O-Hf Records of Magma Sources in the Sierra Nevada Batholith

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Analysis of oxygen and hafnium isotopes of zircon (Zrc) in several magmatic suites in the Sierra Nevada batholith (SNB) provides a fuller picture of how large intrusive suites in this classic Cordilleran batholith reflect variable magma sources and super-imposed mixing within the arc crust.

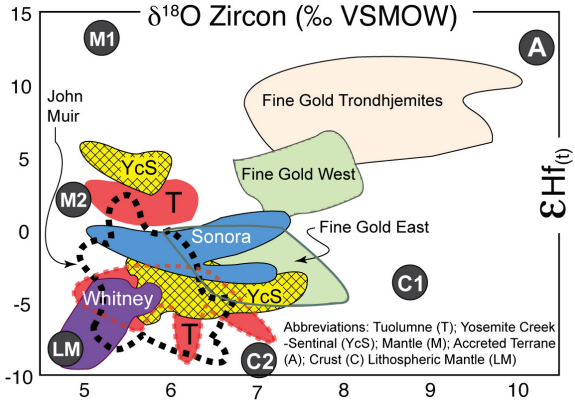

Figure 1. O-Hf Variations in the Sierra Nevada batholith.

Values of $\delta^{18}O$ were analyzed by SIMS and Hf isotopes were measured by LA-ICP-MS, and show that the Early Cretaceous Fine Gold Suite, and the Late Cretaceous Whitney Suite, on the western and eastern sides of the SNB, respectively, define the maximum and minimum values of $\delta^{18}O$ (10 to 4.8‰) and εHf (+12 to –9), showing greater crustal input in the west, and more mantle input to the east (e.g. [1]). Within individual intrusive suites, O-Hf variations may show no correlation (e.g., amoeboidal cluster in Muir Suite), subtle binary or ternary arrays (Sonora), or bimodality (Tuolumne, Yosemite Creek-Sentinal). O-Hf arrays can be defined by zircon grains from multiple samples but single hand samples (typically from small-volume mafic or felsic units), may also record the entire variability within a suite. Based on mixing arrays toward mantle and crustal $\delta^{18}O$ values, we hypothesize at least three mantle reservoirs of variable age, and two distinct crustal reservoirs. Overall, our data show considerable magma mixing and imply dynamic switching of sources as intrusive suites are constructed.

[1] Lackey *et al* (2008), *J. Petrol.* **49,** 1397–1426.