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Atmospheric Chemistry and Physics Discussions

Interactive comment on "The vertical distribution of aerosols, Saharan dust and cirrus clouds at Rome (Italy) in the year 2001" *by* G. P. Gobbi and F. Barnaba

Anonymous Referee #2

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"General Comments"

In this paper, the authors perform a climatological analysis of tropospheric aerosols from a set of 813 lidar profiles of aerosol extinction and depolarization coefficients obtained in Italy in 2001-2002. They determine yearly and seasonal averages of the contribution of cirrus clouds and saharan dust episodes to the total observed optical depth, using typical values of backscatter and depolarization ratios for these conditions. The paper is correctly written and well presented. The authors provide a clear description of the instrumentation and the signal processing. The statistics are well documented and the figures correctly explained. The data seem to be of good quality and the authors make a noticeable effort to explain the observed variations of the ex-

tinction and depolarization ratios in the various seasons. This analysis should provide a valuable input for trend studies of tropospheric aerosols or validation of future satellite missions dedicated to tropospheric aerosol measurements. However, the paper lacks a clear explanation of the data discrimination for dust and cirrus cloud conditions. Lidar profiles representative for the various conditions are presented but the theshold values necessary for the discrimination are not given. Furthermore, the authors should put their analysis in perspective with other climatological studies of tropospheric aerosols. Very few references are provided on this subject although to my knowledge, several networks for tropospheric aerosols measurements such as the European EARLINET have been implemented recently and have provided results.

"Specific comments"

1.Methods

- Specify the aerosol-free height at which the lidar profile is calibrated.

- What is the model atmosphere used for computing the molecular backscatter profiles?

- The error analysis is based on one reference only. This part should be expanded.

- How exactly are the data discriminated for dust and cirrus clouds condition? Are threshold values for the the basckacstter and depolarization ratios determined?

2. Yearly averages

- Figure 2b: Why the depolarization ratio increases to 5% in the NC curve (pale blue)?

3. Monthly averages

- Page 8: explain RH-enhanced

- Figure 3: I don't see any mention of tropopause height for the cirrus cloud condition analysis. Is there a dependance of cirrus appearance to the tropopause height? What is the tropopause height seasonal variation above Rome?

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- Comparison with sunphotometer aerosol optical depth: it is difficult to see thinner cirrus clouds on an average figure since the clouds can be located at different altitude ranges.

4. Conclusions

- As already mentioned, the sentence on the few yearly climatologies of tropospheric aerosol profiles in the literature is surprising.

Interactive comment on Atmos. Chem. Phys. Discuss., 3, 5755, 2003.