Resistivity structure beneath Mt.Mihara, Izu Oshima by the ACTIVE System

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This study developed the skills to estimate and monitor resistivity structure by the Controlled Source Electromagnetic (CSEM) method. We use the system, developed by Takahashi.2005, ACTIVE (Array of Controlled Transient Electromagnetic for Imaging Volcano Edifice). The system consists of two parts: one is a transmitter; a grounded wire electric dipole to generate alternative pulsatile direct current, and the other is an array of receivers; vertical coil to measure the vertical component of the transient magnetic field by using induction coils at various distances.

We apply the system to investigate the current resistivity structure in the vicinity of Mt, Mihara volcano, Izu-Ohima in Central Japan. From the data observed by the ACTIVE, we calculate the response function, defined as the ratio of vertical Magnetic field at the receiver site to unit electric current generated by the transmitter in the frequency domain. Next, we inverted the response functions of 1-100Hz frequency bands to estimate the 1-D resistivity structure. As a result, we got the 3-stratified-layers structure from the ground surface to the bottom at a depth of about 1 km around Mt.Mihara: upper resistive layer, lower moderately conductive layer and lowest conductive layer. This structure is different from previous study, 2-layered resistivity structures reported in Takahashi.2005 and Ogawa et al.1989.

The 3-layered structure can be explained as rocks with unsaturated water, saturated water and sea water from the top to the bottom, called the Ghyben-Herzberg Lens (Eacker,1976;Barlow 2003). We will show the interpretation above and relating developed skills such as method of evaluating response, sensitivity estimation and new inversion algorithms.