

Evaluation of Natural Catastrophe Impact on the Pearl River Delta (PRD) Region - Earthquake Risk

Why the Focus on PRD?

- PRD region has the largest growth of real assets & urban centers in China, which exacerbated the catastrophe risks.
- It comprises major urbanized areas of Guangzhou, Shenzhen, Hong Kong, Macau, etc and is home to 100 million inhabitants. The region is one of China's main economic centers, generating 11% of China's GDP.
- It has high density exposure (human and economic), while being one of the most exposed to Nat Cat impact of floods, storm surges, and to a lesser extent earthquakes.
- Climate change effects will potentially impact further the PRD region.

T.C. Pan, E. Lo, W. Du
Institute of Catastrophe Risk Management, NTU, Singapore

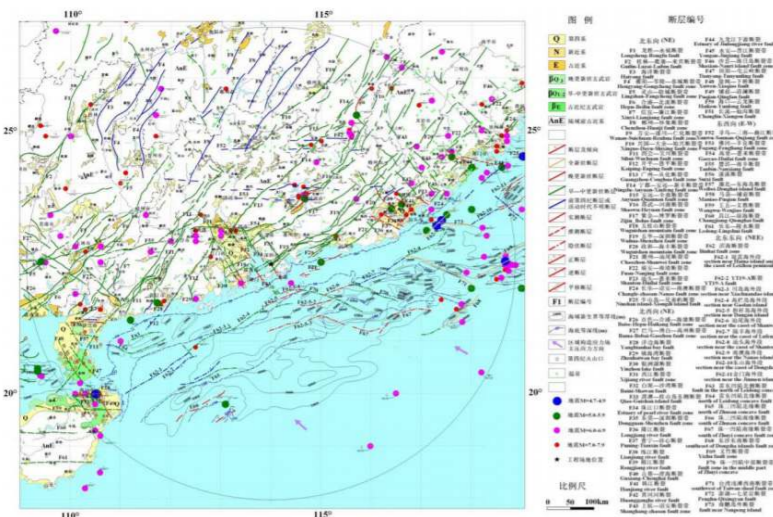
C. Su, H. Mu, Y. Deng
South China University of Technology

H. Zuo
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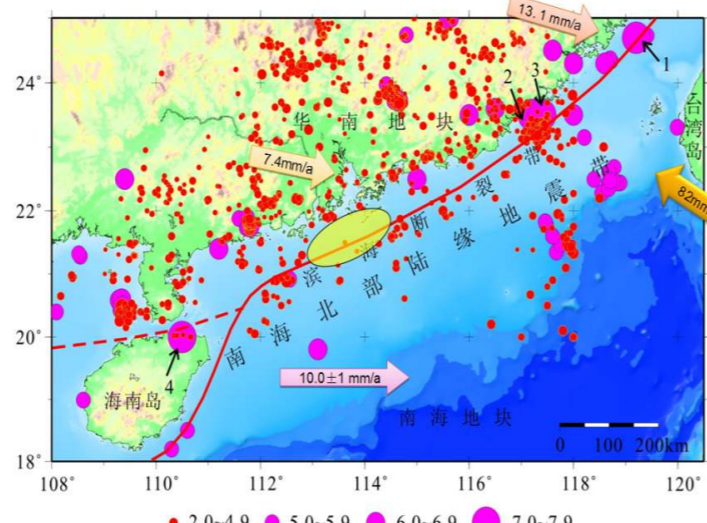


Mapping Earthquake Hazard of the PRD Region

Regional Seismology of the PRD Region



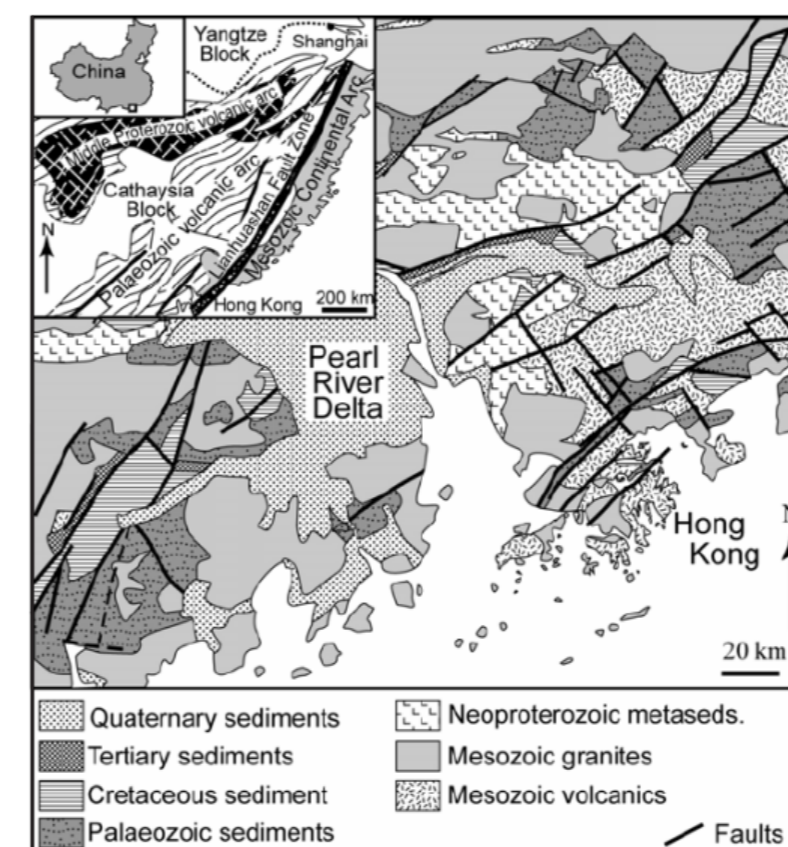
Tectonic structure of the PRD region
Source: GEERRI 2010



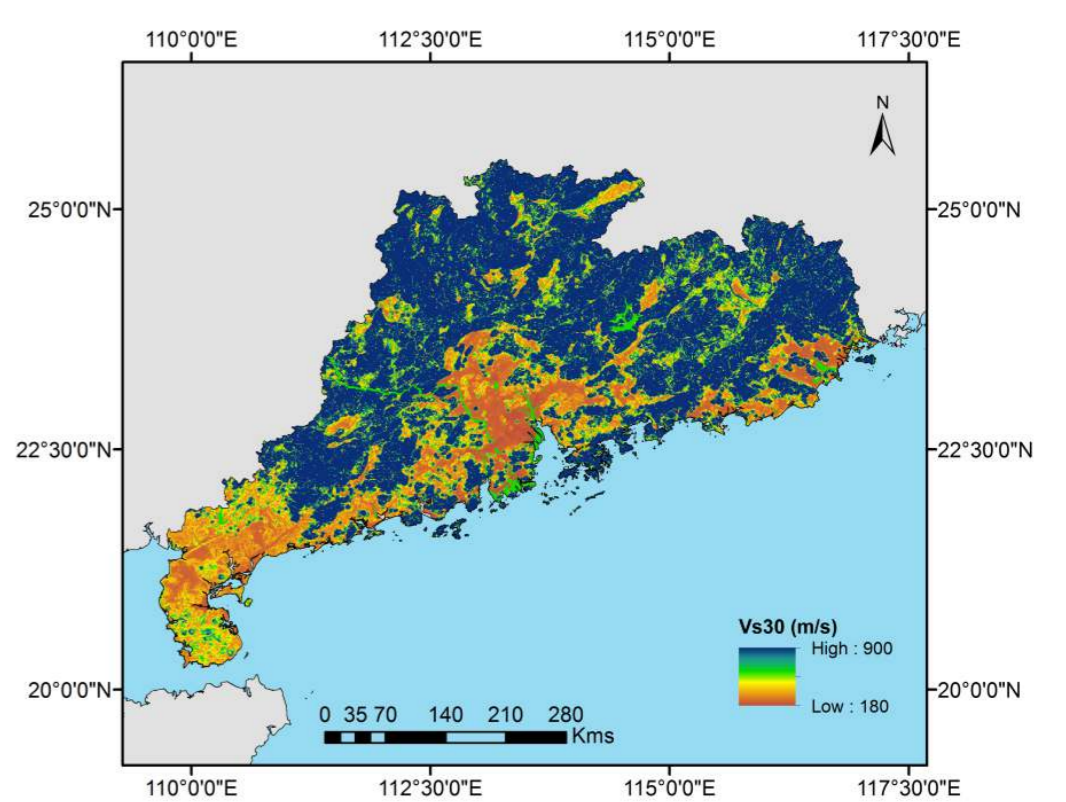
Seismic activity in northern margin of South China Sea

1. 1604 Quanzhou Coast M8
2. 1600 Nanao Island M7
3. 1918 Nanao Island M7.5
4. 1605 Qiongzhan M7.5

Geological Information of the PRD Region

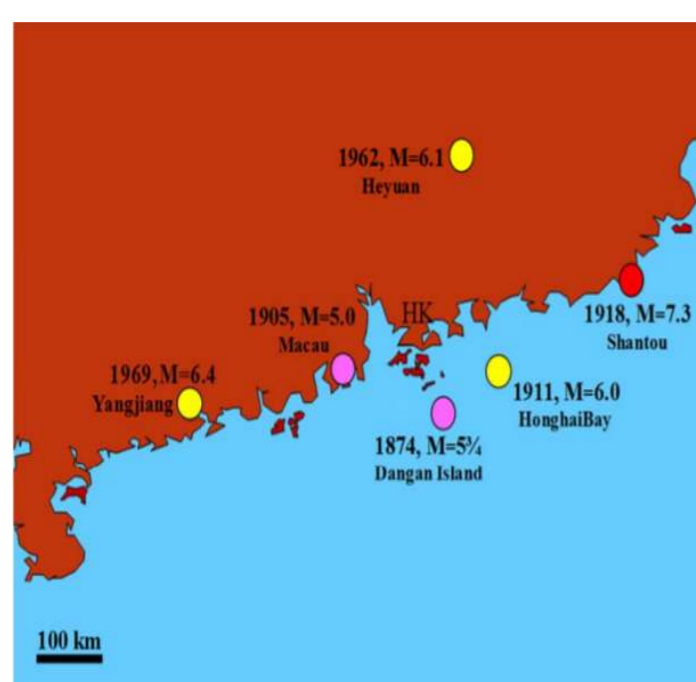


Geological Map of the PRD region
Source: Shaw et al. 2010

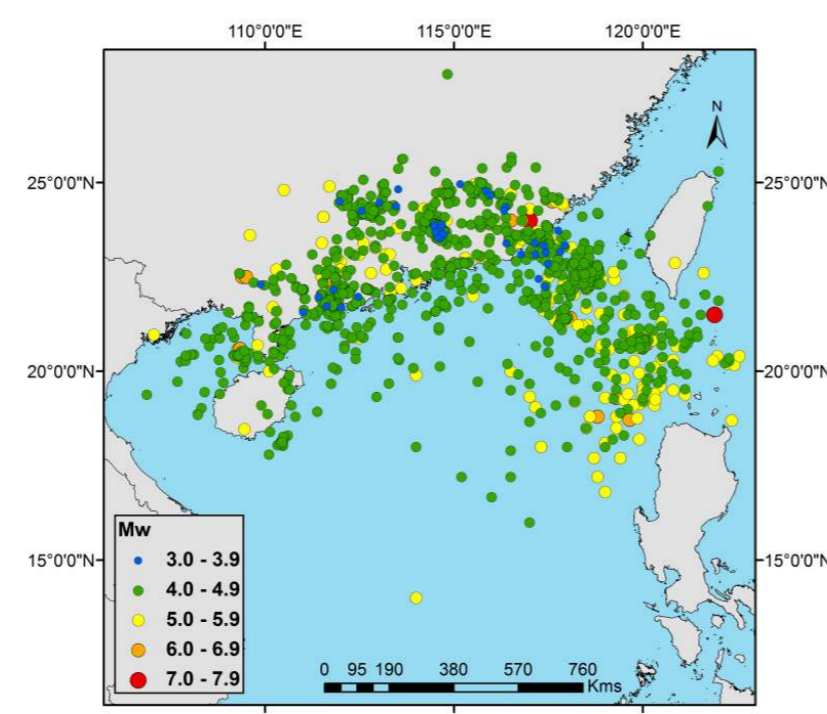


Site Condition: Vs30 map of Guangdong Province obtained from USGS

Historical Earthquake Events Catalogue



Major historical earthquakes in PRD region (1067 to 2011)
Source: HK GEO information note 2015



Historical earthquake events collected in the study area

Earthquake Hazard Evaluation

- OpenQuake-based framework for seismic hazard and risk analyses

Source parameters used in OpenQuake for the 1918 Shantou Earthquake

M _w	Depth (km)	Strike (°)	Dip (°)
7.3	10	44	60
Epicenter (lat)	Epicenter (long)	Upper Depth (km)	Lower Depth (km)
23.613	116.828	2.0	17

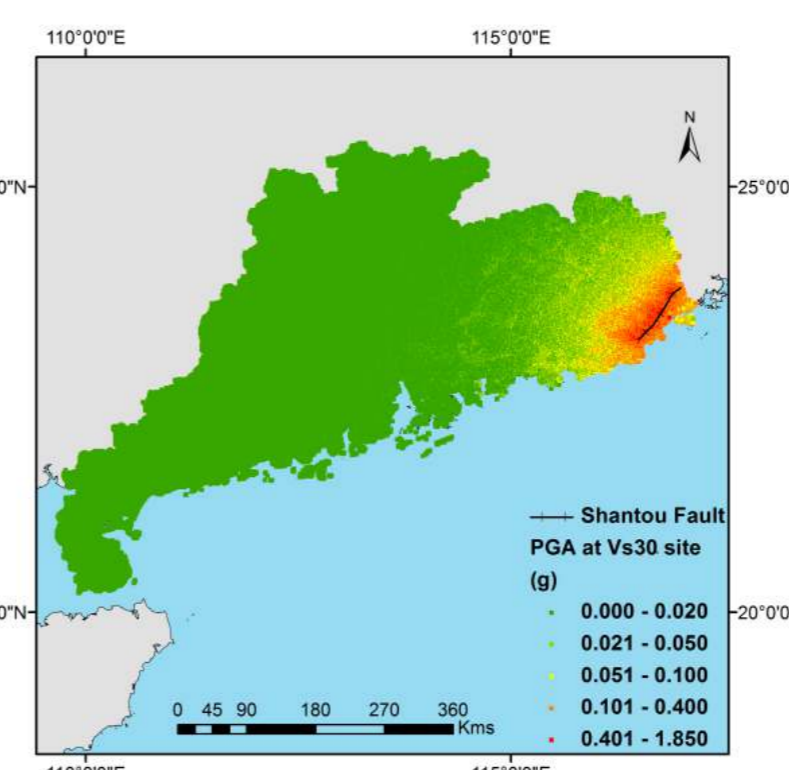
The Worst-case Earthquake Scenario: 1918 Shantou Earthquake (Mw 7.3)



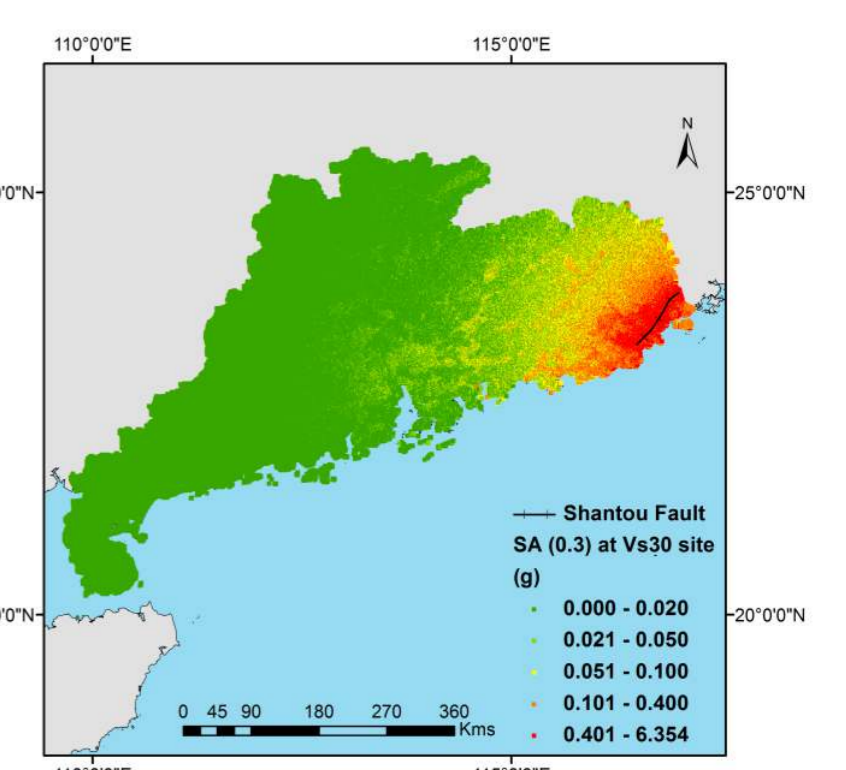
Epicenter of the 1918 Shantou Earthquake



Damaged buildings during the 1918 Shantou Earthquake



Generated surface PGA map considering the 1918 Shantou Earthquake (Mw=7.3)



Generated surface Sa(0.3s) map considering the 1918 Shantou Earthquake (Mw=7.3)