Seismic Interpretation of Crescent Shaped Bedforms and Cyclic Steps Developed During the Cenomanian Age in the Ceára Basin, Brazilian Equatorial Margin

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Abstract

Crescent shaped bedforms with up to 140 meters of thickness were recognized within a trough on the downslope area in the Ceará Basin using exclusively 3D seismic data. The Ceará Basin is located on the Brazilian Equatorial Margin and it is characterized by transpressive and transtensive tectonic events that have generated an oblique rift. Due to these distinct structural characteristics, this basin was compartmentalized in four sub-basins being one of them, the Mundaú Basin, where this study area is located. This basin was filled by sediments from Early Aptian, when the rift phase started, to Upper Aptian and after this, the post-rift phase was initiated from Albian to present. Seismic interpretation led to the recognition of submarine channel complexes and crescent shaped bedforms during the Cenomanian age. The seismic geomorphology on the updip slope shows canyon conduits related to these complexes for about 20 km in the lower slope, which has around 3° of estimated structural gradients as result of turbidity currents action at this age. Based on the amplitude maps, the crescent shaped bedforms have been interpreted as transversal to the axis of the trough in the lower slope. In a dip cross section, the discontinuous reflectors appear as shingled seismic pattern against a strong reflector which is portrayed as a hardground at the base. These features are aggradational with discontinuous reflectors exhibiting asymmetric geometries. The bedforms have been interpreted as built by a combination of the erosion and deposition of sediments associated

with cyclic steps which are developed due to variation between supercritical and subcritical flows in the turbidity currents. These cyclic steps are delimited by hydraulic jumps creating trains of scarps as it can be observed in many modern analogues around the world (e.g. Monterey Canyon, Offshore California; West Penghu Submarine Canyons, South China Sea).