

Petrology and Geochemistry of the TTG migmatitic orthogneisses from the Granja area (NW Ceará, Brazil)

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The Granja Complex, located in the Médio Coreaú Domain (NW Ceará, Brazil), corresponds to a medium to high-grade metamorphic belt consisting of two main sequences: (1) migmatitic TTG (tonalitic-trondhjemitic-granodioritic) orthogneisses with minor occurrences of amphibolites and (2) metasedimentary and meta-igneous granulites. Overall, the Granja Complex represents a segment of the Paleoproterozoic basement (2,2 - 2,5 Ga) intensely reworked during the Neoproterozoic Brasileiro / Pan-African Orogeny at approximately 600 Ma.

At the outcrop-scale, the TTG rocks are characterized by a prominent stromatic foliation (alternance between dark hornblend-biotite-rich layers and leucocratic quartzofeldspathic bands) indicating that these rocks were affected by partial melting. Sporadically, nebulitic and schlieren structures were also observed (diatexites). In the proximity of the Granja Shear Zone (a crustal-scale shear zone crossing the study area), the TTG migmatites show a mylonic subvertical fabric and a strong sub-horizontal mineral stretching lineation.

Whole-rock geochemical data for the darker layers reveal that most of the analysed samples are metaluminous ($A/CNK = 0,77 - 0,97$) and plot in the tonalitic, granodioritic and trondhjemitic fields in the R1-R2 and normative An-Ab-Or diagrams, confirming the TTG affinities of their parent rocks. The lighter bands (leucosomes) range in composition from granodiorite to granite and are slightly peraluminous ($A/CNK = 1,03 - 1,05$). Most of the samples from the darker layers have moderately fractionated REE chondrite-normalized patterns ($La_N/Yb_N = 5,32 - 36,87$), negative Eu anomalies ($Eu/Eu^* = 0,76 - 0,90$), negative anomalies of Nb-Ta-Ti coupled with a clear enrichment in LILE relative to HFSE ($Ba_N/Yb_N = 17,97 - 89,03$). Their geochemical signatures are consistent with derivation from calc-alkaline igneous protoliths formed in a magmatic arc geodynamic setting.

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