Estimation of fault model for Ansei-Edo earthquake using seismic intensity data

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The Ansei-Edo earthquake occurred on November, 1855 and caused severe damage in Edo (Tokyo) city and marginal area. Because more than 150 years have elapsed from this earthquake, a similar type earthquake is assumed as one of the M7 or greater earthquakes which have high potential to occur around Tokyo metropolitan area. Therefore, it is important to survey a fault model of the Ansei-Edo earthquake to construct a source model of the next large earthquake.

Many historical literatures for the damage caused by this earthquake exist around Kanto area, and some maps of the distribution of seismic intensity data are drawn using those records. We tried to estimate a fault model of the Ansei-Edo earthquake using these seismic intensity data.

We used the map of the seismic intensities compiled by Usami (2003) in this preliminary analysis. Because the seismic intensity data are estimated from the degrees of damages on the ground surface, the data are strongly affected by surface condition below the each position. We have to correct the amplification effect to retrieve the source effect. Therefore, the geomorphology data (Wakamatsu *et al*., 2005) are used for this purpose. First we estimated AVS30, the average shear wave velocity to the depth of 30 m from the surface, using the empirical relation between the geomorphology and the AVS30 (Matsuoka *et al*., 2005). After that, the amplification ratios of the peak ground velocity (PGV) are calculated by the relation between the AVS30 and the ratio (Fujimoto and Midorikawa, 2006). The observed seismic intensity data are converted to PGVs using the formula by Fujimoto and Midorikawa (2005), and then those values are divided by the amplification ratios to retrieve the velocities at the basement layer.

We estimated the distribution of strong motion sources on the fault plane using an inversion method. In the inversion method, we calculate the theoretical PGVs by summing up envelopes from subdivided faults. The peak velocities from each subfault are set according to the empirical attenuation relation (Si and Midorikawa, 1999). The envelope for the entire fault is calculated using power summation.

A preliminary analysis was performed assuming the fault model of the Tokyo-wan Hokubu earthquake by the Central Disaster Management Council of Japan. Two major asperities were recovered at western and eastern regions of the Tokyo bay. It seems that the result strongly reflects the Usami's seismic intensity distribution, which has some intensity 6 area in the Boso and Miura peninsulas.

Another map of the seismic intensity for the Ansei-Edo earthquake is presented by Nakamura *et al*. (2003). Therefore, we will try to reexamine the intensity values. Further we will analyze some fault models with horizontally and vertically changes assess the feasible fault model for the Ansei-Edo earthquake.