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GSA Connects 2022 meeting in Denver, Colorado

Paper No. 185-9

Presentation Time: 3:55 PM

TRACKING THE COLLAPSE AND EXHUMATION OF A CONTINENTAL MAGMATIC ARC: THE RECORD FROM ZIRCON DEPTH PROFILING ANALYSES OF NORTH CASCADES METASEDIMENTARY ROCKS

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The Late Cretaceous–Eocene North Cascades arc is characterized by three high-flux magmatic events, with the final Eocene event coinciding with the exhumation of the mid to lower crust of the arc. Abundant metasedimentary rocks are exposed in the northern portion of the exhumed crystalline core. Some of these rocks represent the host rocks to the arc whereas others were incorporated into the arc during the middle high-flux magmatic event from ca. 74 to 65 Ma. Previous work (Sauer et al., 2017) showed that there are low-U, thin (<10 μ m) rims on the outermost parts of the metasedimentary zircons that could not be analyzed with conventional LA-ICP-MS analyses. Here we use depth profiling LA-ICP-MS analyses of unpolished zircons from several metasedimentary samples to investigate if these outermost rims formed during the final magmatic event and during exhumation of the crystalline core. One of the metasedimentary samples closest to the ca. 48 Ma Golden Horn batholith in the northeastern portion of the crystalline core yields zircon rims within uncertainty of the pluton intrusion. The same metasedimentary rock yields slightly older rims of ca. 51 Ma (207-corrected ages) from other grains. Farther west, away from the pluton, two other metasedimentary samples contain zircons with rims that cluster at ca. 55 Ma, and one of these samples has an additional zircon rim population at ca. 52 Ma. These zircon rims track the early to late exhumation history of the crystalline core. The ca. 55 to 51 Ma rims are coeval with migmatization likely associated with near-isothermal decompression, whereas ca. 48 Ma rims are coeval with continued late ductile deformation and magmatism in the deep crust. Accretion of Siletzia to the west along the plate boundary resulted in the slab rollback, breakoff, and voluminous magmatism, which in turn drove the exhumation of the deep arc crust. The outermost rims of zircons from several metasedimentary samples track the heat and fluid flow associated with this final magmatic event in the North Cascades arc system.

Session No. 185

[T31. Basin Analysis, Strike-Slip Faults, and Tectonics II: Honoring the Contributions of Paul Umhoefer](#)

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