

Ground magnetic survey over fumarolic areas in the Nish-yama craters, Usu volcano, Japan

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The Geological Survey of Japan, AIST conducted a ground magnetic survey over fumarolic areas in the Nishi-yama craters, Usu volcano, Hokkaido Japan in October 2006 to better understand the origin of the magnetic lows, which had been observed in the same areas by previous surveys. We employed a Cesium magnetometer to measure total magnetic intensity at an interval of 2 m along five survey lines traversing the fumarolic areas in a direction of ENE. We used a DGPS system for positioning of node points and a measuring tape for positioning between each node. Diurnal variation of the Earth's magnetic field was also observed by a proton magnetometer and was removed from the observed magnetic values. The resultant magnetic profiles showed local magnetic lows extend further to NNW, corresponding well to fumarolic areas. However, similar magnetic lows were also observed further north across a newly built road, where no fumaroles are seen.

Rock magnetic measurements were conducted for Tertiary and Quaternary volcanic rocks from outcrops on ground and inside a tunnel in the vicinity of the area, indicating reverse magnetizations of these rocks. There has been also confirmed a contrast among magnetization intensities and porosities of these volcanic rocks (Okuma and Ishizuka, in preparation).

On the basis of these results, it is implied that the magnetic lows were originated mainly by reversely magnetized bodies with high porosities, causing high temperature fluid to pass through the bodies easier than the surrounding ones.