The Role of Science and Innovation in the Preparedness of Catastrophic Earthquake in Metropolitan Region of China

Submitted by: China
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1 Hazard and Risk of the metropolitan region due to great earthquake
Large earthquakes in last century

![Bar chart showing large earthquakes in the last century with magnitude ranges and corresponding counts.](chart)

- Magnitude 7: 149
- Magnitude 7.5: 38
- Magnitude 8: 12
- Magnitude 8.5: 2
annual rates

\[ \nu_{7.5} = 0.4 \]

\[ \nu_{8} = 0.12 \]
Cities and towns threatened by catastrophic earthquakes
Historical Great Earthquakes in Density Populated Region

- 1604年, 大于7.5级
- 1605年, 大于7.5级
- 1604年, 大于7.5级
- 1605年, 大于7.5级
- 1668年, 8.5级
- 1669年, 8级
- 1679年, 8级
- 1739年, 8级
- 1920年, 8.5级
- 1927年, 8级
- 1920年, 8.5级
- 2008年, 8级
- 1879年, 8级
- 1556年, 8.3级
- 1854年, 8级
- 1303年, 8级
- 1604年, 大于7.5级

色码:
- 7<M<7.5
- 7.5=<M<8
- M>=8
Casualty: 1.5 million

1679, Beijing, 80,000?
1976, Tangshan, 242,000
1695, Linfen, >50,000
1596, Cixian, 50,000
1596, Huaxian, 830,000
1668, Tancheng, >50,000
1038, Xinzhou, 32,000
1303, Linfen, >200,000
1303, Xinzhou, 32,000
Clustering of catastrophic earthquake during Kangxi Empire
Population and wealth as well as industry concentrating in future potential epicenter of great earthquake.
Lessons from Wenchuan Earthquake

Aged Buildings and Infrastructures

New Buildings and Infrastructures without Experience

Most Buildings cannot withstand earthquake with magnitude 8

Events
High Risk, Serious Consequences and Low Probability

Preparedness
2 Monitoring, Forecasting, Early Warning of the Great Earthquake Generated in the Active Fault in Metropolitan Region
Advanced Notional Seismic Network

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Earthquake Forecasting
Earthquake Ground Motion Forecasting

Rapid earthquake locating
Earthquake Rupturing
ShakeMap
Rapid Loss estimation
Seismic Hazard Model
Earthquake Early Warning
Fault behaviors
Fault detailed structures
Deformation and rupturing in and near fault
The process of the generation of large earthquakes

Noise level
Sensors
Configuration of the observation system

Advanced underground observation system
Population and wealth as well as industry concentrating in future potential epicenter of future great earthquakes.
3 Catastrophic Earthquake Scenarios for Metropolitan Region
Spatial distribution of basin amplification factor (fault-parallel component)
The National Science Foundation of China supporting a program to study the mechanism of disaster for high rise building, long spanning bridge, large scale structure.

Vulnerability of New Type of Building and Infrastructure
Scenarios

Land using plan
Site
Retrofit
Design
Drilling
Emergency Facilities
4 Rapid Disaster Information from Multidisciplinary High Technology Approaches
“天、空、地”立体数据获取与应急通信体系

中国航天科技集团公司
China Aerospace Science and Technology Corporation
(According to Huang Jiantao)
(According to Huang Jiantao)
5 Promoting Ability for Public Engagement through Knowledge, tools and technology Transfer
Thank you for your attention