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Satellite observations of deep convection during Mediterranean Hurricanes

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Deep convective clouds have been recognized as a significant source of tropospheric water vapor and latent heat release during the formation of the Mediterranean tropical-like cyclones, the so-called Mediterranean Hurricanes or "Medicanes". Numerical studies suggest that the wind-induced surface fluxes work synergistically with convective updrafts in the transformation of a cold-core cyclone into a warm-core system, but the evaluation of numerical simulations has been limited mostly by the scarcity of in-situ observations in the Mediterranean Sea.
In this study, microwave and infrared satellite retrievals are used to study the temporal and spatial evolution of deep convection (DC) surrounding the core of Medicanes and thus to better understand the contribution of DC in the intensification and dissipation of Medicanes. The study period spans from 2005 up to 2018. Satellite diagnostics are employed to detect DC and convective overshooting tops, namely the cores of the strongest updrafts, which are able to produce hazardous weather conditions. Spaceborne scatterometers are also used to derive the surface wind speed from which sensible and latent heat fluxes can be estimated, together with their role in the Medicanes life-cycle. Finally, numerical re-analysis datasets and high-resolution simulations are evaluated in their capability in reproducing the DC associated with Medicanes.