6th European Conference on Computational Mechanics (ECCM 6)
7th European Conference on Computational Fluid Dynamics (ECFD 7)
11 – 15 June 2018, Glasgow, UK

HINDCAST DATA ON MODELLING WAVE PROPAGATION TOWARDS THE COAST.

António Trigo-Teixeira[1*], Francisco Constantino[2] and Silvia Di Bona[3]

[1*] CERIS, Instituto Superior Técnico, Lisbon, Portugal, trigo.teixeira@tecnico.ulisboa.pt
[2] ENGIFOCUS, Lisboa, Portugal, francisco.constantino@engifocus.pt
[3] Università degli Studi di Padova, Padova, Italia silviadibona@gmail.com

Key Words: *Hindcast data, spectral energy, Salamanza bay, STWAVE, CGWAVE.*

Coastal planning and engineering activities often require the establishment of a multidecade sea wave climatology in the location. In many places measurement stations are not available, so wave hindcast technology is used, having as data input the meteorological conditions. In this way, time series of spectral estimates are generated for the whole ocean using phase averaging models, typically WAM, WAVEWATCH III or WAVAD. (Hanson et al. 2009) went a step further validating the hindcast data with buoys, to show the good skill of the technology. Yet they used the idea of wave spectral components, as regions of enhanced energy in the directional spectra $S(f,\theta)$ that can be attributed to windsea or swell systems to extract more information from the spectra.

As a result, the time series of hindcast parameters are provided with much more detailed information which includes the integral parameters for the spectra as a whole, and in addition: the primary swell component, the secondary swell component and the sea component corresponding to regions of enhanced energy in the spectra. This detailed information was used for the design of two rubble mound breakwaters in Salamanza bay, Cape Vert.

The STWAVE and CGWAVE models were used to propagate waves from an hindcast point offshore of the island of São Vicente and to bring waves, mainly from the north and north-easterly directions, into the surf zone of the Salamanza bay. Simulations were made first: using a JONSWAP spectra based on the integral hindcast parameters from the whole spectra and second: using the "real" spectra as given by the hindcast. Results of the simulation show the importance of using the "real" spectra as input, when the so called sea component is present. Actually, Trade winds blow regularly (speed and direction) in Cape Verde region producing an important sea component in the spectra.

REFERENCES

[1] J. Hanson, B. Tracy, H. Tolman and R. Scott, Pacific Hindcast Perfomance of Three Numerical Wave Models. *J. Atmos. Oceanic Tech*, Vol. **26**, pp. 1614–1633, 2009.
[2] F. Constantino, A Trigo-Teixeira and S. Di Bona, *Design of an Artificial Beach in Cape Verde*, 4ª Conferência sobre Morfodinâmica Estuarina e Costeira, MEC 2017, Porto, Portugal.