

2014 GSA Annual Meeting in Vancouver, British Columbia (19–22 October 2014)

**Paper No. 223-8**

**Presentation Time:** 9:00 AM-6:30 PM

**HIGH SPATIAL-RESOLUTION ISOTOPE GEOCHEMISTRY OF MONAZITE (U–PB & SM–ND) AND ZIRCON (U–PB & LU–HF) IN THE OLD WOMAN PIUTE RANGE BATHOLITH, MOJAVE DESERT, CALIFORNIA**

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The Old Woman-Piute Range Batholith (OWPB) in the Mojave Desert of south-eastern California is a suite of metaluminous and peraluminous Cretaceous granites that intrudes a long-lived and complex Proterozoic basement. The OWPB consists of a number of discrete plutons that due to post-emplacement regional tilting expose deeper structural levels of the batholith to the south. The peraluminous Sweetwater Wash, Painted Rock and North Piute plutons were chosen for this study to investigate geochemical heterogeneity at the sample-, pluton- and batholith-scale. Samples taken show a magmatic differentiation sequence of two-mica granite to garnet-bearing granite to aplite.

Zircon and monazite crystals were analysed for U–Pb & Hf and U–Pb & Sm–Nd isotopes respectively, by *in situ* LA-ICP-MS and LA-MC-ICPMS using the recently developed Laser Ablation Split Stream (LASS) approach. This high spatial-resolution approach allows a detailed assessment of geochemical changes in the magmatic system at a fine spatial and temporal scale. Additional zircon U–Pb data were collected by Q-LA-ICP-MS.

The U–Pb data show widespread inheritance in zircon cores, yielding ages varying between ~1400 and ~1800 Ma, consistent with regional Proterozoic crustal building events. Only four monazite grains yield inherited cores ~1700 Ma, all of which are found in the Sweetwater Wash two-mica granites. Zircon and monazite rims give crystallisation ages between 70–75 Ma, with monazite rims typically slightly younger than the zircon rims from the same samples, and ages between samples and between plutons are within uncertainty of each other. The zircon and monazite crystals also preserve the Hf and Nd isotopic ratios of their crustal sources. Correct age determinations are crucial for this interpretation for monazite grains, illustrating the utility of the LASS technique in integrating two isotopic systems from the same ablation volume. The OWPB shows a large range in  $\epsilon_{\text{Hf}}$  (young = -8.2– -19.2, old = -0.9– 8.4) and  $\epsilon_{\text{Nd}}$  (young = -12.6 – -21.8, old = -0.8– -4.1) with the North Piute pluton being the most isotopically homogenous. Isotopic data is consistent with derivation of the OWPB Batholith from the ancient crust into which it intrudes, which is spatially coincident with the inferred edge of Precambrian North America.

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[General Information for this Meeting](#)

Session No. 223--Booth# 283

[Continental Arcs #3: Mapping the Temporal and Compositional Evolution of Subvolcanic Magmatic Systems \(Posters\)](#)

Vancouver Convention Center-West: Exhibition Hall C

9:00 AM-6:30 PM, Tuesday, 21 October 2014

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