



Long-term landscape evolution of the southeast Brazilian highlands: comparison of two alkaline intrusions areas

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The southeast Brazilian highlands records a long history of tectonic and magmatic events that were consequence of the South Atlantic Ocean opening. After the rifting process has ceased, an epeirogenic uplift of the continental crust has started in response to the drifting of the South American Platform over a thermal anomaly that accompanied an intense alkaline and basaltic magmatism. Related Late Cretaceous alkaline intrusions are distributed from the southeast Brazilian coast to the interior of the South American Platform. The landscape evolution is associated with several distinct exhumation events at the South American passive continental margin (Hackspacher 2004; Doranti et al, 2014). The present study intent providing insights on the behaviour of the coupled magmatic tectonic-erosional system, comparing thermochronological data from two alkaline intrusions, Poços de Caldas Alkaline Massif (PCAM) and São Sebastião Island (SSI). The PCAM is the biggest alkaline structure located in the interior of the continent, 300km from the coastline (Rio de Janeiro). The structure is formed as a caldera, covering over 800km², intruding Precambrian basement around 83Ma, nepheline syenites, phonolites and tinguaite intruded in a continuous and rapid sequence lasting between 1 to 2 Ma. Meanwhile, the SSI (236km²) is located at the coast, 200 km southeast of the city of São Paulo and is characterized by an intrusion in Precambrian granitic-gnaissic rocks affected by the Panafrican/Brazilian Orogen. This crystalline basement is intruded by Early Cretaceous subalkaline basic and acid dykes, as well as by Late Cretaceous alkaline stocks (syenites) and dykes (basanite to phonolite). The Apatite Fission-Track ages for PCAM range from 333.3±27.6 to 94.0±13.7 Ma at the surrounded metamorphic basement area, and 76.8±10.9 to 48.7±10.7 Ma in the alkaline Massif. The older ages, are concentrated on the lower topography region (700 until 1200m) in the north side alkaline massif. In the SSI area the crystalline basement registered ages 121.1±11.5 Ma and 49.4±4.8 while the alkaline stocks ages ranges 112.5±13; 91.1±11.2Ma; 89.4±13.4 88.2±8.5; 71.3±7.9. The results shows that the main difference between the areas is that PCAM region register older history then the coastal area of SSI, where thermal history starts register cooling event after the South Atlantic rifting process, while in the PCAM area register a previous history, since Carboniferous. The age-elevation relationship shows that the ages decrease systematically with increasing elevation with a break-in-slope near the 150Ma, 80Ma and around 50Ma, which means that the landscape evolution can be associated with several distinct exhumation events at the South American passive continental margin, which include the Gondwana break-up, the Late Cretaceous alkaline magmatism, and the Cenozoic evolution of a N-S trending continental graben system.

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