

AGE, COMPOSITION AND SOURCE OF THE POÇO DA CACIMBA PLUTON, BORBOREMA PROVINCE–NE BRAZIL: SR AND ND ISOTOPIC CONSTRAINTS

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Abstract: The Pernambuco–Alagoas Domain is the most extensive and complex tectonic domain of the southern part of the Borborema Province, which is composed of magmatic and metamorphic rocks. The Poço da Cacimba pluton represents a Neoproterozoic intrusion in the Águas Belas–Canindé composite batholith. The lithotypes are porphyritic to equigranular medium - to - coarse - grained quartz monzonite to granite. The mineralogy is composed of quartz, plagioclase and alkali feldspar as essential phases, and biotite as main mafic together amphibole, sphene, apatite, zircon and epidote as the accessory phase. The Poço da Cacimba pluton shows a flat-lying foliation and field relationships suggest that migmatization followed the intrusion. Dioritic enclaves are common into the pluton. The rocks are metaluminous to peraluminous, magnesian (low $Fe\# = FeOt / (FeOt + MgO)$) of subalkaline to slightly alkaline, and show some of the main characters of the shoshonite association. Chondrite-normalized rare earth elements patterns are moderate to highly fractionated ($La_N/Lu_N = 21$ to 32.5), with a slightly negative Eu anomaly ($Eu/Eu^* = 0.67$ to 0.71). A primitive mantle normalized incompatible element spidergram shows a negative Nb, Ta, Sr and Ti anomalies, akin to convergence setting granites (volcanic arc granites). The zircon grains are characterized by an igneous oscillatory-zoned core. The analyses of oscillatory zoned rims and cores yield concordant ages of 640.9 ± 3.7 Ma ($n = 12$) with MSDW (Mean Square of Weighted Deviation) = 0.70 . This age is interpreted as the crystallization and emplacement of the pluton. The rocks of Poço da Cacimba pluton are characterized by TDM ages of 1.0 to 1.2 Ga, ϵNd (0.640 Ga) values from $+0.11$ to -1.99 , ϵSr values of 31 to 59, and intermediate initial $^{87}Sr/^{86}Sr$ ratios, back-calculated to 640 Ma from 0.7059 to 0.7079. These data point to a Cryogenian to Ediacaran partial melting of a mantle-derived Tonian source, with limited lower crustal component. U–Pb SHRIMP age results from this pluton and from the literature date the beginning of the Brasiliano orogeny of this studied area at ca. 640 Ma, probably during the peak of metamorphism related to the contractional deformation associated to convergence of the São Francisco Craton and Pernambuco–Alagoas Domain during the Gondwana amalgamation.

Keywords: Cryogenian granite; Sr–Nd isotopes; Brasiliano orogeny