SMALL OVERTOPPING DISCHARGES AT ALBUFEIRA HARBOUR: FIELD MEASUREMENTS AND MODELLING

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Paper topic: Laboratory and field observations and techniques

1. Introduction

Overtopping studies have paramount importance for the design of new coastal structures, risk assessment and warning systems. Overtopping evaluation is mainly based on mean overtopping discharges, determined by empirical formulations, neural network analysis, and both numerical and physical modelling. Comparison with field measurements is scarce and the vast majority of the available data came from the European project CLASH (www.clash.ugent.be). This work presents results from the first field campaign carried out in Portugal to measure overtopping, at the Albufeira harbour (Algarve). The results are compared with empirical estimations of overtopping based on existing formulae and the NN_OVERTOPPING2 tool (Coeveld *et al*., 2005).

2. Methods

Overtopping experiments were conducted at the West breakwater of Albufeira Harbour (Algarve) on the 25th October 2012 (Figure 1). The chosen breakwater is of easy access while it is often overtopped by waves higher than 3 m during spring tides. The field campaign included (a) measurement of waves (offshore and near breaking position) using 2 pressure transducers (PTs) placed at the face of the main breakwater armour slope, and (b) swash and overtopping estimates (flow and level), using 4 PTs cross-shore aligned at the breakwater crest. Video images from crest overtopping at the measurement profile (Figure 1) were recorded for about 1 hour around the maximum tide level. Ground control points where placed to support overtopping flow analysis using video imagery. Wave spectra and wave parameters (e.g. significant wave height and peak period) were obtained. Results include overtopping levels at two positions at the breakwater (St3 and St9, Figure 1), and corresponding estimated overtopping discharges and frequency. Field measurements were compared with the output from the calculation of the mean overtopping discharge using empirical formulae and the NN_OVERTOPPING2 tool (Coeveld *et al*., 2005),

3. Results

During the field campaign the dominant significant offshore waves (Hs) were from WSW with a maximum wave height around 2.8 m and peak periods (Tp) of about 10s. At the breakwater face (St1, Figure 1) the recorded Hs values were depth limited (Figure 2) and represent after breaking conditions, with maximums of 1.8 m and associated Tp of 10 s. These conditions resulted in the occurrence of weak overtopping flows above the breakwater edge (St3, Figures 1 and 3) that reached the middle portion of the crest superstructure (St9, Figures 1 and 3). The overtopping flow did not reach the harbor basin due to infiltration through the porous rubblemound. The highest overtopping frequency occurred during ebb, associated to higher offshore Hs. The average overtopping duration at St3 was 1.8 s with a maximum height over the structure of 0.30 m, while at St9 the heights were below 0.05 m.

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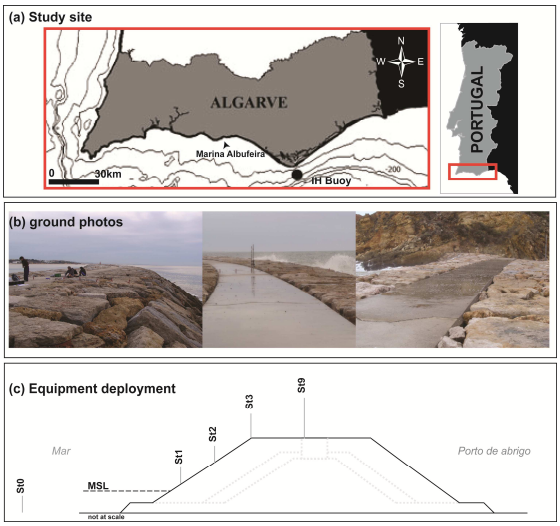

Figure1. (a) Study area location; (d) Ground photographs of the breakwater crest including the deployed equipment; and (c) distribution of the main pressure transducers along the measurement profile.

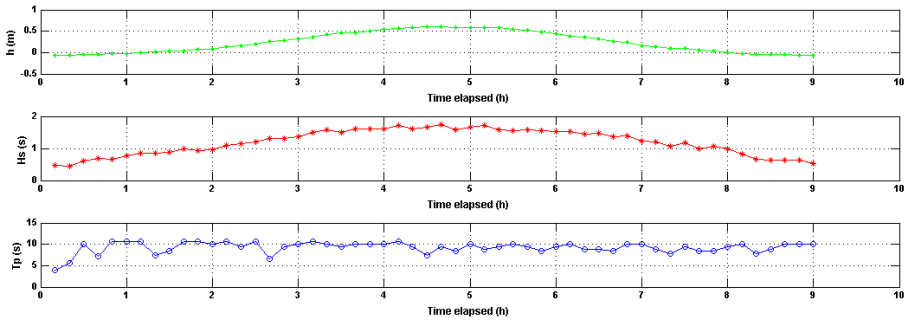

Figure 2. Sea level, significant wave height and peak period (from top to bottom) records at St1.

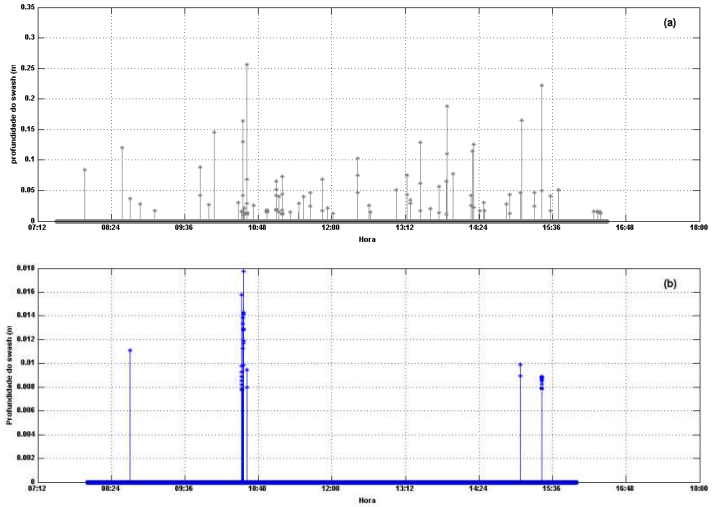

Figure 3. Swash records at St3 (a) and St9 (b).