Tectonic and sedimentary effects of a hotspot track of alkali intrusions defined by Ar-Ar dating in SE Brazil

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An approximately ESE-trending line of alkali intrusions cross-cuts the ENE structural trend of the Serra do Mar in SE Brazil, from Poços de Caldas near the Paraná basin to the Atlantic. Systematic sampling, and step-heating Ar-Ar dating of single amphibole, feldspar and biotite minerals in a single laboratory permitted us to separate relict and overprint ages and reliably assess intrusion times. The plate velocity deduced from these data, 3.4 cm/yr, is in good agreement with the plate tectonic model velocity of 3.6 cm/yr. The passing of a hotspot across the Serra do Mar in latest Cretaceous through Paleocene time had a profound impact on regional teconics and sedimentation. Weakening of the lithosphere by the plume resulted in the reactivation of a complex network of braided E-W to NE-trending Neoproterozoic ductile shear zones, creating transpressional and transtensional sedimentary basins along them (Resende, Taubaté and São Paulo basins). Uplift of the heated crust renewed the already eroded relief of the early Cretaceous South Atlantic rift shoulder; the topography created by this uplift at present still exceeds 2.5 km. The high relief resulted in accelerated erosion and sedimentation in Eocene and Oligocene times, filling the inland basins, causing reworking of shelf sediments, and thus providing material for the large turbidite fans which contain most of the hydrocarbons of the oil-rich Campos basin.