

Paleomagnetic study of the Holocene volcanic rocks from post-caldera central cones of Aso Volcano

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We have conducted a paleomagnetic study on Holocene volcanic rocks from post-caldera central cones of Aso Volcano. On the basis of the previous studies (e.g. Miyabuchi, 2009), these volcanic rocks (lavas and scoria cones) were considered to be formed above the K-Ah tephra (7300 cal year BP). Except a ¹⁴C age, no radiometric age is reported for these young lavas and scoria cones.

Paleomagnetic sampling was made at 25 sites of seven units. Nineteen sites gave reliable mean paleomagnetic directions that had a 95% confidence circle of lower than 5 degree. The other sites of large (> 5 degree) 95% confidence circle tend to have a strong natural remanent magnetization, which suggests that local magnetic anomaly at the sites may to be related to the large scatter of natural remanent magnetization (NRM) directions.

Interestingly, different sites from a few lavas, which had been treated as a single unit in the geological map of Aso Volcano (Ono and Watanabe, 1985), gave distinct mean directions at 95% confidence level. For Kishimadake lava, Ojodake lava, lavas from Nakadake young edifice, two or three different mean directions were obtained from multiples sites. These differences in mean directions indicate that multiple flows were extruded with a temporal gap of more than 10 or 100 years. We also found that Kamikomezuka scoria, two sites of Kishimadake lava, two sites of Ojodake lava, and two sites of Nakadake lava gave identical mean directions at 95% confidence level. The concordance of the mean directions suggests that the multiple vents erupted simultaneously, in a time interval of the order of 10 years, and these lavas were extruded over a wide area of the post-caldera central cones. On the basis of the volcanic stratigraphy, the event of the simultaneous eruptions appeared to occur between 3000 and 5000 years BP.

Keywords: paleomagnetic direction, Aso Volcano, lava, scoria, simultaneous eruptions