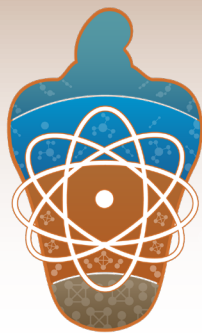


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UNRAVELING THE METAMORPHIC CONDITIONS OF AN ALPINE-TYPE OROGEN IN NE-BRAZIL: CONSTRAINTS FROM P-T PATHS OF ZONED GARNET IN THE RIACHO DO PONTAL BELT, BORBOREMA PROVINCE

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This study focuses on the burial-uplift history of a section of the Riacho do Pontal Belt (RPB) during the Pan-African convergence between the São Francisco Craton (SFC) and the South Borborema Province. The tectonic architecture of this belt is characterized by a double-vergent orogenic wedge, with a complex nappe system thrusting towards both the foreland and hinterland, separated by an ancient internal oceanic suture zone. To determine the pressure-temperature (P-T) paths, a combination of XRF-based whole-rock geochemistry, phase equilibrium modeling (pseudosections), and EPMA compositional maps of zoned garnets was employed. The aluminous schist from the hinterland (Santa Filomena Complex) exhibited garnet porphyroblasts in textural equilibrium with a matrix composed of Ru-Ms-Bt-Ky-Plg-Qtz. By combining calculated isopleths, the prograde and peak P-T conditions were estimated at 7.5-8.0 kbar/550-570 °C and 12-13.5 kbar/630-650 °C, respectively. The Si-in-muscovite (3.10-3.16 apfu) constrained the maximum pressure conditions to ~14.0 kbar, suggesting burial to ~50 km depth assuming a crustal density of 2.7 g/cm³. On the top of the foreland sequence (Mandacaru unit), the (Crd)-Ilm-Ru-Grt-Bt-Ms metagreywacke yielded peak metamorphic P-T conditions of 7-8 kbar/600-640 °C. The presence of cordierite in the matrix indicated a retrograde path involving decompression at P < 4.0 kbar/600 °C. The clockwise P-T path is consistent with burial to around 30 km followed by uplift to approximately 15 km. The passive-margin schist from the lower nappe system (Barra Bonita unit) exhibited prograde garnet growth at 5-6 kbar/510-530 °C. The rimward increasing of X_{Py} content up to 0.16, the presence of syn-tectonic kyanite in equilibrium with rutile-phengite at this Mg-rich garnet rims, coupled with high-Si content in phengite (up to 3.22 pfu) indicated P-T conditions of 16-18 kbar/610-630 °C. The occurrence of post-tectonic, barrovian-type index assemblages (St-Bt-Plg-Ilm) within a mylonitic matrix indicated a subsequent clockwise decompression to pressures < 9.0 kbar. These observations suggest that the rocks were buried to ~60 km, followed by minor heating and exhumation to ~34 km. Overall, the study reveals the complex tectonic evolution of the region, including the development and exhumation of a MT-eclogite facies foreland-directed nappe stack (Barra Bonita unit), and the presence of a deep-buried crustal-scale back fold and thrust (Santa Filomena complex). These features can be explained by the changing dynamics during the transition from the subduction of the SFC passive margin to continental collision tectonics, resembling an Alpine-type continental collision zone in NE-Brazil. Further geochronological data is fundamental to understand the geodynamic from behind the continental collision in this region.

KEYWORDS: CONTINENTAL COLLISION, METAMORPHISM, PHASE EQUILIBRIUM MODELLING

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