The first results of mantle electric structure beneath east part of China from geomagnetic observatory data

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Northeastern China is located in the back-arc region of the NW-Pacific subduction system. Recent seismic tomography studies revealed a high velocity layer lying in the mantle transition zone beyond the Wadati-Benioff zone beneath the back-arc region of East Asia (e.g. Fukao, 2002). The layer was interpreted as a stagnant subducted slab in the mantle transition zone. Besides, there prevails Neocene to Quaternary volcanic activity in NE China, which coincidently overlies the high velocity anomaly region. In order to get deeper insights on these relationships between seismic structures and volcanic activities, and aiming at giving independent information of the substructure, we have started to analyze long period continuous redording data from geomagnetic stations in the eastern part of China. We have also started magnetic recording at two stations near China-Mongol and China-Russia boundary areas, where no magnetic observatory exist.

In this presentation, we first show the results from the first analysis of the long period magnetic records from the existing geomagnetic observatories. GDS response functions between vertical and horizontal magnetic field components at more than 20 observatories in the eastern part of China have been obtained. Very long period (10ˆ5 - 10ˆ7 s) responses were obtained by using three component geomagnetic records for 11 yaers (1995-2005) or 4 years (2002-2004), respectively depending on the stations. MT impedances were derived from the GDS responses by assuming P10 source field configuration. As a result, remarkable contrast in MT impedance can be detected between in NE and SE China. Apparent resistivity values at all the stations decrease almost monotonously from several tens ohm-m to a few ohm-m as the period gets longer. In NE China, apparent resistivity becomes 10 Ohm-m at a period of about 3x10ˆ5 s, whereas at 10ˆ6 s in SE China. In order to examine this difference, we applied the 1-D Occam inversion to the responses and determined 1-D conductivity structures with smoothness constraint. The results indicate that the lower part of the upper mantle in NE China is from 10 to 100 times more conductive than that in SE China. We also briefly describe about installation of the two new magnetometers in Nov. 2007 and show characteristics of their first records.