Title
U-Th/He Dating of Basalt

Authors
Aciego, S.
DePaolo, D.
Kennedy, B.
et al.

Publication Date
2005-02-15

Please ensure that your abstract fits into one column on one page and complies with the *Instructions to Authors* available from the Abstract Submission web page.

U-Th/He Dating of Basalt.

S. ACIEGO[1,2], D. DEPAOLO[1,2] B. KENNEDY[2], AND J. CHRISTENSEN [2]

[1]Department of Earth and Planetary Science, UC Berkeley, Berkeley, CA 94720, USA (aciego@eps.berkeley.edu)
[2]Lawrence Berkeley National Lab, Berkeley, CA 94720

Determining ages and/or time scales for Quaternary (<1.8 my) basaltic eruptions still remains a challenge. Despite considerable progress in the fields of C-14, Ar-Ar, and cosmogenic nuclide dating, no single method with wide applicability has emerged and those methods that have been used often do not overlap in time or type of applicable material. We have investigated the use of the U-Th/He system as a method for dating the eruption age of volcanic rocks. Our first step was to assess the viability of using this dating technique on young samples (Aciego et al, 2003). The second step is to apply this technique to a system that has some age constraints, but that could benefit from direct age measurements. For this purpose we have chosen to focus on two areas: (1) a set of basalt samples from the Snake River Plain of Idaho and (2) a suite of post-shield alkalic basalts from the Big Island of Hawaii. Both sets of samples have upper and lower bounded age constraints, but individual flows have not been dated.

One of the drawbacks associated with using the U-Th/He technique on olivine has been the different sources of error. First, the olivine typically has low U,Th concentrations, making measurement of U,Th and He difficult. In the absence of improvements in mass spectrometer sensitivity, one way to overcome this is to measure larger amounts. The low concentrations of parent and daughter products also necessitates measuring the parent and daughter on the same aliquot, as small variations in parent or daughter between separate aliquots would produce large erros in the calculated age. For this purpose, a furnace was designed capable of heating 1-2 g of sample then retrieving the melted sample for U, Th determination. Second, the basalt matrix has more U and Th than the phenocrysts leading to a He implantation effect. Modeling of the injection-ejection effects indicate that the corrections are small. Ages have been measured for several basaltic lavas ranging from 100 to 350 kyr. The ages are consistent with geological constraints and have 1-sigma errors of ±6%.

References

[1] Aciego et al. (2003) *EPSL* **216**, 209-219