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GREATEM survey in Tokachidake Volcano

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The GREATEM system uses a grounded electrical dipole source of 2-3 km long as a transmitter and a three-component magnetometer in the towed bird as a detector. With a grounded source, a large-moment source can be applied and a long transmitter-receiver distance used, yielding a greater depth of investigation but limiting the survey area. Data are recorded in the time domain, providing a raw time series of the magnetic fields induced by eddy currents in the ground after cutting off the transmitting current, meaning that a noise filter can be easily introduced. The GREATEM system is considered to be an airborne version of the Long Offset Transient ElectroMagnetics (LOTEM) system (Strack, 1992), one of the electromagnetic survey systems used in surveying deeper structures.

GREATEM survey was carried out in Tokachidake Volcano and surrounding area at September, 2009. Tokachidake Volcano is located at the SW end of the Daisetsu-Tokachi volcanic chain in the central highlands of Hokkaido, northern Japan. According to Katsui (1990), effusive and explosive products characterize the eruptive history of Tokachidake Volcano and are divided into three temporal groups termed Older, Middle, and Younger Tokachidake Volcano Groups. The distribution of eruptive centers appears to be structurally controlled, reflecting the presence of a concealed cauldron. Tokachidake Volcano previously erupted in ca. 240 B.C., 1670, 1857, 1887, 1926, 1962 and 1989. The resistivity structures obtained by the GREATEM survey indicate that the younger lava flows and volcanic products show relatively resistive and older ones show conductive. Very low resistivity layers, less than 10 ohm-m, are distributed at the flank of volcanoes. These layers probably correspond to saline ground water reservoir. The conductive layers which appeared at beneath craters probably correspond to a hot water circulating zone.

Keywords: Volcano Structure, Subsurface Structure, Airborne Electromagnetics