PASSIVE MARGINS EVOLVED FROM A CONFINED OROGEN: COMPARISON OF BOTH SIDES OF THE SOUTH ATLANTIC (D.R. CONGO - EAST BRAZIL)

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1. Introduction

The passive nature of “**passive**” margins has been **contradicted** numerous times, based on data inferred from low-temperature thermochronology. These findings of tectonic activity at passive margins (long) after break-up, has started a still ongoing discussion. Although agreement largely exists on the timing of margin reactivation, the **mechanisms** behind it are still under debate. A part of this discussion deals with the (dis)similarity of passive margins with different morphology (low-lying vs. elevated). The Araçuaí orogen of east Brazil and the West Congo Belt of western central Africa are two counterparts of the same ancient orogen: the **Araçuaí - West Congo Orogen (AWCO)**, before they separated during the Cretaceous with the break-up of Gondwana and opening of the South Atlantic ocean. The AWCO formed during the latest Neoproterozoic and was **confined** by the São Francisco - Congo Craton in all directions but the South, rendering it in a **unique geological/tectonic setting**. The South Atlantic now separates the western fold-and-thrust belt and orogenic core (Araçuaí) and the eastern fold-and-thrust belt (WCB). The confined orogenic setting thus evolved to two passive margins with a **distinctly different morphology**; the Brazilian margin being of the elevated type. In its setting, flanked by cratons, and with inherited structures from its pre-break-up history, the AWCO forms an ideal case to study passive margin evolution, from confined orogen to different passive margins. For this poster we present a selection of apatite fission track (AFT) data from **both sides of the South Atlantic**. Based hereon we will provide a brief comparison between the tectonic evolution of both sides.

2. Materials and methods

All samples are crystalline basement samples (granite, gneiss, quartzite). In order to reveal the tectonic history of the upper crust we applied the **apatite fission track** method, using the classical external detector - zeta method. All samples were analysed using a **Nikon Eclipse Ni-E motorized microscope** with Nikon DS Ri-2 camera. Density and length measurements were performed under a 100x plan apo objective. For length and D_{par} measurements a secondary optical magnification of 2x was applied. Data processing was done in a **beta** version of the TRACKflow Excel sheet. Inverse modelling was done in QTQt (Gallagher, 2012).

3. Preliminary results and comparisson

23 Brazilian samples are **younger (70-90 Ma)** than the Gondwana break-up age. Only a small dataset of D.R. Congo is now available, but shows ages around **100-130 Ma**, around break-up. One sample from the Congolese margin shows a **190 Ma** age.

Mean confined track length (MTL) of Brazilian samples is medium long (**~13 µm**), with small standard deviation and **subtle negative skewness**. MTLs from the Congolese passive margin are shorter (**11-12 µm**), with a **larger standard deviation**, but a lesser degree of negative skewing. Heavy ion LINAC treatment is necessary to improve length statistics of the Congolese samples.

Inverse modelling shows similar T-t expected model cooling paths for the Brazilian samples, with a cooling event around 100-80 Ma. Congolese samples all with larger credible envelope show more gradual, older cooling. Forward modelling and changing prior delivers similar T-t paths that also fit the length-frequency histogram well.

Evolved from a same structure, a comparison of this small dataset already shows **distinct differences** between the Brazilian and Congolese passive margins. The Brazilian samples are dominated by a **100-80 Ma cooling event**, where samples C2 and C1b only show cooling **related to South Atlantic opening**. Sample C1 from close to C1b strangely seems **unaffected**.

4. References

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RG: CoBra thermochronology project