**Atmospheric
Chemistry
and Physics
Discussions**

Interactive comment on "Measurements of the relation between aerosol properties and microphysics and chemistry of low clouds in northern Finland" *by* H. Lihavainen et al.

H. Lihavainen et al.

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This paper contains significant original material, referring to cloud droplet numbers concentrations in northern Finland. It is suitable for publication in ACPD after responding to the following comments: General statement concerning the title and introduction: Define clouds! This work considers only a small fraction of possible clouds types namely liquid water or warm clouds.

The title will be changed to Measurements of the relation between aerosol properties and microphysics and chemistry of low level liquid water clouds in Northern Finland

Abstract: POM needs particulate in the definition to make clear that you do not talk about primary organic matter.

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Added

p.4, 3rd paragraph: I am not very familiar with the cloud water collector and though you mention one citation I think a more detailed description of the instrument right in the text would be useful. In addition it would be interesting to know how the errors of this instrument are and with respect to fig.7 how did you calculate the error bars there. To me the errors in fig.7 seem actually rather small, is the instrument that precise?

A more detailed description of the fog collector is now given. The errors of the instrument are also defined. In this work, field blanks were taken, and a detection limit, namely 3 times the standard deviation of field blanks, was determined. This is now written in the text. As can be seen the detection limits are in some cases quite high, and the absolute concentrations of this data should be used with great care. This is also stated in the text. The bars in figure 7 are not really error bars, they are the 10th and 90th percentiles of the data. This is now clarified in the figure caption.

p.6. 2nd paragraph: It is important to make clear that there are uncertainties in the system and the authors need to admit this. It is never certain that there are identical air masses at both stations even when it might look like this.

Starting from page 7 there is a paragraph dealing with this issue, in the paragraph it is stated that the air masses are approximately same. Two sentences were added to clarify the issue: In the case studies the size distributions and total number concentrations should be quite stable during the event. While the above screening procedures cannot guarantee that the air masses measured at the two stations were the same, we believe the resulting uncertainties in the analyses presented later are minor.

p.7. 1st paragraph: Subtraction into a negative value – how often did this happen and to which order of magnitude?

This happened at the low end of the size distributions, below 100 nm, since there the size distributions from different stations are usually very close to each other and par-

ticularly in the cases with low total number concentration. It should be kept in mind that the DMPS errors are usually already order of 10%. It was tested how this procedure effect to DMPS derived cloud droplet concentration results when comparing DMPS derived results to directly FSSP measured concentration. The uncorrected vs. corrected total number of DMPS derived cloud droplets formed a line with a fit corrected=uncorrected*0.96 + 21. In this light of this analysis the effect is within the error limits of DMPS systems. Text was slightly changed and one sentence was added: If the subtraction resulted in a negative value, the value was set to zero to avoid unphysical situation. The effect of this procedure to total number of activated cloud droplets was tested and it fell well within the uncertainities in aerosol particle concentrations resulting from the accuracies of the DMPS systems themselves .

Fig.5: The figure shows evidence of the first indirect effect. But is it possible to make some differentiation like showing secondary effects as the air mass origin (e.g. sea salt versus continental) or the aerosol size? I think this might be also an interesting outlook for future studies to put in the summary section.

This is possible and interesting but to do this we would need more cases to get some statistical meaning for it.

Fig.7 versus Fig.8: Since the information from these figures is so similar, I suggest to use only one of them.

Figure 7 is the dealing with the total concentration over the whole period, and figure 8 is concentrated on case studies and hence serves different purposes.

Table 4: I suggest using a more similar style with respect to table 3, e.g. add a sample column.

Changes were made to make tables more similar in style.

Interactive comment on Atmos. Chem. Phys. Discuss., 8, 14105, 2008.

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