

Estimation of source model of the 1931 NISHI-SAITAMA earthquake using long-period ground motion at Hongo in Kanto basin

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The 1931 Nishi-Saitama earthquake occurred in the northwestern part of Saitama prefecture on September 21, 1931 with a magnitude of 6.9. This is one of the most destructive shallow crustal earthquakes in the Kanto district in the last 100 years. Heavy building damage was experienced in the epicentral area during the quake. It is important from the viewpoint of disaster mitigation to know the source model of the earthquake for considering ground shaking during future events. Abe (1974) estimated the focal depth according to observed P-wave travel time in distant station and suggested shallow focal depth. However, the focal depth has not been precisely understood. In this study, we tried to estimate a source model of the 1931 Nishi-Saitama earthquake by comparing a long-period seismogram observed in Hongo, Tokyo, which is the only seismogram recorded completely in the Tokyo Metropolitan area with synthetic seismograms simulated by a 3D finite differential method considering recent detailed model of the Kanto basin. It is clarified that the main part of the observed long-period seismogram is composed of surface waves affected by the three-dimensional effect of the sedimentary layers in the Kanto basin. We also found good agreement between the calculated and observed seismograms, when the depth of the source fault is set to be in a range of 20-30 km with a rupture propagating from the bottom edge of the center of the fault.

Keywords: The 1931 Nishi-Saitama earthquake, long-period seismogram, focal depth