Cretaceous granitic magmatism in the Northern Snake Range, Nevada

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During Mesozoic time, the Northern Snake Range metamorphic core complex (east-central Nevada) lay in the retroarc of the active Sierra Nevada batholith. Tonalite orthogneiss and variably deformed leucogranite intrusions, emplaced during regional shortening, presently underlie a 10's-100's of km^2 area in the lower plate of the metamorphic core complex. The orthogneiss was metamorphosed at amphibolite-facies conditions during Late Cretaceous time (~85-80 Ma), coeval with intrusion of the majority of leucogranites [1]. Isotopically, the orthogneiss body is relatively primitive considering its geographic position (Sr_i = 0.7070, εNd = -2.8) and less evolved than the later leucogranites ($Sr_i \approx$ 0.712, εNd = -17) [2]. SHRIMP-RG based investigation of zircon from these granitic rocks offers new insights into their genesis.

Orthogneiss samples from Deadman Creek, Smith Creek, and Horse Canyon yield 102.1±0.8, 101.5±1.5, 99.4±0.8 Ma ages, respectively. Only a few zircons (<5%) are entirely Cretaceous in age, whereas most contain pre-magmatic cores that yield predominantly concordant 1.0-1.4, 1.6-1.8 and lesser 2.7 Ga ages, identical to some DZ populations in the Neoproterozoic McCoy Creek Group. The Cretaceous zircons contain low Hf sector-zoned cores overgrown by high Hf oscillatory-zoned rims, potentially reflecting early and late growth in first primitive, then crustal-contaminated magmas. Zircons from Deadman Creek leucogranites yield 84.2±1.1 and 74.8±1.2 Ma ages and also contain 1.0-1.4 and 1.6-1.8 Ga cores. The younger sample contains ~30% wholly Cretaceous zircon with low Hf cores. HREE concentrations in 100 Ma zircon are an order of magnitude higher than in 85-75 Ma zircon.

Parental basalt mixing with deep metagreywacke crust likely produced the tonalite protolith, whereas 85-75 Ma magmatism may reflect partial remelting (and rheologic weakening) of deeper 100 Ma tonalite intrusions that previously assimilated the metagraywacke crust. Zircon inheritance is markedly different from inheritance in the nearby 70 Ma Tungstonia pluton, which contains numerous 1.7 and 2.5 Ga and a few Jurassic age cores. These details highlight how complexly zoned zircons are useful for investigating the nature and histories of deep crustal sections.

[1] Miller and Gans (1989) *Geology* **17**, 59-62. [2] Wright and Wooden (1991) *Geology* **19**, 457-460.