S147-P006 **Room: Poster Session Hall** **Time: May 26**

Structural features of the subducting slab beneath the Kii Peninsula: 1. Receiver function stacking and slab segmentation

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We report seismological feature that the subducting Philippine Sea slab (PHS) beneath the Kii Peninsula, central Japan, can be divided into three segments by using stacked receiver functions with consideration of a dipping velocity interface. Offshore the Kii Peninsula, the 'Tonankai' and 'Nankai' fault segments suffer mega-thrust earthquakes that repeat every 100 to 150 years. These two rupture zones have historically ruptured closely in time, with the Tonankai earthquake typically preceding the Nankai earthquake. The structure of the young, thin, contorted PHS is important to the seismo-tectonics in this region. We apply receiver function (RF) analysis to 26 Hi-net and 4 F-net seismographic stations.

If dipping velocity discontinuities and/or anisotropic media exist beneath a seismometer, both radial and transverse RFs contain useful information to estimate underground structure. For isotropic media with a dipping-slab interface, back-azimuthal variation in transverse RFs shows 2-lobed pattern and it depends largely on three parameters; the down-dip azimuth, dip angle and depth of the interface. We stack both radial and transverse RFs with allowance a time-shift caused by the dipping slab Moho, searching for optimal depth, dip and plunge azimuth, using a grid-search for each station. In this estimation procedure, we assume the slab Moho is a flat sheet and JMA2001 [*Ueno et al.*, 2002] is used for the background velocity model. Comparing the interface dips estimated in this study with the direction of slab motion determined by the GPS observation, we can classify the slab beneath the Kii Peninsula into three segments: east, center and south. Within the eastern part of the peninsula, the plunge azimuth of the velocity interface is rotated 40^o clockwise relative to the slab displacement direction. This clockwise dip-azimuth rotation averages only 20^o in the central part, and increases to more than 70^o within the southern part of the Kii Peninsula. The segments correspond to distinct source fault zones of past megathrust earthquakes and to the spatial distribution of intraslab seismicity. The boundary between the eastern and central regions of the Kii Peninsula corresponds to the region where a topographic high in the slab interface is subducting [*Hirose et al.*, 2007; *Shiomi et al.*, 2008] and the intraslab seismicity shows double-layered activity [*Miyoshi and Ishibashi*, 2004]. The boundary between central and southern regions is coincident with the segment boundary of megathrust earthquakes in the Nankai region. The structural features revealed by RF-stacking may be key to the seismotectonics around the Kii Peninsula.