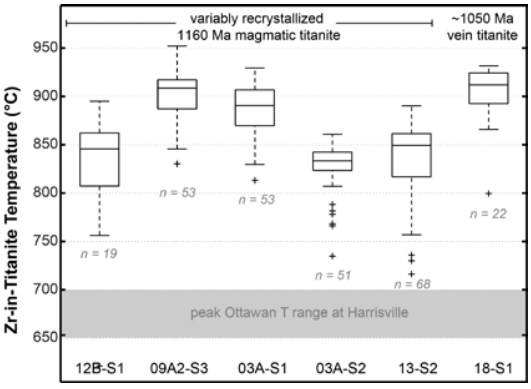
Zr-in-titanite thermometry for Adirondack titanite

C.E. BONAMICI[1*]

[1]New Mexico Tech, Socorro, NM 87801, USA
(*correspondence: Chloe.Bonamici@nmt.edu)

Zr-in-titanite thermometry [1], paired with *in situ* U-Pb titanite dating, has recently been used to constrain orogenic T-t paths, e.g. [2]. We present Zr-in-titanite thermometry data for a suite of well-characterized and U-Pb dated titanite grains from Harrisville, NY, in the Grenville-aged Adirondack Mountains (USA) [3, 4]. Zr concentrations range from 200-6000 ppm and generally decrease toward grain rims but vary by 100s to 1000s ppm across grains. Calculated Zr-in-titanite temperatures for Harrisville titanites are 720-950 ºC (Figure). Harrisville is near the orthopyroxene-in isograd [5] and carbon isotope thermometry indicates peak Grenville temperatures of 660-700 ºC [6]. The discrepancy between Zr-in-titanite and isotope temperatures can potentially be explained by 1) preservation of Zr concentrations from magmatic crystallization of titanite, or 2) Zr disequilibrium in titanite. The first explanation is unlikely because titanite rims that overgrow, and thus post-date, Ottawan deformational fabrics yield Zr-in-titanite temperatures ≥720 ºC (Figure, grain 13-S2), yet have oxygen-isotope compositions consistent with growth during post-peak Ottawan cooling at ≤ 550 °C [3]. We conclude that Zr concentrations in Harrisville titanite do not represent equilibrium partitioning and cannot provide accurate temperatures to pair with U-Pb dates.



[1] Hayden et al. (2008) *Contrib Mineral Petrol* **155**, 529-540. [2] Kohn & Corrie (2011) *EPSL* **331**, 136-143. [3] Bonamici et al. (2014) *J Met Petrol* **32**, 71-92. [4] Bonamici et al. (2015) *Chem Geol* **398**, 70-84. [5] Bohlen et al. (1985) *J Petrol* **26**, 971-992. [6] Kitchen & Valley (1995) *J Met Petrol* **13**, 577-594.