

溶岩中の板状節理の形成メカニズムに関する野外地質学的考察 Field geological considerations on the formation mechanism of platy joints in lava flows

佐藤 景^{1*}; 石渡 明²

SATO, Kei^{1*}; ISHIWATARI, Akira²

¹ 東北大学大学院理学研究科, ² 東北大学東北アジア研究センター

¹Grad. School Sci., Tohoku Univ., ²CNEAS, Tohoku Univ.

Columnar jointing and platy jointing are characteristic types of jointing in volcanic rocks. The origin of columnar joints has been discussed for centuries, and at the present day it is considered that they are the result of cooling and contraction of lava (Aydin and DeGraff, 1988). However, platy joints have far less attracted researchers than columnar joints and their formation mechanism is still controversial. Platy joints can develop in thick (>100 m) and voluminous lava flows which have glassy margins such as "flood andesite" in Kyushu, Japan (Nagao et al., 1995) and ridge-forming lava flows at Mount Rainier (Lescinsky and Sisson, 1998), probably reflecting stress distribution or physical property within solidifying lava. Previous studies attributed formation of platy joints (sheeting joints) to late stage shear of lava flow and/or microlite orientation (Lescinsky and Fink, 2000), deflation of flow (Spörli and Rowland, 2006) or both flowage and shrinkage of lava (Bonnichsen and Kauffman, 1987). Although absolute evidence for the origin of platy jointing has not been found, restraining of internal lava by solidified flow margin would be an important factor in any case and density (volume ratio of crystals to glass) difference between flow margin and interior would be also important when we consider thermal contraction. It is also a problem when platy joints form, especially in the case that columnar and platy joints intersect without terminating each other. Occasionally platy joints are filled with tridymite and/or mica mineral with or without andesitic to dacitic melt, which might be segregated from the crystallizing lava body, suggesting that platy joints start to form at early stage of cooling of lava.

References:

Aydin and DeGraff, 1988, *Science*, 239, 471-476.

Bonnichsen and Kauffman, 1987, *GSA Special Papers*, 212, 119-145.

Lescinsky and Fink, 2000, *J. Geophys. Res.*, 105, 23711-23726.

Lescinsky and Sisson, 1998, *Geology*, 26, 351-354.

Nagao et al., 1995, *Mem. Geol. Soc. Japan*, 44, 155-164 (in Japanese with English abstract).

Spörli and Rowland, 2006, *J. Volcanol. Geotherm. Res.*, 157, 294-310.

Keywords: platy joints, flood andesite, internal flowage, thermal contraction, segregation vein