

From confined orogen to passive margins: temporal constraints on the break-up evolution of the Araçuaí – West Congo orogen (D.R. Congo - eastern Brazil)

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Abstract

The Araçuaí – West Congo orogen (AWCO) was formed during the Pan-African – Brasiliano orogeny (late Neoproterozoic), and is confined by the São Francisco – Congo craton (SFCC). Its formation, in a process called nutcracker tectonics, was preceded by at least six rifting events in a protracted extensional regime (1.77 Ga – 678 Ma). None could completely sever the SFCC connection to the north (Bahia-Gabon cratonic bridge). During the Early Cretaceous (~130 Ma), the AWCO finally separated, due to the opening of the South Atlantic Ocean. Today we find the eastern part of the AWCO on the African continent as the West Congo Belt (Angola, D.R. Congo, Congo Brazzaville and Gabon), and its western counterpart on the South American continent (Brazil). The complex history of this area resulted into two passive margins with a range of older inherited structures predating the Cretaceous break-up.

The CoBra (D.R. Congo – Brazil) thermochronology project is part of an international cooperation with focus on the syn- and post-tectonic processes related to the opening of the South Atlantic. The project aims to place passive margin evolution and the role of inherited structures herein in an absolute time frame. The outstanding technique to investigate tectonic processes in the upper crust is multi-method low-temperature thermochronology. More precisely we use quantitative modelling (Markov chain Monte Carlo) of the combined apatite fission track (AFT) and apatite (U-Th-Sm)/He (AHe) thermochronometers. The AFT analyses were performed using our new protocol for data acquisition and processing. For this purpose we acquired basement samples on E-W and N-S (along-trend) profiles on both sides of the AWCO (Brazil: Minas Gerais, Espirito Santo; Lower Congo). The Brazilian margin shows AFT ages ranging between Late Cretaceous and Paleogene. Length date indicate distinct events, which can be interpreted as the effect of basement denudation due to post-rift uplift of the passive margin. Data from the Congolese part indicate Mesozoic to Cenozoic denudation as well and hence further constrains the tectonic evolution of the AWCO.