Multiple growth–resorption events in garnet: Record of pressure pulses?

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Garnet major element zoning records multiple growth–resorption episodes in eclogite–amphibolite rocks of Pto Cabello, Venezuela. Repeated peak–trough progression in core-to-rim Mn concentration (Fig. 1) provides the best example of these growth–resorption features. Garnet growth–resorption must record cycles of relative garnet stability (growth) then instability (dissolution) related to rapid changes in P, T and/or chemistry. Similar features occur in eclogitic garnets from Cuba [1] and California [2], suggesting that the processes responsible may be common in subduction zones.

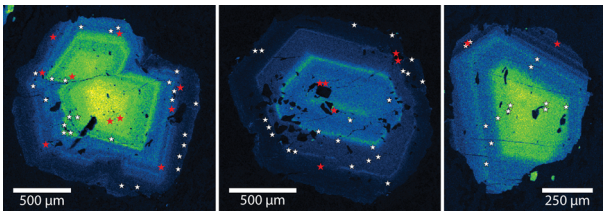

Fig. 1: Colour-contoured WDS raw x-ray count maps for Mn in the garnets. White stars = rutile, red = titanite inclusions.

Titanite (Ttn) overgrows rutile (Rt) in the matrix of the eclogite–amphibolite rocks. Rt (high-P [3]) inclusions occur throughout the garnets, whereas Ttn (low-P [3]) inclusions occur exclusively in cores and immediately rimside of Mn peaks (Fig. 1). There is no evidence to suggest Ttn was stable anytime other than during early (prograde) garnet growth, and immediately following garnet resorption (dissolution) events.

The observations are consistent with growth–resorption marking pressure pulses, possibly relating to 'yo-yo' tectonics [1], or to production–dissipation of fluid overpressure by metamorphic dehydration–seismicity cycles. Raman thermobarometry and O isotope work is planned to further explore context and drivers for garnet growth–resorption episodes.

[1] García-Casco *et al*. (2002) *J Metamorph Geol* **20**, 581–598. [2] Page *et al*. (2014) *J Petrol* **55**, 103–131. [3] Ernst & Liu (1998) *Am Mineral* **83**, 952–969.