Is there Philippine Sea Plate below Mt.Fuji?

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An eruption rate of Mt. Fuji has been extremely larger than most other island-arc volcanoes in Japan. A typical eruption product from an island-arc volcano is andesitic, while Mt. Fuji has been erupted basaltic products. The tectonic situation around Mt. Fuji is very complicated: the Philippine Sea Plate is colliding with the North American Plate at Izu peninsular, and is subducting beneath the Eurasia Plate along the Nankai Trough. Mt. Fuji lies the boundary area between the colliding and the subducting regions. Even though this region is very active tectonic zone, the seismicity below Mt. Fuji is quiet, resulting little knowledge about the structure of the Philippine Sea Plate (the PHS Plate) below Mt.Fuji. Takahashi (2000) said the PHS plate is splitting below Mt.Fuji and mantle material is rising like oceanic ridge. However, Geophysical evidences for this model had not been found until 2004.

From September to December in 2000 and from April to May in 2001, many deep-low-frequency seismic events occurred below Mt.Fuji. Then, National universities in Japan cooperated various researches about Mt.Fuji. On the ground of Magnetotelluric (MT) survey, Aizawa et al. (2004) obtained a low resistivity below the eastern side of Mt. Fuji, considering the geophysical evidence of Takahashi's model. On the other hand, Nakamichi et al. (2007) pointed out the existence of PHS plate below Mt.Fuji based on the tomography imaging of seismic velocity. In this way, no one knows whether there is PHS Plate below Mt.Fuji or not.

In this paper, we study the structure of PHS plate below Mt. Fuji using a receiver function technique. Receiver functions (RFs) are an effective tool in the seismic investigation of velocity gaps: the multiple-taper correlation (MTC) receiver function technique (Park and Levin, 2000) is employed in our analysis. We use seismic data of about 180 teleseismic events, which occurred from autumn in 2002 to spring in 2005 and recorded at 38 temporary stations and 115 permanent stations around Mt.Fuji, involving Hi-net data and JMA data. We check these waveforms and select good events with high SN ratio. After calculating RFs, we divide into 36 groups according to back-azimuth and stack these RFs in each station, transforming the time axis of RFs to the depth (km). In this transforming, we use structure calculated by a result of structural exploration below Mt.Fuji and Izu. In other area, we use the velocity structure used in the JMA routine hypocenter determination. Then we calculate vertical cross sections of the receiver functions' amplitude.

As a result, moho boundary cannot be seen below Mt.Fuji, by comparison with other area where the seismicity is active and the boundary of the PHS plate is well known. However, something high velocity layer is recognized below Mt.Fuji, which may be the moho boundary of the PHS plate.