



Cirrus clouds observations at Thessaloniki with a Raman lidar EARLINET (2001-2004)

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Microphysical and optical properties of cirrus clouds were examined in this study, using a Raman lidar, located at Laboratory of Atmospheric Physics, in Thessaloniki, Greece. Several cases of cirrus clouds were found in the tropopause region, between 8 and 12 km, during routine measurements of EARLINET (2001-2004). Backscatter and extinction coefficients were computed using the Raman method. Typical values of lidar ratio from 5 up to 25sr are found, while the optical depth found was between 0.05 and 0.7. The estimated variability of the extinction to backscatter ratio within the cloud, in certain cases, made possible the discrimination of different ice crystals. In addition the Fernald-Klett method was applied to the elastic signals, giving lidar ratio values between 10 and 20sr for 355nm and from 10 up to 30 for 532nm, while the estimated optical depths of the clouds were between 0.05 and 0.45 for 355nm and from 0.1 up to 0.4 for 532nm. The influence of multiple scattering within the cloud was taken into account in both methods, considering literature studies. Comparison of the two methods has shown that the Fernald-Klett solution was strongly affected from the lower layer of the cloud.