Geomorphological seismic interpretation from Albian to Turonian of the Mundaú sub-basin

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Abstract

The Brazilian Equatorial Margin (BEM) has been increasingly studied due to its conjugate in West Africa, the latter of which has well-documented large hydrocarbon discoveries in the last years. Nevertheless, because this zone is complex, more research needs to be conducted to address knowledge gaps. The Ceará Basin, located in the BEM, is divided into 4 sub-basins that have different tectonic and stratigraphic settings developed since the Cretaceous period. This study focused on the Mundaú sub-basin during the geological time between the Albian to Turonian interval. The goal of this research was to create seismic maps based on a 3D seismic attribute to identify geomorphological features that might be of scientific and economical interest. Driven by advances in the oil industries, seismic interpretation has evolved considerably in recent years, especially modern technologies that allow for better 2D and 3D data resolution. Initially, we adjusted the seismic amplitude range in a histogram analysis and then we cropped the cube in a smaller area that comprehends half of the original volume. Seismic attributes as RMS amplitude, sweetness, gray-level co-occurrence matrices and spectral decomposition was generated to identify deepwater features that may constitute significant oil and gas reservoirs. We observed channels, faults, and emphasized a fan-like structure nearby the Pecém wildcat. Amplitude anomalies from the composite RGB were helpful to identify a feed canyon where sediments pass through the slope. At the base of these system, we interpreted deposits of lobe complexes. The RGB blending has been used to further understand the depositional patterns and thickness of the beds inside the lobes. To better understand potential reservoir sand deposition along this deepwater system, seismic lines taken through this fan-like feature are being carefully interpreted. We demonstrate the extent of the lobes and how attribute analysis and sedimentary mapping are imperative to understanding the sedimentary distribution in a frontier basin with a complex geological evolution.