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Atmospheric Chemistry and Physics Discussions

Interactive comment on "An investigation of processes controlling the evolution of the boundary layer aerosol size distribution properties at the Swedish background station Aspvreten" *by* P. Tunved et al.

P. Tunved et al.

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Response referee #2

The referee raises a few questions concerning the manuscript, but welcome publication of the paper in ACP. The questions/comments raised by the referee concerns details of the manuscript and are addressed according to the suggestion of the referee in most cases. Large effort has been put down to improve the English language used in the manuscript. The comments and suggestions made by Referee #2 have been of great help in this task. A detailed response is outlined below:

Major comments:

Comment 1: Pg 4510, l. 7: It is stated in the original manuscript that the rate of dry deposition decrease with increasing size as the particle enters the accumulation mode. The statement refers to deposition of particles, not on deposition of gases onto particles. This is clarified in the revised manuscript.

“Also the rate of deposition decreases with size in this so called Aitken size range.”

Was changed to:

“Also the rate of dry deposition of particles decreases with size in this so called Aitken size range.”

Comment 2: Pg 4511: The nature of the observed size distribution was not mentioned in the original manuscript. However, the instrument set up observes the dry aerosol size distribution. This is clarified in the revised manuscript.

“The setup observes the number size distribution of particles with a dry size between 10-450 nm. A new size distribution is observed every 7.5 minutes.”

Comment 3: 4512 section 2.2.2: The description of the trajectory model output was not sufficient in the original manuscript. The referee further raise questions concerning the use of 3 days trajectories. The text is clarified accordingly:

Page 4512, l. 15-16 was changed to

“120 h back trajectories were calculated four times a day. Each trajectory consist of 120 endpoints, one each hour.”

At the end of section 2.2.2 following paragraph was added.

“In the analysis of meteorological data from trajectories, only the last 72 h were used. Although aerosol lifetimes may be much longer than 3 days, additional analysis extending three days did not add more information about the different states of the aerosol

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number size distribution." . Comment 4: Pg 4515, l.20: Concerning the grouping of trajectories.

We agree with the referee and omit line 20 in the revised manuscript

Comment 5: Pg.4521. l.28: It should be stated that the effect from oxidative uptake on the size distribution decreases with size in the accumulation mode.

Additional information is supplied on Pg 4521, l. 28:

"The effects of the clouds on the aerosol size distribution become smaller with increasing size in the accumulation mode."

In the revised copy of the manuscript an additional change was implemented for sake of clarity: Pg 4522 l. 28: "Through continuous growth by condensation and coagulation, but more importantly through in-cloud process the distribution evolves to become cluster type F. If the cloud precipitates then to become a size distribution as defined by H."

Was replaced by:

"Through continuous growth by condensation and coagulation into a size distribution represented by cluster F or by processing by clouds and wet deposition into a size distribution represented by H."

In addition to these changes figure 10 was slightly modified to agree with the text.

The following part of the revision is limited to typographical and typing errors and need not to be described here in detail. The referee has put a lot effort in increasing the readability of the paper, especially concerning language treatment. The suggestions given by the referee are implemented in the revised manuscript.

Interactive comment on Atmos. Chem. Phys. Discuss., 4, 4507, 2004.