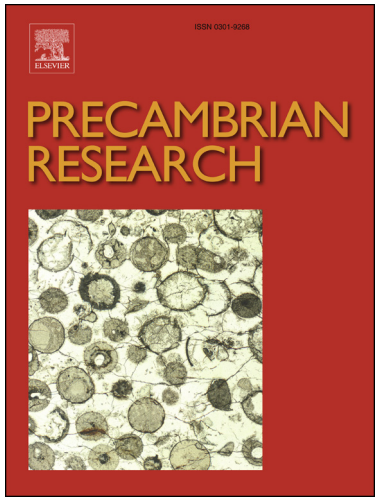

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Constraining timing and P-T conditions of continental collision and late overprinting in the Southern Brasília Orogen (SE-Brazil): U-Pb zircon ages and geothermobarometry of the Andrelândia Nappe System.

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ABSTRACT

The Andrelândia Nappe System (ANS) is an important component of the Neoproterozoic Southern Brasília Orogen (SBO) in SE Brazil and its evolution is related to the convergence and subsequent collision between the passive margin of the São Francisco paleocontinent and Paranapanema block during the Brasiliano Orogeny. The ANS is mainly composed of a pile of deformed meta-sedimentary rocks that record an inverted metamorphic pattern, ranging respectively from amphibolite facies at the bottom to high-P granulite conditions at the top. The ANS is here simplified into the lower, middle and upper nappes. Four samples from different tectonic settings within the ANS were collected for zircon isotopic investigation. In addition, geothermobarometry analyses were performed on seven samples from the middle nappe. Retro-eclogite slices associated to basement gneissic rocks occur along the contact between the upper and middle nappes and have zircon grains with metamorphic rims grown in high-P conditions of 12-16 kbar with temperatures of ~700-800 °C, during the continental subduction dated here by U-Pb SHRIMP in zircon at 625 ± 6 Ma. A period of nappe emplacement accompanied by melting in the middle nappe is evidenced by a garnet-muscovite-staurolite-kyanite schist with leucosome parallel to the main foliation dated by U-Pb SHRIMP in zircon at 618 ± 5 Ma. Re-equilibrium at pressures of 4-7 kbar with temperatures of ~500-700 °C is ascribed to a second heat pulse under lower pressure conditions. The period of melting associated to this event in the middle nappe occurred at 586 ± 9 Ma and is marked by an anatectic tourmaline-garnet-muscovite bearing S-type granite. This granite body is part of a NE-SW belt of granites, with ages between 605 and 563 Ma and covering both the Central Ribeira Orogen (CRO) and the SBO. The age and the alignment of this granite belt justify the interpretation that it is genetically related to the CRO. Thus, the new data provide evidence that tectonothermal events related to the collisional front of the CRO extended up to ~200 km overlapping the consolidated SBO at ca. 580 Ma.

Keywords: Zircon geochronology, Geothermobarometry, Andrelândia Nappe System; Southern Brasília Orogen; Central Ribeira Orogen; Interference Zone;

1. Introduction

Continental collision is the ultimate consequence of the closure of an ocean between continental masses and constitutes an important step of crustal growth and reworking (Holdsworth et al., 2001), being the Cenozoic collision between India and Asia, with the formation of the Himalayas, the archetypical example of collisional orogeny (Molnar and Tapponnier, 1975). Onset of the continental collision in the Himalayas is not only defined by stratigraphic relationships (Najman et al., 2010), but also by the occurrence of exhumed ultra-high pressure eclogites formed at ca. 50 Ma (de Sigoyer et al., 2000; Kaneko et al., 2003). The timing of the most