FIRST STEPS TOWARDS A QUANTITATIVE ASSESSMENT OF MEDICANE RISK UNDER FUTURE CLIMATE CONDITIONS

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Mediterranean tropical-like cyclones (also called medicanes) are extreme events that occasionally occur over the Mediterranean Sea, threatening the islands and coastal regions. These storms operate on the thermodynamical disequilibrium between the sea and the atmosphere, and although their dimensions and other meteorological parameters such as maximum wind speed differ in magnitude with real tropical cyclones, their development mechanism and satellite images appear to be similar.

An empirical genesis index for tropical cyclones which involves some large-scale meteorological parameters like low-tropospheric vorticity, mid-tropospheric relative humidity, sea surface temperature and tropospheric wind shear, is revealed as an appropriate discriminating parameter to detect which areas have a potential risk to develop a medicane. Combining this result with our goal to evaluate the quantitative risk of medicanes under future climate conditions, this study implements the first steps towards that assessment.

As a necessary step in the methodology, the ability of the MM5 model to simulate past medicanes is proved in the first place. These control simulations have been run with a horizontal resolution of 7.5 km and are forced using large-scale analyses with a coarse resolution, of the same order than current GCMs. Then, areas presenting high values of the genesis index in ERA-40 and GCM outputs are identified and numerically simulated with MM5. Results from ERA-40 reanalyses are compared, on the one hand, against the satellite-based climatology of events and, on the other hand, with GCM-derived results. Initially, possible medicane development in the simulations is checked manually, but an automatic objective detection algorithm is going to be implemented to cover a larger GCM database.