



Tectonic stress evolution in the Pan-African Lufilian Arc and its foreland (Katanga, DRC): orogenic bending, late orogenic extensional collapse and transition to rifting

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Between the paroxysm of the Lufilian orogeny at ~ 550 Ma and the late Neogene to Quaternary development of the south-western branch of the East African rift system, the tectonic evolution of the Lufilian Arc and Kundelungu foreland in the Katanga region of the Democratic Republic of Congo remains poorly known although it caused important Cu-dominated mineral remobilizations leading to world-class ore deposits. This long period is essentially characterized by brittle tectonic deformations that have been investigated by field studies in open mines spread over the entire arc and foreland. Paleostress tensors were computed for a database of 1450 fault-slip data by interactive stress tensor inversion and data subset separation, and the relative succession of 8 brittle deformation events established. The oldest brittle structures observed are related to the Lufilian brittle compressional climax (stage 1). They have been re-oriented during the orogenic bending that led to the arcuate shape of the belt. Unfolding the stress directions from the first stage allows to reconstruct a consistent NE-SW direction of compression for this stage. Constrictional deformation occurred in the central part of the arc, probably during orogenic bending (Stage 2). After the orogenic bending, a sequence of 3 deformation stages marks the progressive onset of late-orogenic extension: strike-slip deformations (stages 3-4) and late-orogenic arc-parallel extension (stage 5). It is proposed that these 3 stages correspond to orogenic collapse. In early Mesozoic, NW-SE compression was induced by a transpressional inversion, interpreted as induced by far-field stresses generated at the southern active margin of Gondwana (stage 6). Since then, this region was affected by rift-related extension, successively in a NE-SW direction (stage 7, Tanganyika trend) and NW-SE direction (stage 8, Moero trend).