A role of water in magma cooling infered from geomagnetic changes

Yoshikazu Tanaka [1]

[1] Aso Volcanological Laboratory Kyoto Univ.

Thermal energy trapped in a shallow part of the ground was estimated through geomagnetic changes at Aso and Kuju volcanoes. Thermal states fluctuated within10^21 erg on Aso, while 500MW vapour was released continually from the new vents of Kuju and the coincide increase of geomagnetic changes was observed. Those relations suggest existence of super pressurized gas barrier between a hot magma body and aqua zone. The closed vent causes expansion of the barrier and decreasing of magnetization. If the vent is opened water comes to the hot region and vapolized steam escapes throuhg the vent. Thus the magnetization of the rocks should increase. This mechanism will keep no phreatic explosions at the vent.

Some aspects of the interactions between magma and ground water were revealed by the geomagnetic observations at Aso and Kuju volcanoes. Thermal energy trapped in a shallow part of the ground may be estimated through geomagnetic changes. The thermal states fluctuated within10^21 erg on Aso, while 500MW vapour was released continually from the new vents of Kuju volcano and the coincide increase of geomagnetic changes was observed. This energy balance between fumarole and estimated geomagnetic ones means that the most of steam is formed by interactions between the ground water and hot rocks near the vent, and also suggests existence of super pressurized gas barrier between a hot magma body and aqua zone. When the outlet of the vent is closed the barrier expanded and magnetization is decreased. If the vent is opened the barrer pressure decreases, then the ground water comes close to the hot region and vapolizes and the steam escapes throuhg the vent. Thus the magnetization of the rocks should increase. This mechanism will keep no phreatic explosions at the vent.