阿蘇カルデラ南西壁に分布する火山角礫岩（先阿蘇火山岩類）の定置過程

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Paleomagnetic investigation of emplacement process of lithic breccia distributed in the southwest wall of Aso Caldera

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Magnetic properties of lithic breccias are important to access its emplacement process. Remanent magnetization of lithic breccias is used to determine emplacement temperatures of the breccia. Magnetic mineral contents also reflect temperatures at the time of emplacement.

This study illustrates the emplacement process of the lithic breccia distributed in the southwest caldera rim of Aso caldera based on paleomagnetic viewpoint. The Aso caldera is located in central Kyushu. The four caldera-forming eruptions have taken place between 300 and 90ka. The pre-caldera volcanic products are distributed in the caldera wall. The southwest caldera wall is composed mainly of thick pyroclastic rocks, which include lithic breccias, tuff breccias, lapilli tuffs and tuffs. Takajosan pyroclastic rocks (Hase et al., 2008), which are intruded by the andesitic dikes of approximately 0.5-0.8Ma (Watanabe, 1989), are distributed around the southwestern caldera-rim. The proximal coarse lithic breccias of Takajosan pyroclastic rocks are exposed within 1km from the source. The breccias tend to change laterally into the pumiceous tuff breccias and the pumiceous lapilli tuffs. The location of the source for the pyroclastic rocks is inferred to be at around the Green Pia Minami Aso, using the imbrication of clasts, bedding and dune structures.

Paleomagnetic samples have been collected at ten sites of lithic breccias, one site of matrix, and one site of breccias in basal part of erosion structure. Thermal demagnetization experiment is carried out to the samples up to 695C, and multiple components of natural remanent magnetization are observed from every sample. A low-temperature component has unblocking temperatures of about 250-500C. Directions of the low-temperature component from ten lithic breccias sites have northward declinations and slightly steep inclinations, which is different from the present Earth’s field direction around the Aso caldera. The lithic breccias are considered to have emplaced at temperatures up to 500C through pyroclastic process. The directions of a high-temperature component from these sites are highly scattered. The site composed of matrix showed a viscous remanence erased by 175C, and the low- temperature component was observed between 175 and 450C. Thermal demagnetization of a composite isothermal remanence showed an unblocking temperature of 450C, and therefore essential material of the pyroclastic flow was emplaced more than 450C. Directions from the breccias in basal part of erosion structure are indistinguishable from those from the lithic breccias of ten sites, indicating that the erosion structure is not resulted from debris flow but from pyroclastic flow.