

Resistivity Structure of Hokkaido Komagatake Volcano using Wide Band MT Method

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Hokkaido Komagatake is a conical form stratovolcano and is located in southeast part of the Oshima peninsula, Hokkaido, Japan. Pumice eruption accompanied with pyroclastic flows have repeated since 1640. Recently, small phreatic eruptions occurred in 1996, 1998, and 2000.

Magnetotelluric (MT) surveys were conducted in August 2001, June 2002 and June 2003 to construct the 3-D resistivity structure in and around the Komagatake volcano. We used seven Phoenix Geophysics MTU-5 systems to observe the variations of electric and magnetic field. The apparent resistivity and phase were calculated for 40 frequencies in the range of 320 - 0.00055 Hz. The obtained data set were edited manually and applied the remote reference process to remove noisy data.

1-dimensional resistivity structure calculated by inversion analysis agree with the result of Tanimoto and Nishida (2000): volcanic edifice is low resistive. Below a frequency of 1 Hz, the skewness is far greater than 0.1 and it suggests that 1-dimensional analysis is not suitable. Furthermore, induction vectors at frequencies lower than 0.1 Hz tend to point to the neighboring ocean, suggesting that sounding curves are influenced by the high conductive ocean.

We made a 3-dimensional forward modeling considering the topography of Komagatake volcano, and the neighboring ocean. In addition, we assumed the existence of resistive blocks at a depth of 1-5 km at northern and western sides of volcano, and the conductor beneath the summit crater. As a result of the calculation, the tendency of sounding curves are explained.