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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Urban aerosol size distributions over the Mediterranean city of Barcelona, NE Spain" *by* M. Dall'Osto et al.

Anonymous Referee #1

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General Comments

The manuscript is focused on an analysis using K-means clustering and PMF of the size distribution measured in Barcelona. The different aspects are discussed in details and interesting results from the comparison of PMF and K-means clutering are obtained. However, there are a few points that need further discussion 8see my specific comments) and some technical corrections are needed. Therefore I believe that the paper merit publication after a moderate revision that take into account the following comments.

Specific Comments

Page 16465. Lines 12-14. It is discussed the possibility the enhancement in concentra-

tions in the afternoon, shown in Figure 2 could be due to a photochemical nucleation event. However, this enhancement is visible only on relatively large particles (larger than 20-30 nm). If it was a nucleation I would expect the increase to start at lower size and be visible from the first stage of the DMPS (13 nm). Could traffic (or another anthropic source) be the cause for this enhancement?

Page 16468. Lines 23-25. The sentence "The position of the clusters to the bottom left of Fig. 6 is consistent with this origin, although the relatively low values of N13−50 are surprising, but consistent with the low frequency of nucleation events." It is not clear to me how the frequency of these events is actually related to their position in the graphs of Figure 6. Even if the frequency is low the increase of particles in the size range 13-50 nm should be relevant. Could the authors discuss in more detail this aspects?

Page 16472. Lines 1-3. It is reported significant relationships between factor 1 and factor 2 and between factor 4 and factor 5. Probably it would be better to quantify the meaning of significant relationships indicating the probability level given that the determination coefficients are relatively low especially between factor 4 and factor 5.

On table 2 only the concentration in the size range 13-50 nm is reported. If I understand well this is only for display but all the available range (i.e. 13-800 nm) is used in the clustering. I was wondering why showing only this range and not three ranges associated with typical nucleation, Aitken and accumulation modes?

On Supporting Information material. Page 2. In the discussion relative to Cluster 2 three modes are reported, however, in Figure SI1b only two modes are included in the fit. Authors should modify the text or include all the modes in the Figure.

On Supporting Information material. Page 6. At the end of the discussion relative to Cluster 8 it is reported "...with growth events as discussed in the next section." However, it is not clear what section are referring because the only thing after this is the discussion of another cluster.

Technical corrections

Page 16468. Line 13. In the sentence “. . ..solar radiation associated with of these two clusters” please remove “of”.

Page 16471. Line 15. Given the meaning of the sentence it would probably be better to substitute the symbol N<13-800 with N<13.

Interactive comment on Atmos. Chem. Phys. Discuss., 12, 16457, 2012.