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An intense tropical-like cyclone in the western Mediterranean basin: numerical simulations and satellite analysis

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Vortices with characteristics similar to tropical cyclones, such as presence of an “eye” and of spiral-like cloud bands, are occasionally observed in satellite images over the Mediterranean. In such tropical-like cyclones (TLC, sometimes called Medicanes) a warm, symmetric core can be identified across the whole troposphere. The present study analyses a specific Medicane that affected the western part of the Mediterranean basin on 5-9 November 2011. Such a vortex displayed a longer persistence (about 60 hours) of tropical features than other TLCs recently analysed in the Mediterranean (Miglietta et al, 2013).
Numerical simulations performed with the WRF model were able to reproduce properly the evolution and the track of the cyclone. The presence of a large-scale upper air cold anomaly and intense sea surface fluxes in the Gulf of Lion appear as necessary ingredients for the development of the vortex. In particular, sensitivity experiments reveal the importance of the topography of the region in modulating the wind field, leading to an intensification of the sensible and latent heat fluxes below the upper level low.
The microwave precipitation retrieval method 183-WSL (Laviola and Levizzani, 2011) is used to describe the characteristics of this storm in terms of cloud development, precipitation regime and type (convective/stratiform). In particular, the satellite analysis of cloud top height and retrieved rainfall indicates that the stage characterized by the most intense convective activity and rainfall anticipates the mature phase (when the cyclone is deeper and characterized by tropical features), during which convection is shallower and rainfall weaker.

References
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