

Interactive comment on “The composition of nucleation and Aitken modes particles during coastal nucleation events: evidence for marine secondary organic contribution” by P. Vaattovaara et al.

Anonymous Referee #1

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General

In this work it is shown that newly formed particles at a coastal site in Ireland have properties which imply that they contain organic material. This has not been shown before, and the results are timely and interesting. The likely sources of the organic material are discussed as is the potential impact on cloud droplet formation.

General comments to the readability/organization

Some parts of the paper are rather difficult to read and in my opinion the paper could

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be better organized (see suggestions below). I suggest that the English language is checked.

Major comments

Introduction: It should be explained briefly what a nucleation event is and references given.

Methods section: The explanation of why particular compounds were chosen is mixed with the description of the instruments. It would be clearer if the reasoning for the choice of compounds as well as the discussion of chlorinated and brominated hydrocarbons were separated from the instrument description.

For the reader who is not familiar with the PHA-UCPC the text is very difficult to understand. The authors should consider if Figure 3 is really relevant, I would think that a reference to O'Dowd et al 2004 is enough. I agree with Refee #2 that the text should be rewritten. I suggest including a short description of the operating principle of the PHA-UCPC.

In the method section it would be informative to give an overview of what other types of information was available for the data-analysis, e.g. back trajectories, particle size distributions, satellite data, BC data etc. (e.g. Page 3345, line 9: Nucleation events are central in this study, yet the availability of DMPS data is not mentioned until later in the paper)

p. 3345: line 16 -25: I suggest to avoid the words obviously and naturally or at least explain why this is obvious and natural. It says that the growth rates are quite high - compared to what? A reference should be given. Figure 4 should be better explained.

p. 3346: it should be mentioned what the uncertainties of the measured growth factors are.

Page 3347: Line 23 - "as they do during many other event days" - how many event days were there during the campaign? If there are data for an event day where 30 and

50 nm particles behave the same - would it not be interesting to show that?

Page 3347 line 28 and page 3348 line 12: what is the evidence that the organic compounds are actually produced during the nucleation event - could they not have been there before?

Page 3349 - as I understand PHA-UCPC field experiments were not carried out in the same time period as the UFO-TDMA measurements? It would be useful to give an overview of the time periods, instrumentation and events in the beginning of the paper.

Minor/technical comments

Abstract: A number of abbreviations (UFO-TDMA, LBA, HBA) are introduced in the abstract, making it a bit complicated to read. I would suggest that full words are used in the abstract and abbreviations introduced in the text of the paper. (for example: line 10: HBA, i.e. a high mass concentration of chlorophyll a of the ocean - this sentence could be left out).

Page 3339, line 26: It would be more correct to say that the condensable iodine containing vapors are products of photolysis followed by oxidation/chemical reactions.

Page 3340: how much is a high concentration of chlorophyll a in the Atlantic ocean? There should be a reference for this definition of biological activity. Where were the satellite data obtained from - there should be a reference in the figure caption or text.

Page 3340: line 14 "to exist" can be left out

Page 3341, line 18: The meaning of the sentence about the dew point meter, in particular the words in parenthesis (if one excludes water or ethanol one can measure the other) is very unclear. This sentence should be reformulated.

Figure 10: please provide a more detailed description of figure 10.

Figures 7-9: the figures contain a lot of empty space and the authors should consider if the data could be presented in a better way. The time of day (hours) should be

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written on the x-axis. The figures could be combined - growth factors for 10 and 30 nm particles could be shown in the same figure.

Page 3347-3348: References are missing (e.g. about properties relevant for cloud droplet formation).

Interactive comment on Atmos. Chem. Phys. Discuss., 6, 3337, 2006.

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