

DEVELOPMENT OF LOW COST AND HIGH PRECISION PROTOTYPE SYSTEMS FOR MORPHOLOGICAL AND SEDIMENTARY DATA ACQUISITION IN SANDY SHORES

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The Portuguese coastal morphology has undergone a significant change in the last decades. This reality is particularly evident in some sand beach stretches where a fast inland beach migration has been occurring, with significant intensity, since the last decade. The development of a national coastal plan with inputs from all kinds of interviewers becomes necessary to avoid future economic and social problems related with the human pressure over the littoral. Under this perspective, the establishment of medium and long term monitoring programs, in which several physical parameters are measured, provides a powerful workbench in the analysis of littoral morphodynamics.

There are several monitoring systems for the acquisition of morphological data in sandy beaches, which contribute to the development of morphodynamic models. Aerial based methodologies, like Airborne Laser Scanning (ALS), or land based methodologies, adapting Global Positioning System (GPS) receivers to fast survey platforms (such as four-wheel motor quad), are two examples of data acquisition systems that allow the generation of Digital Elevation Models (DEMs). However, most of morphodynamic studies and many physical models for sandy shores only provide good results if morphological and sedimentary data are acquired simultaneous. Also, the fast dynamic characteristics of sandy littorals can only be efficiently integrated in morphodynamic models if measurement epochs of morphological and sedimentary data are not very separated in time.

In the scope of the INSHORE project (INtegrated System for High Operational RESolution in Shore Monitorisation), a low cost and high efficiency monitoring system is under development, being adequate for sandy shore surveying (from the foreshore to backshore), which integrates two prototype systems for morphological and sedimentary data survey. The first prototype system is a high resolution GPS based system incorporated on a four-wheel motor quad. This system allows the morphological survey of sandy beaches stretches with tens of kilometres in just a few hours, resulting on the production of 3D digital elevation models and respective characterisation of the main morphological features. The second prototype system is a digital image system for an automatic sand textural analysis, using image processing techniques. This system, when integrated with the former, allows a geo-referenced and real-time grain size textural analysis of a great number of samples along the sector under study.

This paper presents in detail the design and implementation of the prototype systems mentioned above, together with the morphological and sedimentary results obtained in the first survey tests that took place in the sandy shores of the Tróia-Sines littoral ribbon (TSLR), with special focus on the Sto. André sandy shore. The evaluation of the accuracy of this system, and also of its productivity (which, associated to the low survey costs involved, constitutes a major advantage of this system, especially if the monitoring program demands frequent surveys of long beach stretches) will be highlighted.