**Atmospheric
Chemistry
and Physics
Discussions**

Interactive
Comment

Interactive comment on "Changes in background aerosol composition in Finland during polluted and clean periods studied by TEM/EDX individual particle analysis" *by* J. V. Niemi et al.

Anonymous Referee #3

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General comments:

This paper describes detailed characteristics of aerosol particles collected at a rural background area in Finland from air masses that were affected by pollution to different degrees, discussing the origins and alteration processes of the particles based mainly on the TEM individual particle analysis. The methods are orthodox and the conclusions are not strikingly new, but the elaborate descriptions and discussions, combined with proper references to previous works, would be a valuable contribution to atmospheric and environmental sciences especially in the locations near the studied site. The present manuscript is generally well organized and easy to read, and I would rec-

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ommend publication in ACP with some revisions. One major problem is classification of the particles, which I mention in specific comments.

Specific comments:

ABSTRACT

I suggest the authors to insert a sentence mentioning how they determined the polluted, clean, and intermediate samples (mass concentrations of particulate matter and backward air mass trajectories) either in the 3rd or 12th line in p.6754.

MATERIAL AND METHODS

p.6758, l.26; "~ and these results were used to calculate PM1.6 mass concentrations~" I wonder why the authors use PM1.6 concentration as indicator of pollution rather than PM2.5. PM1.6 does not fit the size ranges for TEM (PM0.2-1.0, 1.0-3.3, 3.3-11) and VI (PM1.3 and 1.3-10) samples either. A brief explanation for the reason would be helpful for readers.

RESULTS AND DISCUSSION

p.6761, l.26-p.6762, l.10; The authors classify the particles into 12 different groups. The number seems too many, and I'm not comfortable with the authors' classification scheme. To begin with, the difference between the 4) carbon/sulphate mixture with dark inclusion(s), 5) ammonium sulphates with/without carbon and dark inclusion(s), and 6) K-rich particles with S and /or C is not clear. All of these three groups are described in 3.3.3 in detail, and I found the section somewhat confusing and hard to follow. From Table 3 and Fig.4, the difference between these three groups seems to be mainly due to different amounts of the S-rich (ammonium sulphate), C-rich (organic material and inclusions), and K-rich (K-sulphates) endmembers mixed in a particle. Also, because the "dark inclusion(s)" are not well characterized (they may be collapsed soot, p.6765 l.1), the boundary between the soot/sulphate mixture (group 3) and the carbon/sulphate mixture with dark inclusion(s) (group 4) or the ammonium sulphates

with carbon and dark inclusion(s) (group 5) is obscure. In my opinion, the groups 3 to 6 can be treated together as "ammonium sulphate with variable amounts of C, K, and inclusion(s)."

On the other hand, sea salt and spongy Na-S-K-O-rich particles (Fig.11) are grouped together (group 10), although the authors interpret the latter to be anthropogenic (p. 6770, 2nd paragraph). These would be better separated. I would like the authors to reconsider the classification.

p.6764, l.23; "The proportion of C was high in these particles,~"

Fig.7 only shows the data for the mixed carbon/sulphate with dark inclusion(s). How about the ammonium sulphates with/without carbon and dark inclusion(s)? Do they plot in a significantly different area in the S-C-K ternary diagram?

p.6773, l.7;"No clear difference was observed in the proportions of biological particles and C-rich fragments related to source regions of the air masses."

Is it possible that these particles resulted from contamination during handling of the samples?

Technical corrections:

RESULTS AND DISCUSSION

p.6759, l.16; "The concentrations of gaseous pollutants~"

Add "(Table 1)" at the end of the sentence.

p.6764, l.8; "its poorly know surface area"

"its poorly known surface area"

p.6772, l.3; "salt-salt particles"

"sea-salt particles"?

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FIGURES

p.6791, Fig. 5, p.6794, Fig. 8

Some letters in these figures are hard to recognize.

Interactive comment on Atmos. Chem. Phys. Discuss., 6, 6753, 2006.

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