Metamorphic evolution of the Granja migmatitic paragneisses (NW Ceará, Brasil)

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The Granja Granulite Complex (GGC), exposed in the Médio Coreaú Domain (NW Ceará, Brasil), represents a segment of the Paleoproterozoic basement intensely reworked during the Neoproterozoic Brasiliano Orogeny. It consists of migmatitic paragneisses enclosing discontinuous lenses of meta-igneous granulites. The age of the migmatitic / granulitic metamorphic event is reasonably well constrained at ca. 600 Ma by U-Pb and Ar-Ar data [1].

The Granja paragneisses are strongly foliated rocks characterized by an anastomosing alternance of dark garnet-biotite-sillimanite-rich mesosomes and quartz-feldspathic leucosomes. Field evidence show that the stromatic layering was developed during the Brasiliano D_2 and D_3 tectonic events and subsequently overprinted by a late penetrative S_4 mylonitic foliation correlated to the dextral NE-SW trending Granja Shear Zone.

During Brasiliano collision tectonics, the Granja paragneisses underwent granulite-facies metamorphism and anatexis involving four main stages: a prograde metamorphic stage (M_1), a peak metamorphic stage (M_2), a post-peak decompression stage (M_3) and a retrogression stage (M_4), documenting a clockwise PT evolutionary path.

Partial melting conditions appear to have been reached during M_1, through the muscovite dehydration reaction, continued during the metamorphic peak (M_2) as a result of fluid-absent incongruent melting of biotite ($P \approx 8\text{-}10$ kbar; $T \approx$ 800-850°C) and persisted during most of the post-peak decompression stage (M_3). The retrograde cooling path (M_4) is coeval with D_4 shearing and was accompanied by intense dynamic recrystallization of the leucosomes.

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[1] Santos *et al.* (2009) Geological Society, London, Special Publications, **323**, 271–281.