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Program and Abstracts

Trace element and Hf isotope composition in primary zircons from the São Sebastião Pluton, SP, Brazil and implications

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Alkaline rocks in the São Sebastião Island are related to the extensive Meso-Cenozoic alkaline magmatism in the South American Platform, a response to the Gondwana breakup. In the Island, this magmatism comprises Mesozoic (80-90 Ma) felsic (syenites, traquites, phonolites), mafic and ultramafic (as layered complexes) alkaline rocks, as well as a variety of lamprophyres. The main syenites, including silica undersaturated and oversaturated varieties constitute three main ocurrences, the Serraria, São Sebastião and Mirante plutons.

We present high-resolution trace element and Hf isotope composition of primary zircon crystals as well as Pb isotope composition of alkali-feldspar from the São Sebastião Pluton, the largest syenite occurrence in the island. This pluton is mainly made up by metaluminous to peralkaline alkali feldspar syenites containing alkali feldspar, Ca and Ca-Na pyroxenes and amphiboles as the main mafic minerals, besides fayalite, apatite, zircon, chevnikite, pyroclore and interstitial quartz.

Chemical composition of zircon show high Hf contents (6.82-8.64 wt%) coupled with high REE abundances ranging from 5790 to 21371 ppm. The chondrite-normilised REE patterns show a concave-upward trend with a pronounced HREE enrichment $(Yb/Sm)_N \sim 28.66$), a strong positive Ce anomaly (Ce/Ce*~13.) and a subtle negative Eu anomaly (Eu/Eu*~ 0.12), in agreement with the magmatic fingerprint of feldspar-rich rocks. The zoned alkali feldspar crystals are characterized by an increase on the Pb isotope ratios from core to rim ($^{206}Pb/^{204}Pb$ ratios from 18.25 to 18.48; $^{207}Pb/^{204}Pb$ ratios from 15.48 to 15.64 and the $^{208}Pb/^{204}Pb$ ratios from 38.39 to 38.71). The ε_{Hf} (t) values were calculated at t=84.78 Ma (U-Pb TIMS), corresponding to the timing of zircon growth from syenitic magmas yielding values from +3.29 to +11.92 and single-stage Hf model ages varying from 544 to 1061 Ma.

The extensive variation in lead isotopes as well as in both ε_{Hf} (t) values and model ages suggest a juvenile mantle derived source with different degrees of crustal contamination during magma ascent. The highest ε_{Hf} (t) values and youngest model ages represent the magma derived from a mantle source with little contamination constraining the time for the addition of new material into the crust.