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## Joint 53rd South-Central/53rd North-Central/71st Rocky Mtn Section Meeting - 2019

Paper No. 3-6

Presentation Time: 9:20 AM

### MAFIC ENCLAVES FROM THE CENTRAL ANDES: INVESTIGATING THE MAGMATIC PLUMBING SYSTEMS OF CONTINENTAL ARCS

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Volcanism at continental arcs shares many geochemical similarities to Earth's bulk upper continental crust. Through study of the components of these magmatic systems, the processes that drive the formation of the ground we stand on can be investigated. This study focuses on Quillacas, a monogenetic volcanic center located in the back-arc region of the Central Andes on the Bolivian Altiplano. Here, the continental crust reaches up to 80 km in thickness. Unique to the lavas erupted ~2 Ma from Quillacas compared to other monogenetic centers of similar age in Bolivia, is the presence of amphibole-rich (up to 90%) mafic enclaves in host andesites. These sampled mafic enclaves are excellent recorders of the magmatic processes occurring beneath the Central Andean region and provide insights into processes not otherwise recorded by their hosts as they are compositionally different. They can be considered an 'open window' into the magmatic processes operating within the arc crust. Modal mineralogy obtained from petrographic analyses classify the enclaves as amphibole-plagioclase feldspar bearing with porphyritic textures. Bulk rock chemical data indicates that the mafic enclaves are compositionally different (basaltic at <45 wt. % SiO<sub>2</sub>; <4.5 wt. % Na<sub>2</sub>O + K<sub>2</sub>O) than their host andesite (60 wt. % SiO<sub>2</sub>, at ~ 6.0 wt. % Na<sub>2</sub>O + K<sub>2</sub>O) and similar-aged Central Andean lavas. Commonly crystallizing in the mid-lower crust, amphibole plays an important role in the fractionation and chemical evolution of arc magmas. We aim to combine textural, compositional, and mineralogical data (microscale) to gain insight on the architecture of the plumbing system beneath the Central Andes (macroscale). This will be accomplished by performing compositional mapping of entire thin sections using MicroXRF, obtaining *in-situ* major element data using an electron probe from which geothermobarometric constraints will be calculated, and Laser Ablation Inductively Coupled Mass Spectrometry (LA-ICP-MS) for complementary trace element data. Through study of these back-arc mafic enclaves, it is the goal of this research to contribute impactful science which will advance our understanding of the types of magmatic processes that are operating in the sub-arc continental crust, not only on the Central Andes, but at other active continental margins.

Session No. 3

[T11. Microanalyses, Macro Implications: Using Microscale Analyses to Decipher System-to-Regional Scale Processes](#)  
Monday, 25 March 2019: 8:00 AM-12:00 PM

Kings Room (Hilton Garden Inn Manhattan )

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