Zircon growth during shear deformation in the Seve Nappe Complex, Sweden

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The narrow metamorphic rims typical in high pressure rocks can be difficult to date due to their small size (< 10 microns) and correlate to the P-T history of the rock. This study uses coupled depth profiling and direct measurement of REEs in zircon using LASS in conjunction with P-T calculations for rocks of the Seve Nappe Complex (SNC) of the early Paleozoic Scandinavian Caledonides to constrain timing of exhumation. Models of Zr mass balance assessing metamorphic zircon dissolution and growth along collisional P-T paths [1]. Their work showed that most zircon growth occurs post-peak T during exhumation especially in high temperature systems like this one.

The SNC is an allochthonous sequence of metamorphosed sedimentary and mafic units that together represent the pre-collision continent-ocean transition zone along the margin of Baltica. Two UHP zones of significantly different age (Northern Jämtland, ca. 460 Ma, e.g. [2], 2007; Southern Norrbotten, ca. 480 Ma, e.g. [3]) have been identified within the SNC. Our data span the ~200 km of northern Jämtland, Västerbotten, and southern Norrbotten between the two terranes. Preliminary U/Pb data suggest metamorphic zircon growth (identified by narrow rims with Th/U < 0.1) in northern Jämtland and southern Västerbotten occurred over a protracted period of time from the Cambrian to late Silurian (>490-422 Ma). These ages correspond to previously published ages associated with (U)HP metamorphism, migmatization, and late-stage shearing during exhumation.

The most recent zircon growth in this part of the SNC appears to have occurred ca. 440 to 425 Ma. REE patterns for zircons with ca. 440 Ma ages lack an Eu anomaly and have flat HREE patterns, suggesting they grew during eclogite facies metamorphism. The ca. 425 Ma zircons show Eu anomalies as well as enriched HREE patterns reflecting continuing exhumation at lower pressures. Based on zircon relationship with matrix fabric, we preliminarily interpret these young metamorphic rim ages to reflect enhanced zircon growth during shear deformation.

[1] Kohn et al., (2015) *Am. Min* **100**, 897-908; [2] Brueckner and van Roermund, (2007) *J. Roy. Soc. Lon*., **167**, 117-128;[3] Root and Corfu, (2012), *Contrib. Mineral. Petrol.*
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