On the impacts of dust on Mediterranean cyclones: The Medicane case of December 2005

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Abstract

It is well known that aerosols modify the Earth’s radiative budget by scattering and absorbing solar and terrestrial radiation. In addition, they affect cloud development and precipitation formation by acting as cloud condensation nuclei (CCN) and ice nuclei (IN), thus indirectly changing the energy budget. Dust aerosols, in particular, have been recently shown to play an important role in the development and evolution of Atlantic tropical cyclones. Considering this, the present study aims to examine the potential effects of dust on the genesis and evolution of tropical-like Mediterranean cyclones (Medicanes). To this end, a Medicane event that took place between 13 and 16 December 2005 is selected for a case study. Analysis of satellite imagery shows clearly that a significant amount of mineral dust was advected into the Medicane, thus making it an ideal case study. In the context of a multi-model inter-comparison, four (4) different regional climate models are employed for simulating the event. The effects of dust (both direct and indirect) on the Medicane genesis and development will be quantified and compared among the four models.