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TÍTULO: PETROLOGICAL AND THERMOCHRONOLOGICAL CONSTRAINTS ON THE GEODYNAMIC EVOLUTION OF THE RIBEIRA FOLD BELT

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The Ribeira Fold Belt is a complex orogenic system composed of several geological units, consisting largely of granulite-facies migmatitic gneisses (kinzigites) and charnockites; granitoids are widespread, ranging from syn-collision, ~630-600 Ma, batholiths to late-/ post-tectonic intrusions at 540-490 Ma. On the basis of new petrological and thermochronological data, this study addresses the thermal history and origin of metamorphic heat sources in order to contribute to a better understanding of the geodynamic evolution of the Ribeira Fold Belt. In the Costeiro Complex peak metamorphism in migmatitic kinzigites and charnockites (700 - 800 °C, 5 - 6 kb) at 570 – 590 Ma was partially coeval with the emplacement of mafic magmas at 580 – 600 Ma; themochronology defines initial very slow cooling rates (~ 3°C/Ma; 570 to 480 Ma) and much faster cooling and exhumation rates afterwards. Quirino orthogneisses of the Embu Complex yielded peak metamorphic ages from 620 to 570 Ma, whereas cooling ages suggest that the area underwent initial slow cooling (~2 – 5 °C/Ma, until ~530 Ma) followed afterwards by faster cooling rates (~20 – 25 °C/Ma). In the São Fidelis area, migmatitic kinzigites (including xenoliths of meta-gabbroic/ -pyroxenitic cumulates; dated ~600 Ma) and charnockites reached peak T-P metamorphic conditions (800 – 900 °C, 8 – 9 kb) at ~560 – 570 Ma, coeval with emplacement of granitoids and garnet-bearing aplitic bodies. Despite rapid initial differential uplift of some units (~20 °C/Ma), most São Fidelis high-grade rocks have sustained ~20 – 50 Ma at high temperatures (> 650 °C) and exhumation rates decreased as the rocks passed bellow 600 – 400 °C at 500 – 470 Ma ago. In the Araçuaí Belt massive igneous charnockites and migmatitic kinzigites (800 – 850 °C; 6 – 7 kb) are associated to (late orogenic) granitoid and mantle derived gabbroic bodies. Charnockitic activity ranged from 560 to 500 Ma, whereas migmatitic gneisses have remained at peak conditions from ~530 to 480 Ma; these rocks underwent a short period (<10 Ma) of rapid cooling (≥ 60 °C/Ma) at ~480 Ma, followed afterwards by slow cooling rates (~2 °C/Ma). Common to all studied sites, the elevated geotherms and the long period of abnormally high heat flux cannot be explained solely by internal heat production in a thickened continental crust. We suggest that after the Brasiliano main continental collision, thermal erosion and lithospheric thinning (caused by heating from the deeper mantle) should have induced asthenospheric (magmatic) upwelling, sustaining the long-term thermal anomaly that predated generalized gravitational orgenic collapse. These conditions promoted middle to lower crustal melting, causing widespread granitic magmatism and charnockite development at different stages of the Ribeira Fold Belt orogenic evolution.

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