Characterization of Heterogeneous Source Models toward Strong Motion Prediction for Intraslab Earthquakes

Kimiyuki Asano[1]; Tomotaka Iwata[1]

[1] DPRI, Kyoto Univ.

Since Japanese Islands are located along the subduction zone, a numerous large intraslab earthquakes those occurred within subducting slabs (e.g., the 1993 Kushiro-oki earthquake, the 2001 Geiyo earthquake, and the 2003 Miyagi-oki earthquake). A strategy is necessary to be constructed for reliable strong motion prediction of intraslab earthquakes.

In the studyies on broadband strong ground motion simulation by the empirical Green's function method for shallow intraslab earthquakes, it is revealed that intraslab earthquakes have smaller strong motion generation areas and higher stress drops compared to inland crustal earthquakes (Asano *et al.*, 2003, 2004; Morikawa and Sasatani, 2004). Asano *et al.* (2003) also pointed out that deeper intraslab event has higher stress drop. However, knowledge about total rupture area of these intraslab earthquakes is not sufficient for making strong motion prediction (Sasatani *et al.*, 2006).

Somerville *et al.* (1999) compiled the kinematic source models and proposed a set of empirical scaling relationships for inland crustal earthquakes. Murotani *et al.* (2006) proposed empirical scaling relationships for plate-boundary earthquakes. Mai and Beroza (2000) also studied scaling properties of kinematic source models.

We started to compile kinematic source models of intraslab earthquakes to compare source scaling properties with those of inland crustal and subduction-zone plate-boundary earthquakes. Firstly, we characterized these heterogeneous slip distributions and extracted rupture area, asperity, and average slip following the procedure proposed by Somerville *et al.* (1999) to see general nature of source models for these intraslab earthquakes.

As for the 2001 Geiyo earthquake (M_J 6.7, focal depth 46 km), the kinematic source rupture process is estimated by Kakehi (2004) and Sekiguchi and Iwata (2002). The total rupture area of Kakehi (2004) model is 540 km^2. The model has two asperities, and combined area of asperities is 81 km^2. It is respectively 73% and 49% of size expected for inland crustal earthquake with same seismic moment by Somerville *et al.* (1999). The source model by Sekiguchi and Iwata (2002) has total rupture area of 630 km^2 and asperities of 135 km^2. These values are 58% and 56% of those expected from the empirical scaling relationship by Somerville *et al.* (1999). That is, the size of asperities is half of an inland crustal earthquake with same seismic moment in case of the 2001 Geiyo earthquake.

As for the 2003 Miyagi-oki earthquake (M_J 7.1, focal depth 72 km), the source model by Aoi *et al.* (2005) has total rupture area of 784 km^2, and its combined area of asperities is 108 km^2. These values are 48% and 30% of those expected from the empirical scaling relationship by Somerville *et al.* (1999).

Including other intraslab events, we plotted the size of total rupture area and combined area of asperities against total seismic moment. We could see clear tendency that both of total rupture area and asperity area are smaller than empirical source scaling relationships for inland crustal and plate-boundary earthquakes. We will expand our data set to see more detailed nature of source scaling properties for intraslab earthquakes. Furthermore, we will estimate stress change during these earthquakes and investigate the characterization of stress parameters in and outside asperities for intraslab earthquakes.

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