The relation between the stress field and the seismic coupling in the Hyuga-nada region deduced from OBS observations

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The Philippine Sea (PHS) plate is subducting beneath the southwest Japan arc along the Nankai trough at a rate of about 5 cm per year. The seismic activity in the boundary between the PHS and the Eurasian (EU) plates varies spatially along the Nankai trough. Especially the region from off coast of Shikoku to the Bungo channel and Hyuga-nada has large variation of seismicity. In addition, recent studies reveal that a coupling rate between two plates has variety.

We used the data of OBSs and temporary stations from 2002 to 2004 and permanent stations for this analysis. The stress field was estimated using a stress tensor inversion method by polarity of first arrivals from earthquakes. The obtained stress field has spatial heterogeneity, especially near the boundary between the PHS and the EU plates. The direction of minimum principal axis of the PHS slab is parallel to the direction of subduction. This means that stress field of the PHS slab is down-dip tension. The direction of maximum principal axis is almost perpendicular to the plate boundary, but there is a little variation. The northern region of the study area has small angle between maximum principal axis and the normal vector to the plate boundary, on the other hand, the direction of maximum principal axis in the southern region has large deviation from the normal direction to the plate boundary. The shear stress of plate boundary is estimated to be smaller in the north, and larger in the south. The slip distribution estimated by using waveform data of large earthquake and geodetic data is thought to indicate the state of the plate coupling. There is a good correlation between the slip distribution at large earthquakes and the angle between maximum principal axis and the plate boundary. Although slip distribution has not been obtained in the southern area, it is estimated that subducting plate in the southern region couples with the landward plate stronger than the northern region.