

***Interactive comment on “Chemical composition of PM<sub>10</sub> and PM<sub>1</sub> at the high-altitude Himalayan station Nepal Climate Observatory-Pyramid (NCO-P) (5079 m a.s.l.)” by S. Decesari et al.***

**Anonymous Referee #1**

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General Comments:

This paper presents a relatively unique data set of aerosol chemical composition in the high Himalaya over a roughly two year period. The paper adds to prior work by a number of research groups supporting the relatively high loadings of anthropogenic aerosols and dust over the Himalaya. This paper also adds some inferences on the source regions of the aerosols with speculation regarding the influence of more local (i.e. within Nepal) sources versus longer range transport. The paper is generally well written, although there are some specific questions below that should be addressed before the paper is suitable for publication. Suggestions are also made with regards to

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the data analyses.

Specific Comments:

1. Abstract.
2. Introduction. Line 27. What exactly is meant by ‘optically-active aerosol’. I would believe that all aerosols are optically active, but I think a key characteristic of an actual aerosol climatic impact is linked with the aerosol loading and relative amount of absorption. I think a clarification is needed, or a more specific definition of ‘optically-active’. I also would suggest not referring to the aerosol in this fashion in the abstract. I suspect other papers in the special issue address this point in a more specific way and hence it is not needed in this paper.
3. Page 25492, lines 7-8. It would be helpful to include the months that are being discussed as summer to give a better view of the data coverage.
4. Page 25497, lines 20-25. This discussion is a bit confusing. A clarification is needed with respect to what is meant by ‘well-mixed’. Also, ammonium sulfate can not be used as a ‘characteristic of an aged pollution’ since it can exist in excess near sources as has been clearly documented in a wide range of urban studies. It should also be noted that it is difficult to infer seasonal differences for the ‘monsoon’ and ‘postmonsoon’ cases since there are only a limited number of samples (n=6, m=5). With respect to aged airmasses it would also be useful to discuss the WSOC/OC ratios. For example, based on the data in Table 1 the ratios are nearly identical for the ‘premonsoon’ and ‘dry season’ cases. Doesn’t this suggest similar aging of air masses reaching the site? Also it would appear that WSOC is at times greater than OC (it appears this is the case during monsoon samples) and this needs to be discussed. Could it be linked with gas phase OC artifacts?

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5. Page 255023. Lines 20 -30. It would be helpful to include in the discussion the EC/OC and WSOC/OC ratios on the source regions. It would appear that the afternoon/night samples do not vary greatly for these ratios. Does this mean that in both cases longer range transport carries OC and EC to the region or that more local, Nepalese sources dominate both cases?
6. Figure 5. I am confused as to why the ratios are plotted versus mass concentrations. Certainly there is information in the ratios shown on the Y-axes but I am not sure why there should be a relationship with anthropogenic and/or reconstructed mass. This point seems to be made in what appears to be no meaningful statistical relationships in any of the plots shown in Figure 5. I don't believe the plots are useful and it would be potentially better to simply have a summary table of the values (perhaps with means and standard deviations) discussing the results in prior sections as has already been mentioned above. I would remove the 'nature of the background aerosol' section and have related discussion in the prior relevant sections.

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Interactive comment on Atmos. Chem. Phys. Discuss., 9, 25487, 2009.