DEEP ELECTRICAL CONDUCTIVITY STRUCTURE BENEATH THE NORTHWEST PACIFIC

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Since August, 2001, we have been conducting seafloor electromagnetic (EM) observation at a site called NWP on the North-West Pacific basin (Toh et al., 2004; Toh et al., 2006). We applied the magnetotelluric (MT) and geomagnetic depth sounding methods to the observed 5-component EM field of approximately 1200-day long to yield electrical conductivity in the deep mantle. The one-dimensional (1D) electrical conductivity structure was then estimated using both the static shift corrected MT response and the scalar MT response converted from the so-called Schmucker's C-response. The characteristics of the derived 1D model that penetrates to depths well below the 660-km seismic discontinuity are summarized as follows:

1) The resistivity-thickness product of the uppermost lithosphere is of the order of 10^{10} Ωm, which is one order of magnitude larger than those reported in the northeast Pacific (e.g., Cox et al., 1986). This means a very cold lithosphere beneath NWP depleted in volatile elements including water.
2) A conductive asthenosphere centred at a depth of 200km has been detected, which is, in turn, consistent with the result beneath the northeast Pacific (Lizarralde et al., 1995). The cause of the conductive asthenosphere can be explained by the presence of small amount of water (~0.06 wt %), which is less than what is necessary for the onset of hydrous melting.
3) Discontinuous jumps of electrical conductivity at depths of 410 km and 660 km are within factors of approximately 10 and 2, respectively, where latter of the two is a more reliable estimate.

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