

PAIRED RESIDUAL DEFORMATION AND POST-OROGENIC EXHUMATION OF THE KAKO AND DOM FELICIANO BELTS: impacts of the migrating orogenic front during the assembly of western Gondwana

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RESUMO

The reactivation of shear zones under brittle conditions during exhumation due to extensional collapse of the thickened continental crust is a common feature of post-collisional settings. New illite K-Ar analyses and (U-Th)/He data help establish the timing of exhumation and residual deformation during the final stages of orogenic activity in the Kaoko Belt, NW Namibia. Dating of clay-sized white mica from fractionated samples can be used to estimate late-stage deformation in shear zones and constrain the transition from the ductile to the brittle regime. XRD characterization of the dated material indicates crystallization under epizonal conditions ($>300^{\circ}\text{C}$), which, together with the lack of correlations with age in fractionated samples are suggestive of protracted mineral growth. This supports the interpretation that K-Ar ages at 510-480 Ma in the analyzed samples set a maximum age for the end of ductile activity in the Kaoko Belt, after which brittle faulting is interpreted to have been the predominant style of deformation. This is in accordance with zircon thermochronological data, which predominantly record fast cooling towards temperatures below 200°C shortly thereafter. When compared with equivalent data in South America, the new results reveal that, while the peak orogenic stage of the Dom Feliciano Belt (650-570) took place many tens of Myr earlier than in the Kaoko Belt (580-550 Ma), the transition from ductile to brittle deformation (535-465 Ma and 510-480 Ma, respectively) and rapid exhumation into upper crust conditions (550-400 Ma and 500-350 Ma, respectively) has much more significant overlaps. This observation suggests that, with the progression of the main deformation front from present-day South America to Africa at the time of the collisional process in the Kaoko Belt, the late-stage deformation and eventual post-orogenic exhumation of the Dom Feliciano Belt may have been controlled by the far-field tectonic influence of the continuing orogenic activity to the West. The late stages of the Kaoko Belt, on its turn, are also influenced by a continuation of the progressive migration of the orogenic front towards the Damara Belt, thus highlighting the interconnected character of deformation and exhumation within the entire orogenic system.

Palavras-chave: structural inheritance; shear zone reactivation; ductile-brittle transition; low-T thermochronology; Brasileiro/Pan-African orogenic cycle