Deformation assisted melt production during the Brasiliano Orogeny: The Banabuiú Migmatitic Complex (NE Brasil)

M.R. AZEVEDO[1], B. VALLE AGUADO[1], M.N. LIMA[1], J.A. NOGUEIRA NETO[2]

[1] GeoBioTec, Department of Geosciences, University of Aveiro, Portugal, mazevedo@ua.pt

[2] Department of Geology, Federal University of Ceará, Brazil

The Banabuiú gneiss-migmatic complex is located in the Ceará Central Domain of the Borborema Province (NE Brasil) and consists of Paleoproterozoic orthogneisses and metasediments affected by deformation and Barrovian-type regional metamorphism during the Brasiliano / Pan-African Orogeny in the late Neoproterozoic.

Structural evidence suggest that the Brasiliano tectonic evolution of the Banabuiú metamorphic basement involved two contractional deformation events (D_1 + D_2) associated with crustal thickening and ended with a D_3 transcurrent regime related to a crustal-scale sinistral shear zone (Orós Shear Zone). As a result of strong D_3 overprint, most of the earlier D_1+D_2 structures are poorly preserved.

Mineralogical assemblages and textural data reveal that the early prograde Barrovian metamorphic path is coeval with contractional deformation and reached granulite facies conditions at the end of D_2. The metamorphic peak was attained in the beginning of D_3 at estimated temperatures of 700-800°C and pressures ~8 kb. Anatexis of supracrustal materials started at this stage, through incongruent breakdown of biotite. Still during D_3, a decompression path at nearly isothermal conditions allowed the production of larger amounts of melts. Melt crystallization occurred during retrogression in the final stages of D_3.

The Banabuiú gneiss-migmatic complex is interpreted as a large-scale injection complex where abundant volumes of anatectic melts were accumulated. Melt generation took place at slightly lower crustal levels than the present level of exposure by partial melting of metasedimentary materials similar to the outcropping host rocks,. The water released as the injected melt crystallized rehydrated the adjacent granulite facies rocks and may have induced further partial melting in the basement orthogneisses and extensive retrogression of previously formed high-grade mineral assemblages.

SHRIMP U-Pb zircon ages obtained in two diatexite samples (594 ± 6 Ma and 596 ± 21 Ma) provide the best approximation for the timing of the Brasiliano migmatization event in the studied area.