Dual-wavelength Raman lidar observations of the lidar ratio of Saharan dust

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Discussion
Long-range transport:
removal of coarse mode particles (> 1 μm) by gravitational settling

Non-spherical particle shape:
reduction of backscatter efficiency compared with backscattering by surface-equivalent spheres (sphere / spheroid ratio: 1.5 - 3)

Mie calculations for typical desert-dust size distributions yield lidar ratios of 15 - 30 sr.


Results
Backscatter
355 532
Extinction
355 532
Lidar ratio
355 532
Depolarization
532
H₂O Mixing ratio
Temperature
Relative humidity

Unexpectedly large lidar ratios between 50 and 80 sr were observed in the dust layers.

Application of correction factor of 2 - 3 leads to lidar ratios of 22 - 33 sr for spheres, as predicted from Mie calculations

For details see:

Leipzig on August 2, 2001
Leipzig on October 13, 2001
Leipzig on October 14, 2001

Backscatter, Extinction, Lidar ratio, Depolarization