Santos Basin continental shelf seascape modeling using GIS techniques

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RESUMO

Continental shelves are relevant physiographic environments because it acts as a transition zone between oceanic and continental processes, being one of the greatest repositories of present-day and relict morphodynamic processes over space and time. This work aims to sectorize the seascape of the Santos Basin shelf applying the Benthic Terrain Modeler (BTM) GIS tool resulting in a comprehensive Digital Terrain Model (DTM) evaluation of the entire shelf. The model is in line with results generated by sub-bottom profiler, sampling and imaging surveys. We gathered 694,431 single-beam bathymetric data, interpolated at the GIS by Inverse Distance Weight (IDW) method, and applied the BTM processing. The BTM considers factors such as broad-scale and fine-scale BPI (Benthic Positioning Index), seafloor slope, roughness, and a classification table containing appropriate parameters and limits for seascape zoning. As significant results, we identified eight benthic structures: elevations, depressions, flats, gentle slopes, shelf break, crests and shoals, upper slope and valleys; related to present-day oceanographic processes (waves and currents), and relic bottom-forms formed during lower sea-level conditions. In addition, this work reveals the connection between the seabed morphology and the living or ancient benthic habitats, such as carbonatic pavements of rhodolith bottoms or coalescent calcareous algae. The analysis of the seabed features diversity on the studied shelf highlights its relevance in understanding coastal evolution during the Quaternary. Besides, it contributes to better management of coastal and marine resources regarding habitats, benthic structures, and marine protected areas.

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Santos Basin ; Continental Shelf; Benthic Terrain Modeler