

Climatic study of the marine surface wind field over the seas around Greece: use of a high resolution RCM and application of POT techniques to estimate extreme wind speed thresholds

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The marine surface wind field (10 m) over the seas surrounding Greece is studied, in areas where observations from meteorological stations are scarce and difficult to be obtained. The 3rd version of the ICTP–Regional Climatic Model (RegCM3) is used in order to simulate the offshore surface wind field. The model’s spatial resolution has been dynamically downscaled to 10x10 km, in order to better deal with the complex Greek coastlines and the numerous islands, especially in the Aegean Sea. Wind data for the 1980 – 2000 (control) period are produced by the RegCM3 and are evaluated against real observational data from 15 island and coastal meteorological stations. Future projection of the wind field for the 2080 – 2100 period is, also, estimated. Mean states for seasonal wind speed and direction are produced, depicting the main characteristics of the wind field in the study region, and defining various, similarly behaved sub-regions. Emphasis is given on the extreme wind speed occurrences. Extreme wind speed thresholds are produced by applying three Peaks Over Threshold (POT) techniques, the Mean Residual Life (MRL), the Threshold Choice (TC), and the Dispersion Index (DI). Also, three percentile indices the 90th, the 95th and the 99th are used, and their results are compared with the estimated POT wind speed thresholds. The threshold values of the three POT methods are averaged in order to produce, a more robust, single threshold value for each grid point. Subsequently, these mean POT thresholds are used in order to examine the intra-annual distribution of extreme winds in the study region, helping depict the seasonal spatial variability of extreme winds. Finally, return levels for periods of 20, 50, 100 and 200 years are estimated, by applying the profile likelihood methodology for extreme excesses, and estimating the lower and upper 95% confidence limits as well.