New data on the petrogenesis of the lithiniferous pegmatites from Montalegre (northern Portugal)

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Samples of pegmatites from a lithium prospect area close to Montalegre (northern Portugal), as well as samples of spatially related lithologies (metasediments and granites), were studied in the scope of this work.

The studied metasediments include garnet and andalusite-bearing metapelites, belonging to the Pelite-Greywacke Formation (with probable Lower Silurian deposition age). Sr-Nd isotope compositions, calculated to an age compatible with the generation of Variscan granitic magmas, show variations of $^{87}Sr/^{86}Sr$ from 0,7227 to 0,7314, and of εNd from -11,4 to -10,7.

The sampled granites were emplaced in relation with the Variscan D3. They display peraluminous (A/CNK between 1,21 and 1,28), ferroan and alkali-calcic compositions, revealing that they are S-type granites. Initial $^{87}Sr/^{86}Sr$ and εNd values range from 0,7164 to 0,7198, and from -5,4 to -8,4, respectively, which agree with the S-type fingerprint. However, there is no overlap with the isotopic signature of the metasediments, which may be due either to the small number of analysed metasediment samples, or to the occurrence of the anatectic processes in a different lithostratigraphic unit.

Pegmatite samples are clearly of the LCT family, being formed of albite, quartz, petalite, K-feldspar. In smaller amounts, muscovite, biotite, apatite, montebrasite, cassiterite and sphalerite were also identified. LCT pegmatites are usually considered as extreme differentiates from peraluminous S-type granitic magmas, emplaced during late stages of orogenies. Rb-Sr isotopic data point to an age of 300 ± 14 Ma (Ludwig's age model 3) to the emplacement of the main pegmatite body in the Montalegre prospect area; the initial Sr-Nd isotopic signature of this body has values around $^{87}Sr/^{86}Sr$ = 0.718 and εNd = -8.4. Therefore, the available evidence suggests that this pegmatite had a parental granitic magma very similar to the studied granites, and that this magma formed and evolved during late stages of the Variscan orogeny.

FIGURE 1
Rb-Sr isochron diagram for samples from the main pegmatite body of the Montalegre prospect area.

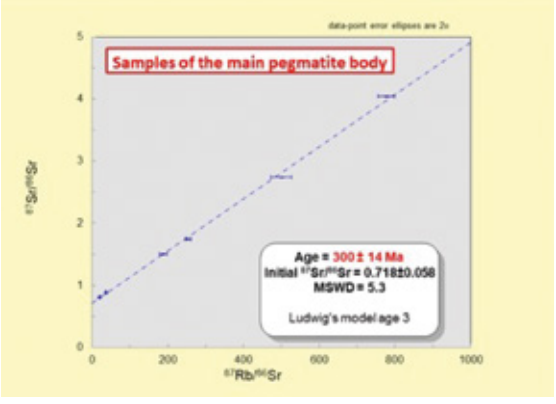

FIGURE 2
Nd-Sr isotope correlation diagram for lithologies from Montalegre region, considering initial (for the age of magma emplacement) isotope compositions.