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Characterization of atmospheric aerosols in the Paris region: local contribution and long range transport

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Atmospheric aerosols may influence greatly Earth surface heating and cooling, representing a key uncertainty when assessing the energy budget of our environment. In general, aerosols are both produced locally and transported from and to other regions. In the present study, it is shown how Saharan dust intrusions transported over the Paris region impact considerably the local environment. Aerosols are characterized during a 15-day-period through a sophisticated Active + Passive remote sensing synergism. Observations of a backscatter Mini-Lidar and a sunphotometer - both direct and microphysical retrievals - are used. A vertically-resolved retrieval of optical and microphysical properties is achieved. The quality of the retrievals is insured through a multiple closure of the spatial + optical + microphysical properties. Hygroscopic growth of aerosols is considered. Finally, the aerosol characterization obtained though this remote sensing approach is used to simulate radiative fluxes at the surface. The retrievals of global, direct and diffuse fluxes match within 5 to 10% to observations thought the whole time series. In consequence, the present study enables to perform a realistic simulation of the contributions of both local and transported aerosol to the visible fluxes arriving to the surface. In a nutshell, the results of this study are the quantification of the aggravation of the conditions of the urban agglomeration of Paris due to long range transport of aerosols.