

Three-dimensional inversion of resistivity structure for CSEM method and its application to the ACTIVE system in Izu-Oshima

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We developed a numerical solver of three-dimensional inverse problems for resistivity structure by the CSEM method. The forward calculation is based on the modified IDM (Singer, 1995; Avdeev et al, 1997), and is originally modified to drastically reduce both the computation time and memories by giving the 1-D Green's functions in horizontal wavenumber-domains analytically. The inversion is based on the hybrid method by the steepest descent and the quasi-Newton methods (Koyama, 2001).

We apply it on the ACTIVE system installed at Mt. Mihara in Izu-Oshima, which is a kind of the CSEM (Takahashi, 2006). Now the ACTIVE system is operated every other day; 1 Hz square currents (J) are injected at the electric line embedded at about 1 km distance in the south east of Mt Mihara and five stations observe the vertical magnetic field (Z). We try to detect the temporal change of the resistivity structure and elucidate the volcanic activity of the Mt. Mihara, analyzing the responses Z/J.

In our presentation, by using the change of the responses Z/J and the 3-D inversion code, we estimate the change of the resistivity beneath the Mt. Mihara. We discuss also further plans to install other receivers and transmitters to effectively detect the magma ascent in the future.