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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Scattering and absorption properties of near-surface aerosol over Gangetic–Himalayan region: the role of boundary layer dynamics and long-range transport" *by* U. C. Dumka et al.

Anonymous Referee #2

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Review of "Scattering and absorption properties of near-surface aerosol over Gangetic-Himalayan region: the role of boundary layer dynamics and long-range transport" by Dumka et al. Manuscript number: acp-2014-521.

The manuscript deals with a topic appropriate for ACP presenting the analyses of aerosol optical properties gathered during an experimental campaign in the Gangetic-Himalayan region. Although the study period roughly covers a complete annual seasonal cycle, the variety of variables potentially available for the study makes it really

worthy. Bellow there are general and particular comments to help the authors in improving their manuscript. According to these comments, I consider that the manuscript requires substantial revision before to be accepted for publication in ACP. General comment The experimental data set is really interesting, but the study will benefit from a more exhaustive analysis of some aspects like the PBL study or the use of additional data described in table 1 but excluded from the present study, like the hygroscopic growth information. Furthermore , as reviewer #1 states the authors must clearly distinguish the outreach of the present manuscript from the previous one Dumka and Kaskaoutis (2014) where some analyses of the same data set were presented. It is worthy to note that along the text there is some confusion on the interpretation of the separation of data measured with PM10 and PM1 cut-off. It seems that the authors consider data measured with these two cut-offs as completely separated categories, while in fact the larger cut-off allows measuring the effects of micron and submicron particles at the same time. An effective characterization of micron and submicron particles could be only got by subtraction of the PM10 and PM1 associated variables.

Particular comments Along the manuscript the authors use the term parameter to describe the variables the measure, compute and analyze. They must revise this misuse considering that they measure different variables that characterize the atmospheric aerosol properties. Some of these variables are used in different models, climate models, as parameter of the models and in this use the values are fixed according to a given choice of aerosol type for example. But in this study they determine the experimental values of these properties, so the term variable is the appropriate. The treatment of the PBL information is really superficial in the paragraph in page 21118 in spite of the relevance evidenced in the abstract. Details on the source of this information are required together with a more detailed discussion. Table 1 describes a large number of variables that can be derived from the experimental data set. In this sense, it is clear that the potentiality of the data is not completely exploited by the authors in the manuscript, read my general comment. In my opinion the study will benefit of the analyses of additional variables like the hygroscopic growth factor that will compensate of the limited period

of measurements and will contribute to enhance the advances over the previous study on the same experimental campaign (Dumka and Kaskaoutis, 2014). Furthermore, a good number of the variables included in the table are derived from experimental values assuming some empirical relationships that require the inclusion of the appropriate references to track their meaning and relevance A relevant question concerns the statistical information. In this sense, by one hand the information included in Box and whiter charts must be explained, see figure 1 and 2, the meanings of the elements in this figure are similar? Why they are described for figure 2 for the first time? On the other hand, along the text when the authors present average values, for example in their description of the meteorology it is necessary additional statistical information offering the reader a complete picture of the variability of each variable. Concerning quantitative aspects the authors present a chaotic treatment of the significant figures of the measured variables. When they combine the information on average values and associated standard deviations they sometimes presents different number of decimals or significant figures for then (for example Line 17 page 21112, 1.5+-0.09). In other cases they express the results with an excessive number of significant figures (Line 20, page 21110, 75.2+-41.7). They must carefully revise these expressions avoiding the use of more than two significant figures for the standard deviation, as a measure of the spreading of the data. In fact, they must reduce the number of significant figures to only one if the most significant figure is larger than 2. And finally, there must be an agreement between the significant figures used for the average and standard deviation. So the previous example must read: 80+-40 (clearly evidencing the large spreading of data around the average value). Furthermore, the authors must be careful with the uncertainties of the experimental values and those of the derived variables. In this sense for example the description of the Angström exponent for the scattering or absorption coefficients with more than one decimal figure is inappropriate, especially for the absorption coefficient, considering the large uncertainty of the experimental values used in their computations. So in this sense for the example on figure 21112, see about, 1.5+-0.1 would be more appropriate than 1.50+-0.09. Another point that must

be carefully revised is the use of duplicated notation for the same variable, for example the authors must revise the notation for SAE and AAE that is not coherent along the text, figures and tables.

Concerning the figures, by one hand the authors must apply the previous comment on significant figures, but also must revise carefully the inclusion of information on the units used for the different variables, see for example figures 9, 10 and 11. The last paragraph previous to the conclusions section (Pages 21121 and 21122) is a little bit confusing. In fact the comment is on figure 13, that for me is an example of figure that can be excluded from the analyses. The spread of the data in this figure hardly allows deriving any dependence between the analyzed variables. In this sense, the above mentioned paragraph must be carefully revised or excluded from the analyses. The author must track the typos along the text. An example is the term “isentropic” in line 19, page 21114, they must correct the word otherwise they need to explain the meaning of “isentropic scattering”.

Interactive comment on Atmos. Chem. Phys. Discuss., 14, 21101, 2014.