RED-ACT Report

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

Mar. 11, M5.9 Japan Fukushima-ken Earthquake

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Acknowledgments and Disclaimer

The authors are grateful for the data provided by K-NET and KiK-net. 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 02:11 11 Mar 2019 (Local Time, UTC +9), an M 5.9 (JMA) earthquake occurred in Japan Fukushima-ken. The epicenter was located at 142.5 36.8, with a depth of 10.0 km.

2. Recorded ground motions

9 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 9.5 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.

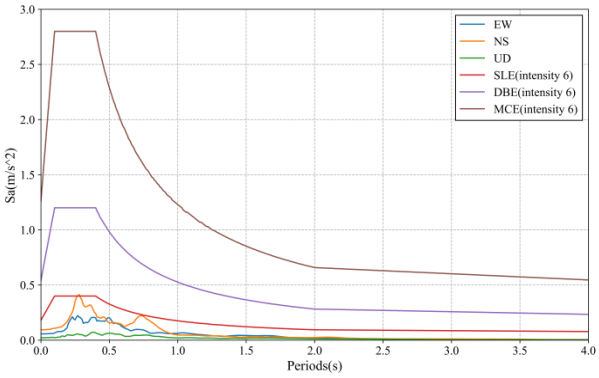

Figure 1 Response spectra of the recorded ground motions with maximal PGA

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.

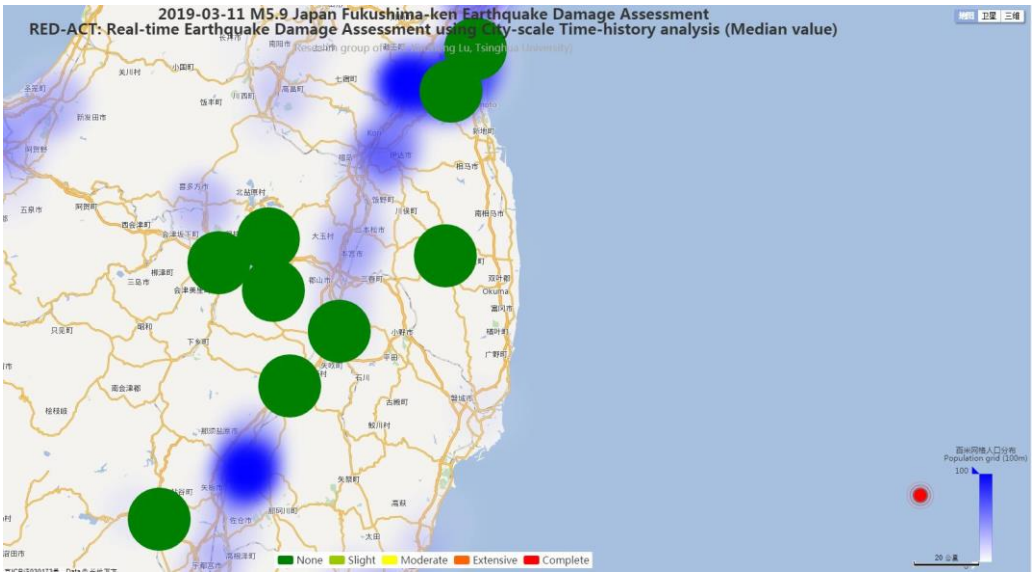

Figure 2 Damage ratio distribution of the buildings near to different stations

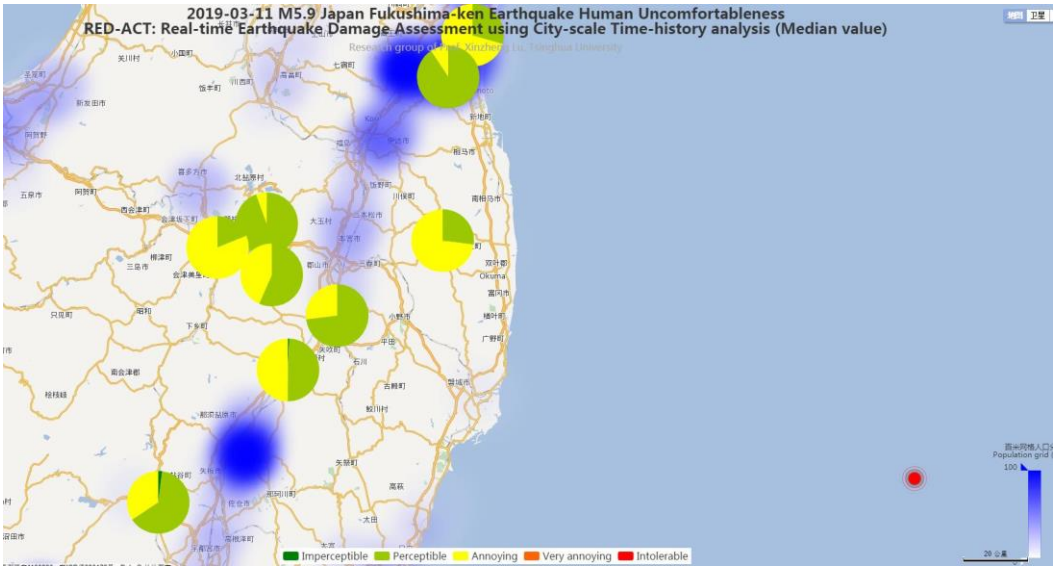

Figure 3 Human uncomfortableness distribution near to different stations

The details can be accessed at
http://www.luxinzheng.net/software/2019-03-11-Japan-5.9.html
http://www.luxinzheng.net/software/2019-03-11-Japan-5.9-Acc.html

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Table 1 Names and locations of the strong motion stations

No.	Station Name	Longitude	Latitude
1	FKS006	140.759	37.5031
2	FKS016	140.191	37.1228
3	FKS017	140.369	37.2842

4	FKS020	140.108	37.5474
5	FKS023	139.929	37.4774
6	FKS024	140.132	37.3957
7	MYG015	140.87	38.1049
8	MYG017	140.782	37.9763
9	TCG009	139.715	36.7258