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Correlations between the basement geology of Florianópolis to Vitoria coastline (Brazil) and Swakopmund (Namibia) to Luanda (Angola) coastline

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This paper presents a tectonic reconstruction for the Espirito Santo-Campos-Santos/Kwanza-Benguela-Namibe conjugate margins and makes a comparison between the onshore basement structures in the northern Santa Catarina/NW-Namibia, Rio de Janeiro/Benguela and Espírito Santo/Luanda margins of Brazil and Southwestern Africa.

The study of conjugate margins of the South Atlantic Ocean has led to an increased understanding of the tectonic evolution of West Gondwana in particular it's Jurassic to Cretaceous break-up, but also the Neoproterozoic to Cambrian amalgamation. Most tectonic reconstructions are constrained by seafloor magnetic anomalies and oceanic fracture zones. As such models are only reliable from break-up onwards, with the earlier tectonic evolution of the rifted margins remaining unexplained.

The comparison of basement structures on both sides of the South Atlantic and the overlying onshore basins not only allows a better understanding of the evolution of the marginal basin but may also led to better tectonic models for the break-up of West Gondwana. Our studies have identified transversal to parallel, ductile and brittle structures both parallel and oblique to the respective margins. The geometry, cinematics and temporal relationships of these structures has been evaluated. This has led to the proposal that deformation (extension/shearing?) was concentrated along fault zones during break-up. In places these zones can be traced offshore with possible equivalent structures identified on the correspondent conjugate margins. Structural styles on both sides of the South Atlantic were also compared.

Ultra-deep (crustal scale) seismic reflection and refraction surveys permit the study of crustal structures beneath marginal basins. The integration of this seismic data with gravimetry and magnetometry of the Santos Basin, offshore south-east Brazil, led Rigoti 2015 to a proposed model for the evolution of this basin. Early work on the same dataset by Zalan et al. 2011 also resulted in a suggested continental ocean boundary (COB) that differs from the globally recognised COB (Seton et al. 2012) for this region. It was also shown that the degree of crustal extension varies across the Santos basin and along the both margins of this portion of the South Atlantic. This variation may be due to variations in the composition and structural architecture of the underlying basement, a possibility that was discussed by Manatschal et al. 2014.

The rheological contrast between cratonic areas and mobile belts creates ideal conditions for the concentration of deformation along the major structural discontinuities (shear zones and sutures) that

separate them. The limit between the Angola-Luis Alves Craton and the Ribeira belt is considered controlled break-up along the Espirito Santo/Luanda and Rio de Janeiro/Benguela margins, while to the south break-up occurred oblique to this limit along the Santa Catarina/NW-Namibia margin.

References:

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