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Offshore Namibia / SE Brazil-Uruguay Conjugate Volcanic Passive Margins

François Chauvet (1,2), Laurent Geoffroy (2), Jean-Claude Ringenbach (3), François Sapin (3), and Frank Despinois (3)

(1) SEDISOR, Plouzané, France (francois.chauvet@sedisor.eu), (2) Laboratoire Geosciences Océan - UMR6538 - Université Bretagne Occidentale, (3) CSTJF - TOTAL PAU

We present a new interpretation of conjugated ION GXT seismic profiles through the South Atlantic volcanic passive margins (VPMs). The detailed analyses of the depth isopach maps of the continental crust thickness combined with the seismic interpretation syn-rift volcanic successions and post-rift sequences allow to detail their 3D structural architecture. We evaluate the impact of the Early Cretaceous magmatism on the continental rifting and on the post-breakup subsidence from the Rio Grande/Walvis conjugated ridges to the Salado Fracture Zone N of Argentina.

Moho depth map, Precambrian basement and Phanerozoic sedimentary basins and the apparent symmetry/asymmetry of the different margin segments are put together in order to understand the potential influence of the structural inheritage onto the formation of the VPMs. In addition the inner and outer sequences of seaward dipping reflector (SDR) and the genetic domains, i.e. early rift, necking zone and stretched domains have been mapped in details along both conjugated margins and replaced in their original geographical setting. The results suggest a certain degree of asymetry that we interpret in regard to the historical and more recent models for the development of magma-assisted lithospheric rifting.

The results of this study suggests that the post-rift thickness variability is inversely correlated to the volume of magma added into the crust during the thinning of the continental crust. This observation is valid in both dip and strike direction along VPMs, and therfore demonstrates a long-term control of the deep structure on the flexural evolution.

The first post-rift sequences deposited in the distal parts of the margin exhibit very clear sedimentary progradation associated with shallow water sedimentary features recognized on amplitude maps extracted from a 3D seismic survey (e.g. estuarine and deltaic-type meandering complex, erosional sequence boundary, etc.). These observations argue for a 10 to 20 Myr delay for the subsidence of the distal parts of the margin to reach a more classical lithospheric cooling curve. Two possible explanations are proposed: a dynamic and/or thermal mantle control or/and lower-crust exhumation occuring in the immediate post-rift/early oceanisation period.