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Thermal structure and melt fraction distribution of mantle from a 3-D electrical conductivity structure beneath Kyushu

HATA, Maki[1*] ; UYESHIMA, Makoto[1]

[1]Earthquake Research Institute, The University of Tokyo

The Kyushu Island in the Southwest Japan Arc has many Quaternary active volcanoes, which exist along the volcanic front of N30^{o}E-S30^{o}W, in relation to the subduction of the Philippine Sea Plate (PSP). The volcanoes are located in northern and southern regions of the island, and no volcano is located in the central region between the two volcanic regions of the island. We have performed three-dimensional (3-D) inversion analyses to obtain a lithospheric-scale electrical conductivity structure (model) beneath the entire Kyushu Island using the Network-Magnetotelluric (MT) data [*Hata et al.*, 2015]. One of two major findings from a distribution of conductive anomalies in the model is that the volcanoes in the northern and southern volcanic regions have two different origins bordering the non-volcanic region at deep depths. Secondly, the degrees of magmatism and the relative contributions of slab-derived fluids to the magmatism vary spatially in the one non-volcanic and two volcanic regions. Then, in this study, we try to verify whether the respective conductivity anomalies impart a different effect on temperature and melt fraction.

We use laboratory work results to determine thermal structure and melt fraction distributions derived from the electrical conductivity structure beneath the Kyushu Island. The laboratory work results are relation between electrical conductivity and temperature for four nominally anhydrous minerals (Olivine, Orthopyroxene, Clinopyroxene, and Garnet) in solid phase, relation between electrical conductivity and temperature for hydrous basaltic melt in liquid phase, and a parameterization result of isobaric hydrous mantle melting. In this presentation, we will show our approach to determine temperature and melt fraction as a function of the water contents among the four mantle minerals and the basaltic melt, which integrate laboratory-derived conductivity and field-derived conductivity. We will also show thermal structure profiles and melt fraction distribution profiles of the mantle wedge beneath the one non-volcanic region and the two volcanic regions of the Kyushu Island.