

Improvements of numerical simulations of tropical-like Mediterranean storms through the assimilation of satellite and lightning data

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The scarcity of meteorological observations in maritime areas is a well know problem that could be an important limitation in the study of different phenomena. Tropical-like storms or medicanes developed over the Mediterranean sea are strong storms with some similarities with the tropical ones. Although they do not reach the hurricane intensity, its potential for damage is very high due to the densely populated Mediterranean coastal regions. The capability of simulation of such phenomena by mesoscale numerical models has been previously shown. However, numerical simulations many times present clear spatial and temporal shifts in comparison with the satellite-observed storms. With the aim of improving the numerical results, an adjustment of the vertical profile of the humidity in MM5 simulations is performed by means of satellite derived precipitation. Convective or stratiform precipitation types obtained from satellite images are used to individually adjust the profiles. Lightning hits are employed to identify convective grid points. The adjustment of the vertical humidity profile is carried out in the ECMWF analyses used as global conditions of the simulations. It has also been applied the analyses nudging with ECMWF analyses and ECMWF analyses with corrections of humidity through the satellite-based profiles. The adjustment is also applied as observation nudging at each time step when the satellite image is available. The obtained improvements in the simulations and the degree of sensitivity to the adjusted vertical moisture profiles are discussed.