

RED-ACT Report

Real-time Earthquake Damage Assessment using City-scale Time-history analysis

June 23, M5.6 California Petrolia Earthquake

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Acknowledgments and Disclaimer

The authors are grateful for the data provided by **CESMD**. This analysis is for research only. The actual damage resulting from the earthquake should be determined according to the site investigation.

Scientific background of this report can be found at:

<http://www.luxinzheng.net/rr.htm>

1. Introduction to the earthquake event

At 20:53 22 Jun 2019 (Local Time, UTC -8), an **M 5.6 (USGS)** earthquake occurred in **California Petrolia, USA**. The epicenter was located at **40.2813N 124.2983W**, with a depth of **9.4 km**.

2. Recorded ground motions

7 ground motions near to epicenter of this earthquake were analyzed. The names and locations of the stations can be found Table 1. The maximal recorded peak ground acceleration (PGA) is **301 cm/s/s**. The corresponding response spectra in comparison with the 8-degree design spectra specified in the Chinese Code for Seismic Design of Buildings are shown in Figure 1.

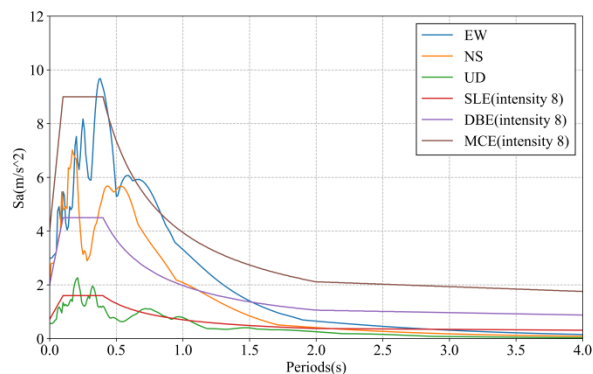


Figure 1 Response spectra of the recorded ground motions with maximal PGA

3. Damage analysis of the target region subjected to the recorded ground motions

Using the real-time ground motions obtained from the strong motion networks and the **city-scale nonlinear time-history analysis (see the Appendix of this report)**, the damage ratios of buildings located in different places can be obtained. The building damage distribution and the human uncomfortableness distribution near to different stations is shown in Figure 2 and Figure 3, respectively. These outcomes can provide a reference for post-earthquake rescue work.

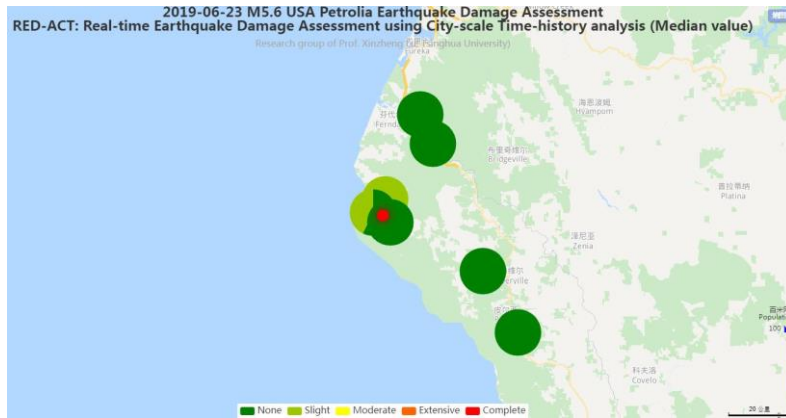


Figure 2 Damage ratio distribution of the buildings near to different stations

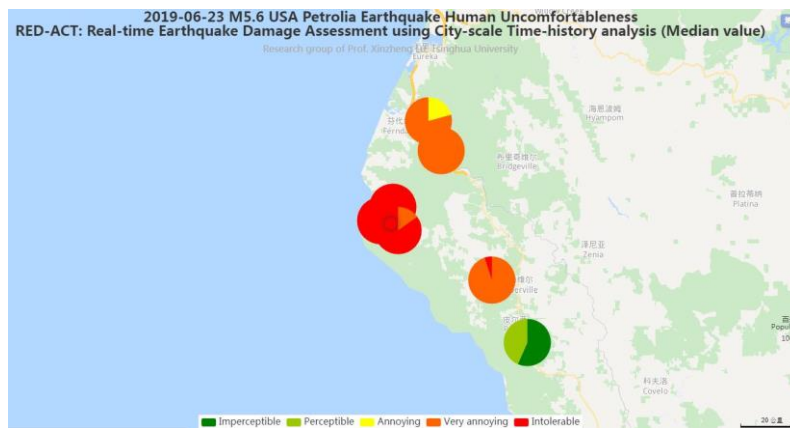


Figure 3 Human uncomfortableness distribution near to different stations

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Table 1 Names and locations of the strong motion stations

No.	Station Name	Longitude	Latitude	Epi. Distance (km)
1	79435	-123.761	39.923	60.2
2	89101	-124.288	40.325	5.8
3	89255	-124.146	40.592	37.7
4	89462	-124.101	40.504	30.6
5	BRIC	-123.896	40.112	38.8
6	PETL	-124.343	40.288	4.0
7	KCO	-124.266	40.257	3.5

