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Three-dimensional conductivity image of the Society hotspot using marine magnetotelluric data

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The mantle upwellings are one of the most important features for understanding the mantle dynamics. A large-scale mantle upwelling beneath the French Polynesia region in the South Pacific has been suggested from seismic studies, which is called the South Pacific superplume, and a slow velocity anomaly continues from the core mantle boundary to the upper mantle just beneath the Society hotspot (e.g., Suetsugu et al., 2009). However, the previous studies 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 that include broadband ocean bottom seismometers, ocean bottom electromagnetometers (OBEMs), and differential pressure gauges from 2009 to 2010 (Suetsugu et al., 2012). In this study, we will present the results of observed data obtained from OBEMs.

In order to obtain three-dimensional (3-D) image of the upwelling of the Society hotspot in terms of electrical conductivity, we newly settled eleven OBEMs. In addition to these data, the old data obtained by Nolasco et al. (1998) was reanalyzed, and we obtained magnetotelluric (MT) responses at 20 sites totally. A 3-D marine MT inversion program (Tada et al., 2012; Baba et al., 2013), which can treat topographic change distorting EM data, was applied to these MT responses to estimate 3-D electrical conductivity image beneath the seafloor.

The result detected a 3-D shaped high conductive anomaly, like a thumb, elongating from the mantle transition zone to the uppermost upper mantle just below the Society hotspot. With regard to interpretations, we will make a presentation at another session (GD3.3/EMRP4.3/GMPV3.3/SM6.11).