Geophysical Research Abstracts
Vol. 19, EGU2017-4468-1, 2017
EGU General Assembly 2017

Long-term coastal measurements for large-scale climate trends characterization

Angela Pomaro (1), Luigi Cavaleri (1), Piero Lionello (2,3)

(1) CNR-ISMAR Institute of Marine Sciences, Venezia, Italy (angela.pomaro@ve.ismar.cnr.it), (2) University of Salento, Lecce, Italy, (3) Centro Euromediterraneo sui Cambiamenti Climatici (CMCC), Lecce, Italy

Multi-decadal time-series of observational wave data beginning in the late 1970's are relatively rare. The present study refers to the analysis of the 37-year long directional wave time-series recorded between 1979 and 2015 at the CNR-ISMAR (Institute of Marine Sciences of the Italian National Research Council) "Acqua Alta" oceanographic research tower, located in the Northern Adriatic Sea, 15 km offshore the Venice lagoon, on 16 m depth.
The extent of the time series allows to exploit its content not only for modelling purposes or short-term statistical analyses, but also at the climatological scale thanks to the peculiar meteorological and oceanographic aspects of the coastal area where this relevant infrastructure has been installed.
We explore the dataset both to characterize the local average climate and its variability, and to detect the possible long-term trends that might be suggestive of, or emphasize, large scale circulation patterns and trends.
Measured data are essential for the assessment, and often for the calibration, of model data, generally, if long enough, also the reference also for climate studies. By applying this analysis to an area well characterized from the meteorological point of view, we first assess the changes in time based on measured data, and then we compare them to the ones derived from the ERA-Interim regional simulation over the same area, thus showing the strong improvement that is still needed to get reliable climate models projections on coastal areas and the Mediterranean Region as a whole.
Moreover, long term hindcast aiming at climatic considerations are well known for 1) underestimating, if their resolution is not high enough, the actual wave heights as well as for 2) being strongly affected by different conditions over time that are likely to introduce spurious trends of variable magnitude. In particular the different amount, in time, of assimilated data by the hindcast models, directly and indirectly affects the results, making it difficult, if not impossible, to distinguish the imposed effects from the climate signal itself, as demonstrated by Aarnes et al. (2015).
From this point of view the problem is that long-term measured datasets are relatively unique, due to the cost and technical difficulty of maintaining fixed instrumental equipment over time, as well as of assuring the homogeneity and availability of the entire dataset.
For this reason we are furthermore working on the publication of the quality controlled dataset to make it widely available for open-access research purposes. The analysis and homogenization of the original dataset has actually required a substantial part of the time spent on the study, because of the strong impact that the quality of the data may have on the final result. We consider this particularly relevant, especially when referring to coastal areas, where the lack of reliable satellite data makes it difficult to improve the model capability to resolve the local peculiar oceanographic processes.
We describe in detail any step and procedure used in producing the data, including full descriptions of the experimental design, data acquisition assays, and any computational processing needed to support the technical quality of the dataset.