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Interactive comment on "Aerosol climatology: dependence of the Angstrom exponent on wavelength over four AERONET sites" *by* D. G. Kaskaoutis et al.

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We believe that our paper presents original results on the relationship between the Angstrom wavelength exponent and its second order polynomial fit, beyond those presented in the papers by Eck et al. (1999), Reid et al. (1999) and O' Neill et al. (2001) mentioned by the Referee and cited in our paper. The differences between those papers and ours are the followings. Eck et al. (1999) introduced the curvature in the AOD wavelength dependence on logarithmic co-ordinates and presented results from some case studies from AERONET sites having different aerosol load and properties. However, that study which constituted the basis for numerous similar publications in the next years in different environments (e.g. Eck et al., 2001; 2003; 2005) does not provide an extensive aerosol climatology about Angstrom exponent and its second derivative, as performed in our study. The study by Reid et al. (1999) provides interesting relationships between fine-mode particle radius and Angstrom exponent determined at different wavelength bands. It also provides correlations between Angstrom exponent, particle size, volume size-distribution and AOD. Nevertheless, that paper only focuses on biomass-burning aerosols in Amazonia and does not provide any relationship for other aerosol types in different environments as done in our study. The papers by O' Neill et al. (2001) present theoretical approaches on the wavelength dependence of Angstrom exponent, but neither focus in detail on specific aerosol types nor provide climatological analyses over specific worldwide locations as done in our study. As also indicated by Reviewer 1, our study takes into account the previous ones but further extends them by presenting new/original results, which are indicated below.

1) The curvature a2 of the polynomial fit is strongly dependent on the spectral band used/chosen. By consequence, the relationship between the Angstrom exponent derived from different spectral bands (i.e. shorter wavelengths, 380-440, or longer wavelengths, 675-870 nm) and the curvature a2 varies strongly. The results are presented in Figs 4a, b.

2) To our knowledge, our study is the first one providing a climatology of the constant terms a1 and a2 of the polynomial fit at four AERONET sites, representative of different aerosol regimes.

3) In the present study, the curvature of the wavelength dependence of AOD is correlated with the AOD using a relatively long-term (˜3-year) dataset for each AERONET site. Therefore, the obtained results provide useful and realistic information on the behavior of the aerosol types under different atmospheric conditions (Figs 3, 8 and 9).

4) Our study makes possible the verification of the assertion made by Schuster et al. (2006) that a-Angstrom = a2 - a1, using long-term datasets for the four different aerosol types.

5) We would like to note that we do not only use the a-Angstrom values provided by

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AERONET for the spectral band 340-870 nm, but we also compute them for a different spectral band (340-870 nm). Furthermore, the differences between the AERONET a440-870 and those computed via the least-squares method are computed and presented in Fig 15 of the paper. 6) We thoroughly investigate (see Fig. 16) the errors produced in the computations of Angstrom exponent by using the least-squares method. This is valuable since similar error analyses are not provided in most of papers using AERONET Angstrom exponent retrievals in the 440-870 nm spectral band.

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