



Temporal and spatial variability of extreme significant wave heights in southern Europe based on satellite and reanalysis data bases

M. Menendez (1), C. Izaguirre (1), F.J. Mendez (1), I.J. Losada (1), and A. Luceño (2)

(1) Universidad of Cantabria, Environmental Hydraulics Institute, IH Cantabria, Santander, Spain (menendezm@unican.es, +34942201860), (2) Universidad of Cantabria, Department of Applied Mathematics. Santander. Spain

Wave reanalysis data bases and satellite measurements provide information about both temporal and spatial variability of wave climate. However, the accuracy or inhomogeneities of these data sets require taking special caution to assess reliable climate variability of extreme values.

We use a time-dependent extreme value model for monthly maxima of significant wave height to describe variations at different time scales in the southern Europe. The model is applied to hindcast data and satellite data covering different periods (1958-2001 for the reanalysis, and 1992-2007 for the instrumental data bases). Satellite data require a special statistical treatment due to its spatial and temporal inhomogeneities. As the number of satellite observations per month (N) is increasing through time, we have modified the extreme value model for block maxima considering that N can change in order to avoid artificial shifts in the maxima time series. Monthly maxima show a clear non-stationary behavior within a year, suggesting that the seasonality can be represented by using intrannual harmonic functions (Menendez et al., 2008). Seasonality explains great part of the variability of data, removing noises in larger time scale analysis.

Once the seasonality is taken into account, the interannual variability is modelled including different co-variates such as the North Atlantic Oscillation (NAO), the East Atlantic (EA) or Scandinavian (SCA) indices. The model allows to quantify the influence of these indices (i.e. every unit of the EA index explains 30 cm of the extreme wave height in the Gulf of Biscay). Results show maps of influence of the climate indices on extreme wave heights in the South of Europe (Northeast Atlantic Ocean and Mediterranean Sea).