Sr and Nd isotope composition of the Alcáçovas calc-alkaline rocks (Ossa-Morena Zone, Portugal)

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The Alcáçovas area is located in the SW sector of the Ossa-Morena Zone (OMZ), close to a major fault that separates this geotectonic unit from the South Portuguese Zone (SPZ). Along this boundary, in the OMZ, testimonies of low-K tholeiitic and calc-alkaline magmatism are common and have been interpreted as being related to the operation of a subduction zone between OMZ and SPZ during the Variscan cycle [1]. Two main igneous lithologies, both displaying calc-alkaline compositions, can be found in the studied area: gabbro-diorites and dacitic-rhyolitic porphyries [2,3]. Outcrop conditions have not yet allowed to establish unequivocally the sequence of magma emplacement. In previous geochronological studies on the porphyries, whole-rock Rb-Sr dates and K-Ar ages cluster around 320 Ma [4,5,6].

According to field observations, sometimes felsic dykes cut mafic rocks, but there are also gradual transitions from gabbroic to tonalitic compositions, within bodies mapped as gabbro-diorite, revealing that different melts coexisted.

In this study, rock samples of both gabbro-dioritic bodies and porphyries were analysed for Rb-Sr and Sm-Nd isotopes. Considering the whole set of samples, no isochron was obtained, showing that they can not be simply related by crystal fractionation processes.

Rb-Sr data of porphyries from a single quarry (at Lameira, 7 km to the SW of Alcáçovas) give 323±16 Ma (MSWD=1.9; initial $^{87}Sr/^{86}Sr$=0.7097±0.0018). Taking into account that the rocks of the Lameira outcrop show strong hydrothermal alteration, this date must be viewed as a consequence of a very efficient redistribution of mobile elements during aqueous fluid circulation and, as such, it places a minimum limit to the actual magmatic age

The plot of compositions of the gabbro-dioritic bodies, including their transitions to tonalites and the associated felsic dykes, in the ε_{Nd}-$^{87}Sr/^{86}Sr$ diagram, define an almost perfect hyperbole (from εNd_{323} = +3.9 and $^{87}Sr/^{86}Sr_{323}$ = 0.7058 to εNd_{323} = -3.8 and $^{87}Sr/^{86}Sr_{323}$ = 0.7085), as expected in a mixture between mantle-derived melts and crustal materials. In the same diagram, samples from the Lameira quarry show an almost constant εNd_{323}, between -2.4 and -2.9, and $^{87}Sr/^{86}Sr_{323}$ varying from 0.7092 to 0.7106. Therefore, the Lameira porphyries could represent a member of the same mixture, with the Sr signature modified by hydrothermal fluids with a stronger crustal component.

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[1] Santos et al. (1990) *Comun. Serv. Geol. Portugal* **76**, 29-48.
[2] Gonçalves et al. (1992) *Not. Expl. Carta Geol. Torrão*, 86 pp.
[3] Caldeira et al (2007) *Comun. Geol. INETI* **94**, 05-28.
[4] Andrade (1974) *Mem. Not. Univ. Coimbra* **78**, 29-36.
[5] Coelho et al. (1986) *Ciências da Terra UNL* **8**, 65-72.
[6] Priem et al. (1986) *Comun. Serv. Geol. Portugal* **72**, 03-07.

Correlation of magnetic susceptibility with δ¹⁸O data in magnetite- and ilmenite-type granites from Iberian massif

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The relationship between oxygen isotopic values and magnetic susceptibility composition on 11 Variscan Portuguese granites has been investigated. Whole-rock oxygen-isotope ($\delta^{18}O$) values for Vieira do Minho (VM), Vila Pouca de Aguiar (VPA), Chaves, Castelo Branco (CB), Manteigas and Serra da Estrela (SE) granitoids, were compiled from bibliography [1,2,3,4], and $\delta^{18}O$ for Santa Eulalia Plutonic Complex (SEPC) were obtained by laser fluorination at the Stable Isotopic Laboratory of Salamanca. Magnetic susceptibility (Km) values were obtained with a Kappabridge equipment from Toulouse University and Geology Centre, Porto University [2,5,6,7,8]. In this study is shown that there is a significant inverse correlation between Km and $\delta^{18}O$. *Magnetite*-type granites (Manteigas granodiorite and SEPC external facies) have Km>10^{-3} SI and low $\delta^{18}O$ values ranging from 8.9 to 10.3‰ instead those of *ilmenite*-type (all the other granites) have Km≤10^{-4} SI and are $\delta^{18}O$ enriched (9.3 to 13.5‰). The *I*-type granites (VM, VPA, Chaves, Manteigas and SEPC external facies) show lower average $\delta^{18}O$ (10.2‰) and higher Km values (100x10^{-6} SI) than the *S*-type granites (SE and CB) with $\delta^{18}O$ = 12.6‰ and Km = 65x10^{-6} SI.

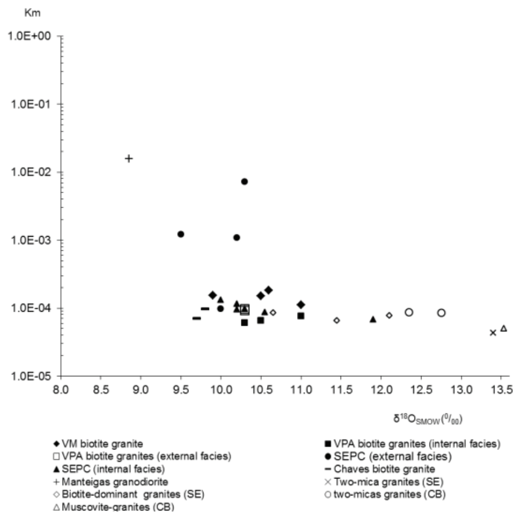

Figure 1: Semi-log plot of Km (in Si units) versus $\delta^{18}O$.

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[1] Martins *et al.* (in prep.) [2] Martins *et al.* (2009) *Lithos* **111**, 142-155. [3] Antunes *et al.* (2008) *Lithos* **103**, 445-465. [4] Neiva *et al.* (2009) *Lithos* **111**, 186-202. [5] Sant'Ovaia *et al.* (2010) *JSG* **32**, 1450-1465. [6] Sant'Ovaia *et al.* (2000) *TRSE, ES* **91**, 123-127. [7] Sant'Ovaia *et al.* (2008) *33rd IGC* CD. [8] Sant'Ovaia *et al.* (2011) *Min. Mag.* **75**, 3, 1795.