

Estimating the measured seismic intensity by the questionnaire survey

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The seismic intensity of JMA (Japan Meteorological Agency) is important information base for preventing disasters related to earthquake damage. The purpose of the present study is to develop a relationship between the questionnaire seismic intensity and the measured seismic intensity. A method to estimate seismic intensity with less number of questions than that of usual method has also been proposed. Ohta et al. (1979) proposed a method for estimating seismic intensity through a questionnaire survey. This method can provide more seismic intensity data than that obtained from seismic observation points. This method has been widely used, and its reliability has been checked in the range of seismic intensity from II to V in JMA scale. However, this method underestimates the calculated intensity in the intensity range from VI to VII in JMA scale for the 1995 Hyogo-ken Nanbu (Kobe) earthquake. Although some studies modified the equation of this method, these studies did not consider a seismic intensity coefficient between measured intensity and questionnaire survey data. The present study has proposed a new seismic intensity coefficient that gives better relationship between the calculated and measured seismic intensity. Moreover, the present study has identified 11 questions that can give even better result than the 21 questions used in usual method.

A field survey was conducted in order to carry out a questionnaire survey for the 2000 Western Tottori prefecture earthquake. Another questionnaire was distributed through mail for the 2001 Geiyo earthquake. In addition, the questionnaire survey data of the 1995 Hyogo-ken Nanbu (Kobe) earthquake was also used. The seismic intensity coefficient was determined by observing the relationship between measured seismic intensity and category number. Category number is a number corresponds to the choice of the questions and reflects the strength of an earthquake motion. In order to make a direct comparison between the measured seismic intensity and the questionnaire survey data, the questionnaire survey data within 1.5 km radius from each seismic observation point were used. Regression analysis was performed between the measured seismic intensity and average value of the category number of each question. The value of the measured seismic intensity corresponding to a category number was considered as the seismic intensity coefficient for that category number. Further, the questions that give low correlation between the measured and calculated seismic intensity were removed. Finally, only questions that correlated well with the measured seismic intensity were selected. Sorting the questions can lead to more effective questionnaire survey without effecting the quality of the result.