RED-ACT Report

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

Jun. 9, M5.5 New Zealand Earthquake

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First reported at 17:00, Jun. 10, 2019 (Beijing Time, UTC +8)

Acknowledgments and Disclaimer

The authors are grateful for the data provided by GeoNet. 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/software/Real-Time_Report.pdf

1. Introduction to the earthquake event

At Jun. 10 2019 3:24 (Local Time), an M 5.5 (GeoNet) earthquake occurred in New Zealand. The epicenter was located at 168.15 -44.34, with a depth of 5.0 km.

2. Recorded ground motions

24 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 10 cm/s/s. The corresponding response spectra in comparison with the design spectra specified in the Chinese Code for Seismic Design of Buildings are shown in Figure 1.

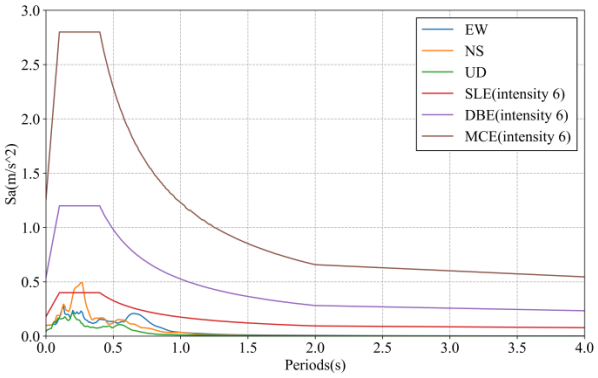

Figure 1 Response spectra of the recorded ground motions with maximal PGA

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.

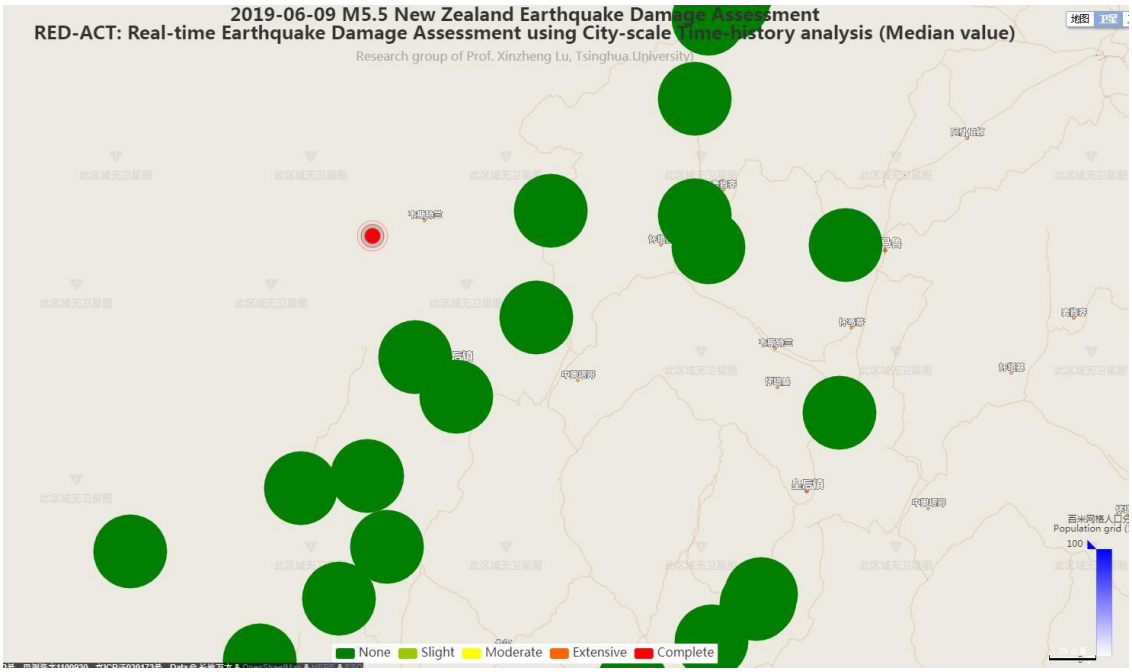

Figure 2 Damage ratio distribution of the buildings near to different stations

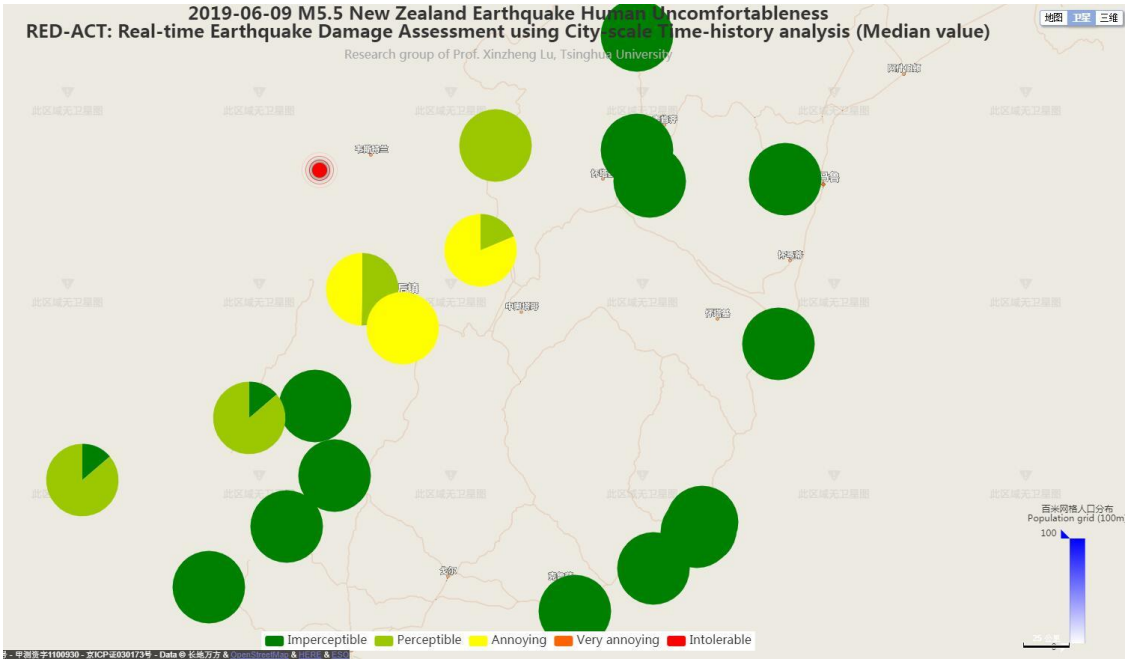

Figure 3 Human uncomfortableness distribution near to different stations

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Table 1 Names and locations of the strong motion stations

No.	Station Name	Longitude	Latitude
1	GLNS_20	168.4064	-44.8644
2	MECS_20	169.2331	-44.2306

3	QTPS_20	168.6628	-45.0322
4	WNPS_20	169.1431	-44.6947
5	_MLZ_20	168.1183	-45.3667
6	TAFS_20	167.7192	-45.4167
7	MOSS_20	168.2378	-45.6678
8	TWAS_20	170.0983	-44.2547
9	_LBZ_20	170.1844	-44.3856
10	MCNS_20	170.0972	-43.7364
11	FJDS_20	170.1842	-43.3892
12	_WHZ_20	167.9469	-45.8925
13	WHAS_20	170.3267	-43.3161
14	RRKS_20	167.4725	-46.1475
15	WHFS_20	170.3589	-43.2611
16	OAMS_20	170.9692	-45.0997
17	_CVZ_20	171.0061	-44.3831
18	DCDS_20	170.5022	-45.8744
19	DUNS_20	170.4706	-45.9053
20	BDCS_20	169.7194	-46.2492
21	WVAS_20	170.7372	-43.0717
22	DKHS_20	170.4931	-45.9022
23	RLNS_20	166.6858	-45.6875
24	TMBS_20	170.1958	-46.0719