Geophysical Research Abstracts
Vol. 15, EGU2013-2310, 2013
EGU General Assembly 2013

Tectonic stress inversion of large multi-phase fracture data sets: application of Win-Tensor to reveal the brittle tectonic history of the Lufilan Arc, DRC

Damien Delvaux (1,2), Louis Kipata (3,4), and Manuel Sintubin (4)

(1) Royal Museum for Central Africa, Geology - Mineralogy, Tervuren, Belgium (damien.delvaux@africamuseum.be, +32 2 7695432), (2) School of Geosciences, University of the Witwatersrand, Johannesburg, South Africa, (3) Department of Geology, University of Lubumbashi, Katanga, Democratic Republic of the Congo, (4) Geodynamics and Geofluids Research Group, K.U.Leuven, Belgium

Large fault-slip data sets from multiphase orogenic regions present a particular challenge in paleostress reconstructions. The Lufilian Arc is an arcuate fold-and-thrust belt that formed during the late Pan-African times as the result of combined N-S and E-W amalgamation of Gondwana in SE-DRCongo and N-Zambia. We studied more than 22 sites in the Lufilian Arc, and its foreland and correlated the results obtained with existing result in the Ubende belt of W-Tanzania. Most studied sites are characterized by multiphase brittle deformation in which the observed brittle structures are the result of progressive saturation of the host rock by neoformed fractures and the reactivation of early formed fractures. They correspond to large mining exploitations with multiple large and continuous outcrops that allow obtaining datasets sufficiently large to be of statistical significance and often corresponding to several successive brittle events. In this context, the reconstruction of tectonic stress necessitates an initial field-base separation of data, completed by a dynamic separation of the original data set into subsets. In the largest sites, several parts of the deposits have been measured independently and are considered as sub-sites that are be processed separately in an initial stage. The procedure used for interactive fault-slip data separation and stress inversion will be illustrated by field examples (Luiswishi and Manono mining sites). This principle has been applied to all result in the reconstruction of the brittle tectonic history of the region, starting with two major phases of orogenic compression, followed by late orogenic extension and extensional collapse. A regional tectonic inversion during the early Mesozoic, as a result of far- field stresses mark the transition towards rift-related extension.
More details in Kipata, Delvaux et al.(2013), Geologica Belgica 16/1-2: 001-017
Win-Tensor can be downloaded at: http://users.skynet.be/damien.delvaux/Tensor/tensor-index.html