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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Chemical composition and aerosol size distribution of the middle mountain range in the Nepal Himalayas during the 2009 pre-monsoon season" *by* P. Shrestha et al.

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Reply to Anonymous Referee #2

Major comments:

Section '3.2.1 General characteristics' This section is too narrative, too detailed and too long. Showing six out of thirteen figures in this section seems a little out of proportion considering the fact that this section is only 'General characteristics'. This reviewer feels that such detailed descriptions about particle size distributions do not add much useful information to the manuscript. The authors should shorten this section and leave only the most important findings here.

REPLY: Four of 15 Figures in the revised manuscript (Figs. 3, 4, 5 and 6) are in Section 3.2.1. They show the measured aerosol size distribution during the sampling period for both sites, effect of topography in aerosol size distribution and the lognormal fits, which are also important for the following discussion.

Section '3.3 Aerosol composition' It seems so that Figure 8 shows the percentage of each component in the sum of measured inorganic ions, oxalate, OC, WSOC, WSON and EC rather than in PM2.5 mass. This needs to be clearly stated. In Figure 8, have the authors subtracted oxalate, WSOC and WSON from the OC values? This needs to be clarified as well.

REPLY: In Figure 8, the WSOC has been subtracted from OC for the plotting, so OC represents the non-soluble organic carbon. WSON has not been subtracted from the OC, because it refers to organic nitrogen, not carbon. For oxalate, it was a mistake on our part that we did not subtract from OC, now it has been incorporated by simply removing oxalate from the pie-chart but it is still documented in Table 2. Thank you.

Minor comments:

Page 15636, line 18: For clarity, these values should be given in mean values and ranges. A '$\pm$' sign is often used for the standard deviation in combination with a mean value.

REPLY: The duration of each electricity outage was on average 1.22hr (approximately ranging from 0.5 $\sim$ 2.5 hrs) and 3.7 hr (approximately ranging from 0.5 hr to 6 hr) for Sites A and B, respectively.

Page 15637, line 1: Do the authors mean 'MâĎęcm' instead of "MW"?

REPLY: The units were corrected. It should read (MâĎęcm).

Page 15637, lines 8-13: The authors should define WSOC and WSON used in this study at the beginning of the paragraph rather than at the end. It is not clear from the paragraph how the authors have defined the WSOC and WSON (NPOC and NPON

materials that are not trapped by a 0.2 μm Teflon filter). REPLY: The WSOC/WSON is defined by the sampling and extraction process as described in the manuscript. The insoluble filter extracts in the solution are probably large clumps and once filtered through the 0.2 μm pore Teflon membrane filter, the probability of insoluble core in the solution is low. For clarity purposes, Lines 10$\sim$12 were been moved up in the paragraph: "Since the TOC/TN instrument can not distinguish between water-soluble and water-insoluble components in the solution, the sample was filtered through a 0.2 μm pore Teflon membrane filter to remove water-insoluble particles." Here, we assume that the any OC or ON in the sample solution that is filtered through the 0.2um pore Teflon membrane filter is water soluble.

Page 15639, line 17: Do the authors mean '$\pm$ 1 _'?

REPLY: Yes it refers to '$\pm$ one standard deviation.

Page 15640, line 5: A period should be a comma. 'At both locations.' -> 'At both locations,' Page 15640, lines 5-7: This sentence is not clear to me. Please rephrase.

REPLY: Lines 5-7 has been grammatically revised and rephrased for clarity : "At both locations, the observed aerosol peaks take place when the wind speed is calm during the boundary layer transition growth in the morning and during the collapse of boundary layer in the evening preceding the nocturnal stable layer."

Page 15641 line 10: A space is missing in 'LTthroughout'.

REPLY: Corrected.

Page 15646 line 4: Unnecessary carriage return.

REPLY: Corrected.

Page 15646 line 20: I am not too sure how relevant the 10 years old EC/OC values in Bombay (or Mumbai rather) is to the measurement in Kathmandu valley. Some explanations should be given if the authors want to emphasize the differences in the

EC/OC ratios in different environments.

REPLY: Different locations and different time periods of the data make it difficult to compare but these are the only few data in the general region of study that are available for comparison purpose. Besides, a recent measurement of EC, OC in Manora Peak (Ram et al. 2010, ACPD) was also included in the manuscript.

Page 15646 line 25: WSOC/OC ratios of 0.27 aren't that high. On contrary, the authors should state that large fractions of OC at the both sites were water 'insoluble' and may have a significant impact on the CCN activation (if there is any – the authors need provide evidence for this).

REPLY: We agree that the WOSC/OC ratio of 0.27 is not very high as compared to other measurements in the European Alps for example, but it is in line with values reported for ACE-Asia, in Japan and China. In addition data analysis shows that there are size dependencies and temperature dependencies which may be location dependent and must be taken into consideration. Thus, the value per se is not sufficient to establish the role of WSOC in CCN activation. We are currently working with the simple Köhler model with insoluble core, and ammonium sulphate coating along with WSOC to explain the observed diameter growth factor of aerosols. The effect of WSOC on CCN, if any, will be discussed in the forthcoming paper. This section was revised top reflect this discussion. Also please see Reply to Reviewer1.

Page 15647 lines 3-4: The units should be ugN/m3.

REPLY: The units are explicitly stated for organic nitrogen only, not organic nitrogen compounds.

Page 15665: Figure 8. Charges are missing from ions.

REPLY: The figure was corrected.

Interactive comment on Atmos. Chem. Phys. Discuss., 10, 15629, 2010.