



40Ar/39Ar age (64 Ma) of magnetic pole inversion recorded in the Morro de São João alkaline intrusion, Rio de Janeiro, Brazil

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The Meso-Cenozoic magmatism registered in the Brazilian territory can be associated with two great magmatic events that occurred in the American South Platform, which are: (i) Tholeiitic magmatism aged around 130-120 Ma which is associated to the fragmentation of the West Gondwana, the opening of the South Atlantic Ocean and implantation of the Brazilian continental margin basins; and (ii) Alkaline magmatism that occurred due to the South American crust fracturing and rise of the mantelic magma culminating with platform uplifting phenomena and southeastern Tertiary basins formation.

The Rio de Janeiro State region, located between Serra do Mar and the coast presents some remnant bodies in part formed by several plutons of alkaline nature, lined up according to a WSW–ENE trend. Such intrusions alignment includes Mendanha, Itatiaia, Morro Redondo, Tinguá, Itaúna, Marapicu, Tanguá, Soarinho, Rio Bonito, Moro dos Gatos, Cabo Frio Island and Morro de São João plutons. The present contribution comprises 40Ar/39Ar isotopes studies of biotite from the Morro de São João alkaline intrusion. Magnetometric survey of these rocks indicates a magnetic pole inversion recorded during the crystallization of the alkaline magma.

The Morro de São João Alkaline Complex (MSJ) is located in the NE part of Rio de Janeiro State and shows pronounced topography, with the following lithology: coarse-grained felsic syenites (K-feldspar, nepheline, hornblende, titanite and pseudoleucite), and mafic syenites (K-feldspar, hornblende and pyroxene). One 40Ar/39Ar analysis was carried out on biotite crystal from a syenite sample. The age of 64.86 ± 0.61 is interpreted as the timing of the magma cooling.

Petrography and litho-geochemistry data suggest a bimodal suite. Felsic and mafic magma mixing and mingling textures are locally observed indicating the presence of coeval magmas. Nd and Sr isotope compositions correspond to EMI (Enriched Mantle I) mantle reservoir signatures, suggesting an asthenospheric enriched mantle source with low 87Sr/86Sr values (from 0.7049 to 0.7061) and low 143Nd/144Nd (from 0.512361 to 0.512428). The ϵ_{Nd} values range from -4.03 to -5.54, indicating an anomalous enriched mantle reservoir, confirmed by the high TDM values between 730-830 Ma, very different from the 67 Ma 40Ar/39Ar cooling age here reported.

The aeromagnetic survey data used in this study covers the area of Rio de Janeiro State and was acquired by CPRM (Geological Survey of Brazil) in 1978 and corresponds to a 150 m height aero survey, with 1 km of line spacing and 10 km control line spacing. In order to study the crustal structures in detail, an aeromagnetic anomaly map with high resolution was produced. In this way, the magnetic anomalies map allowed a better comparison with the local tectonics and major geological features, indicating a magnetic inversion of the MSJ alkaline intrusion.

Previous geochemical models suggest that this activity is, currently represented by Trindade hotspot, which produced a trace represented by the Vitória-Trindade volcanic chain. However, there is a great debate about the controlling mechanisms of Trindade-Martim Vaz magmatism within the edge of the Brazilian platform, and deep fault-controlling magmatism is still in discussion.

