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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Measurements of UV Aerosol Optical Depth in the French Southern Alps" *by* J. Lenoble et al.

J. Lenoble et al.

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MS-NR: acpd-2007-0570 Aswers to referee 2

The referee considers that there is no additional information from the Lenoble et al., 2004 paper. There are results from three years of measurements; we think this is not a negligible information, and that these results can be useful. We do not claim more ambitious objectives.

General comments.

1. The interest of a climatology can always be questionned. We consider that measurements of aerosol AOD, in any place, constitutes a useful data base, for climatological studies. There are no other sites carrying out similar research in this region of the Southern Alps, and we do not know of other similar study.

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2. We clearly say that we present experimental data, which would be useful for the two stated objectives. A complete analysis is left for further work, either by ourselves, or by other researchers. Some hints are given in section 5.

3. The comparisons of the two instruments mentionned in this section, and leading to an agreement within ś5%, have been performed several times, as it is said, both for global and diffuse irradiances (see further information in the answer to question 7). The error due to the diffuse radiation intercepted by the shadowing disc, had been evaluated previously to be smaller than 1% in the conditions of Briançon site.

4. We clearly say that the two approaches are similar (p.4, line 14), and even rigorously equivalent (p.5, line 9), but the numerical approximations in both methods could lead to somewhat different values. The choice of one or other method is mostly a question of convenience.

5. There is a cosine correction applied to both instruments. But, as stated by the referee, this correction is important only at high solar zenith angles, and we did not consider such cases in our study.

6. The uncertainty between 310 and 330 nm strongly depends on the ozone total column amount, and also on the solar zenith angle. It would be tedious, and out of the purpose of this paper to analyze it in details. Actually in all our analysis, we used only the results at 340 and 380 nm.

7. The direct irradiances measured by both instruments and used in this paper, agree for all cases within 3%, which is better than the general agreement of 5%, mentionned above and found for a few cases. Showing a scattered plot of these direct irradiances would not bring much more information than the uncertainty analysis.

8. We purposely limit our analysis to 12 UT, in order to avoid the cases with large solar zenith angles, which have larger uncertainties (see above question 5).

9. Of course we use only smoothed values. Figure 2 was included to show the high

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spectral noise (not perfectly understood), and the absolute necessity of performing a smoothing.

10. We explain the annual variability, in section 5, by the emission of soil and vegetation particles in summer, whereas the ground is snow covered in winter; in 2003, the higher temperatures could have lead to a drier soil. But of course we do not raise out other possible causes.

11. We agree that the TOMS AI does bring only a very qualitative information. However we feel reluctant to eliminate this information, which is given in a section named "complementary".

12. Actually we find large Angström values for low AODs, but the uncertainties are too large for making a strong conclusion; this information is also given as "complementary". We do not know of other measurements for the Southern Alps.

13. Cloudless days are really cloudless for hours in this region. We select cloudless days by plotting the diurnal variation of irradiance, either at a fixed wavelength, or integrated over wavelength with an erythemal weighting function. This curve is perfectly regular only when there is no cloud.

14. We confirm that NO2 is negligible.

Minor comments

Page 162 and Page 163, we do not understand the questions. Moreover, we do not have such page Nrs.

Figure 5 The wavelength is not reported, because the AOD here is not for a fixed wavelength, but is an average value over UV-A. It is said in the text that is why it cannot be compared quantitatively to the new values.

Interactive comment on Atmos. Chem. Phys. Discuss., 8, 161, 2008.