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MORPHOLOGICAL EVOLUTION OF FIGUEIRA DA FOZ COASTAL SECTOR AFTER THE EXTENSION OF THE NORTH JETTY: INTEGRATING SEDIMENT BUDGETS AND HYDRO-TOPOGRAPHIC MONITORING

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RESUMO

As one of the most energetic and dynamic coastal regions in Europe, the Portuguese west coast was classified as having a high index of exposure to coastal erosion. The propagation of a southward erosive trend in the north and central west coast, predominantly due to the lack of sediment supply, which is apparent over large time and space scales, forced the construction of coastal protection schemes in urbanized maritime fronts. In general, the problem is likely to be aggravated by climate change, mainly due to sea level rise.

The coastal sector of Figueira da Foz is one of the most influenced by human interventions. Starting in the sixties with the construction of the Mondego river jetties, the spectacular growth of Figueira da Foz beach due to the longshore sediment transport retention by the north jetty, and the sediment dredging from the navigation channel. The interventions continued in the seventies with the construction of the groynes and seawalls along the southern coast, in Gala-Cova, Costa de Lavos and Leirosa, in response to increasing local outbreaks of erosion.

Recently, the north jetty was extended in 400 m (2008-2010) aiming to decrease the silting up of the navigation channel and to improve port sheltering conditions. Just the second objective was achieved. At the same time, the local erosion downdrift was aggravated and the vulnerability of the maritime fronts increased, especially during extreme maritime events.

This work integrates the sediment data from the dredging and sand nourishment operations with the hydro-topographic surveys of Buarcos-Leirosa, from 2011 to 2017, using different technologies: surveys performed by the Port Administration and remote sensing (LiDAR). The objective is the interpretation of the coastal sector sediment dynamics based on a large spatial scale morphological evolution analysis and on the dredging and nourishment sand volumes.

The analysis revealed a general tendency of accretion in the subaerial beach to the north of the north jetty and the submerged profile stabilization, as opposed to a large inter-annual morphological variation in the downdrift area immediately adjacent to the south jetty. In Gala-Cova and Costa de Lavos, the morphological variations in the beach face show an erosive behaviour and no stabilization tendency was found further offshore, indicating a greater active depth in this area.

Palavraschave: Coastal monitoring; sediment dynamics; dredging; beach nourishment; Figueira da Foz.