

# Impact of Aerosols on the Evolution of a Medicane in November 2011

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A Medicane is a high impact weather system over the Mediterranean Sea. This tropospheric depression occurs approximately once a year mainly in the autumn and winter months [1], [2]. It has similarities to a hurricane, which is also in the coinage "Medicane" in combination with "Mediterranean Sea". In such a system a circular, cloudless eye is surrounded by an eye wall with a roughly axisymmetric cloud pattern. The wind speed is not as high as within a hurricane and the spatial extent is smaller as well [3]. Nevertheless, the damage potential is high due to high wind speeds, heavy precipitation, and flooding when making landfall. Therefore, a good prediction of such a weather system is essential.

We address the questions whether and to which extent aerosols affect the track, intensity and structure of the Medicane, the formation and lifetime of related clouds and the locations, duration and amount of the ensuing precipitation. We have already found locally a strong impact of sea salt particles on precipitation. In comparison with observation the accumulated precipitation is in better agreement if sea salt is taken into account.

The relative importance of the influence of natural and anthropogenic aerosols on high impact weather is still an open question. Aerosol-Cloud-Precipitation feedback processes are very complex and not completely understood. In modeling studies the impact of aerosol on precipitation differs in sign and magnitude from case to case [4], [5]. Consequently, it is not known whether it is necessary to take into account this impact in numerical weather prediction models.

Aerosols have an impact on cloud formation and therefore on precipitation. They alter the energy budget by absorbing and scattering radiation. Aerosols can influence the water cycle as well. This is done by acting as cloud condensation nuclei or ice nuclei. Thereby, they also alter the physical properties of the cloud.

The air over the Mediterranean Sea consists of a special mixture of aerosol composition. There are natural aerosols like sea salt, which is emitted directly out of the sea and mineral dust, which is transported out of the Saharan Desert over the Mediterranean Sea. Anthropogenic aerosols occur there, too. Sources are coastal cities, traffic, and emissions of ships.

In our study we focus on the development of a Medicane that occurred in November 2011. Simulations of such systems have been done before [4], [5]. However, the

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