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Abstract

CMIP5-Based projection of future changes in the frequency and intensity of medicanes at subregional scale

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Medicanes are mesoscale maritime storms that from a physical point of view operate much as tropical cyclones. Although with typical wind intensities far below those registered in their tropical analogues, these Mediterranean cyclones pose serious threat to the affected islands and coastal regions and can adversely affect open sea activities. Concern about the way these extreme phenomena could respond to global warming (e.g. possible changes in frequency, intensity or regional variability) motivate the present work.

We apply a statistical-deterministic method, originally devised for the tropical cyclone problem but which has been adapted for the dynamics of mid latitudes, to generate thousands of synthetic tracks of medicanes along with their radial distributions of winds; these synthetic storms are compatible with the "climates" provided by 30 CMIP5 models in both historical and RCP85 simulations for a recent (1986-2005) and a future (2081-2100) period, respectively. We examine the present-to-future multimodel mean changes in medicane risk, with special attention to the most robust patterns in terms of consensus among individual models on the sign of change. Downscaled fields obtained using the ERA-interim and NCEP-ncar reanalyses will be used as reference.

Future change in the number of medicanes is unclear (on average the total frequency of storms does not vary) but it is found a profound redistribution of events depending on the lifetime maximum wind: results project a higher number of moderate and violent medicanes at the expense of "ordinary" storms. Spatially, the method projects an increased occurrence of medicanes in the western Mediterranean and Black Sea that is balanced by a reduction of storm tracks in contiguous areas, particularly in the central Mediterranean; however, future extreme events (winds >60 kt) become more probable in all subbasins.

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