COMPLEX, 3D STRAIN IN A SYNKINEMATIC TONALITE BATHOLITH FROM THE ARAÇUAÍ (SE-BRAZIL) NEOPROTEROZOIC HOT OROGEN: EVIDENCE FROM ASM AND U/PB STUDIES

Marcos Egydio-Silva[1]; Alexandra Fernandes Oliveira[2]; Mathieu Mondou[3]; Alain Vauchez[4]; Maria Irene Bartolomeu Raposo[5]; Olivier Bruguier[6]

[1] INSTITUTO DE GEOCIÊNCIAS - UNIVERSIDADE DE SÃO PAULO; [2] INSTITUTO DE GEOCIÊNCIAS - USP; [3] INSTITUTO DE GEOCIÊNCIAS - UNIVERSIDADE DE SÃO PAULO; [4] GÉOSCIENCES MONTPELLIER - UNIVERSITÉ MONTPELLIER 2; [5] INSTITUTO DE GEOCIÊNCIAS-USP; [6] GÉOSCIENCES MONTPELLIER - UNIVERSITÉ MONTPELLIER 2

RESUMO: The neoproterozoic Araçuaí belt of SE- Brazil involves a huge (~300x60km) tonalitic to granodioritic batholith formed by several magmatic bodies and numerous tonalitic sills interlayererd with host metasediments. These magmatic rocks display a well-defined magmatic fabric consistent with the solid-state fabric observed in the country-rock. A detailed structural (Anisotropy of Magnetic Susceptibility) and geochronological (U/Pb) study was carried out across this batholith to determine the strain distribution through space and time. Magnetic investigations indicate that the studied tonalites have a predominantly paramagnetic behaviour and therefore that the magnetic fabric is a good proxy of the structural (flow) fabric. Measured magnetic foliations and lineations, together with field measurements, highlight a variation of the strain pattern through the studied domain. The western part is characterized by orogen parallel, eastward gently dipping foliation that bears a down-dip lineation, in agreement with westward thrusting of the belt onto the São Francisco craton. Eastward, the foliation progressively becomes steeply dipping then subvertical. From the centre of the tonalitic unit to its eastern limit, magmatic foliations are subvertical, orogen parallel and bear lineations varying from horizontal to vertical. In a narrow (~15 km), NS-elongated domain, the magmatic foliation is horizontal and bears orogen parallel lineations.To constrain the emplacement history of the huge volume of tonalitic-granodioritic magma involved in the batholith, and to constrain the timing of the deformations recorded by the magmatic fabric, U/Pb dating of zircons from 11 outcrops representative of the various facies and magmatic fabric observed in the batholith has been performed. The homogeneity of the results suggests 1) that the whole batholith emplaced during a single magmatic event at ~580 Ma, probably in an already deforming middle crust, and 2) that the entire batholith was deformed before it started to behave as a solid. We therefore consider that the different structural patterns are roughly contemporaneous and represent a complex, 3D deformation resulting from the relatively simple East-West convergence that built the belt. The deformation of the tonalitic batholith and its country-rock involves 1) westward thrusting of the western domain (possibly controlled by the stiff cratonic lithosphere present at depth), 2) an association of thickening and lateral escape along both vertical or horizontal flow surfaces in its central and eastern domains. This complex 3D deformation may be due to the combination of a gravity-controlled strain component with the collision-related regional deformation, a behaviour characteristic of weak lithosphere in hot orogens.

PALAVRAS-CHAVE: HOT OROGEN; STRAIN DISTRIBUTION; MAGMATIC DEFORMATION.