

Fault model of the 1703 Genroku Kanto earthquake estimated by coastal movements, tsunami heights, and surface image of PSP

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We propose an appropriate fault model of the 1703 Genroku Kanto earthquake by using the recently imaged shape of Philippine Sea Plate, distributions of the coseismic coastal movements and tsunami inundation heights.

The Genroku Kanto earthquake occurred in southern Kanto, less than 100 km away from Tokyo, on December 31, 1703. The source region is located on the subducting Philippine Sea Plate. Several fault models have been estimated from distributions of the coseismic coastal vertical movements or tsunami inundated heights (e.g. Kasahara et al., 1973; Matsuda et al., 1978; Aida, 1991; Shishikura, 2003).

Recently, details of upper-surface of the subducted Philippine Sea Plate has been imaged by using deep seismic reflection profiling (e.g. Sato et al., 2005; Takeda et al., 2007; Tsumura et al., 2007 submitted). One of the features is the low dip angle in the shallow region of the Philippine Sea Plate (Tsumura et al., 2007). In this study, we first compiled the above three images and estimated the shape of the plate. Next, the 51 sub faults on the estimated upper surface of the Philippine Sea Plate (normally 10 km x 10 km, but larger offshore) were settled as they do not overlap with each other. The vertical movement on the coast and the tsunami waveform (Green functions) were calculated for a unit amount of slip. Then the slip amounts of each subfault were estimated by the inversion of the measured vertical movement (Shishikura, 2000) and/or tsunami heights (Hatori, 1975).

As a result, the slip amount of more than 10 m is estimated in the south part of Boso peninsula and Miura peninsula, while the small slip is estimated in the Uraga channel. The large slip off the Miura peninsula is similar to that of the 1923 Taisho Kanto earthquake (Kobayashi and Koketsu, 2005).