Atmos. Chem. Phys. Discuss., 11, C12923–C12929, 2011
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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Link between local scale BC emissions and large scale atmospheric solar absorption" *by* P. S. Praveen et al.

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Received and published: 9 December 2011

We thank the reviewer for very attentive comments. We have included all of the suggested corrections in revised manuscript. Answers to specific comments are given below.

1) As per reviewer suggestion all linear regressions plots were redone with Y-offset

2) In all the plots, the standard errors for slope and intercept are mentioned at 95% confidence.

3) As suggested, "Title" has been modified to "Link between local scale BC emissions in the Indo-Gangetic Plains and large scale atmospheric solar absorption"

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4) As suggested, the work of Rizzo et al., 2011, and Chakrabarty et al., 2010 on the spectral dependence of aerosol light absorption has been taken into account and their references are added at appropriate place in the revised manuscript.

5) P. 21321 Line 26: As pointed out, “BC” here refers to BC emissions in Tg yr-1; we have replaced “BC” by “BC emissions (Tg yr-1)” in the revised manuscript

6) P. 21321, Line 28: Here percentage refers to BC mass emissions rate in (Gg yr-1); we have replaced “BC emissions” with “BC emissions (Gg yr-1)” in the revised manuscript.

7) P. 21325, Lines 11: As pointed out, it is true that “shadowing” is not a valid concept for particles with size parameter much below the geometric limit, but this concept is true for measurement of attenuated light for air borne particle. However, for Aethalometer which measures incremental light attenuation of the continuously deposited particles, the attenuated light still has to pass through the previously collected particle on the filter to reach the detector. And with gradual increase in the filter loading with increase particle deposition, absorbing particles in the filter absorb a higher fraction of the scattered light which leads to a reduction of the optical path length. As a consequence, the measured attention coefficient decreases at higher filter loading which will lower specific absorption cross section (Weingartner, et al., 2003).

8) P. 21325, Lines 19-23. This section is modified to “A wide range of values have been reported for specific absorption cross section (11.1 to 14.5 m2g-1 at 670nm) for ambient BC aerosols depending upon the location in IGP region (Ram & Sarin, 2009). Considering specific absorption cross section inverse relation with wavelength, its values at 880nm will be 8.6 to 11.2 m2g-1. We used a middle value of ∼10 m2g-1 for 880-nm channel””.

9) P. 21329, Lines 26-27: “RH” in this sentence is a typo mistake and is deleted in the revised manuscript

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10) P. 21330, Lines 3-4: As suggested, this sentence is rephrased to “During noon time, secondary aerosol production through photochemical processes may increase scattering aerosol compare to absorbing aerosol, which may be reflected in high SSA”.

11) P. 21330, Lines 16-17: As suggested, The sentence is modified to “The presence of brown carbon (light absorbing OC mainly from biomass combustion) enhances the aerosol light absorption in the wavelength region λ<600 nm”.

12) P.21332, Lines 13-14: As pointed out, the sentence is corrected to “The CALIPSO lidar instrument known as CALIOP (Cloud-Aerosol Lidar with Orthogonal Polarization) measures the depolarized aerosol back-scattered light at wavelength 532nm”.

13) P. 21333, Lines 18-19: As pointed out, the sentence is corrected to “Aerosol optical depth (AOD) is a measure of the columnar extinction of light due to aerosols, with higher AOD values indicative of higher aerosol loading in that column..”

14) As suggested, the following sentence is added to detail the satellite overpass times and number of valid measurements in the revised manuscript.

“MODIS TERRA has two prominent over pass time over the observational location, one during ∼05:00 GMT and other ∼17:00 GMT. Total of 118 daily mean AOD data points were available for inter-comparison study during October 15th to April 14th”.

15) P. 21335, Line 3: As pointed out, typo “haave” is corrected in the revised manuscript.

Weingartner, E., Saathoff, H., Schnaiter, M., Streit, N., Bitnar, B., and Baltensperger, U.: Absorption of light by soot particles: determination of the absorption coefficient by means of aethalometers, J. Aerosol Sci., 34, 1445–1463, 2003.

Interactive comment on Atmos. Chem. Phys. Discuss., 11, 21319, 2011.

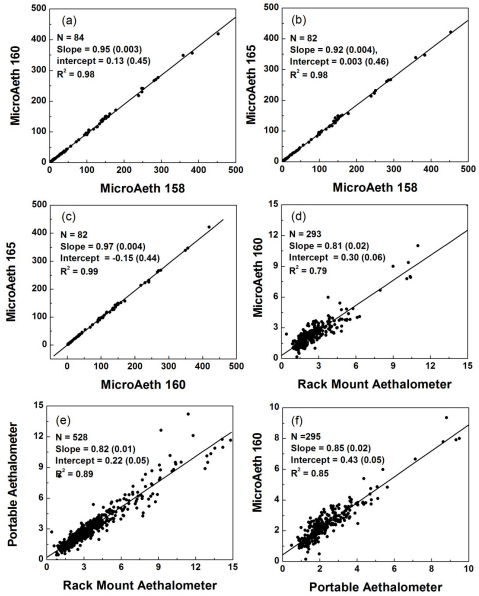

Figure 3: Inter-comparison of BC measurements between three different models of Aethalometers (microAeth, Rack Mount and Portable) used in our study, Standard errors for slope and Y offset at 95% confidence are given in brackets.

Fig. 1.

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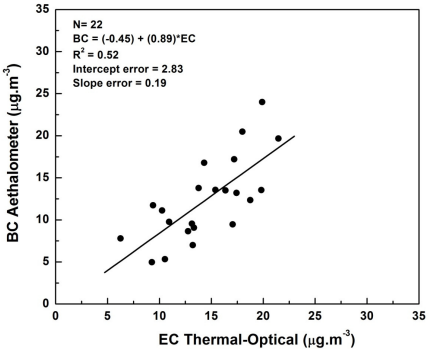

Figure 4: Comparison of BC measurements (from Aethelometer) and EC measurements (from thermal-optical analyzer) at village center (VC) located in Surya Village (SVI_1).

Fig. 2.

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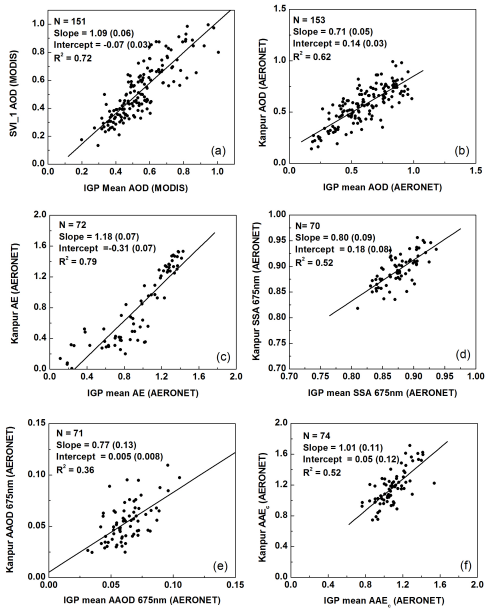

Figure 13: Comparison of daily mean IGP_MODIS and IGP_AERONET to local (Kanpur and SVI_1) scale aerosol optical properties for the period November 2009 to May2010.IGP _ AERONET was calculated from the mean of six AERONET sites located in India and Nepal (see Figure 1). The IGP _MODIS represents the mean of the AOD over the region shown as dashed line in Figure 1. Standard errors for slope and Y offset at 95% confidence are given in brackets.

Fig. 3.

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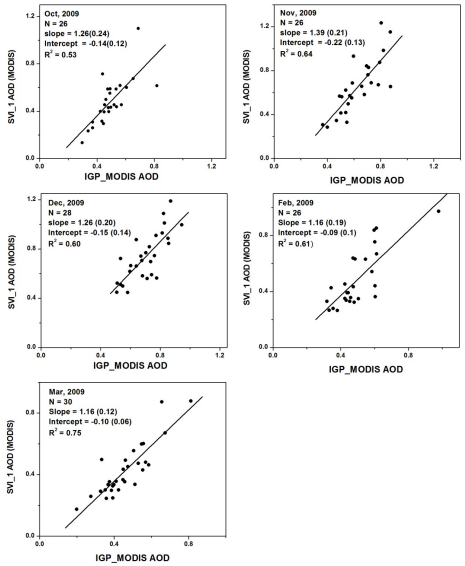

Figure 14: Comparison of daily mean IGP_MODIS to local (SVI_1) scale MODIS aerosol optical depth (AOD) during different months. The IGP _MODIS represents the mean of the AOD over the region shown as dashed line in Figure 1. Standard errors for slope and Y offset at 95% confidence are given in brackets.

Fig. 4.

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