

## **The “fault of the Pool” along the Congo River between Kinshasa and Brazzaville, R(D)Congo is no more a myth: Paleostress from small-scale brittle structures**

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Small-scale brittle structures such as shear fractures and tension joints are well developed in the indurated Paleozoic Inkisi red sandstones of the West-Congo Supergroup in the “pool” region of Kinshasa and Brazzaville, along the Congo River. They appear to be related to the evolution of intraplate stresses during the late Cretaceous-Paleogene period, possibly related to the opening of the South Atlantic. However, inferring paleostresses from such structures is difficult due to the lack of clear kinematic indicators, so we used mainly the geometry, architecture and sequence of the joint systems to infer paleostresses. A limited number of kinematic indicators for slip sense (displaced pebbles, irregularities on striated surfaces, slickensides) or extension (plume joints) confirm the general conclusions of the joint architecture analysis.

We found evidence for two major brittle deformation systems, leading to almost orthogonal fracture sets. They both started by the development of plume joints, which progressively evolved into open tension joints, isolated shear fractures and long (up to several hundred meters) brittle shear zones. The first system started to develop under NE-SW extension and evolved into strike-slip with NNW-SSE horizontal compression while the second (and later), started to develop under NW-SE extension and evolved into strike-slip with NNE-SSW horizontal compression. The second brittle deformation episode was associated with fluid flow as shown by the presence of palygorskite-calcite veins in the most prominent fractures of the second fracture system. Along the NE-SW brittle shear zones which run parallel to the Congo River, carbonate-rich fault-gauge lenses are filled by sand derived from the crushed adjacent walls and calcite vein fragments injected at a high fluid pressure, with late precipitation of palygorskite.

Our study demonstrates the existence of two fault systems between Kinshasa and Brazzaville, the first one orthogonal to the trend of the Congo River and the second one, orthogonal to it. This reconciles the different views on the suspected presence of a major fault in the Pool.