



MEDICANES AND CLIMATE CHANGE: ANALYSIS WITH TWO DIFFERENT METHODS

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Medicanes or "mediterranean hurricanes" are extreme cyclonic windstorms morphologically and physically similar to tropical cyclones (Tous and Romero, 2012). Owing to their potential destructiveness on the islands and continental coastal zones, medicane risk assessment is of paramount importance. With an average frequency of only 1-2 events per year and given the lack of systematic, multidecadal databases, an objective evaluation of the long-term risk of medicane-induced winds is impractical with standard methods. Also, there is increasing concern on the way these extreme phenomena could change in frequency or intensity as a result of human influences on climate.

First attempts to evaluate the medicane risk and its possible changes have been undertaken recently by our group based on two different perspectives. The first approach consists of detecting and tracking symmetric warm-core cyclonic disturbances generated in nested climatic simulations. This technique is limited by its high computational cost, which prevents it from using very high grid resolutions and from analysing enough climatic realizations to permit an adequate and complete sampling of the probability distribution function of storms. As an alternative, the second risk assessment method takes advantage of the statistical-deterministic approach developed by Emanuel et al. (2006) in the context of the long-term wind risk associated with tropical cyclones. This approach generates thousands of synthetic storms with low computational cost, thus enabling a statistically robust assessment of the spatio-temporal risk function, in the form, for instance, of geographical distributions of return periods for medicane-related extreme winds.

Here we present unprecedented medicane risk maps based on both techniques, using ERA40 reanalysis and GCM outputs as input data. Both methods generally agree with regard to the medicane-prone geographical areas and times of the year, and point out fewer storms but an increased probability of violent cases at the end of the century compared to present.

Emanuel, K., Ravela, S., Vivant, E. & Risi, C. A Statistical-Deterministic Approach to Hurricane Risk Assessment. *Bull. Amer. Meteor. Soc.* **87**, 299–314 (2006).

Tous, M. & Romero, R. Meteorological environments associated with medicane development. *Int. J. Climatol.* (2012), doi: 10.1002/joc.3428.