

Sismostratigraphy of the Ceará Plateau to decipher the Cenozoic evolution of Brazilian Equatorial Margin

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Abstract

The Ceará Plateau offshore Fortaleza holds some particular characteristics when compared to the other seamounts of the Brazilian Equatorial Margin (BEM). Not only it is the largest and the closest to the continent, it is also located at the boundary between the continental and the oceanic crusts, while all the others seamounts along the BEM are located on oceanic crust. Although the age estimation (between Coniacian and Eocene) has an uncertainty of more than 40 Myr, the current interpretation is that it developed initially as a volcanic edifice, formed by a series of magmatic events that occurred between the Santonian and the Eocene. Since then, the topography has been levelled by pelagic/hemipelagic sedimentation.

The seismic imaging of the Ceará Plateau shows a “disorganized” interior, overlain by a series of horizontal seismic reflectors that can be interpreted as pelagic/hemipelagic sediments. If the age of the volcanic edifice is Coniacian, then the overlying pelagic/hemipelagic sedimentary succession can include an almost continuous record of the last ~90 Ma at the Equatorial Atlantic Ocean. Even in the case that the volcanic edifice is Eocene in age, the sedimentary sequence would still incorporate the upper Paleogene and all the Neogene. There is also the possibility that the volcanic edifice was built during multiple magmatic events. In this case, it is likely that the sediments are interfingered with volcanic rocks at the edge of the

structure. Nevertheless, a continuous and constant sequence of Cenozoic sediments that deposited onto the Ceará Plateau at the same latitude, and thus under the same oceanographic conditions, for the last ~90 Ma.

In this study we present a seismo-stratigraphic reconstruction of the sedimentary sequence of the Ceará Plateau, offshore the BEM. The Ceará Plateau is part of the Ceará Basin, one of the deep-water basins offshore the BEM that formed in the Cretaceous. Since the breakup of the northern part of the South Atlantic Ocean, the BEM: 1) occupies a stable low-latitudinal setting, and 2) is characterized by oceanographic conditions that has not changed significantly.

The Ceará Plateau, in particular, is also crossing over different bathymetric regions and can preserve a vertical record of distinctive environments. Here there is the potential to retrieve a high-resolution, multi-record, and continuous sedimentary archive if the seamount: (1) has been undergoing enough and steady-state subsidence, (2) has maintained a location proximal to the continent, able to guarantee a supply of both pelagic and terrigenous sediment, and (3) was not involved in major tectonic events, which might have affected sediment burial diagenesis and changed its latitude.

Seismic data is presented here for the first time as public available dataset showing that the Ceará Plateau is likely to preserve a volcanic and sedimentary history that started with the break-up between Africa and South America, occurred at ~120 Ma. The horizontal and continuous hemipelagic succession (~1s-thick = ~1400 meters) overlying the volcanic body of Cretaceous age is, therefore, a primary target to investigate the global paleoceanographic changes occurred at equatorial latitudes from the Cenozoic to present.

Keywords: Ceará Plateau, Seamount, Brazilian Equatorial Margin, Cenozoic, Seismostratigraphy.