

Slab-mantle coupling condition beneath northeastern Japan estimated from distribution of serpentinite

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Seismic evidences (Kawakatsu & Watada, 2007; Tuzji et al., 2008) shows a serpentinite layer in the mantle wedge just above the Pacific slab at depth 90-130 km beneath northeastern Japan. This is inconsistent with the hypothesis of common depths (about 80km) of slab-mantle decoupling among subduction zones (Wada & Wang, 2009). Numerical models show that at the transition depth from the decoupling to coupling, slab surface temperature increase abruptly so that serpentine become unstable at deeper depth. I examined several different coupling conditions in numerical models. The model assuming slab-mantle coupling at 130 km and gradual upward decoupling shows temperature distribution consistent with geophysical evidences. This result suggests that the decoupling depth is controlled by temperature distribution and varies among subduction zones.

Keywords: subduction zone, serpentinite, mantle wedge, thermal structure