North-Central Section - 57th Annual Meeting - 2023

Paper No. 22-2
Presentation Time: 8:25 AM

INSIGHTS INTO THE SOURCE OF CONTINENTAL ARC MAGMATISM: A STUDY OF MAFIC MINERAL CLUSTERS FROM THE CENTRAL ANDES

SEDAGHAT, Azadeh and MCLEOD, Claire, Department of Geology and Environmental Earth Science, Miami University, 118 Shideler Hall, Oxford, OH 45056

Subduction zones are where magmatism, sedimentary processes, climate–carbon cycles, mountain building processes and plate movements are connected. This results in significant cycling and exchange of material between the lithosphere and the planetary interior. In addition, they represent sites at which Earths' continental crust is understood to have differentiated and evolved. Within this context and given the extensive history of active margin tectonics (100s of millions of years), the Central Andes offers an opportunity to evaluate the tectonomagmatic processes associated with volcanic arc evolution and crustal differentiation over a range of temporal and spatial scales. One of the challenges in the Central Andes is deciphering the nature of primitive, mantle-derived, arc magmas due to open system processes occurring in the thick overriding continental crust (70-80 km). To address this, we focus our study on back-arc, monogenetic volcanoes as opposed to on arc, polygenetic volcanoes. This is due to monogenetic centers likely being sourced from one batch of magma (mantle-derived) with limited interaction with the overriding plate.

Lavas from the Quillacas volcanic center form the basis of this study. Samples have been investigated via polarized light microscopy and SEM EDS. Future work will include in situ analyses of mineral grains via EPMA and LA-ICP-MS.

Studied lavas are fine-grained, with a bulk andesitic composition and porphyritic texture. The crystal population is dominated by hornblende and plagioclase. Biotite, quartz, and oxides are present in minor amounts with rarer apatite. The groundmass consists of plagioclase microlites and microphenocrysts of hornblende, oxides, and glass. Within these studied lava samples are rare mafic mineral clusters. These consist of olivine, orthopyroxene and Cr-spinel. Olivine ranges from ~250µm - ~800 µm and is often rimmed with amphibole. Orthopyroxenes are ~1800 µm and Cr-spinels range from <5µm to 34µm in diameter. Cr-spinels occur within the interior of both olivine and orthopyroxene. Preliminary EPMA data revealed olivine have high mg# (87). Future study of these rare mafic mineral clusters aims to provide new insights into the nature of primitive magmas in the Central Andes.

Session No. 22

T25. Future Directions in Mineralogy and Petrology: A Session for Undergraduate and Graduate Researchers
Friday, 5 May 2023: 8:00 AM-12:00 PM

EC 410 (L.V. Eberhard Center)

Geological Society of America *Abstracts with Programs.* Vol. 55, No. 3
doi: 10.1130/abs/2023NC-386739

Back to: T25. Future Directions in Mineralogy and Petrology: A Session for Undergraduate and Graduate Researchers

<< Previous Abstract | Next Abstract >>