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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Some considerations about Ångström exponent distributions" *by* F. Wagner and A. M. Silva

Anonymous Referee #2

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Scientific comments

This paper deals with the error distribution in the Angstrom exponent retrievals produced by the errors in AOD values and the measurements of the direct-beam irradiance. The errors are calculated using the error propagation method, which was fully and well described in the manuscript. The Angstrom turbidity parameters have constituted a great scientific issue in the last decades. Especially, the Angstrom wavelength exponent, which expresses the wavelength dependence of the AOD, has recently been associated with the aerosol optical properties and the discrimination of different aerosol types (Eck et al., 1999; Kaskaoutis et al., 2007; Schuster et al., 2006). Since numerous publications use the Angstrom wavelength exponent, very few though have dealt with the errors in its calculation. To my knowledge, the present study constitutes the

very first investigating the errors in the Angstrom exponent retrievals based on a new propagation error analysis. The method used for the error retrievals is well understood and is described in a well-managed way. The results are clear and the Figures shed light in the main scope of the study. The cited references are relevant with the scope of the study. The authors are encouraged to take some additional information about the Angstrom exponent, its spectral variation, errors and uncertainties of some recently published articles (e.g. Kaskaoutis et al., 2006, JASTP, 68, 2147-2163; Kaskaoutis and Kambezidis 2006, QJRMS, 132, 2217-2234; Kaskaoutis et al., 2007, ACPD, 7, 7347-7397; Schuster et al., 2006, J.G.R., 111, D07207, doi:101029/2005JD006328). In Eq. (2), this approximation assumes that both α and β parameters are independent from each other and from wavelength. Nevertheless, numerous studies showed that both parameters depend strongly on wavelength. Therefore, Eq (2) cannot be applied to different pairs of wavelengths since the results might be different. This must be underlined in the text.

Minor revisions

Maintain the same term for the aerosol optical thickness or depth in the whole text (e.g. AOT or AOD). In the last sentence of the abstract replace are with is. In the introduction section (page 2) give the full name of VDI. On page 3 the authors say ….Tahnk and Coacley (2002) showed that frequency distribution of AOT for a region is well represented….In which region? It must be mentioned. The Angstrom formula is referred to all wavelengths not only two, as expressed in the text (page 4). On page 4 (section 2) replace dependency with dependence. On page 4 (section 2) add for just after allow. On page 4 last sentence, replace for the wavelengths with for the determination of the wavelengths. On page 5 replace optical with atmospheric and hazy with turbid. Also replace drop down with reduce and will be used with are used. On page 6 modify the sentence to …shift depends on the wavelengths at which the relative error…. On page 6 the name O’ Neil is spelled O’ Neill. On page 7 replace of with at before the wavelengths (first or second).

ACPD

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On page 8, the last sentence of Section 4.1 is rather confusing. On page 11 replace exists with exist. On page 11 replace AOTs with AOT. The uncertainty in derivation of Angstrom exponents from space over oceanic regions is also attributed to some additional reasons, such as inaccuracies in satellite algorithms, particle non-sphericity, surface reflectance uncertainties. On page 12 correct the term measurements. Which is the station in Southern Europe in which you refer to? How you can lead to this conclusion? Please clarify. On page 13 replace then with than.

Interactive comment on Atmos. Chem. Phys. Discuss., 7, 12781, 2007.