

Seismic velocity structure around the boundary area of Hyuga-nada and Nankai seismogenic zone

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In the Nankai Trough, three major seismogenic segments (Tokai, Tonankai and Nankai) of megathrust earthquake exist. The Hyuga-nada segment is located on the west of Nankai segment and it was distinguished from these seismogenic segments because of the lack of megathrust earthquake. However, recent studies pointed out the possibility of simultaneous rupture of the Tokai, Tonankai, Nankai and Hyuga-nada segments [e. g., Furumura et al., 2011]. To understand segmentation and synchronization of seismic rupture along the Nankai Trough subduction zone, Japan Agency for Marine-Earth Science and Technology has been carried out a series of wide-angle active source surveys and local seismic observations in the Nankai Trough seismogenic zone.

From the observation data in Hyuga-nada segment, that has been performed from 2008 to 2009, we have clarified the location of subducted Kyushu-Palau ridge as a low-velocity belt with NW-SE strike in the subducted Philippine Sea plate [Yamamoto et al., 2011]. However, because the boundary area between Hyuga-nada and Nankai segments was located in the eastern end of their study area, we could not obtain enough structural information to discuss the difference between Hyuga-nada and Nankai segments.

In this study, we added the observation data in western Nankai segment that has been performed from 2009 to 2010, to the dataset of Hyuga-nada. Then, to discuss the relationship between structural heterogeneities and coseismic rupture pattern around Nankai and Hyuga-nada segments, we performed a three-dimensional seismic tomography for combined dataset.

From our results, high velocity zone is imaged within the continental plate just above the coseismic slip area of 1968 Hyuga-nada earthquake [Yagi et al., 1998]. This high velocity zone is not imaged beneath the coseismic slip area of 1946 Nankai earthquake [Sagiya and Thatcher, 1999]. Besides, uppermost slab mantle in the boundary area of Hyuga-nada and Nankai segments showed relatively higher velocity than that in eastern area. High velocity slab mantle becomes unclear at the eastern side of Cape Ashizuri. This result is consistent with the previous active source studies that showed the P-wave velocity of uppermost slab mantle as 8.0 km/s beneath Cape Ashizuri [Takahashi et al., 2002] and as 7.8km/s beneath Cape Muroto that located about 100 km eastward from Cape Ashizuri [Kodaira et al., 2000]. The existence of high velocity zone in the continental plate and high velocity uppermost slab mantle might be a one of the factor of the boundary area between Hyuga-nada and Nankai segments.

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