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Integration of Geophysical Data on the Dynamics of Submarine Sediment Flows in the Jaguaribe Canyon Region (Ceará), Brazilian Equatorial Margin

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Introduction

The continental slope is characterized by complex geodynamic processes and features, such as submarine canyons. Understanding the morphology and properties of the seafloor is essential for Marine Spatial Planning (MSP), especially in regions with potential for resource exploration and offshore infrastructure development, such as the Brazilian Equatorial Margin. This study focuses on the Jaguaribe Canyon, located on the slope adjacent to the Jaguaribe River in the eastern portion of Ceará state, Brazil. Here, detailed knowledge of seafloor morphology and substrate characterization is required, emphasizing the analysis of backscatter response and high-resolution seismic data.

Method and/or Theory

Data were acquired within the scope of the SeabedMap Project aboard the hydro-oceanographic vessel *Cruzeiro do Sul*, using the Kongsberg EM122 multibeam system (12 kHz) and the SBP 120 Sub-Bottom Profiler, as part of the Pró-Amazônia Azul Commission actions in 2022. While bathymetry enables three-dimensional modeling of the seafloor surface, backscatter provides information on the acoustic reflectivity of the bottom, allowing identification of textural and lithological variations. High-resolution seismic data reveal the shallow stratigraphic structure of the substrate, exposing sedimentary layers and subsurface features. Bathymetric data were processed using Caris HIPS & SIPS software, and seismic and backscatter data were analyzed with SonarWiz.

Results and Conclusions

The integration of geophysical data allowed the understanding of sediment dynamics in the Jaguaribe Canyon through the recognition and association of sedimentary features such as gullies, marine terraces, mass-wasting deposits, distributaries, and submarine fan presence. This integration proved fundamental for the geomorphological characterization and recognition sedimentary processes active in the Jaguaribe Canyon, enabling its subdivision into three distinct domains along its extent. The identification of associated features evidenced the presence of active sediment flows, indicating areas with higher geological hazard potential. The results of this research significantly contribute to Marine Spatial Planning (MSP), providing technical support for strategic decisions aimed at the safe exploration and sustainable use of marine resources along the Brazilian Equatorial Margin.