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Characterization of Turbiditic Channels applying seismic attributes in the Albacora Leste Field, Campos Basin

Byanca Cardoso (Universidade Federal Fluminense), Matheus Nilo (GIECAR), Wagner Lupinacci (GIECAR), Rodrigo Ferro (PRIO), Francisco Abrantes Junior (Universidade Federal Fluminense)

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Introduction

Seismic analysis plays a fundamental role throughout the life cycle of offshore hydrocarbon reservoirs, supporting subsurface structural and stratigraphic mapping essential for exploration, development, and production (e.g., Jannuzzi, 2020; Pinheiro, 2020; Silva, 2021; Mayall & Kneller, 2021). In mature fields, enhanced characterization techniques are crucial to optimize hydrocarbon recovery. Within this framework, seismic facies analysis enables detailed interpretation of turbiditic systems by identifying and delineating channel, levee, and lobe deposits (Xu & Haq, 2022). This study aims to understand the geometry and depositional trends of turbiditic channels that form the sandy reservoirs of the Carapebus Formation in the Albacora Leste Field, Campos Basin. Understanding these systems is essential for refining geological models and predicting high-quality reservoir zones.

Method

This study is based on the interpretation of 3D seismic reflection data, a method that analyses elastic wave propagation and reflection at geological interfaces due to acoustic impedance contrasts (Sheriff, 2002). Seismic stratigraphy was applied to the interpretation of seismic reflection patterns, allowing inferences about depositional environments, geological history, and sedimentary processes (Brown, 1999).

Previously mapped horizons and seismic facies from the Caratinga (Oligocene), Marlim (Eomiocene) and Albacora (Mesomiocene) fields were adapted and correlated with the Carapebus Formation reservoirs. The analysis integrated seismic attributes such as similarity, RMS amplitude, maximum amplitude and spectral decomposition, along with well data. This approach enabled the identification of depositional patterns associated with turbidite channels and their relationship with the distribution of sandy facies.

Results and Conclusions

The integrated seismic-well analysis led to the interpretation of two key reservoir horizons in the region: (i) MRL400 (Eomiocene), comprising deep, erosive channels deposited by high-density currents in a slope setting; and (ii) AB20 (Eomiocene), consisting of narrow, low-incision channels associated with low-density flows in a platform environment.

The results show that the turbiditic channels of the Albacora Leste Field exhibit significant variations in geometry and lateral continuity, reflecting the evolution of the depositional system. This transition records a progressive decrease in system energy during a regressive phase. The integrated analysis improved the delineation of sandy seismic facies and the field's depositional model, helping to reduce uncertainties in reservoir quality prediction and supporting future development strategies.