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GSA Annual Meeting in Phoenix, Arizona, USA - 2019

Paper No. 23-15

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

ZIRCON U-PB CHRONOLOGY OF WESTERN WYOMING CRUSTAL BASEMENT USING LA-ICP-MS

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The present-day geology of eastern Idaho and northwestern Wyoming preserves evidence of processes which have occurred throughout the past several billion years of Earth's history. These processes (e.g. magmatic differentiation and recycling, metamorphism) have been fundamental to shaping this part of the continental USA.

U-Pb in zircon is one of the most robust, and arguably the most widely used, petrochronometer. This study aims to apply this chronometer to a suite of zircons which span over 2 billion years of Earth's history in order to evaluate the petrogenesis of the ancient, Archean Wyoming basement and the potential recycling role the crustal basement plays in the petrogenesis of more recent Snake River Plain (SRP) magmatism. Two basic igneous samples from Torrey Canyon in western WY, a biotite-schist and pegmatitic alkali-feldspar-granite, and a rhyolitic sample from the Heise Volcanic Complex in eastern Idaho form the basis of this study.

The chronology and magmatic history of sampled units will be primarily investigated via U-Pb in zircon via laser-ablation inductively-coupled-plasma mass-spectrometry (LA-ICP-MS) at the University of Arkansas. The zircon grains will be analyzed within thin sections (in order to maintain petrographic context) and as mineral separates. In addition, feldspar phenocrysts in the Heise sample will be elementally mapped via scanning electron microscopy (SEM) at Miami University and via LA-ICP-MS. Mapping these phenocrysts will allow for a better understanding of the pre-eruption dynamics of the Heise system, and thus, their magmatic history.

Preliminary zircon ages from the Torrey Canyon basement schist range from 2.85-2.47Ga while ages in the pegmatite range from 1.6-1.7Ga. Heise zircon ages range from 7.74-5.35Ma. The ages of the Torrey Canyon samples are consistent with the regionally extensive Neoproterozoic basement that at Torrey, was later intruded by younger, felsic magmas. The ubiquitously young ages of the Heise rhyolite suggest little to no interaction with the basement pre-eruption, but rather a recycling of zircons from older Heise rhyolites. By studying the chronological history of this region, a better understanding of the timing of events that have established the Archaean basement in the region will be gained, as well as the sources to more recent SRP magmatism.

Session No. 23--Booth# 21

T43. Diversifying Geochronology: Innovations in Techniques, Applications, and Perspectives (Posters)

Sunday, 22 September 2019: 9:00 AM-5:30 PM

Hall AB, North Building (Phoenix Convention Center)

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