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MEDICANES: database and environmental parameters

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Tropical-like cyclones occasionally develop over the Mediterranean Sea, sometimes attaining hurricane intensity and threatening the islands and coastal regions. These storms, recently called medicanes (MEDIterranean HurriCANES), operate on the thermodynamic disequilibrium between the sea and the atmosphere and in this respect, as well as in their visual appearance in satellite images, are much like tropical cyclones. As meteorological observations in maritime areas are scarce, satellite images become a crucial source of information to attempt, for the first time, to build a systematic database of events.

In this work, cases were selected from historical IR image data (1982-2005) of Meteosat satellite. Two lists were created based on different criteria: a first list including any candidate storm, and a second one by narrowing the list down to most evident events. Main selection criteria are cyclone size, cyclone eye clarity and system lifetime. This identification was done subjectively.

By analyzing both lists of events it was possible to derive characteristic spatial and time distributions. Most of the medicanes evolved on western and central part of the Mediterranean Sea and occurred in autumn and early winter.

Another objective of the study is the identification of thermodynamical parameters associated with medicanes development. For that purpose, meteorological conditions existing on the genesis areas of medicanes have been compared against the bulk of ordinary (i.e baroclinic) Mediterranean cyclonic environments. These conditions have been described in terms of thermodynamic indices highlighted in previous studies on hurricanes. Among these, mid-tropospheric relative humidity, an empirically-derived genesis index for the tropical regions and the diabatic contribution to surface-level equivalent potential temperature local tendency are revealed as appropriate discriminative parameters.

Finally, mesoscale numerical simulations of our second list medicane events have been designed to test the ability of MM5 model to simulate these extreme, small-scale storms. If these experiments get successful results, the model itself becomes an useful tool to examine additional medicane-prone environmental parameters.