MEDITERRANEAN WAVE CLIMATE: VARIABILITY AND TREND

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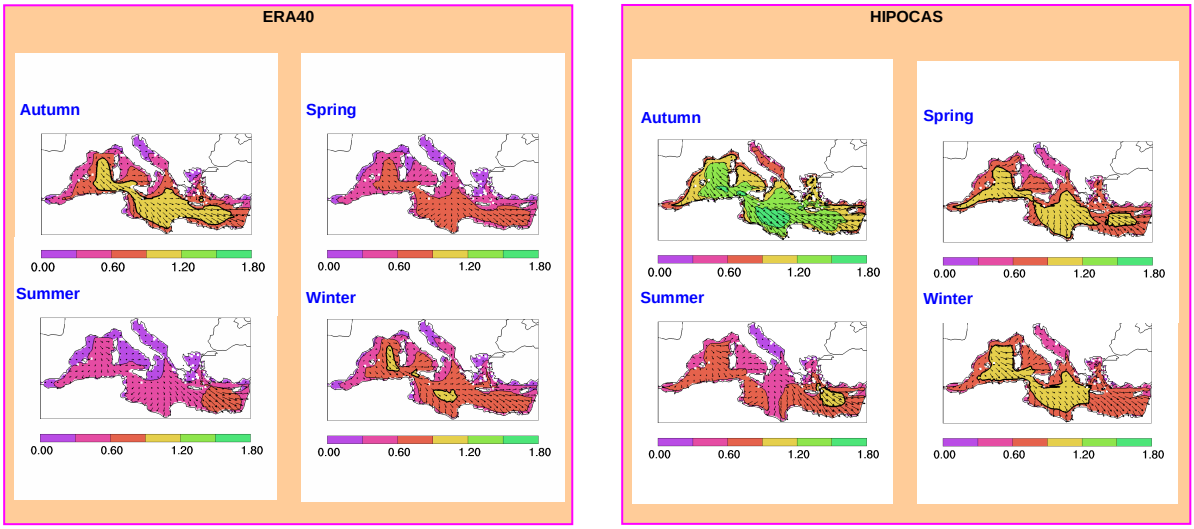
INTRODUCTION

This contribution analyses the wave fields in the Mediterranean Sea, during four years (1995-1998), in order to study the climate variability of SWH (*Significant Wave Height*) and its trend. The results are important for planning and managing coastal defences and off-shore activities. In this study, the SWH fields are produced by the third-generation wave model, WAM (*WAve Model*), at 0.25 degs lat-lon resolution. The two sets of forcing wind fields used are provided by the ERA-40 reanalysis and the HIPOCAS project. ERA-40 have a 0.5 deg grid step and a temporal resolution of 6 hours. The HIPOCAS have the same grid step and a hourly temporal resolution. Output wave parameters fields (SWH and direction) are saved every hour. The comparison between the two simulations and with satellite data is used for assessing the accuracy of the results.

This study aims to identify the most important SWH monthly regimes and evaluate their inter-seasonal variability and trends. The following figure shows the seasonal mean SWH field (autumn and spring in left-right top panel, summer and winter, in left-right bottom panel) for simulation with ERA40 and HIPOCAS respectively.

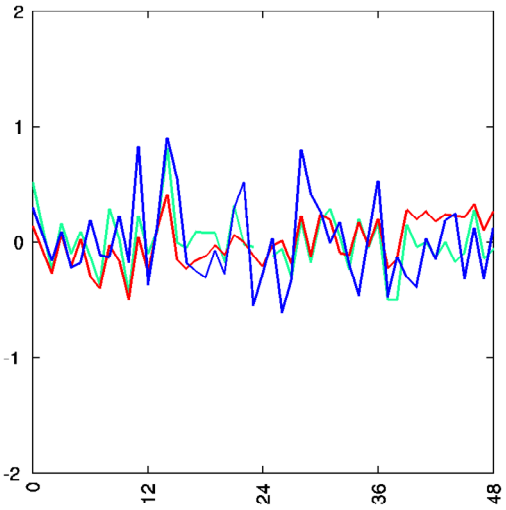


The SWH dimensionless index, denoted as $SWH_i^{dataset}$, for every month i of the simulation, has been defined from the monthly average SWH, computing its deviation from the mean annual cycle, and normalising it with the corresponding monthly standard deviation:

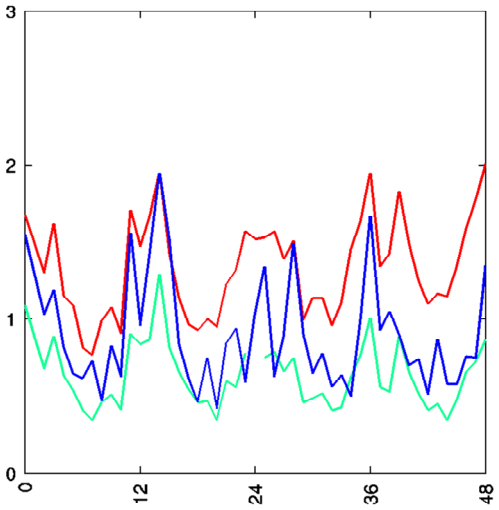
$$SWH_i^{dataset} = \frac{\left\langle swh_i^{dataset} \right\rangle - swh_{month(i)}^{dataset}}{STDV_{month(i)}^{dataset}}$$

Here, $\left\langle swh_i^{dataset} \right\rangle$ is the average monthly SWH value, $swh_{month(i)}^{dataset}$ the value of the corresponding month in the mean annual cycle, and $STDV_{month(i)}^{dataset}$ its standard deviation. This SWH index is meant to retain the information on inter-annual variability, regardless of the actual magnitude of the signal, which is generally different in the observations and the model simulations.

The following figure refers shows model and satellite data from 1995 to 1998. In the right/left panel are plotted the SWH monthly mean/ dimensionless index for the simulation with ERA40 (green) and with HIPOCAS (blue) and for the satellite data (red).



SWH dimensionless index



SWH monthly mean