Development of the spatial information data base using building damage of the 2019 Yamagata offshore earthquake

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Understanding a spatial distribution of damaged buildings caused by an earthquake is important for modeling a relationship of seismic motion and building damages. Furthermore, an accumulation of a building damage inspection result contributes to development of the elaborate damage function, and the real-time damage estimation system based on damage functions is effective both for supporting a decision-making of the disaster response and the contribution for early recovery of infrastructures (Fujiwara et al., 2019).

To this end, we formerly acquired plural building damage inspection results performed by municipalities for the purpose of certification of disaster victims, targeting severely damaged earthquakes such as the 2004 Chuetsu, 2007 Chuetsu offshore, 2008 Iwate-Miyagi, 2011 off the Pacific coast of Tohoku, and 2016 Kumamoto. By using these data, we constructed the spatial information data base with a resolution of 250-meter square meshes, then based on these data base, we developed damage functions of collapsed buildings which are separated from each 2 types of structures and ages (Monma et al, 2018).

These damage functions are available for prediction of the collapsed buildings affected by a severely earthquake corresponding to the seismic intensity 6+ or 7 which is defined by the Japan Meteorological Agency. However, the damage function which is applicable for a partially or moderate damage is also expected to beneficial for disaster responses, because frequency of not so fatal earthquake corresponding to intensity 5+ or 6- is higher.

In this study, we constructed the spatial information database of the 2019 Yamagata offshore earthquake (magnitude 6.7) which occurred at 22:22 of June 18, by using the field inspection results performed by municipalities. The area of this study consists of the Murakami city where intensity 6+ was observed, and the Tsuruoka city where intensity 6- was observed.

Furthermore, we extracted roofs covered by blue plastic sheets using post-earthquake images of 1.5m per pixel resolution taken at July 3 acquired by the SPOT7 satellite, and the ArcGIS is used for automatic image classification. The study area covers the comparatively major damaged districts such as Huya, Gatsugi, Koiwagawa, Ohiwagawa, Nezumigaseki, and Atsumi distirict. We used these extraction results for comparing damage degree of each district.

Additionally, we are going to extract more than partially damaged buildings from the former developed spatial information database, and develop a model between the earthquake motion and the building damage. Moreover, we are going to compare damages of the Yamagata offshore earthquake and the other earthquake, then consider characteristics of each earthquake.

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