

Monazite petrochronology evidence for long-lived high geothermal gradient metamorphism in the intracontinental Seridó Belt, Brazil

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The Borborema Province in northeast Brazil underwent extensive intracontinental deformation and metamorphism during the West Gondwana assembly. At that time the province was in between the São Francisco, Amazon and West Africa cratons and as a result of plate boundary stresses, one of the largest strike-slip shear zone systems of the world was generated. Two continental-scale (>500km long) east-west dextral shear zones (Patos and Pernambuco) transect the whole province. These main shear zones record low-pressure high-temperature conditions associated with partial melting. Northeast-southwest trending metasedimentary belts that occur in between the main shear zones record high T/P greenschist to amphibolite facies metamorphism.

This study reports monazite LA-ICP-MS U-Pb and trace element data from metasedimentary rocks within the Patos shear zone and the Seridó metasedimentary belt. HREE enriched monazite cores from garnet-bearing migmatites within the Patos shear zone yield a weighted average age of ca. 564 Ma whereas HREE depleted rims an average of ca. 554 Ma, constraining the metamorphic peak in the Patos shear zone within this age interval. Garnet-andalusite-cordierite schists within the Seridó Belt and at the NE-SW shear zone that define its eastern boundary were metamorphosed at temperatures of 550-600 °C at maximum pressures of ca. 3.5 kbar. Monazite grains from these samples display individual ages spreading between 550 and 500 Ma with an average of ca. 520 Ma. In spite of the age spread, the REE patterns of the analyzed domains are quite similar, suggesting a protracted mineral growth history under similar P-T conditions. The presented data indicate that intracontinental deformation associated to high-geothermal gradients in the Borborema Province was long-lived and lasted at least until 520 Ma.