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A brand-new MT exploration to reveal electrical conductivity distribution of the upper mantle beneath Tohoku district

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One of the most important objectives in the Scientific Research on Innovative Area, "Geofluids", is to construct a "geofluid map" in which the morphology and distribution of geofluid in the crust and upper mantle in subduction zones are mapped. We plan to infer the geofluid map from both of the seismological (seismic velocity, Vp/Vs, Q etc.) and electrical conductivity structures. While plenty of three-dimensional (3-D) seismic tomographic images has been revealed, none of 3-D electrical conductivity distribution model has been proposed in terms of wedge mantle in subduction zones. Introducing the state-of-the-art mobile magnetotelluric (MT) observation systems (LEMI-417 and NIMS), we have started a brand-new MT observation at Tohoku district, northeastern Japan for the aim of 3-D electrical conductivity distribution in the wedge mantle.

Three-site's MT responses at around the Onikobe-caldera from 10 to 20000 seconds in period have been collected. The three sites locate in ca. 60 km along E-W direction that is parallel to the Pacific plate subduction. We used the BIRRP processing code (Chave and Thomson, 2004) to estimate MT responses. The YX-component (EW electric to NS magnetic fields) of MT phase responses at the westernmost site shows a distinctive increase over 1000 seconds in period; The typical value is ca. 55 degrees at 1000 seconds in period and 85 degrees at 3000 seconds, respectively. This attitude implies that a conductor in L-shaped on a plane is embedded in the subsurface beneath Onikobe-caldera (Cf. Ichihara and Mogi, 2009). Since three sites are insufficient to attempt 2-D and 3-D inversion modelings, we will perform the 1-D Occam inversion (Constable et al., 1987) using the average impedances and show the preliminary report in this presentation.