Seabed mapping of tropical tidal channels, NE Brazil

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The Galinhos-tidal-channel system is located in the Brazilian equatorial margin, northeastern coast of Rio Grande do Norte State. The economic importance of the region began around 1600s and continues until today with salt exports, later shrimp farms, handmade fishing, oil and gas industry, ecotourism and wind energy. A spit, behind which an intricate system of tidal channels has developed, with practically absent riverine influence, characterizes the area. The integration of interferometric sonographic data (total of 4.7 km²), calibrated with sediment samples, and radar images were used to map geomorphological features on the area. The ALOS PALSAR image, allowed to integrate the altitude information of the emerged and submerged portions, resulting in efficient method for coastal flooding areas and substrate mapping. The sonographic study allowed recognizing bedforms, which are important morphological elements that influence water and sediment discharge. Four main types of submerged geomorphic units were identified: a) 2D sandy dunes, b) 3D sandy dunes c) muddy flatbeds and d) irregular beds. Dunes were classified according to their size into small, medium and large. Bathymetric data revealed that depths from 2 to 8 m along the area. The main tidal channel Galinhos has a width of 900m, 12km long, irregular bottom, and asymmetrical margins. The Pisa Sal tidal channel has an average width of 150m and 3km long, U shaped cross-section, slight asymmetric margins and slightly irregular bottom. Deepest parts occurs close to its mouth (between 6,5m and 8m), gradually decreasing until they reach 5m on its inner portion. The Tomaz tidal channel, until to central portion has an asymmetrical bed with the highest depths on its right side reaching 7m. Its left side range from 5.5m to 6m. In the south portion, this channel becomes shallower (5m) and its asymmetry is reversed. After splitting the channel width is reduced from 260m to 140m and the bottom becomes less irregular and flat sometimes. In this portion, the highest depths reach 7m. The data made it possible to identify the regions of higher and lower altitudes using as reference the mean sea level. Altitudes throughout the region range from 0 (sea level) to 20m and come from local topographic elevation. The south portion concentrates altitudes above 10m and the lower regions are located in the central portion of the area. The central portion is the flattest and this behaviour extends over 5km to the dunes located in the Galinhos spit, when the altitudes exceed values above 10m. The Galinhos spit integrates an area with average altitude ranging from two to seven m. Flooded or wet regions were well delimited due to non-penetration or absorption of electromagnetic energy (low frequency) when it interacts with the water dynamics; however,
results are better where the depth is higher than 3m.