

Raman lidar monitoring of extinction and backscattering of African dust layers and dust characterization

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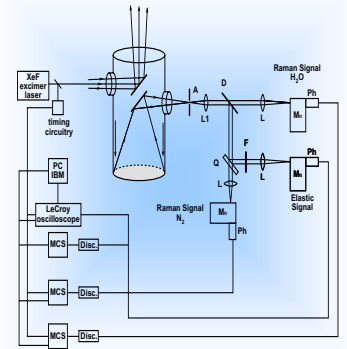
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Results on the monitoring of two strong African dust outbreaks in the south-eastern corner of Italy (40° 20' N, 18° 6'E) during May 2001 are presented. The lidar station of Lecce is located on a flat rural area that is at about 800 km from the northern Africa coast. So, it allows monitoring of African dust transport early in its life cycle, at all levels in the plume.

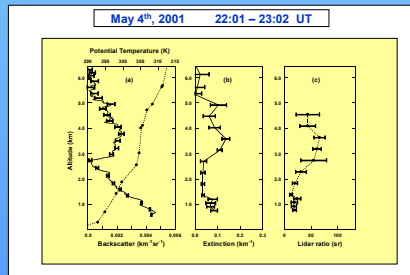
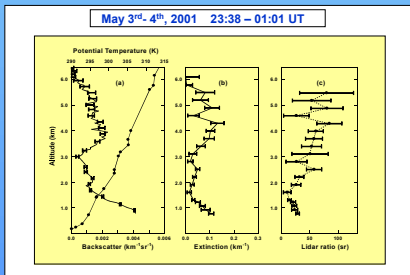
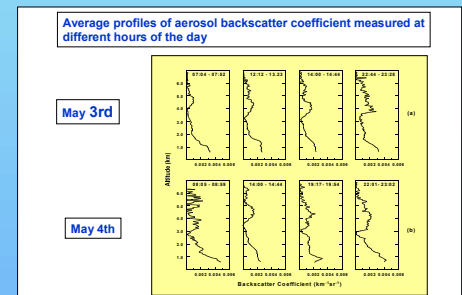
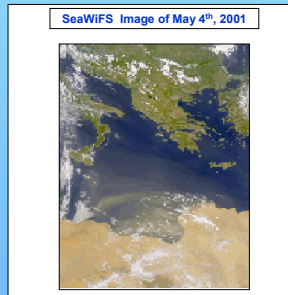
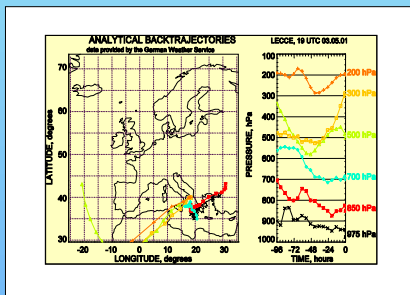
An elastic-backscatter Raman lidar has been used to monitor the time evolution and vertical structure of the dust layers and get independent measurements of the aerosol extinction and backscatter coefficient.

The findings are presented in terms of vertical profiles of the extinction and backscatter coefficient, and of the lidar ratio. Results on the chemical and morphological characterization of the dust collected at the lidar station are also given.

EXPERIMENTAL LAYOUT



Dust event of May, 3-5 2001



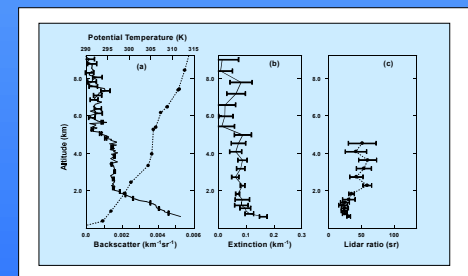
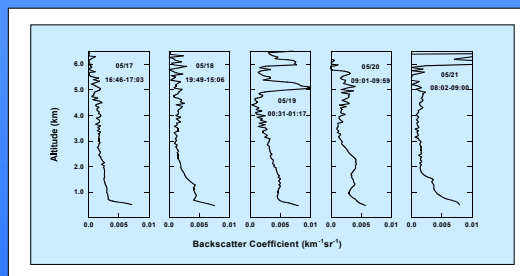
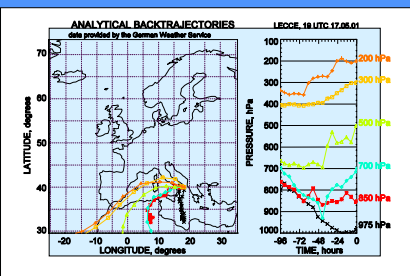
A dust layer of thickness ranging from about 1 to 3 km and located above 3 km height has been monitored during May 3rd and 4th.

The peak values of the backscatter coefficient were in the range 0.001 – 0.003 (km sr)⁻¹ and the AOT of the dust layer was of 0.21.

By contrast, a dust layer extending between 2.7 and 5.4 km and characterized by AOT of 0.22 has been monitored on May 4th.

Average lidar ratio values of 55 sr have been found during this first dust event.

Dust event of May, 17-21 2001



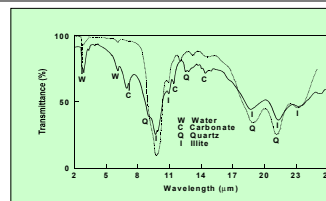
A dust layer of thickness ranging between 4 and 5 km has been monitored at heights above 1 km, during the May 17-21 dust event.

Average lidar ratio values of 50 sr have been found during this last event, in satisfactory accordance with previous measurements and numerical values.

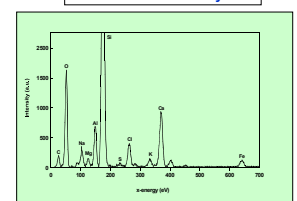
It also been found that the peak values of the aerosol backscatter coefficient vary between 0.002 and 0.005 (km sr)⁻¹ and that the dust layer monitored on May 17th at 19:30 between 2 and 6 km is characterized by an optical depth of 0.26.

Dust-sample characterization

Infrared transmission spectrum of the dust sample of May 17th



EDX Elemental Analysis



The chemical characterization of the dust samples collected during the dust event of May 17th, has allowed us to recognize that the collected dust contains a significant amount of illite besides carbonates, quartz, water and, particles of NaCl from the sea, in accordance to previously reported analysis.