

Resistivity structure of Unzen Volcano from Time Domain Electromagnetic (TDEM)

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The time-domain electromagnetic (TDEM) surveys were carried out around Unzen Volcano, Shimabara Peninsula, South-west Japan in February - March 2001 and 2002 covering mainly the eastern part of the peninsula. Inversion of the recorded transient magnetic fields resulted in resistivity structure which comprises of three main layers: resistive surface layer, a conductive layer (from 10 Ohm.m to 1 Ohm.m) from about 500 m to 3 km below the surface, and a third resistive layer. Combined with previous TDEM and magnetotelluric surveys, these results gave electromagnetic evidence to the presence of water-saturated layer spreading widely in Shimabara Peninsula. Conductance distribution which is derived as vertical integration of the conductivity at the interval of the water layer and regarded as robust parameter to investigate the water-magma interaction shows a W-E elongated pattern of high conductance from Tachibana Bay to the summit of Unzen (Fugen-Dake), which is in accordance with the path of magma migration derived from seismic and deformation studies. Another high conductance zone was also found near Mayu-Yama, indicating magma degassing process due to the possibility of the presence of a magma system beneath it.