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Metamorphic evolution of central Ribeira Belt (SE Brazil) based on pseudosections and P-T-t paths

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This work uses pseudosections combined with geothermobarometric results and careful petrographic observations of gneissic migmatites and granulites from the central area of Neoproterozoic Ribeira Belt, SE Brazil. In this way, mineralogical transformations and textural reactions can quantify P-T evolution, as well as other compositional features, during prograde and retrograde metamorphism of the Braziliano Orogeny. Results establish a prograde metamorphic trajectory from amphibolitic facies conditions to metamorphic peak at T=850$\pm$50ºC and P=8$\pm$1kbar, promoting widespread dehydration-melting of 30 to 40% of the gneisses and high grade granitogenesis with considerable melt loss. Soon after metamorphic peak, migmatites evolved with ΔT=-200 to -350ºC and ΔP=-2 to -2.5kbar to P-T conditions of T$\sim$500ºC and P$\sim$5kbar, coupled with a_{H2O} increase, replacing the high grade paragenesis garnet-plagioclase-K-feldspar by biotite-quartz-sillimanite-muscovite. Cordierite absence, textural reactions and mineral compositions constrain migmatite metamorphic evolution in the pseudosections as a clockwise P-T-t path with retrograde cooling and decompression. High grade conditions, reflecting long-term thermal anomaly sustained from $\sim$570 to $\sim$480Ma (Bento dos Santos et al., 2007), continued to dehydrate the deeper levels of the crust with biotite, amphibole and garnet-dehydration melting and granulite generation with 10% aplite melt formation. Thus, granulites can be envisaged as lower crust highly dehydrated restites. During this period, granulites were slowly (nearly isobarically) cooled with ΔT=-100 to -340ºC and ΔP=-0.1 to -1.8kbar. When the thermal anomaly ceased, related with tectonic collapse of the orogenic belt, granulites were

rapidly cooled with decompression (ΔT=-100 to -200ºC and ΔP=-1 to -3kbar). This retrograde evolution, coupled with water influx, chemically reequilibrated the rocks from granulite to amphibolite facies replacing the plagioclase-hyperstene-garnet assemblage by biotite-quartz-k-feldspar simpletites, reflecting a counterclockwise P-T-t path that consisted in isobaric cooling followed by decompression and cooling.

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Bento dos Santos, T., Munhá, J., Tassinari, C., Fonseca, P., Dias Neto, C., 2007. Thermochronological evidence for long-term elevated geothermal gradients in Ribeira Belt, SE Brazil. *Geoch. Cosm. Acta*, 71, 15, Sup. 1, A79.