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EP33A-0899: Evaluation of the short-term sea cliff retreat along the Tróia-Sines Embayed Coast (Costa da Galé sector), using stereo digital aerial images and Bayesian inference.

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Monitoring the sediment budget of coastal systems is essential to understand the costal equilibrium, and is an important aspect to be considered in coastal management. Thus, the identification and the quantitative evaluation of sedimentary sources and sinks are the first steps towards a better understanding of the dynamics of coastal morphology. The Tróia-Sines Embayed Coast (TSEC) in the southwest Portuguese coast corresponds to a continuous sandy beach that extends for approximately 65 km. It is limited at north by the Sado river estuary and at south by the Sines cape. Beaches are discontinuously limited landward by dunes (≈42 km) and by sea cliffs (≈18 km) made of poorly consolidated Plio-Plistocene detrital deposits. Cliff erosion by subaerial processes or gullying is a continuous phenomenon that contributes a significant amount of sediment to the TSEC coastal system, which is what we want to measure. Mainly due to winter rainfall, sea cliffs develop debris fans at the backshore inner limit, therefore we chose to make morphological measurements at one year interval. Thus, two series digital aerial images at 20 cm resolution were acquired in Oct 2008 and July 2009, supported by a collection of ground control points (GCP) to constrain the sensor orientation. Digital aerial stereo image pairs are used as main data source to reconstruct digital surface models (DSM). A new stereo photogrammetric method is used, based on dense disparity maps and Bayesian inference (Jalobeanu et al, 2010 and Jalobeanu, 2011). The originality of this method is in the computation of the spatial distribution of elevation errors in the DSM using stochastic modelling and probabilistic inference, which helps to detect the statistically significant changes in the estimated topography. The difference between the two generated DSMs is used to characterize the variability of the main subaerial beach morphodynamics parameters, such as: i) the alongshore beach configuration; ii) the beach width; iii) the berm elevation and iv) the beach-face slope. Indeed, these are essential parameters for understanding the sedimentary dynamics of a coastal sector. Moreover, confidence intervals can be provided for quantitative parameters derived from the DSM, such as volumes of displaced material, slopes or various geometric parameters.

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