# Evaluation of Zr-in-Rt and Ti-in-Qtz thermobarometry in granulites

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Recent papers have shown that highest contents of Zr-in-Rt may be used to calculate peak *T* [1] in high-grade Rt+Zrc+Qtz bearing rocks. Several mechanisms have been presented in the literature to explain lower contents of Zr in Rt that are often registered in HT-UHT rocks [1, 2]. More importantly, low Zr contents cannot be used to assess cooling temperatures [2]. Studies have shown that Ti incorporation in Qtz is sensitive to post-peak variation of *P* and *T* [3,4]. Furthermore, dynamic recrystallization enhances the kinetics of Ti equilibration in Qtz [4]. We present Zr-in-Rt and Ti-in-Qtz concentration data on HP metapelitic granulite (Rt+Grt+Ky+Kfs+Qtz+Zrc) samples from the Passos Nappe, Minas Gerais, Brazil, that have faced varying degrees of post-peak retrometamorphism. Although a large inter-grain spread in Zr content (450 to 2090 ppm) in Rt grains from all studied samples is observed, temperature calculated using highest content is ca. 850 ºC at 16 kbar and match those calculated based on peak mineral assemblage and pseudosection modelling. A large inter-grain spread in Ti content (32 to 134) in Qtz grains is also observed, however, highest values (all above 70 ppm) are recorded by the most retrogressed sample. This sample has an intensely oriented fabric where the presence of Ms indicates the foliation formed after metamorphic peak. There is no correlation between Ti content in Qtz and texture (i.e., included in Grt or in matrix). We interpret highest Ti contents in Qtz to represent re-equilibration during decompression and not metamorphic peak conditions. As a consequence, although some Rt grains are able to keep high Zr contents, *P* estimates based on both Zr-in-Rt and Ti-in-Qtz thermobarometer would not represent peak condition in rocks where post-peak retrogression took place. In the studied samples, lower Ti contents (ca. 40 ppm) in less retrogressed samples may indeed indicate metamorphic peak conditions at ca. 850 ºC and 18-20 kbar.

[1] Taylor-Jones & Powell (2015) *J Metamorph Geol.* 115:33. [2] Kohn *et al.* (2016) *Contrib Mineral Petrol.* 171:78. [3] Thomas et al. (2015) *Contrib Mineral Petrol.* 169:27. [4] Nachlas & Hirth (2015) J. Geophys. Research. 8120:120.