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Atmospheric Chemistry and Physics Discussions

Interactive comment on "New particle formation infrequently observed in Himalayan foothills – why?" *by* K. Neitola et al.

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Answers to the comments by referee #2:

Thank you for very helpful and important comments. Here are our answers to the things that you wanted answers or improvements.

Major comments, 1:

Referee points out an important point about that the formation of clouds changes the size distribution significantly, but for the NPF event analysis; this does not change the situation because nucleation happens usually during cloudless, sunny days. The in-cloud periods might affect our analysis e.g. when calculating the CS for all the seasons, where non-event days are equally considered. Unfortunately, there were no visibility

measurements, to be used as an indicative of the in-cloud/out-of-cloud situations. The particle size distributions presented / used are only interstitial due to the 2.5 micron inlet size-cut. The increased CS will be mentioned in the final version of the manuscript.

Major comments, 2:

Topography of the area surrounding the station is roughly presented in Fig. 1. The station is on the slope though close to the hilltop. The valley down from the hill is approximately at 500 to 1000m a.s.l. (according to the figure), which makes the altitude difference to be over 1000 m. It is true that the valley winds and forced convection are controlling the dynamics of the atmosphere but as we do not have 3D-measurments of the uplift of the air, we have to rely on the PBL height as an indicator of the uplifted air masses from lower altitudes.

Major comments, 3:

I assume that the referee means here 10 nm and not 10 microns (at least in the paper we wrote 10nm). As the referee points out, this is an indicator of the uplifted NPF event as the particles have grown already to larger sizes when reaching the station. These are not classified differently here, because we wanted to have better statistics for the event/non-event classification. If we would divide these even further the statistics would drop to low level due to the low number of events in every category.

Detailed comments, page 13206, lines 13-14:

This time window is chosen because this is the time when the NPF event is usually observed. It is true that the actual nucleation has then occurred earlier. The PM2.5 used here is the one that is coming with the same air masses as the NPF event and is the best indicator of the PM2.5 concentration what was in the air masses where the NPF event started because this concentration is uplifted to the station together with the NPF event. If we would use earlier concentration, it would not be representative of the concentration in the air masses where the NPF event starts but it would be represent

the free tropospheric conditions before the uplift.

Page 13206, lines 16-18:

Raatikainen et al. (2011) report that the increased concentration of PM2.5 is an indicator that the height of the PBL has reached the station altitude. This would mean that together with the higher PM2.5 concentration, also higher concentration of precursor gases and condensing vapour are uplifted to the station during spring. During summer and autumn, increased levels of PM2.5 would be in the free troposphere, where condensable vapours and precursor gases are lot lower in concentration, so that small increase in PM2.5 would change the situation drastically.

Page 13207, lines 6-8:

This is a great point, that this is only speculation of the concentration due to the lack of the measurements of vapours. We think that as in Boulon et al. (2010), we have similarly coupled CS and precursor gas concentration, but as contrary to Boulon et al. (2011), our NPF events happen during spring with higher CS.

Comment on figure 6:

It is true that the error bars would help to see the difference in the figure but the figure look a little bit messy due to the different sun elevation even within one season. The messiness would rise from the fact that the PBL starts rising a bit different time so that std is larger during mornings and evenings compared to the ones during noon and afternoon. During afternoon the std is less than 100 m. The most crucial point is that during spring there is no day, when the PBL would have reached the station and there would not be an event.

References:

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