Magma conduit and associated hydrothermal systems of Aso volcano as revealed by broadband magnetotelluric data

*Nobuo Matsushima[1], Mitsuru Utsugi[2], Shinichi Takakura[1], Tadashi Yamasaki[1], Maki Hata[3], Takeshi Hashimoto[4], Makoto Uyeshima[3]

1. Geological Survey of Japan,AIST, 2. Kyoto University, 3. The University of Tokyo, 4. Hokkaido University

Aso volcano is one of the most active volcanoes in Japan. The caldera forming eruptions occurred from 210 ka to 90 ka, emitting the volcanic product of 600 m^3 in total. The caldera has a dimension of 25 ×18 km^2. After the caldera forming eruptions, post-caldera cones more than 17 were formed at the center of the caldera. Resent eruptions occurred repeatedly at Naka-dake cone. The count of the eruption events from Naka-dake crater was 73 times from 1901 to 2015. These volcanic activities suggest the stable magma supply from deep seated magma source to the surface. To investigate the magma plumbing system, the resistivity structure under Aso volcano was analyzed using the broadband magnetotelluric (MT) data. The four components of MT impedance and two components of tipper vector were used to obtain the resistivity structure by three-dimension inversion (Siripunvaraporn and Egbert, 2009). Overall structure was obtained using 55 measurement sites in and around of Aso caldera (Hata et al., 2016). We observed additional 9 sites near Naka-dake crater and revised the previous model to examine mainly the shallow structure near the active crater. The resistivity structure represents the low resistivity (< a few Ω•m) body which extends from near surface to a depth of 15 km (bsl) with a columnar shape, dipping northward and roughly directs to the epicenter of deep low-frequency earthquakes. The top of the low resistivity body is just located below the Naka-dake crater at sea level, which corresponds to the upper bound of magma depth estimated by melt inclusion analysis (Saito et al., 2018). From these results, we conclude that the low resistivity body indicates the upper part of the magma plumbing system of Aso volcano from deep seated magma source to the present active crater.

Keywords: Aso volcano, resistivity structure, magma plumbing system

