MICROSTRUCTURAL EVIDENCES OF SHEAR ZONES DEVELOPMENT IN DUCTILE-BRITTLE CONDITION, SOUTHERN ADELAIDE FOLD-THRUST BELT

1YASSAGHI, A. 2JAMES, P. R. 2fLOTTMANN, T. 1DEPARTMENT OF GEOLOGY, TARBIET MODARESS UNI, TEHRAN IRAN. 2DEPARTMENT OF GEOLOGY & GEOPHYSICS, ADELAIDE UNI., SOUTH AUSTRALIA

Quantitative/statistical evalution of quartz grain configuration data on a number of quartzite samples within the shear zones indicates that from the upper transitional zones towards the lower boundary thrusts, the grain size dcreases, the aspect ratio increases, and the shape preferred orientation of grains is modified. This which is also confirmed by the relatively high statistical confidence value (t-test), provides evidence on the development of grain configuration during shearing process. Furthermore, microstructures of quartz within the shear zones show evidence of intracrystalline deformation in the form of undulatory extinction, deformation bands, and sub-grain formation. Their intensities increase from the upper transitional zones towards the lower boundary thrusts. At these boundaries grain boundary migration recrystallisation and sub-grain rotation recrystallisation occur and to form core and mantle structures. Comparison of the microstructures across the shear zones shows that the amount of intracrystalline deformation features and core and mantle strucutres decreases from within the shear zones closest to foreland towards the shear zones closest to hinterland. Such decrease in crystal plastic deformation products is thought to be occur by transition from ductile to brittle-ductile bulk rock behavior in quartz-rich rocks. This transition condition could happend due to propagation of the shear zones and the major decollement thrust to a lower structural level.