Interannual sub-aerial beach variability along a sector of the Tróia-Sines embayed coast

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Abstract

The comprehension of sub-aerial beach variability of sandy beaches is essential to describe and predict his behaviour after extreme events (e.g. storms). Around the world coastline beach monitoring plans are established in order to characterize the main morphodynamic changes at different spatial and temporal scales. Within this scope, four field surveys (19th to 28th May 2009; 30th October to 10th November 2009, 21th to 30th May 2010 and 14l to 21 April 2011), using a new coastal survey system named INSHORE system(Differential Global Positioning System) [1], were conducted along the Tróia-Sines embayed beach (INSHORE project -PTDC/AMB/73169/2006).

The interannual variability of the sub-aerial beach topography along the Tróia-Sines embayed coast for the first three field surveys were analysed considering the DEM (Digital Elevation Model) analysis regarding the: alongshore coastline configuration; subaerial beach width; beach profile configuration and volumetric changes.

The results points to the definition of eight main coastline sectors very similar to the results previously described by [2]. Although a general north-south increasing beach width trend can be observed, [3] one of these main sectors, Sector 6, presents a significant variation of the beach width and beach profile configuration. This sector was selected to describe the morphodynamic pattern responsible for the sediment accommodation (beach width, and profile configuration) during the studied period.

The subtraction between the three DEMs points to the importance of the beach width variation that describes the landward or seaward subaerial beach displacement. Although this might affect the beach width, this variable should not be taken as the unique one to describe the shoreline change. In fact, this parameter does not describe the beach variability regarding the profile configuration (e.g. berm width and sediment accommodation). According to our results the volumetric changes are strictly related to the beach width variation but the profile configuration has a particular role in the final budget analysis.

The proxies that were used (+2m, +3.4m and +4,3m MSL elevation contours) and the relation between the beach width and subaerial beach volume, has given high correlation values. These results proved that not only the MHW (mean high water) used by others authors [4] can be defined as a proxy to describe the shoreline evolution, but also other morphodynamic meaningful contour elevations can give reliable results.

References

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