

Norite and charnockitic rocks from the Venda Nova pluton, SE Brazil: intensive parameters and some petrogenetic constrains

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The Venda Nova pluton (VNP) is a zoned ring structure emplaced in the southern portion of the Neoproterozoic Araçuaí belt, in Espírito Santo Brazil. It is a slightly westward tilted cylinder-like intrusion, with an almost circular horizontal section. In the center of this structure, an off-centered gabbro-noritic core, surrounded by syeno-monzonitic rocks, intrudes an outer ring of charnockites and norite. These envelop the syeno-monzonitic and gabbro-noritic center, as a narrow discontinuous belt. While, in the core intrusion, mingling and mixing processes are widespread and well documented in the literature, in the outer ring, the norite and charnockitic layers show predominantly homogeneous and isotropic internal structures. Nevertheless, smaller interaction zones between charnockites and norite denote a comparatively more restricted mingling process. The norite is a fine-grained rock with hypidiomorphic granular to intergranular texture. The charnockites are medium-grained and made up of: a) orthopyroxene-tonalite, b) orthopyroxene-quartz-diorite and c) orthopyroxene-granodiorite with hypidiomorphic granular to porphyritic textures. In all lithotypes both ortho- and clinopyroxene are replaced by hornblende and biotite.

Two contrasting compositional sequences have been recognized, based on whole rock geochemistry: 1) a basic, with tholeiitic affinities (norite) and, 2) an intermediate, medium-K calc-alkaline, comprising the charnockites. Estimated crystallization

temperatures, which have been calculated from micro-probe analysis of pyroxenes, range from $915\pm 25^{\circ}\text{C}$ to $960\pm 50^{\circ}\text{C}$. Re-equilibration temperature (ilmenite-magnetite calibration) is around $600\pm 50^{\circ}\text{C}$. This indicates oxygen fugacities four order of magnitude below the FMQ-buffer and a reduced environment. Coeval pressure conditions estimated from the Al-content in hornblende range from 5.5 ± 0.6 kbar. Data obtained for the norite points towards an evolution from the partial melting of an anhydrous tholeiitic mantle magma. The charnockites may correspond to the differentiation of a calc-alkaline parental magma. The later maybe could be the hybrid product from the contamination and mixing between the anhydrous tholeiitic magma with other deeper crustal sources. Further the magmatic system evolved through fractionation of orthopyroxene, clinopyroxene, plagioclase and ilmenite.

Our results support the hypothesis for the evolution of the VNP through a mantle-crust delamination process probably related to the collapse of the Araçuaí orogeny.

Keywords: charnockites, intensive parameters, Venda Nova pluton, Araçuaí belt, southeast Brazil