



Seasonal evolution of Saharan dust observed by Lidar and MFRSR at Lampedusa

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This study is based on tropospheric aerosol observations carried out in different periods between 1999 and 2005 with a lidar and a Sunphotometer at the island of Lampedusa (35.5°N, 12.6°E). The lidar measures backscattered radiation at 532 nm with different polarizations throughout the troposphere in daytime and nighttime. The photometer is a Multi Filter Shadowband Radiometer (MFRSR), which performs automatic measurements of diffuse and total solar irradiance in one broad band and six narrow bands between 415 and 940 nm. The lidar dataset consists of about 1000 hours of observations, carried out in different periods of the year. MFRSR measurements are performed continuously in daytime.

Airmass backtrajectories are used to identify possible aerosol source regions. Saharan dust is observed on 70% of the measurement days in both spring-summer and autumn-winter periods. Thus, the frequency of dust transport to Lampedusa is evenly distributed during the year in the dataset.

Saharan dust properties however show a marked seasonal behaviour. In spring and summer the optical depth is often larger than 0.4, and the vertical extension of the desert aerosol is maximum, with dust present up to 8 km altitude. During autumn and winter the Saharan dust top height is rarely above 3 km, and the optical depth is generally about 0.15. The desert dust Ångström exponent shows a small seasonal evolution, and is usually smaller than 0.5. More intense dust mobilization and vertical transport mechanisms in summer, and increased occurrence of precipitation in winter, are believed to play a significant role in producing the observed seasonal behaviour.