

3D Imaging of crustal fluids under the NE volcanic arc

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Magnetotelluric (MT) method can image the crustal and mantle structure in terms of resistivity, which is sensitive to the existence and connectivity of fluids and melts. Previous MT studies in NE Japan have successfully imaged fluid/melt distribution under the seismically active regions (Ogawa et al., 2001; Mitsuhashi et al., 2001) and volcanic zones (Mishina, 2009; Asamori et al., 2010). However, these studies were restricted to two-dimensional modeling along profiles.

We have carried out wideband MT measurements in order to map the deep crustal fluids and melts under the volcanic arc in the NE Japan around the Naruko volcano. The area has several Quaternary calderas, such as Naruko, Onikobe, Sanzugawa and Mukaimachi calderas. The area has also high shallow seismicity and has one of the largest intraplate earthquakes, M7.0, in 2008 near the Kurikoma volcano. Thus the area is thought as a good test field to study the relation of fluids and volcanoes and intraplate earthquakes. We have 224 sites in total with average site spacing of 5km. From the three-dimensional modelling we have imaged (1) subvertical conductors which shallows towards the active volcanic zones under Onikobe, Naruko and Sanzugawa calderas, and (2) seismic activities over the resistive zones above the crustal conductors, which implies earthquake triggering by fluid migration into the brittle crust.