Regional Modeling of Saharan Desert Dust Aerosol Indirect Radiative Forcing

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Considering that Sahara desert is considered the most important dust source in the world, being responsible for up to half of the global dust emissions, this work aims to study the effects of Saharan desert dust aerosol storms upon clouds.

The method, used in this study, estimates the cloud radiative forcing (aerosol indirect radiative forcing) in the presence of desert dust aerosols during strong desert dust events that occurred in the end of May 2006 and in the beginning of September 2007. The assessment of the cloud radiative forcing (CRF) is made at a regional scale both at the top of the atmosphere (TOA) and at the surface levels.

The results are obtained from numerical simulations with a mesoscale atmospheric model (MesoNH) over Portugal area and nearby Atlantic Ocean.

From the results it is possible to observe that, for all days under study, a cooling effect (negative CRF values) is always found both at the TOA and surface levels and this effect is more pronounced at the surface than at the TOA. Also, for these two levels and for clouds developing in a dust free atmosphere, a more pronounced cooling effect is found compared with the corresponding CRF values for clouds developing in a atmosphere were desert dust aerosols are present.