Migrating Japanese subduction zone

Hitoshi Kawakatsu[1]; Shingo Watada[2]

[1] ERI, Univ of Tokyo; [2] Earthquake Research Insititute, U. of Tokyo

We have extended our receiver function (RF) analysis to map the seismic discontinuity structure beneath the Japanese islands using Hi-net data (Kawakatsu and Watada, last year). From the conventional RF analysis, the 660km discontinuity had been shown to be deflected downwards as much as ˜40km with a width of approximately 500 km where the Pacific plate appears to stagnate in recent tomographic models; the narrow depression of the 660km discontinuity beneath southwest Japan appears to be consistent neither with a simple penetrating slab, nor with a flat stagnating slab near the boundary (Bina and Kawakatsu, 2005@Erice). A more complex slab morphology in the transition zone may be required to explain the observation.

Encouraged by the continuous image obtained by the simple RF analysis, we have further applied a Kirchhoff type migration to the same data set. As the full migration does not give reasonable image, we have restricted to recover the wavefield sub-horizontal (conversion plane within 15 degrees from horizontal) and sub-parallel to the slab dip (within 18 degrees from the local slab dip estimated from the slab contour of Gudmundsson & Sambridge (1998)). Some of the features seen this image are: (1) weak slab signature ˜100-150km depth, which may correspond to the location of basalt to eclogite transition in the subducting oceanic crust, (2) ˜10km elevation of the 660km discontinuity at the ocean side of the Japanese subduction zone, which appear to coincide with the slow P-wave velocity anomaly in a recent tomographic model (Obayashi and Fukao, 2001), (3) though highly speculative, a possible deep (˜800km) structure. As the present image is obtained in a low frequency range (0.1-0.5Hz), we plan to apply the same migration to higher frequency range data to obtain finer images. Velocity analyses will be also attempted.