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Probable epicenters of future M7 earthquakes in the southern Kanto region, central Japan

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The Earthquake Research Committee, Government of Japan reported that an earthquake with magnitude around 7.0 (M7) has a 70% chance of occurring in southern Kanto in 30 years, which had been estimated based on the five past earthquakes in the region. Probable hypocenters of M7 earthquakes are crucial factors to refine seismic hazard maps for the region. However, it must be a difficult matter to configure probable hypocenters of these earthquakes since the mechanisms of the past earthquakes have not been elucidated in detail. Our approach to the problem is an empirical one to derive probability models of M7 epicenters with possible assumptions based on reliable evidences. In the present study, we assume that M7 earthquakes may occur around inter plate earthquakes in this region. Incorporating this assumption into a model, the seismicity associated with the Pacific plate is smoothed with a pair of two dimensional normal density functions with different wave lengths and the smoothed seismicity with the shorter wave length is subtracted from the longer one. Five different wave lengths are considered and in total ten models are constructed. Likelihood of each model is tested with five past M7 earthquakes. The best model performs by 1.3 times better in an average probability gain than that of the model used in the current national seismic hazard maps for Japan.

Keywords: M7 earthquakes, Earthquake forecasting model, Seismic hazard, Southern Kanto