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Electrical resistivity structure of the oceanic crust around hydrothermal vent sites on East Pacific Rise at N9 50'

TERAOKA, Takuya[1*] ; SEAMA, Nobukazu[1] ; EVANS, Rob[2]

[1]Department of Planetology, Graduate School of Science, Kobe University, [2]Woods Hole Oceanographic Institution

We report results of a Magnetometric Resistivity (MMR) survey around hydrothermal vent sites on East Pacific Rise (EPR) at N9 50'. The MMR method is one of the controlled methods, which is used to estimate electrical resistivity structure of the oceanic crust. The magnetic fields induced by 200 vertical bipole electric current source transmission points were recorded by 10 OBMs (Ocean Bottom Magnetometer) which were deployed in the on-axis, and further off-axis to a distance of approximately 4km. We estimated one-dimensional resistivity structure from all the data, and it indicates the three layers with different resistivity, presenting an average resistivity structure in the study area. The most upper layer has low resistivity, impling high porosity layer, the middle layer has high resistivity representing dike, and the bottommost layer has low resistivity, which is probably in association with the magma chamber or mashed melt zone. We introduce the magnetic field anomaly in order to determine the distribution of anomalous resistivity bodies in the oceanic crust. The magnetic field anomaly was calculated from the observed magnetic field data by subtracting magnetic field induced by the vertical bipole electric current source transmission in the average resistivity structure. Magnetic field anomaly map for the each OBM was obtained by plotting the magnetic field anomaly at each source transmission point. The magnetic field anomaly maps present the location of local anomalous resistivity bodies, which are possible due to hydrothermal vent actives and small-scale ridge tectonics.

Keywords: EPR, Magnetometric Resistivity method, controlled source method, hydrothermal vent