

Interactive  
Comment

## ***Interactive comment on “A statistical analysis of North East Atlantic (submicron) aerosol size distributions” by M. Dall’Osto et al.***

### **Anonymous Referee #1**

Received and published: 14 September 2011

The paper shows results of interpretation of a cluster analysis of size segregated ultra-fine particle number concentration measurements performed along one year at Mace Head (Ireland). This is relevant from the point of view that it supplies information on the major air masses and processes controlling variability of ultrafine particles at an marine background site.

The cluster approach applied to hourly size distribution has been used by the team from Birmingham University. From the methodological point of view the papers is applying this methodology to a ‘clean’ site.

In my opinion the results are of interest for the scientific community. These are not reporting very novel findings, but give interesting data on origin and processes affecting ultrafine particles. However, also in my opinion, additional information should be

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provided to support the final conclusions on cluster analysis and on the interpretation of the origin of cluster groups.

Based on the above comments, I suggest publication of the paper after a moderate revision based on the comments attached below.

### Major issues

I have the following major comments to the interpretation of results:

1) In my opinion there is not enough support of the selection of the 12 cluster result. Why not 10 or 14? The authors should give more details about the final output of clustering concerning the number of clusters. 2) Also the basis of the grouping of 3 clusters in each group should be explained in detail from the beginning. 3) The same applies to the interpretation of the origin of the groups 'open ocean' and 'coastal nucleation' and 'background clean marine' 4) You should clarify 'back ground clean marine' if this refers to NE Europe marine background or that this represent the cleanest marine background at Mace Head. The name is a bit confusing. 5) Text gives the impression that the paper have been written very fast. The reader would appreciate a bit of consistency (reporting characteristics for most parameters evaluated in all groups) in the interpretation-description of cluster and group characteristics. Especially applicable in chapter 4.1.

### Specific comments

Abstract: '..... as systematically occurring and these 12 Clusters could .....' by '..... as systematically occurring. These may .....

Abstract: '....more mono-modal...' by '.....more mono-modal (accumulation)

Abstract N.E. by NE (twice)

Abstract '..... of new aerosol particles in N. E. Atlantic Air' by '..... of new nano aerosol particles in NE Atlantic air'

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Introduction: 21680, row 6, IPCC 2001 was updated by IPCC 2007

Introduction: 21680, row 25, 'a fine mode' by an Aitken mode'

Pages 21685 to 2687: Apply general comment 1 here. The classification of clusters is given but no info on why 12 types, and not less or more were obtained.

Page 21688. The same applies here for the grouping of 3 clusters in each group. Based on what grouping criteria?

Page 21668, 20-25: More information on how do you attribute one type of nucleation to coastal and the other to open ocean. Also bimodal (Aitken and accumulation) mono-modal (accumulation)

Page 21689, 14 (give number concentration in brackets as done in row 15 for the other 3 clusters.

Page 21689, 16. 'largest' what this means here? Highest or coarsest?

Page 21689, 16: 9 nm?, in table 1 you report 10 nm

Page 21689, 18: Why low RH and coastal origin? Is the RH differences significant?

Page 21689, 24 to 25: Rewording of the sentence required for a better understanding of the meaning.

Page 21690, 23: clusters 4, 5 and 9; or 4, 5 and 8??

Page 21691: By interpreting 4.1.3. as anthropogenic type; do you mean anthropogenic species are completely irrelevant in all the other cluster groups?

Page 21691: 4.1.4. See general comment 4 above.

Page 21692, 5-6: If you mean the cleanest marine background at Mace Head? Why highest scattering and PM<sub>2.5</sub>?? Sea salt? Give a bit more of info

Page 21693, 8: 'precursor gases' is very general, which ones?

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Top of page 21694: See major comment 4 above.

Page 21694, 10-29: In my opinion this is repeating finding described in the page 21693 but in a different way. Summarise and merge both sections.

Section 5: Please take into account major comments 1 to 4.

Heading of Table 1: I do not see N.D. in table, you do not need to define.

Table 1 and Figure 1 repeat results

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