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TECTONIC SETTING OF THE POST-PALEOZOIC ALKALINE MAGMATISM IN CENTRAL-SOUTHEASTERN SOUTH AMERICA

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Abstract

The central-southeastern region of South America is punctuated by more than one hundred occurrences of alkaline rocks, Permian-Triassic to Paleogene in age, including alkaline centers, associated dyke swarms and small bodies. These occurrences may be grouped into 15 provinces: Alto Paraguay, Ponta Grossa Arch, Valle Chico, Misiones, Central Paraguay, Amambay and Rio Apa, all of them located on the borders of Paraná Basin; Rondonópolis Antecline and Minas-Goiás, lying along the borders of Bauru Basin; Serra do Mar and Piratini, adjoining to the borders of the Santos and Pelotas basins, respectively; Asunción province, associated with the Cenozoic evolution of a rift system; the Cabo Frio Magmatic Lineament, encompassing asynchronous magmatic events along a major fracture zone; and the Velasco and Candelária, in eastern Bolivia, within the Amazon Craton. The alkaline magmatism in the region took place in four main stages: Permian-Triassic, possibly linked to the propagation of stress related to the Cape-La Ventana Orogeny; Early Cretaceous, equivalent to the rift stage in marginal Atlantic basins; Late Cretaceous, coeval to the oceanic stage of the Atlantic Margin; and Cenozoic (Paleogene), related to the evolution of continental rift systems in southeastern Brazil and eastern Paraguay.

The alkaline provinces are controlled by crustal discontinuities, mainly extensional or wrenching fault zones along the present-day borders of sedimentary basins. Available Ar-Ar geochronological data and the distribution of alkaline rocks along tectonic features do not make evident any age distribution pattern. Initial Sr- and Nd-isotopic ratios indicate a lithospheric mantle source to the alkaline magmatism of this region, and thus do not support the hypothesis of the action of mantle plumes. Taking into account the age span (ca. 210 Ma) and the large area of occurrence (ca. 2,000,000 km²), an alternative model comprising a long-lived process of mantle upwelling seems to explain the source of heating for the Permian-Triassic to Cenozoic alkaline magmatism in the region. Changes in the stress-fields and reactivations of regional structures (mainly inherited from Proterozoic crustal discontinuities), in different pulses from Permian-Triassic to the Paleogene, have generated a wide range of structures along which alkaline magmas were emplaced or reached the surface. (Financial support by FAPESP, grants # 97/01210-4, 97/12091-6 and 01/10714-3).

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