

## Topographic Effect in GREATEM data

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Airborne electromagnetics (AEM) is a useful tool for investigating volcanic structures because it can survey large and inaccessible areas. Disadvantages include lower accuracy and limited depth of investigation. The Grounded Electrical Source Airborne Transient Electromagnetic (GREATEM) survey system was developed to increase the depth of investigation possible using AEM. The method was tested in some volcanoes at 2004-2005. Survey results were verified by comparing the GREATEM data with another geophysical surveys and LOTEM data for the same location based on the transient response and resistivity structure. The resistivity structures obtained from both systems were almost identical.

Topographic effect in the airborne data is essential problem to apply it to survey in volcano. Anomalous geophysical responses due to topography are a potential cause of data distortion. Sasaki and Nakazato (2003) addressed this problem in the context of DIGHEM-type AEM, based on three-dimensional modeling. Their results showed that magnetic field responses decrease at the top of a trapezoidal hill and increase at its foot. They also pointed out that the topographic effect is not significant in higher-frequency data. H&ouml;rtd and M&uuml;ller (2000) discussed topographic effects in LOTEM data using three-dimensional modeling and concluded that the overall topographic effect is only significant at very early times, when it is manifest as a modification of the undistorted curve that nonetheless preserves its primary characteristics.

We investigated topographic effect in GREATEM data using a three-dimensional (3D) modeling method. The 3D modeling code used in this study was modified from the 3D modeling code used for the magnetotelluric method (Fomenko and Mogi, 2002). The code was added routine for computing electromagnetic field in the air due to a long grounded electric dipole source to apply for computing GREATEM response.

We used for slope models assumed an angle of 45 and 90 deg. and a height of 200 m in this study. Magnetic field intensity distribution of each component frequency at 10 Hz revealed that the imaginary part of horizontal components clearly varied at upper and lower side of the slope model, but the vertical component has not clearly varied. As to the transient response of the vertical component in time domain, the initial stage, less than 10ms, of the response curve varied with angles of the slope. A smaller effect of altitude in GREATEM diminished topographic effects in later time of response curve.