AN OVERVIEW OF TIMESTACK IMAGE APPLICATIONS FOR NEARSHORE STUDIES

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Key words Coastal videomonitoring, littoral hydrodynamics, surf zone morphodynamics

In the littoral zone, video monitoring technique has been providing crucial information to coastal engineers and scientists for the last three decades. The video remote sensing proved to be an economic and efficient way to collect high-resolution and continuos data, which allow the analysis of beach morphological behaviour and hydrodynamic phenomena in the nearshore zone.
The methodology consists in placing optical devides, such as Internet Protocol cameras, acquiring images of the coast (Fig.1, a) from an elevated position. The technique is based on the use of specific images (e.g. Time-Exposure, Sigma-variance and Timestacks). In particular, timestack images (Fig.1, c) are optical products generated by sampling cross-shore pixel intensity time series over georectified video frames (Fig.1, b). The image intensity variation along the selected cross-shore transects visually depicts wave carachteristics in the nearshore zone and swash motion on the beach face.

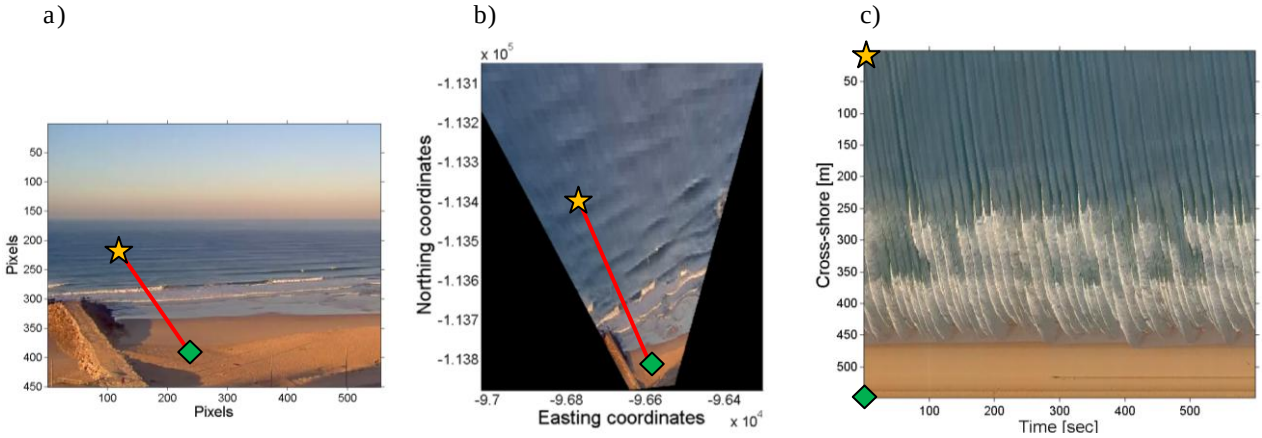

Figure 1 Procedure for timestack production. a) single frame acquired by the camera; b) geo.rectified image; c) timestack image obtained over 10 minutes images sequence (1 Hz acquisition frequency). Red line represents chosen profile for timestack production. Yellow star and green diamond indicate offshore and onshore profile limits, respectively.

This communication will report the state-of-art of timestack images applications for nearshore hydrodynamic characterization, which is a key element for improving storm-related risk assessment and designing coastal protection structures. Examples will show how the utilization of timestack images allowed the monitoring and evaluation of high-frequency hydrodynamic parameters such as wave run-up run up elevation [2,5] and incident wave carachteristics [1,4].Such essential factors can support the development of algortithms for nearshore bathymetry estimation [3,4]. Discussion will introduce a novel methodology to distinguish coastal areas based on the timestack image statistical behaviour. Such new practice will support a stand-alone algorithm for deriving bathymetry over shallow water and intertidal zone, along with an automatic detection of wave run-up elevation on the beach face.

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