

# Relation between Source Acceleration Spectrum and Mj and Mw

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Empirical attenuation relations are utilized to predict seismic ground motions. The Japan Meteorological Agency magnitude Mj or moment magnitude Mw are frequently used as source term parameter of the attenuation relations in Japan. However, it is not so discussed which magnitude is more appropriate as explanatory variable of the attenuation relations.

We have been studied 3-D Qs structure and source acceleration spectrum in short period range (1-10Hz) for the Hokkaido region by tomographic inversion from the data of K-NET and KiK-net of the National Research Institute for Earth Science and Disaster Prevention (NIED) (Nakamura and Uetake, 2007).

In this study, we examined the relation between Mw, Mj and the source spectrum obtained by the tomographic inversion.

Fig.1 shows the scaling relation between magnitude and source acceleration spectrum of 1, 5 and 10 Hz. Mw is determined by F-NET (NIED). The correlation coefficient between source spectrum and Mw is higher than that of Mj for the earthquakes of 0-60km depth. Tsuboi's empirical relation is applied to determine Mj in the depth band of 0-60km.

Because we adopted the Mw converted from Mj using the formula of Takemura(1990) as initial value of the inversion, the initial source spectrum show the correlation to Mj naturally. Although, the result shows that Mw is more correlate to short period source spectrum than Mj for the earthquakes of 0-60km depth.

This shows that Mw is more appropriate than Mj as source term parameter of the empirical attenuation relations for shallow earthquakes.

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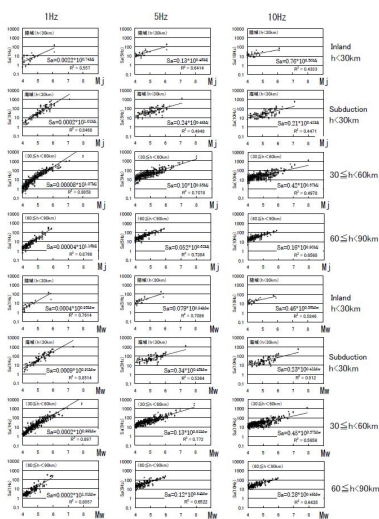


Fig. 1 Relation between Mj, Mw and source acceleration spectrum Sa