

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

The objectives mentioned (p. 1752, line 14 – 25) are impressive but the end leads to the simple observation. However, after reading the whole paper, I would suggest to combine the paper with companion paper (Hyvarinen et al., 2011) if it is still possible, at least with the BC data.

*I am not totally sure what it means to combine the two papers with the BC data? The two are strongly linked, as BC is anyway derived from the measured absorption coefficients – the only difference being the wavelength at Mukteshwar. The paper 2 has now been made more independent, adding e.g. station descriptions, measurement descriptions and data handling. Corresponding discussion has been added. Concerning the mentioned lines 14-25 in the introduction, the speculated effects which aerosols have on the monsoon were meant as a background for this study. It is very difficult from measurements alone to draw any conclusions on this. However, the measurements will give direct knowledge to the modeling community about the aerosol behavior around and during the monsoon, which we regard very important.*

For this paper to be accepted in current format, authors should improve discussion rather than simply presenting the results as in many cases.

*We have added discussion in the paper, see answers to the reviewer points below.*

1. It is suggested to provide more information about the measurement locations under subtitle 2.1 (p. 1753). Lack of information about measurement sites in the same paper makes comparison of data very difficult.

*This is now done, and the chapter 2 was revised in whole.*

2. Meteorological parameters were measured (p. 1753, line 10 – 15) but not presented anywhere. Why to mention these parameters if not used in the result or helpful for any discussion?

*Mention of the individual parameters was removed.*

3. P. 1754, Line 6 (In addition, aerosol...) is not necessary.

*This was removed.*

4. P. 1754, Line 14 -16, how many years of rainfall record available for the area?

*The information was added. It is now written: "Year 2008 exhibited most rainfall, and an early monsoon onset date of 16.6., which is one of the earliest onset dates recorded in the area with rainfall data available since 1901 (Tyagi et al. 2009)."*

5. It seems obvious that the concentration and sizes of aerosols varies as pre-monsoon > post-monsoon > monsoon. However,

explanation provided for the similar size distribution (page 1756, line 5-7) is not convincing. Why is raindrop not effective for washing/scavenging the particles sizes in the range of  $3 \mu\text{m}$ ? If accumulation mode particles were removed more effectively than the Aitken mode by wet deposition (p. 1755, line 10 – 12), then why not particles of coarse mode? Explanation needed.

*The chapter was poorly structured; the reviewers comment: "explanation provided for the similar size distribution (page 1756, line 5-7) is not convincing" was actually valid for Mukteshwar,*

*while the comment: "If accumulation mode particles were removed more effectively than the Aitken mode by wet deposition (p. 1755, line 10 – 12)" was valid for Gual Pahari.*

*The chapter has now been revised, pointing out that the loss mechanisms at the two locations are somewhat different. It is written: "In Mukteshwar, there were two major wet removal mechanisms: aerosol scavenging by falling rain droplets and activation to cloud- and mountain fog droplets. The former mechanism removed other than accumulation mode particles effectively, while the latter mechanism was especially effective in removing the accumulation mode and bigger particles. Thus, the monsoon removed particles in all size classes. In Gual Pahari, the main removal mechanism was scavenging by rain. The accumulation mode was less effectively removed than the smaller and larger particles. In addition to loss processes, aerosol concentrations during the monsoon were affected by sources, especially for the coarse mode particles."*

6. It is mentioned that the sources are an important factor affecting the variability of aerosols (p. 1756, line 10), but what could be the sources of mineral dust?

*It is now written in the corresponding chapter: "The contribution of mineral dust to the coarse mode was discussed in context of high concentration episodes during monsoon in the companion paper (Hyvärinen et al. 2011). A trajectory analysis conducted in that paper indicated that the origin of mineral dust was mainly from the Thar Desert."*

*and in the conclusions: "In both locations, mineral dust was observed. This resulted in an elevated  $\text{PM}_{10}$  concentration at both stations (Hyvärinen et al. 2011), and a dominating volume mode at  $3\text{-}4 \mu\text{m}$  observed with the APS in Gual Pahari. The occurrence of mineral dust was further evinced by an increased scattering coefficient at both stations, and a refractive index  $\sim 1.5$  observed with the Gual Pahari sunphotometer. The contribution of mineral dust during these months has been reported also previously (e.g. Dey & Tripathi 2008, Gautam et al. 2009b, Gautam et al. 2011, Ram et al. 2008 and Ram et al. 2010)." Part I included some trajectory analysis showing that the Thar Desert in the west-north India is one of the important sources of the mineral dust. Several references are available on this too, which were added.*

7. Why there is very little information about the SSA in Gual Pahari during monsoon (p. 1757, line 18)?

*This was an unfortunate combination of the MAAP and the nephelometer breaking down, and having very little overlapping data.*

8. What could be the possible reason for the “substantially similar” properties of aerosols despite the “different annual variation “of absolute concentrations at both stations (p. 1757, line 22 -24)?

*The whole chapter has now been revised and differences in SSA were also found. Consequently, the sentence was removed.*

9. P. 1758, line 28,  
how does the RH affect the particle sizes? Reference required.

*Increased RH results in increased condensational growth. It is now written:” Relative humidity may provide an explanation in the observed discrepancies, as it affects the particle size and thus its optical properties (Zieger et al. 2011).”*

10. Viewing the erratic behavior of monsoon observed during recent years in the region, how comparable the data between 4 years vs. 2 years of observation is?

*This is a very good point and also concerns some of the analyses made in paper 1. However, most of the analyses and figure are segregated with different years. The problem occurs when the conclusions are taken from the whole data-sets. We made a test by calculating the average aerosol properties for 2008 and 2009 only from Mukteshwar. This did not change the conclusions made in the paper. We would rather keep the Mukteshwar data set in 4 years for the simple reason of statistics.*

Couple of spelling mistakes needs to be corrected, e.g. p. 1755 (line 27) and p. 1756 (line 10).

*Done.*

Figures need to be clearer, i.e. the fill patterns and lines are difficult to differentiate.

*I presume this means the size distribution figures. We attempted to make these more clear, however we would like to keep the 10<sup>th</sup> and 90<sup>th</sup> percentiles in the figures, as they add statistical value.*

In its present format,  
My overall recommendation is to accept with major revisions.