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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Aerosol particle size distributions in the lower Fraser Valley: evidence for particle nucleation and growth" *by* M. Mozurkewich et al.

Anonymous Referee #2

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General comments:

The process of particle formation in the PBL is still not completely understood and many open questions concerning the nucleating and condensing species are still beyond our knowledge. In the future strong efforts should be placed in finding of these secrets and so measurement campaigns in different areas all over the world are necessary to get a basic understanding of the various mechanism occurring.

This MS reports interesting results on the formation and growth processes of aerosol particles on a light elevated terrain. The authors used in the framework of the Pacific 2001 Air Quality Study up today technology (SMPS, CPC and hTDMA) to quantify the different fractions of particles formed and transported to the measurement site. There-

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fore, the MS fits to the scope of ACP and should be published after minor revisions.

Specific comments:

1. In section 3.1.1 in the third paragraph the authors claim that the particle appearance of ultrafine particles in the morning was not due to nucleation. I agree with the authors that in this case the main fraction of the particles in the Aitken mode are through advection. However, we all now that in nature processes do not stop like a traffic light and the next one is starting. A detailed look in Figure 3 allows also the conclusion that a nucleation mode under 10 nm at 11.45 is formed. Similar statements concerning the appearance of particles at the detection limit of the SMPS are made on several places in the text. I suggest that the authors are more carefully by excluding the particle formation occurred or not.

One more example in this direction is Figure 9: The authors claim in section 3.1.3. that on this day the increase in particle number concentration was not due to local nucleation since the CPC and DMA concentrations increased at the same time. Thats true, however three lines above the author wrote that odd oxygen increased between 12 and 13.30 by 7 ppbv/hr. Having a closer look at figure 9 we recognize a strong peak in the CPC concentrations at 2 p.m. and a difference between the CPC and the DMA of 30 000 #/cm3 compared with a difference around 1 p.m. of about 10 000 #/cm3. In my opinion local particle formation occurred at this place after 12 p.m. and with growth rates around 5 nm/hr it took about 1 hour until the CPC measured these new formed particles. There are an overlapping on this day with the transport of polluted air masses, but to exclude the formation is to black and white.

2. The authors used quite confusing names for the different particle size ranges (emission mode and growth mode). For clarity I would suggest that the authors stay in the most common classification: nucleation, Atiken and accumulation mode. One example for this confusion is on page 1636, line 15: ... were nearly constant, the 30nm particles were replaced by ultrafine particles.

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Interactive Comment

3. Concerning the NOx concentrations in the text and figures (4 and 9) I have some problems getting the right values. The figures use once as y-label NOx (0,1 ppbv) and then again in the legend NOx X 10. Putting it together means in my opinion that I have to divide the values from the graph by 100 to get the right concentrations in ppbv. In the text the author divides the values only by 10 which gives concentrations between 5 and 60 ppbv. I have no comparable values from the area concerning these concentrations, however I believe there a very high. I suggest the authors should check the data again and clarify the right values in text and figure.

Technical corrections:

Page 1626, line 13: Makela should be changed in Mäkelä

Page 1626, line 26: Makela should be changed in Mäkelä

General: Because the MS is published in ACP and there is no charging for colored figures I think it would be much easier for the reader if the author could change the figures with many lines like 3, 5, 7, 13 and 15.

Interactive comment on Atmos. Chem. Phys. Discuss., 4, 1623, 2004.