

SEISMIC IMAGING OF THE DEEP CRUST IN THE JEQUITINHONHA BASIN, BRAZIL

A. Loureiro^{1,2}, A. Afilhado^{2,3}, F. Klingelhoefer⁴, P. Schnurle⁴, M. Evain⁴, F. Gallais⁴, J. Pinheiro⁴, J.A. Cupertino⁵, A. Viana⁵, M. Moulin⁴, D. Aslanian⁴ & SALSA Team

¹Faculdade de Ciências da Universidade de Lisboa, Lisboa, Portugal

²Instituto Dom Luiz, FCUL, Lisbon, Portugal

³Instituto Superior de Engenharia de Lisboa, Lisbon, Portugal

⁴IFREMER, Dept. Géosciences marines, Plouzané, France

⁵PETROBRAS, Petróleo Brasileiro S.A., Rio de Janeiro, Brazil

* The SALSA Project was led by D. Aslanian and M. Moulin, from Ifremer, and A. Viana, from Petrobras. Modelling of the SALSA profiles was done by A. Afilhado, M. Evain, F. Gallais, F. Klingelhoefer, A. Loureiro, J.M. Pinheiro & P. Schnurle. Processing of the deep sounding reflection seismic data was done by P. Schnurle. 3D Wide-angle modelling by Nuno Dias. On-land operation was conducted by J. Soares, R. Fuck, M. Vinicius de Lima, N. Dias, L. Matias, A. Loureiro, C. Corela, J.L. Duarte, J. Pinheiro, D. Alves, M. Sobrinho, F. Lima, R. De Oliveira and P. Resende. Processing of the high resolution seismic data by A. Baltzer and M. Rabineau.

RESUMO: Wide-angle reflection and refraction seismic data is one of the key components to constrain the architecture of passive continental margins and gain insights on the processes leading to their formation. Twelve profiles, with coincident multi-channel and wide-angle seismic, were acquired along the northeastern Brazilian margin during the SALSA (Sergipe Alagoas Seismic Acquisition) project: a collaboration between the Department of Marine Geosciences (IFREMER: Institut Français de Recherche pour l'Exploitation de la MER, France), the Oceanic Domain Laboratory (IUEM: Institut Universitaire Européen de la Mer, France), the Instituto Dom Luiz and Faculdade de Ciências da Universidade de Lisboa (IDL-FCUL, Portugal), the Universidade de Brasília (Brazil) and PETROBRAS (Brazil). Seismic shot, Multi-Channel Seismic acquisition (MCS) and Ocean Bottom Seismometers (OBS) deployments were performed by the N/O L'Atalante (IFREMER). We will present here the initial results along two of these profiles that image the deep crustal structure in the Jequitinhonha Basin. P-wave velocity models were constructed based on the joint modelling of multi-channel and wide-angle seismic data using the RAYINVR software. Profiles SL11 and SL12 cross the Jequitinhonha basin, immediately south of the Tucano aborted rift, and are oriented in the directions of flow-lines and fracture zones (E-W). Profile SL11 crosses the southern Jequitinhonha basin, and spans from the thinned continental crust, near the São Francisco Craton, to the oceanic basin. 15 OBS from the Ifremer pool were deployed in this profile, jointly with 180 km multi-channel seismic acquisition. Profile SL12 crosses the northern Jequitinhonha basin, from thinned continental crust near the São Francisco Craton and Olivença High to the oceanic basin. The seismic data in the profile includes 220 km multi-channel seismic data and wide-angle data acquired with 11 OBS, totalling a maximum source-receiver offset of 220 km. Profile SL11 is characterized by a continuous, thin, anomalous velocity zone (7.6-8.1 km/s) underlying the crust and extending offshore up to the normal oceanic crust. Profile SL12 does not show the anomalous velocity zone and the lower crustal unit, present in SL11, abruptly terminates at the base of the continental slope. These observations indicate a segmentation in the southern branch of the Tucano triple junction, with parallel profiles within the same basin showing different crustal organizations. The implications on the margin reconstruction of the different velocity structures and the nature of the anomalous velocity body are a key to understand the tectonic history of this rift system.

PALAVRAS-CHAVE: JEQUITINHONHA BASIN, ANOMALOUS VELOCITY ZONE,
CRUSTAL ORGANIZATION