# Feasibility study on monitoring the volcanic activity at Sakurajima by geomagnetic field observations

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We report on simulated results of geomagnetic field observations at the Sakurajima volcano, Japan, where several attempts of the geomagnetic field observation was not very successful.

The repeat observation of the geomagnetic field at Sakurajima was conducted by Japan Meteorological Agency for 1978-1998 giving a disappointing result that no volcanic signal was obtained. This is partly because we could not installed instruments within 2km of the crater and because magnetization of volcanic ashes significantly disturbed the observation. Yamazaki (1997) numerically modeled piezomagnetic effects at Sakurajima showing that a variation of several nT can be generated by a huge eruption such as the one in the Taisyo era, while the order of 0.01nT is expected in other cases.

We modeled the demagnetization or induction effect on the geomagnetic field in three cases here; (1) a recent long term magma supply, (2) an eruption at the Syowa crater in June, 2006, and (3) an intrusion of a small scale dike.

The demagnetization effects in the cases (1) and (2) are estimated as the order of 0.01nT which is the lower limit of observation by a proton-precession magnetometer. If this level of amplitude is required, a underground observation should be considered to avoid the volcanic ashes and this would resulted in a very limit number of observation sites.

On the other hand, a variation of the geomagnetic transfer function generated in the case (3) could be the order of 0.01 at periods from 0.1 to 10 seconds which is an observable level by a fluxgate magnetometer.

It is indicated that a geomagnetic observation by a proton-precession magnetometer could detect only an abrupt change generated by a huge eruption, while that by a fluxgate magnetometer could monitor an apparent resistivity change in the shallow area as well as the abrupt change.