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EXHUMATION PATH OF THE VARZEA DO CAPIVARITA COMPLEX AND ITS IMPLICATIONS FOR THE GENESIS OF THE ENCRUZILHADA BLOCK IN THE DOM FELICIANO BELT, RIO GRANDE DO SUL, SOUTHERN BRAZIL

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The Varzea do Capivarita Complex (VCC) is the oldest unit of the Encruzilhada Block (EB), a (suspect) “terrane” of the Dom Feliciano Belt. VCC ortho- and paragneisses and syntectonic syenites register granulite-facies conditions during a progressive transpressive deformation. The VCC structural evolution is marked by a gradual transition from D_1 thrusting towards WNW into a D_2 dextral shearing, both striking NNW. Field relations and geochronology of metamorphic and syntectonic igneous rocks emplaced along both structures indicate a relative contemporaneity of the two VCC fabrics in terms of strain partitioning, as well as no significant time difference between the granulite-facies peak metamorphism and intrusion of the syenitic magma. Metamorphic conditions were estimated based on whole-rock and mineral chemistry data using the Perple_X software on a representative set of three VCC samples and one additional sample from the neighboring, easternmost part of the Porongos Metamorphic Complex (PMC), for comparison purposes. A weakly migmatitic cordierite-garnet-biotite paragneiss with D_1 flat fabric yielded conditions of 790-815°C/4.6 kbar. Some paragneiss samples contain cordierite + spinel ± sillimanite silica-undersaturated domains formed at ca. 680°C/3 Kbar. A sample of mylonitic clinopyroxene-biotite syenite yielded deformation temperatures of 900-950°C and a sample of orthopyroxene-biotite tonalitic orthogneiss from the steep D_2 fabric yielded PT conditions of 810-865°C/3–6 Kbar. Estimates from a garnet-clinopyroxene calc-silicate layer interleaved with the PMC acidic metavolcanics yielded conditions of ca. 430-530°C and pressures ≥4.5 kbar. The results suggest a high temperature and low pressure/depth conditions during WNW-directed thrusting of the VCC. Although the pressure estimates from samples in D_2 fabric are not very precise, the conditions for their formation are compatible with the conditions of D_1. The development of spinel-bearing silica-undersaturated domains points to a progressive cooling and exhumation of the VCC granulites, with no significant deformation, as the HT matrix mineral assemblage remains intact. Such evolution can be interpreted in terms of a progressive thrusting of the VCC over PMC amphibolite-facies rocks. However, the contact between both units is unclear due to the later Piquiri Syenite and Encruzilhada Granite intrusions. Considering that the thrusting took place during peak metamorphism, it is unlikely that PMC amphibolite-facies rocks were situated substantially deeper than the VCC granulites. It is thus possible to constrain PMC metamorphic conditions close to the lowest estimated PT values, perhaps affected by VCC overload. Recent studies correlate the easternmost PMC metavolcanics with the VCC orthogneisses in terms of geochemistry and age of protoliths (ca. 790 Ma), as well as their metasedimentary rocks in terms of provenance and also early structural evolution. Such similarities sums up in favour of a hypothesis that both complexes represent different parts of the same basin. In this scenario, the VCC rocks represent the deeper part of this basin with a high geothermal gradient, which was tectonically juxtaposed with its shallower and colder margin (PMC) by transpression during the Gondwana assembly (ca. 650 Ma). Our data give new insight into the origin and tectonic meaning of the EB and challenge its interpretation as a “terrane”.

KEYWORDS: PT CONDITIONS; PSEUDOSECTION; .GRANULITE