

Evidence of crustal melting: Insights from the Banabuiú gneiss-migmatitic complex (Central Ceará, Brazil)

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The Banabuiú area, located in the Central Ceará Domain (NE Brazil), exposes a segment of the middle crust intensely affected by partial melting during the Brasiliano / Pan-African Orogeny in the Late Neoproterozoic (ca. 600 Ma).

The high-grade metamorphic rocks from the Banabuiú area comprise paragneisses and orthogneisses, both migmatitic, displaying a wide variety of structures and morphologies (stromatic metatexites, schollen, schlieren and massive diatexites). Stromatic metatexites are the dominant lithological type and contain abundant leucocratic veins parallel to the main regional foliation (S_3), which is related to the N–S striking sinistral Orós Shear Zone. There are, however, some felsic veins that appear to have been folded by D_3 and others clearly discordant with D_3 structures.

Field and petrographic data reveal that the typical mineral assemblage in both leucocratic veins and diatexites is quartz + plagioclase ± K-feldspar + muscovite ± biotite ± garnet ± tourmaline. No evidence of solid state deformation was observed.

Metamorphic assemblages and geothermobarometry suggest that partial melting of fertile metasediments occurred at slightly lower crustal levels, through incongruent breakdown of biotite, over a temperature range of 750–800°C. Subsequent migration and multiple injection of melts was a deformation-assisted process, controlled by the Orós Shear Zone. Water released during melt crystallization was responsible for extensive rehydration of high-grade country rocks and overprinting of their previous mineral assemblages, during the last stages of D_3 .

Thus, the Banabuiú gneiss-migmatitic complex is interpreted as a large injection complex, where anatectic melts produced at slightly deeper levels were accumulated.

Funding: GeoBioTec research unit UIDGEO040352013 and M. Lima PhD Grant SFRH/BD/47222/2008 by FCT (Portugal). Metamorphic Evolution of the Granja Complex & Metallogenetic Potential of the Central Ceará Pegmatites (SPU N°: 11294909-6, FUNCAP, Ceará, Brazil).