AMS FABRIC AND LATTICE PREFERRED ORIENTATION OF THE CARLOS CHAGAS ANATEXITE, ARAÇUAÍ BELT (EASTERN BRAZIL)

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The Carlos Chagas anatexite is a unit that includes diatexites, metaxites and anatectic granites. It is localized in eastern domain of the Araçuaí orogen. This orogenic segment underwent a synkinematic high temperature (>750°C)-low pressure (~ 6MPa) metamorphism that causes widespread partial melting of the middle crust. Thermochronological data suggests that this segment remained hot for 10s of millions years (580-530 Ma) due to a very low cooling rate (<5°C/My). Along all its extension, this unit is thrusted to west over the central domain of the belt, which is formed by granites, granodiorites and metassediments. The Carlos Chagas unit is composed by a peraluminous anatexite with abundant sillimanite, feldspar, garnet, cordierite and biotite. U-Pb data indicates that its crystallization occurred c. a. 574 ± 3 Ma. The main feature of this migmatite is the presence of a pervasive magmatic foliation. This fabric is marked by the preferential alignment of mafic and felsic minerals, specially biotite, alkali feldspars and plagioclase. At the grain scale, quartz displays evidence of interstitial crystallization and few solid state deformation features are observed. Anisotropy of magnetic susceptibility (AMS) was used for recovering mineral fabric of the Carlos Chagas anatexite. Magnetic properties of 153 samples were measured. They yield low values of the bulk magnetic susceptibility (km <360 x 10^{-6} SI), low anisotropy degrees (1.03 – 1.19), and shape parameter ranges from – 0.3 to 0.8. These magnetics characteristics are consistent with biotite being the dominant carrier of the AMS. Magnetic foliations and lineations suggest two main structural patterns. The northern portion of the studied area shows shallowly plunging lineations (02° - 20°) to SE (140°-120°) or NW (340°-300°), while the foliation strikes NW-SE with shallow dips (03°-10°). Local subvertical foliation dips (70°) are due to NE-SW trending transcurrent shear zones. The southern region shows complex magnetic fabric patterns. Magnetic lineation plunges range from 05° to 58°, in varied directions, while the foliation strikes from NW-SE to NE-SW with low to high dips, lacking a statistical preferred orientation. Using electron backscatter diffraction (EBSD) analysis we investigated the correlation of the biotite, sillimanite, quartz and plagioclase crystallographic fabrics with the AMS fabric and structural field measurements. Quartz does not display any lattice preferred orientation (LPO), and confirm that deformation occurred before crystallization of the anatexite. LPO of sillimanite is well-correlated with field lineations and likely results from its preferential growth parallel to the flow direction. LPO of biotite document a correspondence between the <001> direction of biotite and k_3. In hot orogens such as the orogenic sector studied here, strain localization is not efficient and rocks are deformed homogeneously. Field data, AMS and EBSD studies suggest that, in the anatectic unit as well as in the adjacent units of the Araçuaí belt, the Africa-South America convergence resulted in the development of a complex, 3D strain field in huge volumes of magmatic and anatetic rocks, which hinder a simpler, high-temperature plastic flow regime.

Key words: Araçuaí belt, anatexite, anisotropy of magnetic susceptibility, EBSD.