

The changes of interplate coupling area and the vertical changes at Shikoku before the 1946 Nankai earthquake.

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If the velocity of the Philippine sea plate is constant and the width of the coupling zone does not change, the rate of vertical change observed on the ground is also constant. If the width of coupling zone changes, the rate of vertical movement also changes. Umeda and Itaba (2011) drew the vertical changes of Shikoku before the 1946 Nankai Earthquake, combining two kinds data of the Geographical Survey Institute and the Hydrographic Bureau (currently Hydrographic and Oceanographic Department Japan Coast Guard). The solid line (Obs.) in Fig.1 is the vertical changes of cape Muroto and Susaki. Before and after 1930, the rate of change is different. To explain this fact, we consider the changes of coupling zone. Fig.2 shows a cross section of the plate boundary that passes through the central part of Shikoku, almost perpendicular to the Nankai Trough. We assume three coupling zones F1, F2, F3 on the plate boundary and Philippine sea plate moves 5 cm per year. The upper plate is dragged 5 m in 100 year. The change of the dotted lines are calculated for the following four stages. The change in period (a) shows the case where F1, F2, and F3 in Fig. 2 are coupled and the upper plate is also dragged at 5 cm /y. In the period (b), F1 and F3 slides slowly by 70% (3.5 m) and 80% (4 m) of the total slip. (c) indicates the change by the 1946 Nankai earthquake. Period(d) is after slip by 30% (1.5 m) and 20% (1 m) of the total slip. The slope of the vertical change of the ground surface changes depending on the width of the coupling area. reference:Umeda y. and S. Itaba, 2011, Vertical Crustal Movements along the Pacific Coast of Shikoku before the 1946 Nankai Earthquake, Bull. Geol. Surv. Japan, vol.62(5/6), p.243-257

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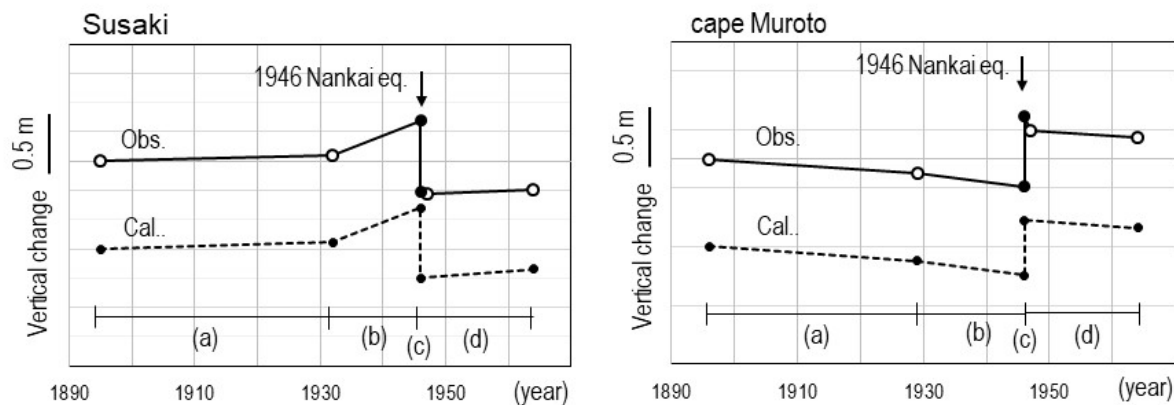


Fig.1 Vertical change of Susaki and cape Muroto before and after the 1946 Nankai earthquake (solid line). The change of the dotted lines are calculated for the following four stages. The change in period (a) shows the case where F1,F2, and F3 in Fig. 2 are coupled and the upper plate is also dragged at 5 cm /y. In the period (b), F1 and F3 slides slowly by 70% and 80% of the total slip. (c) indicates the change by the 1946 Nankai earthquake. Period(d) is after slip by 30% and 20% of the total slip.

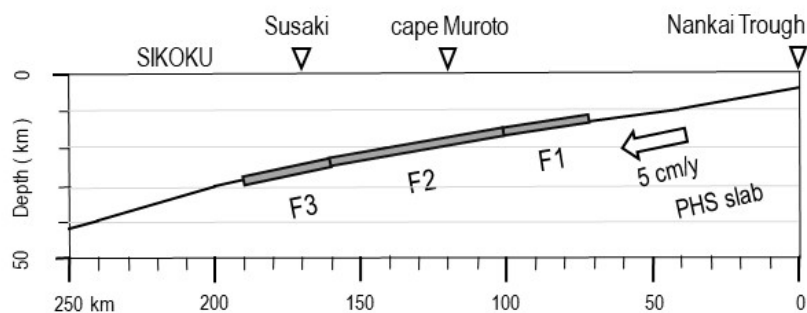


Fig.2 Cross section of the plate boundary perpendicular to the Nankai Trough (solid line). The thick solid lines are the coupled area. The width of F1,F2 ,F3 is 30 km,60 km, 30 km, respectively.