



Cluster analysis of air mass trajectories linked with high aerosol and ozone concentrations observed in the Greater Athens Area, Greece

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During the last five years measurements of the aerosol backscatter coefficient over the Greater Athens Area have been obtained using an elastic backscatter – Raman lidar system. Also, since 2004 regular ozone profiles are obtained with a DIAL system. Cluster analysis has been applied to air mass back-trajectories to identify the meteorological conditions affecting aerosols optical properties and ozone mixing ratio. Back-trajectories showing similar spatial patterns are grouped into clusters and combined with corresponding aerosol and ozone profiles to reveal the causes leading to high aerosol and ozone detection. The lidar system's reliability was ensured by algorithm and hardware tests performed in the frame of the EARLINET project and inter-comparison with ozonesondes. A significant number of episodes were recorded showing high aerosol and ozone concentrations. These episodes are observed mostly in the warm period of the year (late spring, summer and early autumn) and are due to long-range transport (e.g. Saharan dust, forest fires aerosols) and to local air pollution sources. In general, high ozone and aerosol episodes over Athens can be attributed not only to local air pollution sources, but also to long-range transport mechanisms.

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