DETERMINATION OF MULTIPLE SCATTERING BY MEANS OF LASER RADAR TECHNIQUES

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ABSTRACT

Some effects of multiple scattering have been measured with our lidar system IV , consisting of a ruby laser and two telescopes (250 mm and 400 mm mirror diameter). By changing the aperture angle of one telescope (the other is held constant with an aperture angle of 4 mrad) the influence of multiple scattering can easely revealed.
Figure 1 shows signals backscattered by a cloud at different aperture angle. The computation of the values $\beta\tau^2$ is shown in figure 2.
The influence of the multiple scattering and the pulse lengthening mechanism (Bucher and Lerner 1973[1]) are clearly to be seen.
We could also measure the depolarization ratio with these two telescopes at the same aperture angle. The upper scale in fig.2 shows the depolarization ratio of the cloud. The results are similar to those of Carswells (1973[2]).
Additional measurements with two wavelengths (6943Å and 3472Å) and of the Raman-N_2-component were carried out.
Calculations of multiple scattering with all these different methods will be reported.

[1] Applied Optics 12 (1973),2401-2414.

[2] Applied Optics 12 (1973),1530-1536.

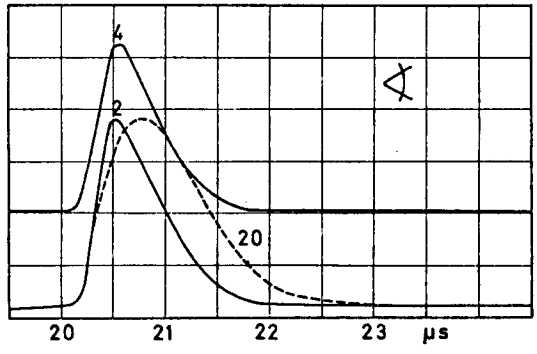

Fig.1: Signals backscattered by a cloud at different aperture angle (upper beam: 4 mrad constant, lower beam: 2 and 20 mrad)

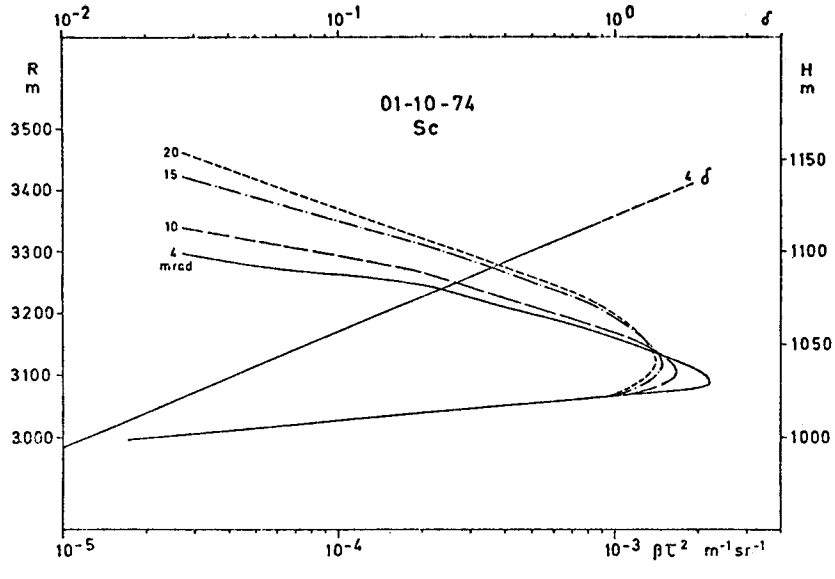

Figure 2: Values $\beta\tau^2$ versus range R or height above ground H measured at different aperture angles. The upper scale shows the depolarization ratio δ.