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RB-SR, SM-ND AND PB-PB ISOTOPIC SIGNATURES OF PHONOLITES AND NEPHELINE SYENITES OF THE POÇOS DE CALDAS ALKALINE MASSIF, SOUTHEASTERN BRAZIL

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**Abstract**

The large subcircular Poços de Caldas (PC) alkaline massif (over 800 km<sup>2</sup>) is mainly constituted by felsic rocks: tinguaïtes (subvolcanic phonolites), mostly altered volcanic phonolites, together with nepheline syenites (NeS). Emplacement occurred at about 79-80 Ma ago.

Related mafic-ultramafic rocks with pyroxene, analcime, olivine and opaque oxides (foïdites) are seen as fragments of lavas flows, agglomerates, lapilli and tuffs close to its western border (Vale do Quartel, VQ).

The felsic PC rocks show K-feldspar, nepheline and subordinate Na-pyroxene as main minerals, with varying proportions of accessory minerals (e.g., eudyalite, especially in lujavrites and khibinites). NeS are intrusive into tinguaïtes and appear as discrete and distinct individual bodies; both rock types have similar major element chemistry (mean values: SiO<sub>2</sub> 53.55, Al<sub>2</sub>O<sub>3</sub> 19.58, TiO<sub>2</sub> 0.52, MnO 0.30, MgO 0.22, CaO 1.63, Na<sub>2</sub>O 7.74, K<sub>2</sub>O 8.31; variable Fe<sub>2</sub>O<sub>3</sub>) but highly variable trace element contents (e.g., Ba 16-1200, Sr 410-6360, Nb 127-1000, Zr 383-4450, La 75.60-1080, Lu 0.12-2.00, Th 18.70-124, U 2.78-30.60, etc.; Ni, Co, Cr, Cu below detection limits).

All felsic rocks are isotopically very homogeneous. <sup>87</sup>Rb/<sup>86</sup>Sr and <sup>87</sup>Sr/<sup>86</sup>Sr values plot close to an 80 Ma reference line; individual initial <sup>87</sup>Sr/<sup>86</sup>Sr ratios vary from 0.70475 to 0.70515. (<sup>143</sup>Nd/<sup>144</sup>Nd)<sub>80</sub> range from 0.51233 to 0.51239. The VQ rocks (data from literature) are more primitive than the felsic PC rocks.

Depleted mantle model ages of felsic rocks vary within 650-750 Ma (mean 692 ±54 Ma), while VQ samples range from 630 to 810 Ma. In (<sup>87</sup>Sr/<sup>86</sup>Sr)<sub>80</sub> vs (<sup>143</sup>Nd/<sup>144</sup>Nd)<sub>80</sub> diagram, felsic rocks plot along the mantle array, below and to the right of Bulk Earth at 80 Ma. <sup>206</sup>Pb, <sup>207</sup>Pb, <sup>208</sup>Pb (vs. <sup>204</sup>Pb) ratios of felsic rocks are similar and range between 17.9-18.3, 15.43-15.48, 38.10-38.55, respectively. In the <sup>207</sup>Pb-<sup>204</sup>Pb vs. <sup>206</sup>Pb/<sup>204</sup>Pb diagram, data plot close to the NHRL, defining a ca. 2.2 Ga line, probably a mixing array.

The felsic rocks are representative of strongly fractionated liquids, plotting within the undersaturated low-temperature valley. Two main genetic hypotheses have to be considered for the felsic rocks: 1) clinopyroxene-Mg olivine removal from parental alkaline ultrabasic (nephelinitic) magmas; 2) low degree of partial melting of an isotopically homogeneous alkaline ultrabasic protolith. An enrichment and isotopic homogenization event (at around 700 Ma?) preceded the generation of the felsic rocks at 80 Ma.

**ACCEPTED as Poster Presentation**

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