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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Accumulation of aerosols over the Indo-Gangetic plains and southern slopes of the Himalayas: distribution, properties and radiative effects during the 2009 pre-monsoon Season" *by* R. Gautam et al.

Anonymous Referee #2

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In this paper, the authors reported aerosol properties over the Gangetic –Himalayan region, and they estimated aerosol direct forcing values with ground-based measurements and broadband radiative transfer model (RTM) calculations. This is a well written paper, yet it lacks innovative ideas. Aerosol properties of this region have been well studied and reported in numerous papers (e.g. Dey, S., and L. Di Girolamo, 2010, Gautam et al., 2010). Also, estimates of aerosol direct forcing from pyranometer measurements and broadband RTM calculations are not new. I recommend that the authors expand this paper to a review paper that summarizes aerosol climatology over

the Gangetic –Himalayan region. Such a review could include ideas from this paper as well as other existing publications. Expanding this paper may require serious effort, and therefore, I recommend that the authors revise and resubmit the paper.

Other suggestions: (1) The authors mentioned two MODIS aerosol products: the Dark-target and Deep Blue products. In the last part of section 2.2 and in Figure 3, the authors mentioned a term called "MODIS AOD data" without further explanation. Were "MODIS AOD data" derived from both the Dark-target and Deep Blue products, or was only one of the products used? This needs to be specifically stated..

(2) Figure 3 and Figures 11a and b look similar to figures from Gautam et al., 2010 (Gautam, R., N. C. Hsu, and K.M. Lau (2010), Premonsoon aerosol characterization and radiative effects over the Indo-Gangetic Plains: Implications for regional climate warming, J. Geophys. Res., 115, D17208, doi:10.1029/2010JD013819.) In fact, the topics of these two papers are very similar. The authors need to highlight the significant contributions from this paper that differ from Gautam et al., 2010.

(3) Section 2, water vapor data. Water vapor data from the MERRA dataset were used in this study. However, no details about this dataset were included, and it is necessary that the authors discuss the bias and uncertainties of these water vapor data.

(4) Section 2.3, radiative transfer model (RTM). Broadband surface reflectance values are needed for the RTM calculations. However, the method of obtaining the broadband surface reflectance values, the uncertainties of the broadband surface reflectance values, and sensitivity studies related to this parameter were not discussed. The authors need to expand their discussion of these topics in their next version of the paper. Also, the overall uncertainties of their RTM calculations need to be reported.

(5) The separation of WRF and ARF is interesting. However, the results from both WRF and ARF need to be validated before any conclusions can be drawn from this study. I recommend that the authors to expand this part of their study as well.

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Interactive Comment