Geophysical Research Abstracts,
Vol. 10, EGU2008-A-00261, 2008
EGU General Assembly 2008

Structural and thermochronological constrains on the tectonic evolution of Ribeira Belt, SE Brazil

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This work integrates the latest thermochronological data on the central segment of Ribeira Belt, SE Brazil and the imprinted structural features of the Paraiba do Sul River megashear structure with the purpose of constraining the thermotectonic evolution of this Panafrican granulite belt. Combining structural analysis of this area with the four main thermochronological periods defined by Bento dos Santos et al. (2007) allows to state that following the earlier collision imbrication nappe thrusts at 630-600 Ma (D_1), main regional high grade thrust deformation (D_2: 250º, 55-70º NW; stretching lineation 55-65º, 5-20º) was coeval with peak metamorphism at $\sim$565 Ma. Previous deformation phases were mostly erased by D_3 thrust and dextral megashear systems (50-65º, 70-85º NW; stretching lineation 5-15º, 172-178º) during long-term slow-cooling ($<$1 to 5ºC/Ma) transpressional shearing (Sanderson & Marchini, 1984) that lasted until 510-470 Ma, when a brittle tectonic event D_{4a} (290-320º, sub-vertical) corresponding to opening and thermal relaxation with granitoid emplacement and D_{4b}, a regional sub-horizontal discontinuity that resulted from tardi-tectonic rebound of the exhumation-caused tectonic collapse, rapidly exhumed/cooled ($\sim$30ºC/Ma) the granulites. Results suggest that a $\sim$35 Ma period of orthogonal shortening between the two cratons occured until 565 Ma when metamorphic peak conditions were reached simultaneously with the development of a D_2 flower thrust system. When orthogonal shortening turned rheologically impossible because rocks could not absorb further shortening, D_3 dextral transpressive regime became dominant, turning the flower structure asymmetrical. Structure related positioning in the flower structure combined with deformation partition of this segment provided special structural features such

as antithetical sinistral kinematics in a globally dextral regime and non-homogeneous exhumation with swift granulite ascension in the central axis whereas along the lateral branches exhumation was much slower because of the small dip angle (5 to 10º), resulting in very slow cooling of the lateral branches lasting almost 100 Ma.

FAPESP, POCA-PETROLOG (CEGUL, UI: 263; POCTI/FEDER) and SFRH/BD/17014/2004 FCT PhD scholarship co-financed by FEDER provided support for field and analytical work.

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