Sharp top and bottom boundaries of subducting Pacific plate observed via vectorial receiver functions for a dipping interface

Hitoshi Kawakatsu[1]

[1] ERI, Univ of Tokyo

To image the subducting Pacific plate better, we have extended the treatment of Kawakatsu and Watada (2007, Science; hereafter KW07) in which they had corrected for the effect of a dipping interface on seismic receiver functions (RF) to have successfully imaged a low-velocity layer atop of the subducting slab beneath northeastern Japan; here we use two horizontal components of RFs to image the subducting Pacific plate. The dip angle of the Pacific plate estimated from seismicity (Gudmundsson and Sambridge, 1998, JGR) is employed to correct the effect of the dipping interface. For each potential conversion point, only a P-S conversion which satisfies the Snell's law on the dipping interface is used for RF. Two horizontal component RFs are then rotated to the direction of expected polarization of P-S converted waves from the interface, and stacked at the conversion point in such a way that the amplitude corresponds to the possible S-wave velocity jump at the interface. This method is applied to Hi-net recording of teleseismic events from 2001 to the end of 2006. The selection criterion of events is the same as that of KW07 except for the period of data set which was obtained by courtesy of the Hi-net data center. The total number of events analyzed is 681, and the number of RFs is more than 300,000.

Preliminary results show a clear image of the top of the slab similar to that of KW07. Furthermore, a clear image of an apparent bottom boundary of the subducting Pacific plate which is consistent with Tonegawa et al. (2006, EPSL) is observed. There also exist signatures inside of the slab which appear to correlate with seismicity, and they may correspond to serpentinized slab mantle. The deeper slab interface below 200km depth postulated by KW07 as a deeper continuation of the water pathway is also observed. All these images should correspond to sharp interfaces observable at ˜3s period; i.e., less than ˜12-15km.