DEFORMATION MECHANISMS AND CPO PATTERNS OF INTENSELY RECRYSTALLIZED ROCKS: AN EXAMPLE FROM THE LANCINHA SHEAR ZONE, SOUTHERN BRAZIL.

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Certain deformation processes that occur at the microscale allow rocks to accommodate strain and change their internal structure, shape or volume. Such processes are related to the rheological behaviour of the rocks, which is controlled by mineral constituents, temperature and pressure conditions, as well as strain rate and fluid assistance. In this sense, deformation at upper crustal levels is dominated by cataclastic flow and low temperature dislocation creep, often associated with recrystallization mechanisms of bulging and subgrain rotation. The Lancinha shear zone (LSZ) is a Neoproterozoic dextral strike-slip shear zone trending NE, located in the southern part of the Ribeira Belt, extending over ~150 km, separating the Apiaí and Curitiba terranes. The Ribeira Belt formed as a result of the collision between São Francisco, Congo and Paranapanema cratons during the amalgamation of west Gondwana at ~600 Ma. For this study were analysed three samples, according to the proximity from the shear zone, by the SEM-EBSD technique, and the data was processed using the Mtex toolbox for MatLab. The rocks represent S-C type schists and mylonites deformed under greenschist facies conditions (~300 - 350°C). In terms of mineralogy and texture the rocks are composed of quartz, feldspar, plagioclase and mica along anastomosing cleavage planes. In relation to microfabrics, quartz from all samples exhibits ribbon shapes with aspect ratios up to 7:1, subgrain boundaries, new grains formed by bulging, and undulose extinction. Results from EBSD analysis demonstrate J-index values ranging from 6.20 to 35.31 on the samples located close to the shear zone, whereas the J-index for the sample collected further from it is of only 2.85, suggesting that higher strain rates can strengthen the CPO (crystallographic preferred orientation) fabric. Quartzite and schist samples show a primary concentration of quartz c-axis parallel to the foliation (Z) and a-axis parallel to the stretching lineation (X), suggesting the activation of the basal <a> slip system. A secondary concentration of rhomb planes close to Z suggests that the activation of rhomb <a> also occurred during the quartzite deformation. The presence of dislocation creep deformation mechanisms as dominants and the activation of such slip systems are consistent with the low temperature microstructure observed in these samples. The mylonite CPO fabric shows a strong maximum of quartz c-axes close to X, such orientation may be a result of oriented growing of the quartz grains, as the mylonite microstructure is of low temperature deformation, associated with bulging and subgrain rotation recrystallization, and therefore inconsistent with the activation of high-temperature slip systems such as prism <c>. The peak at 60˚ observed in the misorientation angle diagram of the mylonite and the schist located close to the LSZ is related to dauphiné twinning, while the low angle peak (<10˚) from the quartzite corresponds to the formation of subgrains. The results document that low-temperature deformation in shear zones are predominantly controlled by dynamic recrystallization mechanisms and by preferred growth of quartz, depending on local conditions, but future work on similar shear zones should be performed for comparison.

KEYWORDS: Ribeira belt, EBSD, Lancinha shear zone.