

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 $^{87}\text{Sr}/^{86}\text{Sr}=0.7097\pm 0.0018$). 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 $\epsilon_{\text{Nd}}-^{87}\text{Sr}/^{86}\text{Sr}$ diagram, define an almost perfect hyperbole (from $\epsilon_{\text{Nd}_{323}} = +3.9$ and $^{87}\text{Sr}/^{86}\text{Sr}_{323} = 0.7058$ to $\epsilon_{\text{Nd}_{323}} = -3.8$ and $^{87}\text{Sr}/^{86}\text{Sr}_{323} = 0.7085$), 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 $\epsilon_{\text{Nd}_{323}}$, between -2.4 and -2.9, and $^{87}\text{Sr}/^{86}\text{Sr}_{323}$ 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 $\delta^{18}\text{O}$ 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 ($\delta^{18}\text{O}$) 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 $\delta^{18}\text{O}$ 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 it is shown that there is a significant inverse correlation between Km and $\delta^{18}\text{O}$. Magnetite-type granites (Manteigas granodiorite and SEPC external facies) have $\text{Km} > 10^{-3}$ SI and low $\delta^{18}\text{O}$ values ranging from 8.9 to 10.3‰ instead those of ilmenite-type (all the other granites) have $\text{Km} \leq 10^{-4}$ SI and are $\delta^{18}\text{O}$ enriched (9.3 to 13.5‰). The I-type granites (VM, VPA, Chaves, Manteigas and SEPC external facies) show lower average $\delta^{18}\text{O}$ (10.2‰) and higher Km values (100×10^{-6} SI) than the S-type granites (SE and CB) with $\delta^{18}\text{O} = 12.6$ ‰ and $\text{Km} = 65 \times 10^{-6}$ SI.

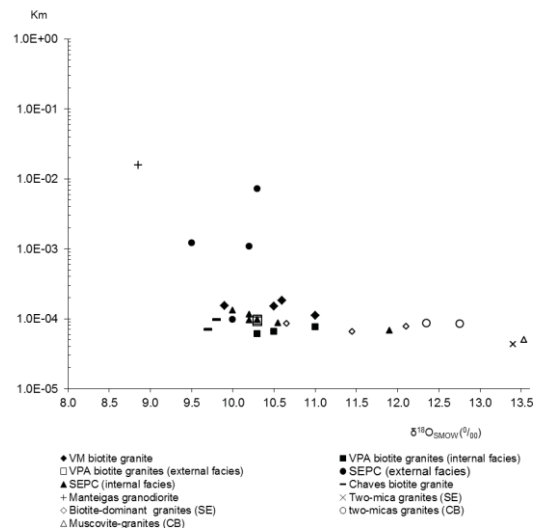


Figure 1: Semi-log plot of Km (in SI units) versus $\delta^{18}\text{O}$.

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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) *Mín. Mag.* **75**, 3, 1795.