Compositional trends in tourmalines from granites and quartz-tourmaline rocks from the Penamacor-Monsanto pluton (Eastern Central Portugal)

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Abstract

Peraluminous two-mica granites are predominant in the late-Hercynian Penamacor-Monsanto pluton [1], intrusive into a massive schist-greywacke sequence, and most marginal granites contain tourmaline, hinting at late-magmatic boron-metasomatism. This is further supported by occurrences of quartz (± mica) -tourmaline rocks along the narrow contact aureole. Tourmaline colour and colour zoning patterns are related to Ti abundance and Fe/Mg ratios, according to X-ray mapping. Notwithstanding ubiquitous late crystallization of euhedral to subhedral tourmaline in the marginal granites, textural and X-ray compositional evidence suggest that some tourmaline may nucleate on biotite and eventually replace it. Given their high proportion of *X*-site vacancies (58 to 78%), tourmalines from marginal granites are classified as foitites and those in the quartz-tourmaline rocks as foitites and Mg-foitites. Schorl-type substitution predominates over elbaite-type substitution, especially in granite tourmalines, which tend to be richer in Fe^{2+} and Al (± Mn) and poorer in Mg and Na (± Ca, Cr, V, Ti) than tourmalines from quartz-tourmaline rocks. In spite of their chemical differences, both tourmaline populations seem to bear a close genetic relationship, as evidenced in the (Fe+Mn)/(Fe+Mn+Mg) *vs.* Al/(Al+Mg+Li) linear trend, strongly suggesting that the same late-magmatic, B-enriched aqueous fluid was involved in their genesis.

Analytical and isotopic work currently in progress will soon add to these preliminary results on the Penamacor-Monsanto tourmalines.

We acknowledge financial support of PTDC/CTE-GIX/116204/2009.

[1] Neiva, A.M.R & Costa Campos, T.F. (1993) *Mem. Not. Publ. Mus. Lab. Mineral. Geol. Univ. Coimbra* **116**, 21-47.