

***Interactive comment on* “Conceptual study on nucleation burst evolution in the convective boundary layer – Part I: Modelling approach” by O. Hellmuth**

Anonymous Referee #3

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Conceptual study on nucleation burst evolution in the convective boundary layer - Part I: Modelling approach O. Hellmuth Atmos. Chem. Phys. Discuss., 5, 11413-11487, 2005

Paper I

General comments: (These are for the whole 4-paper set together)

In the paper "Conceptual study on nucleation burst evolution in the convective boundary layer" the author proposes a modelling approach to interpret anthropogenically

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influenced new particle formation events. With the model, the author aims to reproduce the ultrafine particle evolution observed.

In the first part of the paper, an good overview of the modelling approach is given, showing wide understanding of the field. The problematic areas are described and the methods used for the boundary layer model are given.

In the second paper, typical boundary layer conditions are simulated and shown to agree well with observations.

In the third part, two scenarios, one using a binary nucleation parametrisation, the other a ternary nucleation parametrisation, are made and the model results are presented.

In the fourth paper, the author reviews previous observations of new particle formation and studies them in the light of the findings of the two scenarios.

The papers are well written and give valuable input to the community. However, concerning the scenarios used, I wonder why so extremely low background (Aitken and accumulation mode) concentrations were used. It has been shown (recently e.g. Hyvönen et al: A look at aerosol formation using data mining methods, ACP 5, 3345-3356, 2005) that the condensation sink cause by background aerosol is crucial to new particle formation; here the author has chosen to exclude this parameter almost entirely by simulating an essentially clean boundary layer. The motivation behind this should be explained.

Specific comments:

* On page 11421, references to a 'filtered' and 'non-filtered' model are made. This is explained later, but a short reference to the cause of filtering might be useful to the reader.

* On the choice of the aerosol model (page 11423): To help future research in this area, it might be useful to know why the monodisperse approach (which has some

shortcomings e.g. when describing a simultaneously growing and nucleating aerosol, compared to e.g. a sectional approach) was chosen. Was the reason computation time limitations? The reasoning behind the choice could be described with a few sentences.

* paragraph starting on 11424, line 25 -> 11425, line 14; this paragraph is somewhat confusing.

* Humidity growth factor: what are the parameters affecting it?

* Concerning the model testing, I agree with referee 1 in that it would be useful to have a sub-section on this.

Technical points: * page 11424, line 2: ... the lower THE vapour concentration... * Generally, there are a number of typos in the article.

Interactive comment on Atmos. Chem. Phys. Discuss., 5, 11413, 2005.

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