Fault models of the 1854 and 1707 great earthquakes in the Tokai area, Japan, based on historic, geologic, and geodetic data

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It is important to develop fault models of past great earthquakes for the assessment of a future earthquake and associated hazards especially in the Tokai area, Japan. However, such studies were not extensively performed since Ando (1975) and Ishibashi (1981). In this study, we re-examined the fault models of the 1854 Tokai earthquake as well as the 1707 earthquake using information and data from recent historic, geologic, and geodetic studies. We propose that the dip angle of the fault model of Ishibashi (1981) for the 1854 Tokai earthquake should be modified to around 15 degree, which better explains geodetic data in the Tokai area during the last 100 years and is consistent with hypocenter distributions in this region. According to Aida (1981), we can assume that the fault model of the 1707 earthquake in the Tokai area is the same as that of the 1854 Tokai earthquake. Then, we found that the modified fault model can not explain the uplift over 1 m in Yokosuka, south of Kakegawa, Shizuoka, which might have occurred during and/or after the 1707 earthquake (Fujiwara et al, this issue). We propose two possible models to explain the uplift: (1) a local dip-slip shallow fault beneath Kakegawa and (2) slip of the deeper extension of the modified fault model beneath Suraga Bay. The local fault model explains the uplift without affecting other regions, but there is no clear evidence of the existence of such a shallow fault. In the deep slip model, uplift occurs not only in Yokosuka but also in wide area including Hamana lake. Further comprehensive investigations would be important to understand the fault model and source processes associated with the 1707 earthquake.