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Brittle destabilization of the Congo cratonic plate during and after the Pan-African assembly of Gondwana

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The Congo cratonic plate has been formed by the welding of Archean cores by Paleoproterozoic mobile belts. It was affected during the Neoproterozoic by a failed rift system which initiated the formation of the Congo basin and was later reactivated by compressional deformation during and after the Pan-African assembly of Gondwana. Effects of collisional processes around the Congo plate on the paleostress pattern in Central Africa during and after the late Pan-African final amalgamation of Gondwana period are evidenced by fault-kinematic data and paleostress inversion results from field surveys covering parts of Tanzania, Zambia and the Democratic Republic of Congo. Reconstruction of paleostress field from brittle microstructures reveal that the interior of the Congo cratonic plate recorded the far-field effects of the geodynamic processes that occurred at the plate margin. It also provide important constraints in plate tectonic reconstructions.

The first brittle compressional event recorded in the Lufilian Arc along the southern margin of the Congo plate is related to the ~ N-S convergence and collision between the Kalahari and the Congo cratons at the end of the Pan-African times. N-S thrusting and compression is also evidenced further North near Kisangani, in the interior of the Congo craton. It is tentatively related to the Oubanguides fold belt that formed during interaction between the Congo craton and the Sahara metacraton. The two processes could have been coeval in time, squeezing the Congo craton between the Kalahari craton and the Sahara metacraton, generating a N-S compressional stress field in the interior of the Congo craton. This far-field stress is considered as responsible for the structuration of the Neoproterozoic sediments of the Congo basin and the tectonic unconformity observed in the seismic profiles.

The second major deformation stage observed in the Lufilian Arc generated brittle structures that are compatible with a NE-SW transpressional stress field. It has been spatially correlated with compressional structures that reactivate the Ubendian belt between the Bangweulu and Tanzanian cratonic cores. These are related to the E-W collision between East and West Gondwana, expressed by the Mozambique belt along the eastern margin of the Tanzanian craton (part of the Congo cratonic plate).

A brittle deformation event of regional importance affects the Karoo Supergroup (Permian-early Triassic) in various places and is related to a transpressional stress field generated by the distant Gondwanide collision at the active southern margin of Gondwana (now exposed in the Cape Fold Belt). Since the Late Mesozoic, the Congo craton was dissected by various rifting events, the last and still active one being related to the development of the western branch of the East African rift system.