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Colorado Basin Structure and Rifting, Argentine passive margin

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The Argentine margin presents a strong segmentation with considerable strike-slip movements along the fracture zones. We focus on the volcanic segment (between the Salado and Colorado transfer zones), which is characterized by seaward dipping reflectors (SDR) all along the ocean-continent transition [e.g. Franke et al., 2006; Gladczenko et al., 1997; Hinz et al., 1999]. The segment is structured by E-W trending basins, which differs from the South African margin basins and cannot be explained by classical models of rifting. Thus the study of the relationship between the basins and the Argentine margin itself will allow the understanding of their contemporary development. Moreover the comparison of the conjugate margins suggests a particular evolution of rifting and break-up. We firstly focus on the Colorado Basin, which is thought to be the conjugate of the well studied Orange Basin [Hirsch et al., 2009] at the South African margin [e.g. Franke et al., 2006].

This work presents results of a combined approach using seismic interpretation and structural, isostatic and thermal modelling highlighting the structure of the crust. The seismic interpretation shows two rift-related discordances: one intra syn-rift and the break-up unconformity. The overlying sediments of the sag phase are less deformed (no sedimentary wedges) and accumulated before the generation of oceanic crust. The axis of the Colorado Basin trends E-W in the western part, where the deepest pre-rift series are preserved. In contrast, the basin axis turns to a NW-SE direction in its eastern part, where mainly post-rift sediments accumulated. The most distal part reaches the margin slope and opens into the oceanic basin. The general basin direction is almost orthogonal to the present-day margin trend. The most frequent hypothesis explaining this geometry is that the Colorado Basin is an aborted rift resulting from a previous RRR triple junction [e.g. Franke et al., 2002]. The structural interpretation partly supports this hypothesis and shows two main directions of faulting: margin-parallel faults (∼N30°) and rift-parallel faults (∼N125°). A specific distribution of the two fault sets is observed: margin-parallel faults are restrained to the most distal part of the margin.

Starting with a 3D structural model of the basin fill based on seismic and well data the deeper structure of the crust beneath the Colorado Basin can be evaluate using isostatic and thermal modelling.

Franke, D., et al. (2002), Deep Crustal Structure Of The Argentine Continental Margin From Seismic Wide-Angle And Multichannel Reflection Seismic Data, paper presented at AAPG Hedberg Conference "Hydrocarbon Habitat of Volcanic Rifted Passive Margins", Stavanger, Norway

Franke, D., et al. (2006), Crustal structure across the Colorado Basin, offshore Argentina Geophysical Journal International 165, 850-864.

Gladczenko, T. P., et al. (1997), South Atlantic volcanic margins Journal of the Geological Society, London 154, 465-470.

Hinz, K., et al. (1999), The Argentine continental margin north of 48°S: sedimentary successions, volcanic activity during breakup Marine and Petroleum Geology 16(1-25).

Hirsch, K. K., et al. (2009), Tectonic subsidence history and thermal evolution of the Orange Basin, Marine and Petroleum Geology, in press, doi:10.1016/j.marpetgeo.2009.1006.1009