

A COMPARISON OF WAVE CHARACTERISTICS AT S. JOÃO DA CAPARICA BEACH, PORTUGAL, USING IN-SITU AND TRANSFERRED WAVE DATA

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Paper topic: Laboratory and field observations and techniques

1. Introduction

The HIDRALERTA system is currently being implemented as a novel warning and alert system to assess the risk of flooding in coastal and port region areas. With forecasted sea wave conditions at coastal and port areas, the system is able to determine the effects of waves in the overtopping and flooding of those coastal and port areas, to compare those results with pre-specified thresholds, to build alert maps, and, if necessary, to issue alert messages. The system will be applied to two case studies: Praia da Vitoria harbor, in Terceira Island, Azores, and S. João da Caparica beach, near Lisbon. One of the major inputs of this integrated system is the characterization of sea wave conditions at the site of interest, so that both measured wave data and selected numerical models are used. Numerical models, however, should be calibrated for each area of application.

This paper is a contribution to get a better insight of the wave characteristics at one of those case studies, the S. João de Caparica beach, to provide adequate calibration of the mentioned numerical models. Therefore, a field data campaign was organized at that location, using several instruments, data was collected and analyzed, data was compared with those transferred from the Port of Lisbon wave buoy, by using numerical wave propagation models, which enabled to evaluate its performance and to calibrate some of its parameters. Thus, the paper describes the sea wave characterization using both in-situ data and transferred data from the Port of Lisbon wave buoy, and discusses a number of comparisons between those methodologies.

2. Field campaign

The S. João da Caparica beach is located on the south of the mouth of the Tagus River, in the Almada municipality and just opposite to the city of Lisbon (Figure 1). The beach has a length of approximately 1.3 km, being confined in between two spurs (the northern spur, 350 m long, and the south spur, 150 m long). The choice of this location was due to the following: a) this is a beach of sedimentary origin that presents a small dune system, yet very fragile, and where there is also a cohesive structure; b) the location is near a city where the risk associated with the occurrence of overtopping and flooding is of utmost importance to society; c) historical data of topographic, bathymetric profiles and waves are available for this site; d) also, it is a location where, on February 27th 2010, a serious overtopping and failure accident occurred, followed by an artificial sand feeding that, up to now, has worked quite successfully.

The campaign was held on 29 and 30 October 2012. The measurement area is centered at the southwest of the bar-restaurant "Pé Nu" and has a length of about 50 m for each direction NW and SE and a width of about 150 m (NE-SW), including some submerged zone, – see Figure 1 a). The acquisition equipment was distributed along a beach profile (dotted line in Figure 1) centered on that area, where three "H"-shaped structures were assembled and installed, located in areas before and after wave breaking – see Figure 1 b). The instruments used were two pressure transducers (PT), one electromagnetic current meter (ECM), one Differential Global Positioning System

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(DGPS) and one Acoustic Doppler Current Profiler (ADCP). Data acquisition was carried out from 08:00 October 29th to 08:00 October 30th 2012. Also, topographic-bathymetric measurements were made along seven transverse profiles separated by ~20 m on the 100x150 m² referred to study area.

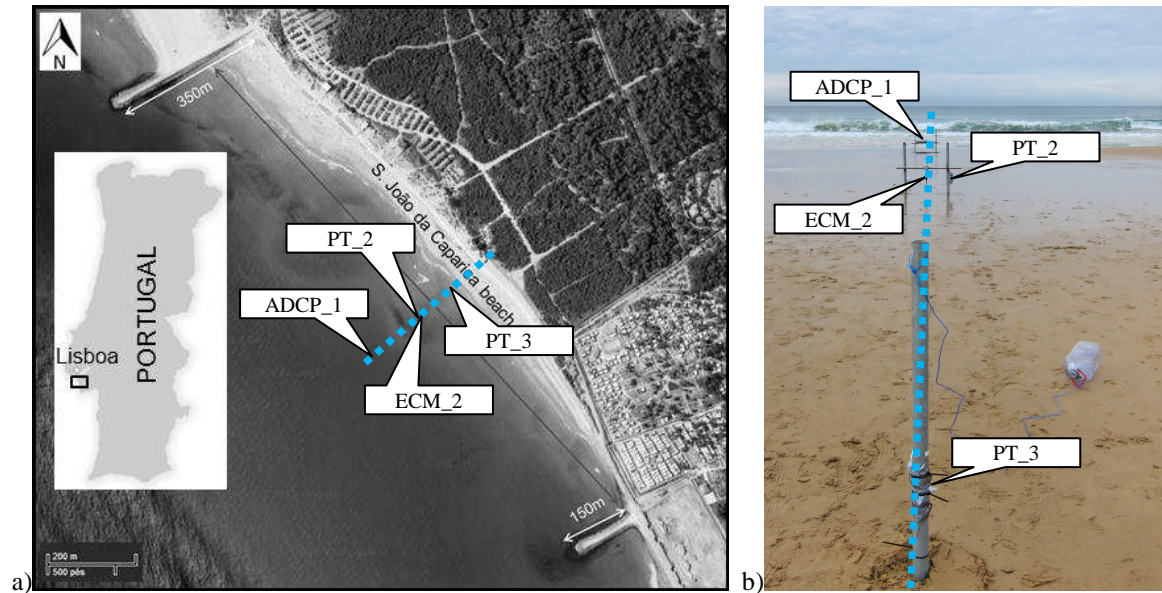


Figure 1. Study area (S. João da Caparica beach) showing instrumentation. a) Plan view; b) Installation.

To verify the agreement of these measurements with numerical estimations using propagation models SWAN (Booij *et al.*, 1999) and COULWAVE (Lynnett and Liu, 2004), a general wave characterization was established by using wave data coming from a wave-buoy located at the depth of -30 m (CD), at the south entrance of the Lisbon Harbor navigational channel, position with coordinates 38° 37' 25" N, 09° 23' 09" W, provided by the Lisbon Port Authority (APL). In normal conditions, this buoy provides wave parameters, such as the significant wave height (HS), the mean wave period (TZ), the peak wave period (TP) and the mean wave direction (DIR), every 1 hour, based on 20-min-duration wave-buoy acquisitions. As such, a comparison of main statistics of the above parameters for the measuring period (i.e., from 08:00 October 29th 2012 to 08:00 October 30th 2012) considering in-situ and transferred (from buoy + numerical model estimates) measurements will be performed.

3. Discussion

Final paper will discuss the results of in-situ measurements as compared with transferred measurements. The methodology for in-situ operations and numerical errors will be analyzed in order to improve the methods and models used to establish the forecasting and warning HIDRALERTA system to prevent and mitigate floods in coasts and ports areas.

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