



Observations of smoke and mineral dust over Eastern Mediterranean

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Four-year combined observations (2010–2014) with EARLINET polarization lidar and AERONET sun/sky photometer at Limassol (34.7 N, 33 E), Cyprus, Eastern Mediterranean, were used in order to study the soil dust content in lofted fire smoke plumes. This study focuses on air masses advected from Turkey as well regions further north of Black Sea during the main burning season (summer half year). Cases with strong impact of smoke events (occurring over Turkey during 1–3 days before arrival at Limassol) and observations with more background-like aerosol signatures (not influenced by Turkish fire smoke) were separated. This first systematic attempt to characterize less than 3-day-old smoke plumes in terms of particle linear depolarization ratio (PDR), measured with lidar, shown that PDR was typically 10–15% when Turkish fires contributed to the aerosol burden in the free troposphere and considerably lower with values 3–8% when fires over Turkey were absent while the air masses cross this country. High Ångström exponents of 1.4–2.2 during all these events with lofted smoke layers, occurring between 1 and 3 km height, suggest the absence of a pronounced particle coarse mode. When PDR plotted vs. travel time (spatial distance between Limassol and last fire area), PDR decreased strongly from initial values around 16–18% (1 day travel) to 4–8% after 4 days of travel caused by deposition processes. This behavior was found to be in close agreement with findings described in the literature. Biomass burning should therefore be considered as another source of free tropospheric soil dust.