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3D SEISMIC ANALYSIS OF TURBIDITIC CHANNELS IN THE QUEBRADAS FORMATION, POTIGUAR BASIN.

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Introduction

Since 2007, the Brazilian Equatorial Margin has drawn increasing attention, driven by significant oil discoveries in its West African counterpart, such as the Jubilee and Tweneboa fields. This interest intensified from 2011 with discoveries in the Guyana-Suriname Basin, including the Zaedyus field and the Liza Complex. Within the Brazilian Equatorial Margin, the Potiguar Basin stands out as one of the most promising areas in deep and ultra-deep waters, especially after recent discoveries in the Pitu-Oeste and Anhangá wells. Despite this potential, there's a noticeable lack of scientific research focused on the 3D seismic analysis of the turbiditic channels within the Quebradas Formation. The main objective of this work is the mapping and seismic characterization of turbiditic reservoirs, aiming to identify potential areas for hydrocarbon accumulation.

Method and/or Theory

To achieve this, 3D seismic data and well data provided by the National Agency of Petroleum, Natural Gas and Biofuels (ANP) were integrated using Petrel and Paleoscan software. Initially, the top of the Upper Campanian Quebradas Formation was mapped. Subsequently, various seismic attributes like RMS amplitude, sweetness, and variance were generated, in addition to applying spectral decomposition. Finally, geobodies of the turbiditic channels were created.

Results and Conclusions

From the analysis of attributes and geobodies, the existence of three distinct channels was revealed. These channels show high amplitudes with regions exhibiting greater seismic anomaly, which may suggest the presence of hydrocarbons. These channels were incised by turbidity currents or represent lateral accumulations of sediments proximal to the basin slope. Despite having unique trajectories, confinement, and sedimentation patterns, all channels contribute to the formation of distal lobes with a preferential NE-SW sedimentation direction. Channel 1 is rectilinear and displays bifurcations and variations in confinement, with a lateral sedimentation area to the west. Channel 2, with a slightly meandering trajectory and originating from a branching, presents multiple branches and slight distal confinement, culminating in a thick lobe partially fed by it. Channel 3, with a mixed trajectory (rectilinear-meandering) and low confinement, demonstrates a rapid decline in sediment supply, depositing a smaller volume onto a lobe predominantly fed by Channel 2. The correlation between geophysical attributes and paleotopography provides crucial information about the location and geometric arrangement of turbiditic channels and the sedimentary dynamics of the region, advancing our understanding of geological processes in the deep waters of the Potiguar Basin. Preliminary results indicate areas with potential for oil exploration in this basin. However, new analyses, studies, and drilling would be required to confirm the presence of hydrocarbons in the mapped prospects.