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Garnet zoning in Variscan pelitic schist from Zicavo, Corsica (France)

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The Zicavo septum in southern Corsica represents one of the Variscan remnants intruded by late Hercynian granitoids. It is made up of the following lithological units cropping out along a NNE-SSW direction with a general NW-SE striking trend: i) an augen orthogneiss; ii) a leptynite-amphibolite series with metapelites and serpentinite bodies, and iii) a metapelitic sequence (Faure et al., 2014). The sequence is polydeformed by two phases of ductile deformation, D1 and D2, the first characterized by top-to-the-SW and the latter by top-to-the-SE sense of shear. The D1 foliation in the amphibolite and metapelite is deformed by SE-verging folds of the D2 phase. Two garnet-bearing micaschist samples have been selected from the metapelitic sequence for detailed microstructural and mineralogical study. The millimetric garnet porphyroblasts (up to 4-5mm in size; ~12-15 vol%) are associated with plagioclase, quartz, biotite, staurolite, white mica, chlorite and chloritoid and minor ilmenite, zircon, monazite, and apatite. The garnet porphyroblasts are subhedral to euhedral, characterized by a high variety of mineral inclusions (Qz+Cld+Mnz+Ilm+Ms+Zrn+Ap; mineral abbreviations after Whitney and Evans, 2010) decreasing in abundance from core to rim. Garnet cores often preserve a relict foliation identified by the alignment of several microinclusions sometimes arranged into a sigmoidal pattern (snowball garnet). In the rock matrix, the pervasive foliation is identified by the preferred orientation of phyllosilicate minerals and by compositional (quartzo-feldspathic vs. micaceous) layering. Garnet from Sample ZIC10 (mineral assemblage Grt+Bt+Chl+Ms+Qz+Pl+Ilm) show an increase of iron and magnesium contents from core to rim (29.5 - 34.5 wt.% and 1.5 - 2.5 wt.%, respectively) and a corresponding decrease of manganese and calcium (9 - 4.2 wt.% and 3.1 - 2.1 wt.%). Garnet in sample ZIC11 (coexisting with Chl+Cld+Ms+St+Qz+Pl+Ilm) shows a similar compositional trend (from core to rim, Fe = 26.8-33.5 wt.%; Mg = 1.2-2 wt.%; Mn = 6.5-1.6 wt.%; Ca = 6.8-4.1 wt.%). Preliminary estimation of metamorphic P-T conditions by using isochemical phase diagrams and compositional isopleths of garnet components indicates garnet core formation at *ca.* 1.6 – 1.7 GPa / 500°C. Garnet compositional zoning suggests an increase in temperature accompanied by a decrease in pressure, compatible with a clockwise P-T trajectory. Comparable P-T conditions and P-T path were observed in HP Variscan pelitic schist from northeastern Sardinia.

Faure M. et al. (2014) International Journal of Earth Sciences 103, 1533–1551.

Whitney D.L. and Evans B.W. (2010) American Mineralogist 95, 185–187.