We thank the reviewer for comments and suggestions, which have helped to improve the manuscript considerably. Answers to the specific questions are embedded below.

In addition, we have discovered an error in the rain accumulation data, which changed figure 5 in the manuscript somewhat. The error was related to Mukteshwar rain accumulation in the rainiest year (2008). Instead of 1710 mm or rain, only 1181 mm or rain was accumulated. Same applies to 2007, but with a smaller difference (922->1015 mm). The error occurred, because the rain accumulation from Almora wasn't taken into account – only the rain accumulation from Nainital, which was available at the time of the initial data analysis. The corrected data does not affect the conclusions made in the paper.

As a smaller major change, table 2 was changed to STP conditions to be consistent with the other data analysis. Furthermore, black carbon is now called equivalent black carbon, as it was measured by means of light absorbtion.

This paper is quite interesting and gives a good description of the monsoon's effect on particles concentration. However it would have been good, in my opinion, to describe a little better the BC decrease. Looking at the figures, the reader is left somehow with some questions on how can the moonson have the same effect on any particles type and in both locations. Being the main focus of this paper, the decrease of concentration with rain accumulation would deserve a more detailed explanation and a more comprehensive interpretation of the figures.

General comments:
Page 1723 : lines 18-20 This conclusion is rather surprising. BC is indeed usually not hygroscopic unless aged and therefore coated with hygroscopic matter. So I would have several comments /questions regarding this conclusion:
-Firstly, do you think BC is aged enough in Gual Pahari such as it becomes more hygroscopic than PM10?

We have revised the discussion in regard to figure 5. In the paper it is now written (chapter 3.2 General features):" During 2008 also the rain amounts were the highest of the study period. The relative decrease can be estimated from the rain accumulation alone by an accuracy of ±5 %. The measured aerosol property and measurement location affected the concentration decrease fine structure, showing a more effective decrease for black carbon and a less effective decrease for PM_{10} in Mukteshwar but vice versa in Gual Pahari. The more effective removal of BC in Mukteshwar may be explained by the additional cloud removal process. Aged BC particles are typically hygroscopic, which further enhances activation into cloud droplets. Data from the rainiest years was not available for PM_{10}, which explains the low R^2 value shown in figure 5." In addition, the next paragraph explains the observed high PM_{10} concentrations during the monsoon season – namely by primary dust emission.

-Secondly, it is surprising to see the same behavior in both stations. One been in the free troposphere for most of the time, it would be expected for the BC to be coated and therefore to activate like any other particles whereas in Gual Pahari I would expect the BC to be freshly emitted and therefore with a thin or no coating. Would you have an explanation to this really surprising similitude?

Actually, observing the figure 5 in detail, we notice that in Gual Pahari the BC is actually less decreased, and in Mukteshwar the decrease is more pronounced. The differences are quite small however. In addition to the coating issue, we believe that this is due to the size distribution of particles (presented in part 2). Mountain fogs and clouds remove the accumulation mode efficiently in Mukteshwar; and BC falls into this size range. See previous comment on how this section was changed.

-Finally, as the author observes in figure 5 the R2 of the PM10 data is rather small and looking at the point at 800mm rain accumulation it looks like the uncertainty in the slope for the PM10 is rather high. So can you really state that BC is better scavenged than PM10 based on this figure?

We have revised the discussion in the sense that we are no longer stating that the "scavenging" or "removal" would be more effective. We rather discuss about concentration differences which are dependent both on the sources and the losses. As noted in the chapter 3.5., both stations experience high concentration episodes in the coarse mode during the monsoon season. Thus, while the removal of PM10 was certainly effective by wet deposition processes, the sources balanced the concentration differences.

In addition to these comments, it would be interesting to have more explanations on how did the author calculate each point. In my understanding and looking at figures 5 and 6, you should have many more points for each rain accumulation and for each year. Did you average the data to retrieve this graph?

As stated in chapter 3.2:" The average monsoon aerosol concentrations were decreased by about 50-70 % compared to the pre-monsoon average concentrations at both stations (Table 2, Fig 5)." In figure 5, each point represents one year, comparing the averaged pre-monsoon and monsoon season data. For figure 6, timeline data is presented.

I do not really understand either, still looking at figures 5 and 6, why don't you have more data point for Gual Pahari. Would it be possible to average the data in a different way such as you would get more points in the intermediate rain accumulation and more points for Gual Pahari?

We did test several ways of averaging and plotting the data to get more points in the figure. These included looking the monthly data for rain amounts and aerosol concentrations, and comparing

- *monthly concentrations and rain amounts*
- *cumulative (1month, 2months, 3months) concentrations and rain accumulations*
- *different combinations of the previous*

However, none of the approaches resulted in satisfactory or meaningful correlations. It seems that for a figure such as figure 5, the phenomenon has to be investigated as a whole, and it is not possible to draw similar conclusion from momentary situations within the phenomenon.

Page 1724, Line 10. It would certainly be interesting to look at how long it takes for the concentration to decrease/increase to below/above the WHO guidelines but it is not actually shown.

In this case the data has to be treated a little bit differently, as the WHO guidelines are for PM only, and regard to annual/daily averages. We wanted to do this however, so we calculated weekly statistics of the percentage of days exceeding the WHO guidelines. A week was chosen, as the transient periods analyzed in the paper varied within this order of magnitude in time. The results are added as a paragraph in chapter 3.6 and says:" We also analyzed the transition times in respect to $PM_{2.5}$ health regulation levels. This was done by calculating the fraction of days which exceeded the regulation limit values in the previous seven days. In Mukteshwar, the transition times were short (2 to 10 days onset; 3 to 12 days withdrawal). WHO limit of 25 μgm^{-3} was exceeded in 78 % of the days during the pre-monsoon, 26 % during the monsoon and 39 % during the post-monsoon. It is difficult to say anything definite about the transition periods from the health regulation perspective due to the short transition times. What can be said that the transition times were connected to the fact that during monsoon, days exceeding the limit values consecutively were rare, while in the pre- and post monsoon the limits could have been exceeded in more than 7 days in a row. This change occurs within the transition time. The Indian National limits we exceeded in 23 % of the days is the pre-monsoon, 0% of the days in the monsoon, and 13 % of the days in the post-monsoon season.

In Gual Pahari, the transition times were longer (23 to 29 days onset; 17 to 31 days withdrawal). The WHO limits were exceeded only with some exceptions in all season, and does not allow a meaningful analysis of the transition periods. However, the Indian National limit of 60 μgm^{-3} was exceeded in 70 % of the days during the pre-monsoon, 13 % during the monsoon and 90 % during the post-monsoon; and the transition periods can be investigated in light of the National limits. At the beginning of the transition period, the fraction of day exceeding the National limit was between 0.6 and 1. During the transition period, this number decreased steadily, and after the onset transition, the fraction was mostly zero, with few exceptional days exceeding the limit value. The withdrawal transition was very similar: fraction of days exceeding the limit value was between 0 and 0.5 at the beginning of the transition, and at the end of the transition, nearly every day exceeded the limit value."

Figure4 :
Would you have an explanation to the fact that the concentrations are still increasing in April and May while the rain accumulation is increasing dramatically? Are the PM2.5 from a different sector in this period explaining different hygroscopicity or an increase of the pollution such that the rain is not enough to counterbalance? Section 3.5 treats of the high concentration but do not really explain that particular point and the origin of the particle. Would this fall into the same explanation such as dust particles?

In our understanding this is due to the dust season in Northern India. The air mass trajectories turn so that they arrive mostly from the desert areas of the Thar Desert and even the Arabian Peninsula. This is now clarified in the text:" At the end of the dry season, before the monsoon, the concentrations are close to the annual maxima, especially in Mukteshwar. This can be donated to dust events, which occur when the air masses arrive from the north-western desert areas, such as the Thar Desert (Gautam et al. 2009)."

The author states in the figure caption that the data are in ambient condition. However I believe that the WHO guideline of 25ug/m3 are in STP? Could you correct the data to STP conditions so the comparison can actually be done.

Actually, to our understanding, the air quality guidelines regarding aerosol are supposed to be reported in ambient temperature and pressure, at least this is stated by the Directive 2008/50/Ec Of The European Parliament And Of The Council (Annex Vi, Point C). I tried to look this up for the WMO, but could not find the specific directives, other than the concentration limits. Unless there is solid evidence pointing otherwise, I trust that the directives are congruent with each other.

More specific questions: Page 1720 line 12. It seems that you had rain data available in Gual Pahari and yet the rainfall you seemed to have used is stated (on page 1721, line22) to be an average of 3 stations closeby . Could you clarify this point. Which rainfall data did you use?

We did use the average of the three stations to get the rainfall over a little bit larger area, and thus have it similar at both two locations. Rainfall from Gual Pahari exists, and shows very similar results.

Page 1720 ,line 24 : The data collection rate seems really low to me. Is there a specific reason why the monthly average limit chosen is so low ? Have you had trouble with the instrument?

Measuring at such conditions is a great challenge. Temperatures during the pre-monsoon and monsoon vary from +30 to + 40, and in addition the relative humidity during the monsoon season is high, creating a demand for both drying the aerosol effectively and keeping certain safety features on to protect the devices from condensing moisture. Combining this with instable electricity gives a reason for choosing a low monthly (in our case, 30 %) data coverage limit. We also suffered from instrument malfunctions.

Page 1721, line 19: Could you state how far are the stations used to calculated the rainfall from Mukteshwar or put them in the map.

This was added in the text:" Rainfall in Mukteshwar was calculated as an average of those at Nainital and Almora, which are the two closest measurement stations, 25 km to the west and north, respectively. "

Page 1724 : line 15. I assume here that you mean that the concentrations are normalized to the mean value of the concentrations during the monsoon period but I think it could be stated in a clearer way.

This is now written:"Data was first normalized to the mean value of the concentrations during each monsoon season."

Page 1725, line 13. How is the official monsoon calculated? Why is it worth mentionning? Could you clarify?

The official monsoon onsets are declared by the Indian Meteorological Department. The sentence was removed from the manuscript.

Page 1726, line 14. You mention an average BC fraction in PM2.5 of 13.5% in Gual Pahari. However I can only see a 9% fraction in the figure 10. Is there a possible error

in the text or the graph?

The percentage values pointed to July only. It is now written:" For Gual Pahari, data coverage does not allow to present the full season average for monsoon. However, for July the ratio $BC/PM_{2.5}$ was 13.5 %, while the pre-monsoon average was 9.4 %, illustrating that during the monsoon season BC was less effectively removed than other particles or had additional sources."

Page 1729 , line 2: As a general comment, I think a possible reason for this difference between the two stations could also be the fact that one station, as you mentioned, is
in the free troposphere for most of the study.

Agreed, it is now written:" A probable reason is the altitude difference at the two stations, with Mukteshwar being in the free troposphere most of the time. "

Typing errors : Page 1720. Line 23 : are presented

Changed accordingly.

Page 1726 , line 9 : to have a noteworthy mass

Changed accordingly.