FLUID REGIMES DURING PROGRADE METAMORPHISM AND EXHUMATION OF ANATECTIC METAPELITES FROM THE TURVO-CAJATI FORMATION, SOUTHERN RIBEIRA BELT

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RESUMO: The Turvo-Cajati Formation is a major unit of the Curitiba Terrane, a segment of the Southern Ribeira Belt, Brazil. It comprises a succession of metasedimentary rocks formed by slate, phyllite, micaschist, migmatitic paragneiss, marble, calc-silicate rocks and quartzite, metamorphosed from lower greenschist to granulite facies condition. This work presents results from fluid inclusion studies performed on rocks from amphibolite to granulite facies conditions, which were used to investigate: (a) the fluid regimes at the amphibolite-granulite facies transition; and (b) what response the fluid inclusions can provide to the reconstruction of pressure-temperature-time-deformation paths? Fluid inclusion studies were performed on 100 µm-thick double-polished section of ten samples, including schists from the staurolite-kyanite and staurolite-sillimanite zones, kyanite-migmatite, sillimanite-migmatite and leucosomes. Petrographic analyzes were used to the identification, description and mapping of fluid inclusion associations and selection of regions to be investigated by microthermometry. Fluid inclusions enclosed in quartz aggregates from non-anatectic schists and residual neosomes of migmatites are exclusively carbonic and occur of four modes: (a) isolated, (b) randomly distributed in tridimensional arrays within grain interiors, (c) along intragranular trails, and (d) along transgranular trails. These four modes of occurrence suggest that the carbonic inclusions are of primary (a,b), pseudo-secondary (c) and secondary (d) natures. The existence of primary and pseudo-secondary carbonic inclusions and the absence of aqueous fluid inclusions are evidence of a low water activity during the progression of metamorphism and exhumation stage. On the other hand, aqueous inclusions coexisting with carbonic inclusions are abundant in quartz grains from granitic and trondhjemitic leucosomes. Microthermometric data were obtained on a representative sample of staurolite-garnet-kyanite-biotite schist with evidence of incipient partial melting. The sample presents primary carbonic inclusions in quartz grains from the rock matrix and included in garnet. Quartz grains enclosed in garnet define a folded schistosity (S_1) discordant from the external S_3 mylonitic schistosity. These grains show scarce and randomly distributed carbonic inclusions with melting temperature between -57.2 and -56.6 ºC, indicating nearly pure CO_2. Homogenization occurred into the liquid state from 21.9 to 29.1 ºC, indicating density between 0.752 and 0.619 g/cm^3. Carbonic inclusions randomly distributed in tridimensional arrays within matrix quartz grains presented melting temperatures from -62.4 to -61.3 ºC, suggesting the presence of ~30 vol.% of metane. Homogenization occurred into the liquid state between 8.6 and 21.3 ºC, indicating density from 0.528 to 0.496 g/cm^3. Microprobe-based thermobarometry indicates peak metamorphic conditions of 670 ± 20 ºC and 9.5 ± 1 kbar. A *P-T* path reconstructed from garnet and plagioclase zoning indicates near isobaric heating from 510 ºC to 585 ºC at 10.2 kbar, coeval with the development of the S_1 schistosity, followed by an episode of heating-decompression until 670 ºC at 9.5 kbar, contemporaneous with development of the S_3 schistosity. Isochores calculated for the carbonic inclusions yield pressure of 1-3 kbar for both syn-S_1 and syn-S_3 quartz, indicating that the fluid inclusions were re-equilibrated due to an exhumation path with 6-8 kbar of decompression. This work was funded by grant 2015/04487-7, São Paulo Research Foundation (FAPESP).

PALAVRAS-CHAVE: FLUID INCLUSIONS; METAMORPHISM; SOUTHERN RIBEIRA BELT