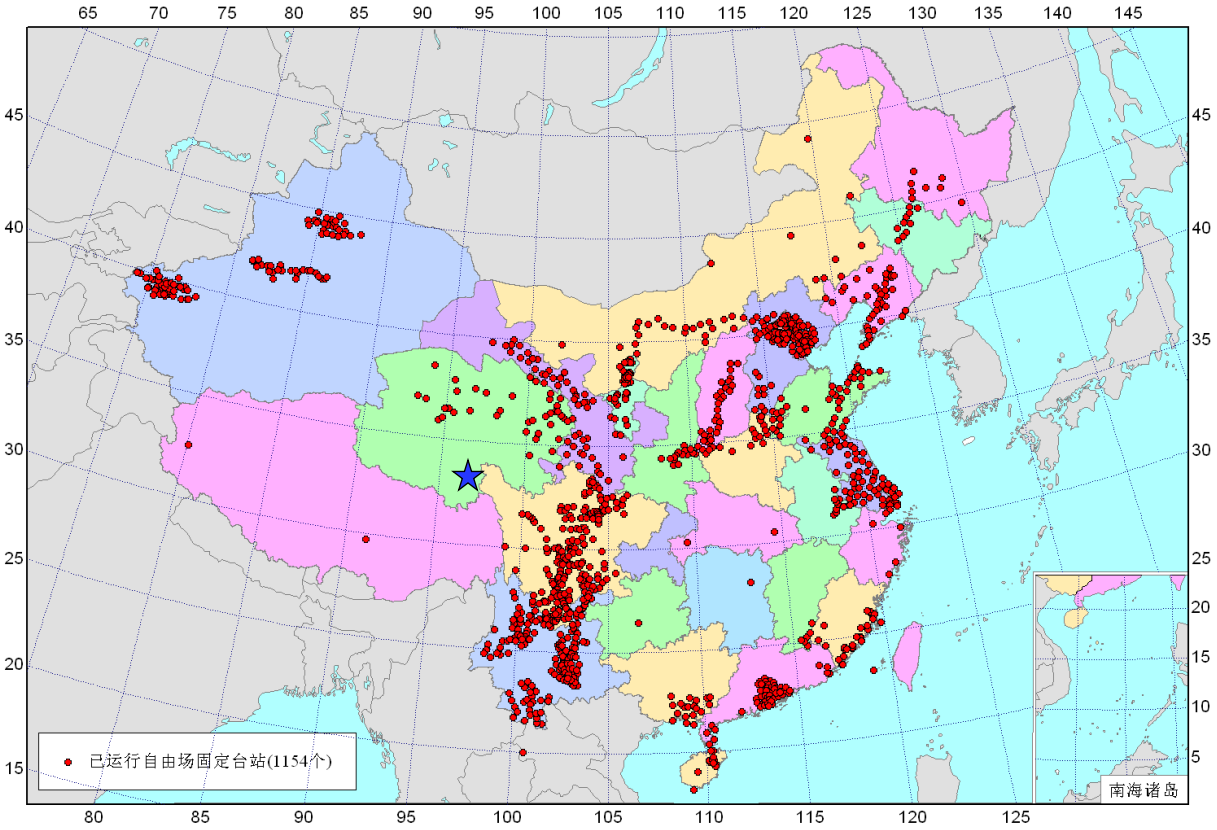
Experience of NSMONS in recent earthquakes



Typical acceleration time-histories in Huangping Town (No.L0027) obtained in Wenchuan aftershock
(PGA in EW, NS, UD component is -966.5Gal, 734.3Gal, 658.9Gal, respectively)

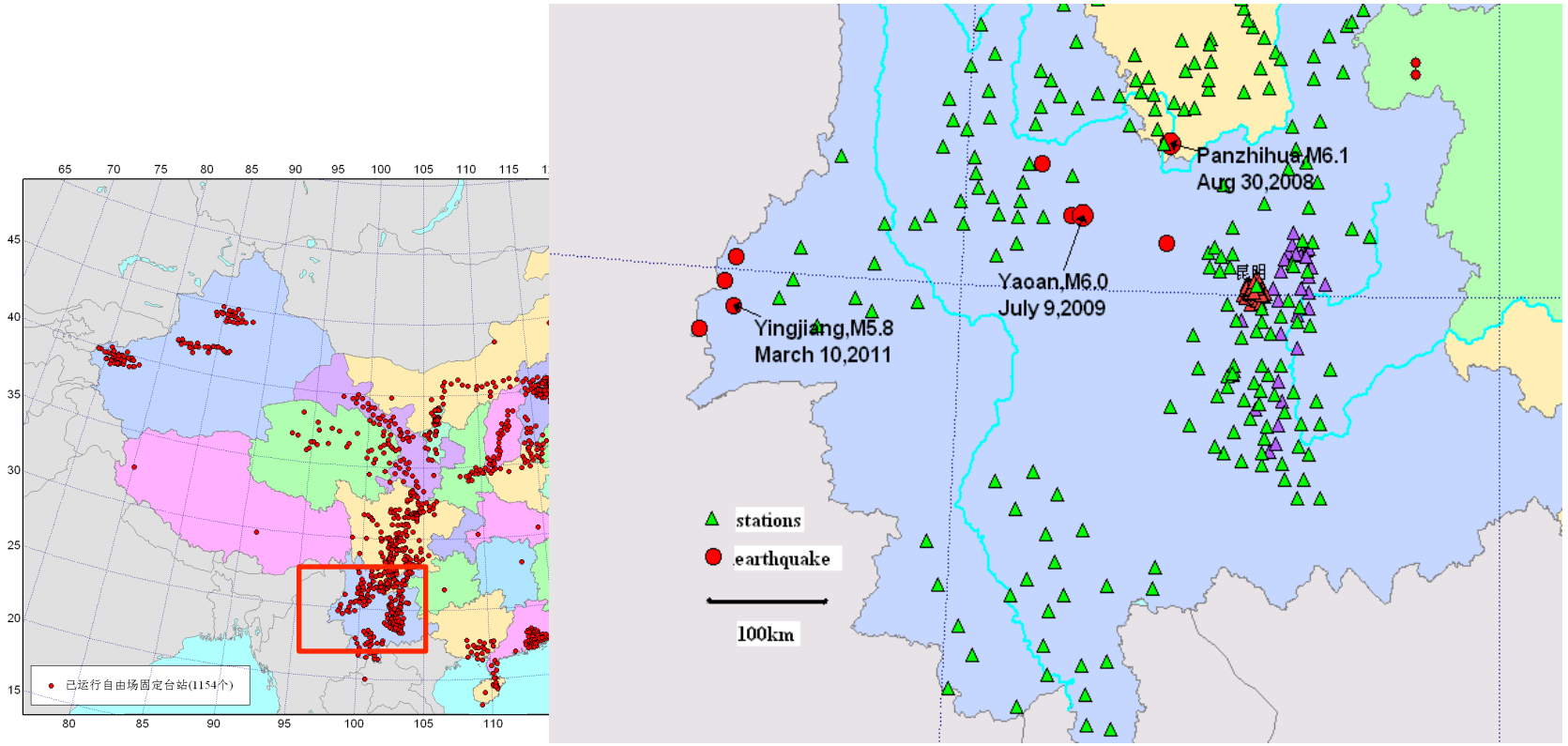
Experience of NSMONS in recent earthquakes

- Others—Yushu Earthquake



Experience of NSMONS in recent earthquakes

- Others—Yingjiang, Yaoan and Panzhihua Earthquake



Outlines

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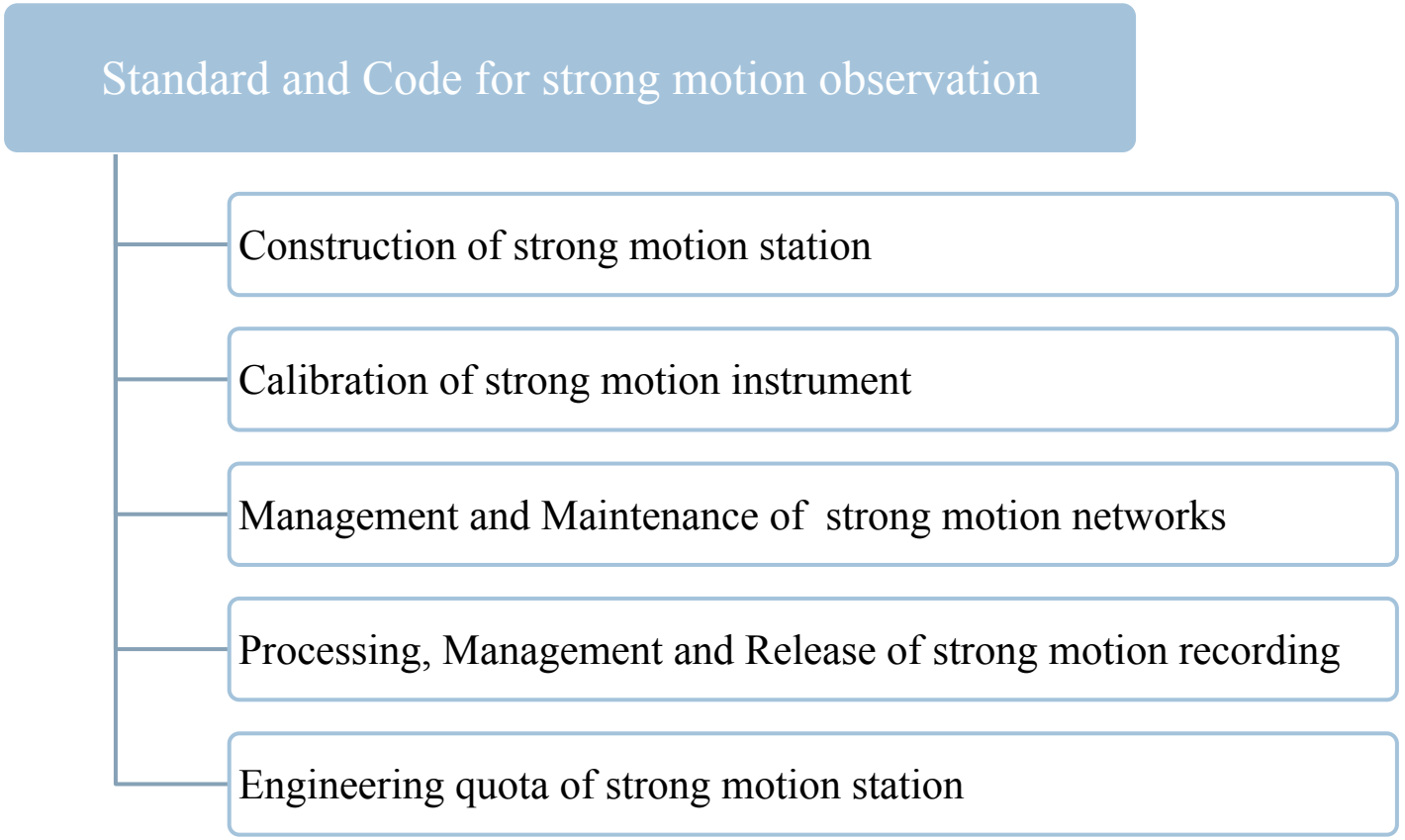
- Current practice and future plan

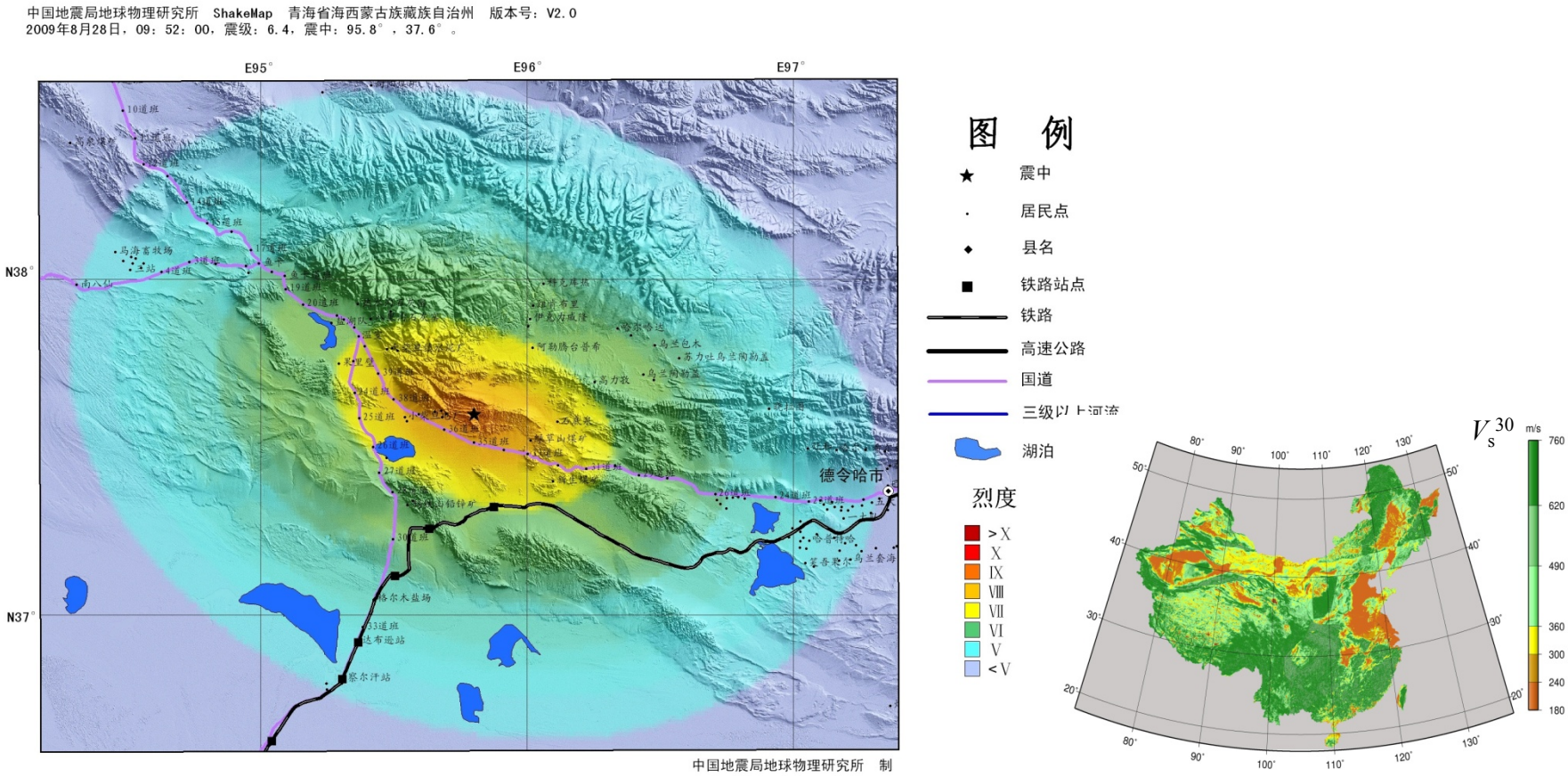
Current practice and future plan

- Current practice



Current practice and future plan

- Current practice—Shakemaps



Current practice and future plan

- Current practice—Earthquake Early Warning System

Two demo Earthquake Early Warning Systems are now setting up in Lanzhou and Beijing Capital regions.

Current practice and future plan

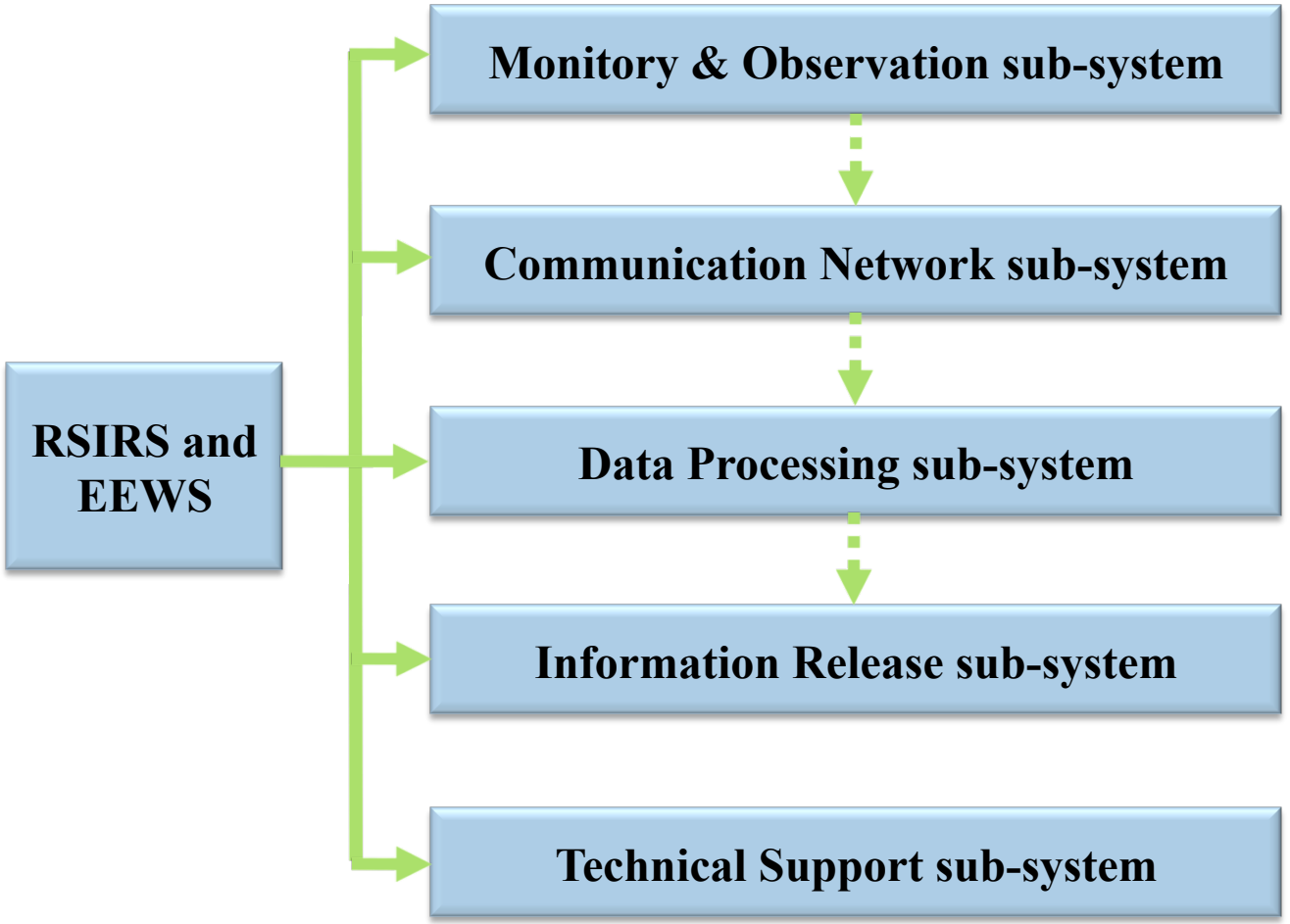
- Future plan

Rapid Seismic Intensity Release System (RSIRS) and Earthquake Early Warning System (EEWS) in China

12th-Five-Years plan

Estimated Budget: RMB 3,000,000,000

Current practice and future plan



Thank you