



Estimating the risk exposed areas and the return periods of Medicanes

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The study of extreme weather events that variously affect human life is not only quite exciting but also of great importance. In this framework, there is a great interest for better understanding the mechanism of development and evolution of these cyclones with tropical characteristics in Mediterranean Sea. Despite their infrequent occurrence, their extreme characteristics and their presence in a basin surrounded by intense coastal activities may lead to severe natural, social and financial implications. It should be noted that the interest for the study of such events has been increased lately, however the risk exposed areas and the return periods of the events are not yet thorough exploited.

The scope of this work is related to the repeatability and intensity of Mediterranean tropical-like cyclones (Medicanes). Documented Medicanes during a 21-years period are simulated by employing an online coupled atmospheric and wave modeling system. The modeling is performed in a high resolution in order to capture the intense characteristics of the events, while the parameters to be utilized are wind speed and gust as well as wave characteristics. The analysis is performed by deriving different extremal indices and methodologies with respect to the principles of Extreme Value Theory. In addition, various tests are carried out for the system optimization and the quantification of the associated uncertainties.

Among the results, it is found that risk exposed areas (in terms of both wind and wave) are located in central and western Mediterranean with the Gulf of Leon to present a special interest. Concerning the generated swell, although there are areas affected, the impact is not quite important due to the small life span of the event and the limited fetch of the basin. Concluding, most of the events could be characterized as tropical storms based on the Saffir–Simpson scale. These results, as well as the comparison between the different approaches, not only present a scientific interest, but also can be a useful tool in early warning systems, civil protection and reinsurance.