

Evaluation of the influence of alteration on K-Ar dating for Hawaiian tholeiites

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To obtain reliable K-Ar ages, the lava samples need to meet various requirements, and lack of K and Ar loss during weathering or alteration is one of the most important considerations. It is desirable to choose fresh rock samples that have not been affected by weathering/alteration; however, such samples are generally not available among the tholeiitic lava of shields older than about 1 Ma. In order to evaluate the influence of alteration on K-Ar dating for Hawaiian tholeiites, unspiked K-Ar ages were measured for 21 samples from four lava flows with varying degrees of alteration collected from the Makapuu Head section of Koolau volcano, Hawaii. The samples were classified based on freshness of olivine phenocrysts and the groundmass olivine, and the presence of secondary minerals in vesicles. The age data was evaluated by means of K_2O/P_2O_5 ratios, ^{36}Ar volumes, and calculated atmospheric Ar contamination. The results indicate that the ages for samples with fresh groundmass olivine are reliable, even though olivine phenocrysts may be slightly altered (thin reaction rims) or secondary minerals may have crystallized in the vesicles.

Keywords: K-Ar dating, alteration, tholeiites, Hawaiian volcano