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**Award Abstract #0549082****MARGINS Post-doctoral fellowship - Jeremy Boyce: Exploring the Record of Magmatic Volatiles in a Volcanic Arc via H, C, F, S, and Cl in Apatite**

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ABSTRACT

Abstract An underexploited tool for determining magmatic volatiles lies in measuring the chemistry of volatile-bearing igneous minerals. Specifically, apatite (nominally $\text{Ca}_5(\text{PO}_4)_3(\text{OH},\text{F},\text{Cl})$) incorporates the key elements H, C, F, Cl, and S and has previously been used to constrain Cl, F, and S concentrations in ancient magmas. Under this funding, the PIs propose to develop and apply the secondary ion mass spectrometer (SIMS, or ion microprobe) to measure variations in

volatile element concentrations (in conjunction with REE and other trace elements) in apatites from extrusive rocks from the Costa Rica arc, where the type of material being subducted has been known to change over the past 60Ma. SIMS combines the ability to quantitatively measure all of the above-mentioned elements with unmatched spatial resolution ($<<1\mu\text{m}$ in depth profiling mode, $<2\mu\text{m}$ in point analysis mode). Intracrystalline zoning of volatiles may represent the evolution of one particular magma body while variations in apatite volatiles throughout the history of a particular volcanic setting may indicate changes in the source, important goals of the MARGINS program. Broader impacts include the fact that Boyce is a post-doc, that a new technique will be explored, that a museum exhibit will be created, and that SIMS work will be performed, helping with SIMS community infrastructure.

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