

Observation of seafloor crustal deformation in the Ryukyu trench

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It has been assumed that the great inter-plate earthquakes would not occur in Ryukyu trench because seismic coupling is small there. However, recent new results, the occurrence of the 2004 Sumatra earthquake and the slow-slip events beneath southwestern Ryukyu trench, require the improvement of seismic coupling model in the Ryukyu trench. GPS network is so far from the trench that the coupling area cannot be detected in the Ryukyu trench.

The GPS/acoustic seafloor deformation observation technique is useful to detect seismic coupling near the Ryukyu trench. The Philippine Sea plate is subducting to northwestward at the rate of 9 cm/yr, and the Ryukyu Islands is moving to SSE direction at the rate of 2 cm/yr. The relative velocity between two plates is estimated about 10 cm/yr. If we measure the position at the continental-side seafloor near the trench in the order of several cm, we can clarify seismic coupling area by observation for about 1 year.

A system for observing seafloor crustal deformation using kinematic GPS observation technique and acoustic ranging had developed on January 15-17, 2008. Three stations were set in the depth of 3000 m in the continental-side near the central Ryukyu trench using R/V Tonan-maru. Each station is away about 2 km. The observation was carried out for 1.5 days. We will carried out the observation twice a year and investigate the degree of seismic coupling in the Ryukyu trench.