



Lightning activity and aerosols over the Mediterranean

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Lightning activity has received extended scientific attention over the past decades. Several international studies on lightning activity and initiation mechanisms have related the increased aerosol concentrations to lightning enhancement. In the frame of TALOS project, we investigated the effect of aerosols on lightning activity over the Mediterranean Sea. Cloud to ground lightning activity data from ZEUS lightning detection network operated and maintained by the National Observatory of Athens, were used along with atmospheric optical depth (AOD) data retrieved by MODIS, on board Aqua satellite. The analysis covers a period of nine years, spanning from 2005 up to 2013.

The results show the importance of aerosols in lightning initiation and enhancement. It is shown that the mean AOD of the days with lightning activity per season is larger than the mean seasonal AOD in 90% of the under study domain. Furthermore, lightning activity increase with increasing aerosol loading was found to be more pronounced during summertime and for atmospheric optical depth values up to 0.4. Additionally, during summertime, the spatial analysis showed that the percentage of days with lightning activity is increasing with increasing aerosol loading. Finally, time series for the period 2005-2013 of the days with lightning activity and AOD differences showed similar temporal behavior.

Overall, both the spatial and temporal analysis showed that lightning activity is correlated to aerosol loading and that this characteristic is consistent for all seasons.