Interpretation of the high conductive anomaly of the Society hotspot

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A large-scale mantle upwelling beneath the French Polynesia region in the South Pacific has been suggested from seismic studies, and a slow velocity anomaly continues from the core mantle boundary to the upper mantle just beneath the Society hotspot [1]. However, the previous studies [1, 2] are not enough to understand the geometry, temperature, and composition of the Society hotspot. Then, we carried out the TIARES project that composed of multi-sensor stations including BBOBSs, OBEMs, and DPGs from 2009 to 2010 [3].

We have analyzed marine magnetotelluric data obtained totally 20 sites around the Society hotspot, and revealed a three-dimensional shaped high conductive anomaly, like a thumb, beneath the Society hotspot. In order to clarify the cause of the high conductivity, water content, melt fraction, and H2O and CO2 contents in the upper mantle were estimated by adopting results of rock experiments at high temperatures and pressures. As a result, the upper mantle in the high conductive anomaly involves more melt, H2O, and CO2 rather than that in the surrounding area. Furthermore, temperature of high conductive anomaly might be higher than the surrounding area. It appears that a large amount of fluid and temperature transfer through the plume.