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GSA Annual Meeting in Indianapolis, Indiana, USA - 2018

Paper No. 41-14

Presentation Time: 9:00 AM-5:30 PM

MAFIC ENCLAVES FROM THE QUILLACAS VOLCANIC CENTRE IN THE BOLIVIAN ANDES: INSIGHTS INTO ARC MAGMATIC SYSTEMS

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Arc volcanoes are characteristic features of many convergent margins where the downgoing oceanic lithosphere partially dehydrates, resulting in the generation and ascent of magma towards Earth's surface. Key to understanding the nature of these systems are petrographic and geochemical studies of the erupted volcanic products and their entrained components. The objective of this research is to integrate microscale information (e.g. chemical zonation) with the macroscale (e.g. thin section observations, bulk chemistry), to evaluate the potential significance of coarse-grained, amphibole-rich (90%) mafic enclaves erupted from the 1.42 Ma Quillacas monogenetic volcanic center in the back arc of the Bolivian Andes. The mineralogy and associated chemistry of these samples will be considered within the context of the magmatic evolution of monogenetic volcanic systems, and within the framework of Central Andean volcanism. These mafic enclaves have the potential to provide new insights into part of the magmatic system that may not otherwise be represented either physically or chemically by the erupted lavas. Optical microscopy observations, crystal size distribution analyses, and bulk rock elemental data will be combined with in-situ analyses of constituent phases (e.g., amphibole and plagioclase feldspar) in order to evaluate their petrogenesis. To date, petrographic studies have shown that these samples (n=10) are dominated by porphyritic, phaneritic, interstitial, and poikilitic textures. Mineralogically, the samples consist of 85-90% amphibole, 5-10% plagioclase, 0-5% quartz, and 0-5% opaque phases. Chemically, these samples are distinct from similar-aged Central Andean magmatic rocks (e.g. bulk rock 43.6 - 44.2 wt. % SiO₂, 12.2 - 12.6 wt. % MgO, with relatively low Ba (~580 ppm) and low Rb (~30 ppm). Given the paucity of basaltic, mafic magmas across the Central Andes these samples could potentially provide new insights into the chemical nature of magmas stored at depth beneath Andean arc volcanoes. Future work will involve the chemical mapping of sections via micro-XRF, mapping and spot analysis of amphibole and plagioclase feldspar via LA-ICP-MS. This study aims to provide new insights into the petrogenesis and role of amphibole-rich lithologies beneath monogenetic centers in the back arc of the Central Andes.

Handouts

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Sunday, 4 November 2018: 9:00 AM-5:30 PM

Halls J-K (Indiana Convention Center)

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