Tectonic evolution of the Araçuaí – West Congo orogen and the opening of the South Atlantic

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SUMMARY. — Passive margins represent the transition from the continental to the oceanic lithosphere and, within the Wilson continent cycle, form the phase between rifting and subduction, ending in continental collision. As their name suggests, passive margins were assumed to be tectonically quiet, passively sitting on the plate after drift, until subduction would set. Around the world, two main types of continental passive margins can be found: non-elevated passive margins, with a gradual increase in elevation towards the continental interior; and elevated passive margins (EPM), with a major escarpment towards higher elevation close to the coastal plain. Research within the last decade revealed that the morphology of EPMs took form (long) after continent break-up, indicating tectonic activity at these "passive" margins. It is however still unclear what the mechanism is behind this post-breakup tectonic activity, and whether low-lying margins were once elevated (e.g. Green et *al*., 2018). Some studies point out the importance of inherited structures, such as faults, in the reactivation of the passive margins (e.g. Cogné et *al*., 2012).

The Araçuaí–West Congo orogen (AWCO) formed inside a southern embayment of the São Francisco–Congo craton (SFCC) as a result of the Brasiliano–Pan African orogeny (600-500 Ma), in a process described as nutcracker tectonics. The AWCO was thus confined by the SFCC in all directions but the south, rendering it into a unique structural setting. With the opening of the South Atlantic, due to the break-up of Gondwana during the Early Cretaceous (*c.* 130 Ma), the AWCO was divided into two counterparts: the West Congo Belt (WCB) on the African continent (D.R. Congo, Congo Brazzaville, Gabon, Angola), and the Araçuaí orogen in South America (Brazil) (Pedrosa-Soares et *al*., 2008). Both evolved into passive margins with distinctly different morphology, the Araçuaí side being an EPM and the WCB being a low-lying margin.

The apatite fission track (AFT) method is a low-temperature thermochronometer based on the spontaneous fission decay of 238U. This fission creates a damage trail (fission track) inside the crystal lattice, which is shortened at temperatures between 60°C and 120°C and totally annealed over 120°C (Wagner & Van den haute, 1962). Fission track analysis thus provides us with information on the cooling age and time-temperature paths of samples within the upper crust.

For this research we analysed samples from both sides of the South Atlantic with the AFT method. We here present results from the Brazilian margin and the first results from the D.R. Congo. The Brazilian EPM displays cooling ages ranging between 70 and 90 Ma, with long track lengths, indicating an exhumation event after break-up. This can be attributed to stress or plume-related activity. The Congolese margin however does not show this signal, but instead has ages of 100 to 130 Ma, with shorter track lengths and a larger standard deviation. This indicates a slower exhumation, which is probably related to the erosion of the rift shoulders. From the current, limited AFT dataset, no recent tectonic reactivation could be inferred for the passive margin in the D.R. Congo.

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