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Impact of aerosol-atmosphere interactions on Medicanes

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This contribution aims at evaluating the role of the explicit simulation of aerosol- atmosphere interactions in the development of extreme events, particularly in Medicanes. These are a type of rare storm that forms in the Mediterranean area and shares many features with tropical cyclones, including the presence of a warm core.

For the analysis, several episodes of Medicanes observed during the last 20 years, have been used. For each case, two simulations have been carried out, being the only difference the inclusion of marine aerosols. Therefore, a model capable of simulating iteratively the emission of aerosols has been considered: WRF-CHEM.

Our working hypothesis is that the explicit simulation of aerosols benefits the simulation of this type of storms, as the severe surface wind leads to the emission of additional marine aerosol (not considered in traditional RCMs). These act as additional condensation nucleii and facilitate the release of latent heating, thus providing additional energy to the storm through a positive feedback.

The results show that the invigorating effects of the released aerosols, which leads to a warmer cores and deeper depressions in most cases. While, interestingly, the trajectory of the storms is hardly affected.