Philippine Sea Plate and Serpentinized Mantle Wedge beneath Kii Peninsula 2

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The deep low frequency events (DLFEs) are distributed widely from western Shikoku to central Tokai through southern Kii Peninsula (Obara, 2002). High $^{3}He/^{4}He$ ratios are found in Kinki district despite in the forearc region (Wakita and Sano, 1987). When we explain these phenomena by the behavior of 'water' dehydrated from the Philippine Sea Plate (PSP), it is important to know structures of the PSP and the mantle wedge beneath the Kii Peninsula. In order to predict accurate strong motions, it is very important to know the downdip limit of the seismogenic zone and large scale structures beneath the Kii Peninsula, through which seismic waves from the Tonankai and Nankai Earthquakes travel to Osaka region. The purpose of this study is to image the S wave velocity discontinuities beneath Kii Peninsula by using receiver function (RF) analyses with waveforms from teleseismic events and to estimate the shapes of the PSP, the Moho and other discontinuities.

RFs were calculated by deconvolving the vertical component of the P coda of teleseismic waveforms from the corresponding radial component in order to remove source time functions. We used the extended-time multitaper method (Shibutani et al., 2008) for the deconvolution. Not only the direct P waves but also Ps converted waves generated at S wave velocity discontinuities beneath stations are left in the obtained RFs. We converted the relative travel time between the Ps converted wave and the direct P wave to the depth of the S wave velocity discontinuity with a velocity model of JMA2001 (Ueno et al., 2002).We obtained images of the S wave velocity discontinuities by averaging the depth-converted RFs at common conversion points.

As results, we find subducting Philippine Sea Plate beneath Kii Peninsula and the continental Moho discontinuity beneath central and northern Kinki district. The oceanic crust shows obvious low velocity anomalies to the depth where the DLFEs occur, and less low velocity anomalies beyond the depth. This suggests that the dehydration is active in the source region of the DLFEs. The discharged water might partly serpentinize the mantle wedge and partly reach the surface. This might cause the high $^{3}He/^{4}He$ ratio in the Kinki district. The shapes of the PSP are similar up to about 40 km depth among the three profiles. The extents of the serpentinized mantle wedges are different among the three profiles. Considering the dehydration of the oceanic crust, DLFEs and Serpentinized mantle wedge, we can estimate that the downdip limit of the seismogenic zone of Nankai earthquakes is about 30 km depth of the top surface of PSP obtained from our results.