Determination of extreme sea levels along the Iberian Atlantic coast

André B. Fortunato[1], Kai Li[1], Xavier Bertin[2], Marta Rodrigues[1], Belén Martín Miguez[3]

[1] National Civil Engineering Laboratory, Av. do Brasil, 101, 1700-066 Lisbon, Portugal.
afortunato@lnec.pt.
[2] UMR 7266 LIENSs, CNRS-Université de La Rochelle, la Rochelle, France.
[3] Centro Tecnológico del Mar, Vigo, Spain.

1. Introduction

There is an increasing concern over the flooding of coastal areas by the combined action of tides and storm surges. On the one hand, the hazard is increasing due to climate change (sea level rise and, in some areas, growing storminess); on the other hand, the vulnerability is also increasing due to the continuous migration of the populations and economic activities to the coast. This presentation describes the determination of extreme sea levels along the Atlantic Iberian coast using a combination of hindcast modeling with a statistical analysis.

2. Methods

The statistical approach to determine extreme sea levels from long time series is first presented and discussed using data from the Brest tide gauge. In particular, we analyze the uncertainty of the results due to the limited extent of the data record, and the tide-surge interactions.
The statistical approach is then applied to 31 years (1980-2010) of model hindcasts to determine extreme sea levels along the Iberian Atlantic coast. Simulations are performed with SELFE (Zhang and Baptista, 2008), an unstructured grid shallow water model. The simulations cover a significant portion of the NE Atlantic, with a 250 m resolution in the Portuguese shelf and 1-4 km in the Spanish shelf (Fig. 1). The model is forced by tides from FES2004 (Lyard *et al.*, 2006) and winds and atmospheric pressure from CFSR (Saha *et al.*, 2010). The model was extensively validated with tide gauge data.

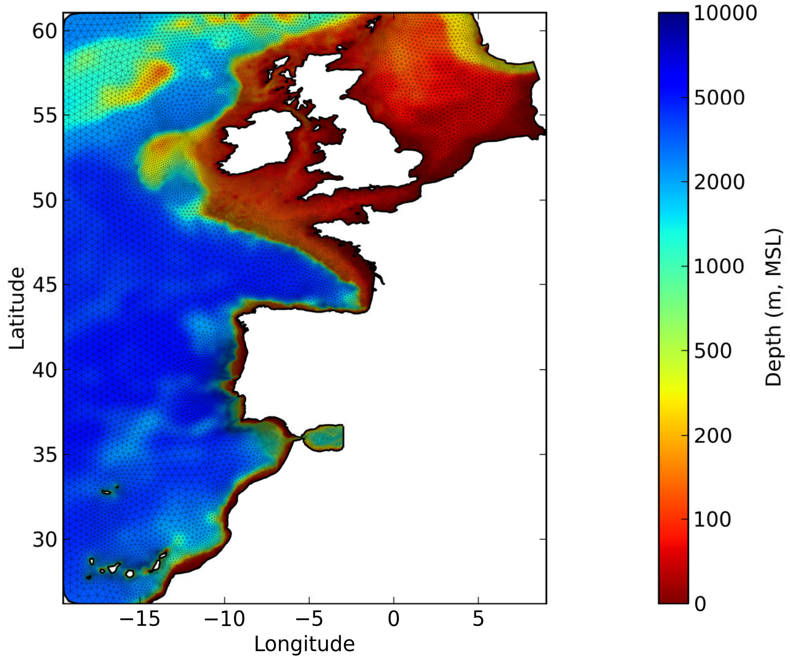

Fig. 1. Finite element grid and bathymetry.

3. Results

Extreme water levels were determined along the Iberian Atlantic coast for different return periods (Fig. 2). Results show that extreme sea levels increase from South to North in this region: the difference between the extreme sea level at the southernmost station (South of Tangier, Morocco) and the northernmost (East of Gijon, Spain) is about 0.6 m. Also, extreme water levels associated with return periods of 1000 years are about 0.3 m higher than those obtained for return periods of 10 years.

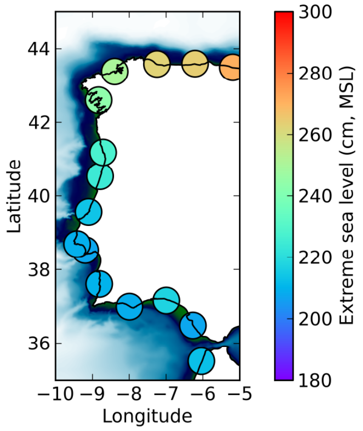

Fig. 2. Illustrative results: extreme sea levels along the Portuguese coast for a return period of 100 years.

4. Acknowledgements

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5. References

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