



Long-range transport of ozone and smoke aerosol from N. American forest fires over Greece during ICARTT 2004 as observed by a ground-based UV ozone DIAL-Raman lidar system

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Tropospheric ozone and aerosol vertical profiles have been measured simultaneously over the city of Athens (37.9°N, 23.6°E) during the ICARTT (International Consortium for Atmospheric Research on Transport and Transformation) Campaign in summer (July 5, 19 and 21, 2004). A ground-based UV ozone DIAL-Raman lidar system was used to provide profiles of ozone and aerosol up to 3.5 km and 6 km above sea level (asl.), respectively (Ancellet et al., 1989; Papayannis et al., 1990; Tzortzakis et al., 2004). The ozone DIAL measurements were corrected using simultaneously obtained aerosol profiles at 299 nm, in combination with a modified Klett inversion algorithm (Klett, 1985) using as input the mean lidar ratio data profiles obtained from N₂-Raman lidar measurements at 387 nm (Papayannis et al., 1990; Ansmann et al., 1992).

The MODIS aerosol optical depth (AOD) images showed the existence of high levels of smoke aerosols over the N. American region (Canada and Alaska) over the studied period, due to large forest fires in that region. Several layers of ozone (70-80 ppbv) and aerosol were observed at various levels between 2 and 5.5 km height over Athens. These layers were related to the extensive N. American forest fires using eight to ten days air mass backward trajectory analysis based on the NOAA HYSPLIT transport and dispersion model. Additionally, the FLEXPART CO tracer calculations confirmed the source region of the high levels of aerosol and ozone observed by our lidar system, using the CO as a tracer. The background ozone concentrations in the free troposphere over Athens usually range from 55-65 ppbv during the summer period (Kourtidis et al.,

2002). Therefore, the excess of 10-15 ppbv observed during ICARTT 2004 between 2-3.5 km, may be attributed to the long-range transport of polluted air masses originating from the extensive forest fires in Canada and Alaska.

1 References

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