

Non-destructive magnetic detection of thin ash layers in ice cores

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We will make a presentation on the results of non-destructive magnetic detection of ash layers in ice core samples with an LTS-SQUID gradiometer developed for non-destructive evaluation. The LTS-SQUID gradiometer have a planar pickup coil with 1.5 mm x 1.5 mm area and the baseline of 3 mm. Volcanic ash sample collected from 2008 eruption of Sakurajima volcano at Sakurajima and AT tephra sample collected in Hokkaido were used to imitate ash layers in ice cores. Both of the model ice core samples gave reasonable signals by artificial magnetization. Preliminary estimate of the detection limit for the current system and configuration is of the order of $\sim 1 \times 10^{-4}$ A/m. The sensitivity is very much enhanced when the magnetic sensor is lowered just above the model ice cores. High sensitivity non-destructive magnetic detection of ash layers will be an important method to identify stratigraphic horizons of volcanic activities combined with electrical conductivity signals related to sulfate supplied at the time of volcanic eruptions.

Keywords: ice core, tephra, nondestructive measurement, SQUID gradiometer, magnetic mineral, age model