

Recent marine magnetotelluric studies on hotspots

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Recent advances of marine magnetotelluric (MT) surveys and the data analysis enable us to image electrical conductivity of the upper mantle beneath hotspots in three-dimension, which can provide independent constraints about the mantle dynamics associated with the hotspot activities from other geophysical (seismological), geological, petrological or geochemical studies. We present two recent examples of marine MT studies for Society hotspot in the southern Pacific Ocean and Tristan da Cunha hotspot in the southern Atlantic Ocean. The former study has been conducted as a part of Japan –French collaboration project (Suetsugu et al., 2012). Tada et al. (2016) reported a distinct high conductivity anomaly beneath the Society hotspot that raises up from lower part of the upper mantle to a depth of approximately 50 km below sea level. They interpreted the anomaly is attributed to an upwelling of hot, volatile rich and thus partially molten material. The latter was the collaborative research project between Germany and Japan and the first result was reported by Baba et al. (2017). Contrary to the Society hotspot study, the MT data did not indicate any distinct conductive anomaly promising an upwelling from the deep in the mantle beneath the Tristan da Cunha hotspot. They discussed that the result may be explained by the upwelling is too weak to detect by the current data set or the upwelling takes place elsewhere out of the MT array. Both projects conducted seismological observations as well as MT and the seismological studies obtained mostly harmonic conclusions with MT studies (e.g., Isse et al., 2016; Obayashi et al., 2016; Geissler et al., 2017; Schlömer et al., 2017). Although it is important to discuss the mantle dynamics associated with the hotspot activities with many independent evidences, we would like to demonstrate, in this presentation, the potential ability of MT data for resolving possible upwelling at the stage prior to such discussion.

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