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Role of mega-splay faulting in the rupture process of great earthquakes at the Nankai Trough

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The latest megathrust events along the Nankai Trough are the 1944 Tonankai and the 1946 Nankai earthquakes. Although the main rupture zone of these earthquakes is the plate boundary megathrust, several authors have argued a possibility of splay faulting associated with the 1946 Nankai earthquake. The estimated splay fault is located at the western end of the source region of the 1946 earthquake and is characterized by a high-angle reverse faulting. Recently, we have investigated the source process of the 1944 Tonankai earthquake. Eastward rupture propagation stopped on the way and did not extend to Suruga Bay, the eastern end of the Nankai Trough. Through a scrutiny of seismological and leveling data, we obtained a new fault model for the 1944 earthquake. One peculiar feature of this model is that it has a splay fault at its eastern end, branching from the plate boundary megathrust at the depth of about 30km. But this splay fault did not reach to the ground surface and the rupture stopped at the depth of 10-15km. The model can reproduce the leveling profile quite well. The model suggests that mega-splay faulting may have an important role of stopping the dynamic rupture of a plate boundary event. Both the 1944 and the 1946 event seem to have stopped when and where the mega-splay faulting occurred. In both cases, the areas above the splay fault had severe shaking. So the specification of possible location of mega-splay faulting is an important target in terms of seismic hazard mitigation.

Keywords: Nankai Trough, Megathrust earthquake, Mega-splay fault, Tonankai earthquake, Nankai earthquake