



## **Seismic Imaging of the Deep Crust in the Pull-Apart Basin off Maranhão-Barreirinhas-Ceará Margin, NW Brazil**

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Five profiles, with coincident multi-channel and wide-angle seismic, were acquired during the MAGIC (Margins of brAsil, Ganha and Ivory Coast) cruise, in order to image the Maranhão-Barreirinhas-Ceará segment of the Brazilian Margins. The seismic experiment was conducted by Ifremer (Institut Français de Recherche pour l'Exploration de la Mer), UnB (University of Brasilia), FCUL (Faculdade de Ciencias da Universidade de Lisboa) and Petrobras. The main objective of the experiment is to understand the fundamental processes which lead to the thinning and breakup of the continental crust in a specific context of a pull-apart system, limited by two strike-slip borders.

We present the main results evidenced by two of these profiles, MC3 and MC4, oriented in the directions of flow lines (E-W) and margin segmentation (SW-NE), respectively. The profile MC3 spans from the continental crust, near Sao Luis Craton, to the oceanic basin, north of Ceara. 31 Ocean Bottom Seismometers (OBS) from the Ifremer pool and 8 small arrays of 6 RefTek Land Seismic Stations (LSS) from the Brazilian pool were deployed in this profile, jointly with 400 km multi channel seismic acquisition. The profile MC4 spans from the Parnaiba and Barreirinhas Basins onshore to the oceanic basin, South of the Northern Brazilian Ridge. The MC4 seismic data includes 225 km multi channel seismic data and wide-angle data acquired in 19 OBS and 21 arrays of 3 LSS each, totaling a maximum source-receiver offset of 400 km.

The analysis of these profiles evidence a NW-SE segmentation of the margin following the opening direction of this pull-apart basin, from unthinned continental crust (about 40 km thick) to thin oceanic crust. The width of the necking zone increases from about 50 km in the direction of flow-lines (MC3-Ilha da Santana margin), to more than 125 km in the direction of segmentation (MC4-Barreirinhas margin), at the corner of the pull-apart system, with two steps first in the upper crust then in middle/lower crust. The intermediate domain, is formed by a thick sedimentary basin overlying a substratum of 5 km- thickness, with velocity ranging from 6.2 to 6.6 km/s. Below, a 2-3 km thick layer with very high velocity (7.4-7.6 km/s) and marked by reflections at the top and base, is followed continuously towards the continent beneath the Parnaiba-Barreirinhas province, at the corner of the system. These observations favor a lower continental crust nature for this domain, in relation to its flow and exhumation in the flow-lines direction.

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