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Intercomparison of Mediterranean hurricane like storms using an axisymmetric, nonhydrostatic, cloud resolving model

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Tropical-like storms in the Mediterranean are occasionally observed on satellite images, often with a clear eye surrounded by an axysimmetric cloud structure. These storms sometimes attain hurricane intensity and can severely affect coastal lands. A deep, cut-off, cold-core low is usually observed at mid-upper tropospheric levels in association with the development of these tropical-like systems. The air-sea interaction theory of tropical cyclones shows that the steady-state of these storms can be idealized by a Carnot engine, with good agreement between the theoretical maximum wind speed (or potential intensity) and observed values in the Tropics. In this study we attempt to apply some tools, similarly to the previously used in tropical hurricanes, to characterize the environments in which 12 known Mediterranean events developed. The results are compared against tropical cyclone environments. Further, an axisymmetric, nonhydrostatic, cloud resolving model is applied to simulate the tropical-like storm genesis and evolution. Results are compared to air-sea interaction theory predictions, surface observations when landfall occurred and with QuickScat microwave derived wind speed measurements over sea surface. Finally, sensitivities of the numerical simulations to different factors (e.g. sea surface temperature, vertical humidity profile and baroclinicity of the environment) are examined.