Magnetotelluric transect of the Unzen graben and its correlation with seismic profile

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We conducted broad-band magnetotelluric (MT) survey along north-south trending survey line across the Unzen graben. MT survey line is located approximately 2 km west of the latest lava dome and consisted of 27 stations on 9 km profile. We estimated 3-D resistivity structure and investigate its correlation to the seismic reflection structure by Matsumoto et al. (2012), which was conducted in the same survey line. The best-fit resistivity structure shows the first resistive layer underlain by the second moderate conductive layer. The first resistive layer, which is interpreted as a water-unsaturated layer, is cut by four faults, i.e., the faults are relatively conductive. The second layer, which is interpreted as water-rich layer, also shows relatively conductive values near the faults. By assuming that the faults are imaged as relatively conductive zones, we infer the dip angles and its deep extensions of four faults. Beneath Chijiwa fault, which is the longest and the most active fault of the Unzen graben, the dominant conductor (C1) with the width of 2 km extend down to a depth of 4 km. C1 corresponds to the zone of strong reflection, and the pressure source B of Kohno et al. (2008) is located near the C1. In this study, we interpret C1 as the zone of fracture network generated by the Chijiwa fault to which the magmatic volatiles are supplied from the deeper pressure source B. In the center of the study area, vertical high resistive body (R1) exist and correspond to the zone of low seismic reflection. We interpret R1 as the zone of cooled dyke complex that may acted as a volcanic conduit.