

## ***Interactive comment on “Nucleation events in the continental boundary layer: Influence of physical and meteorological parameters” by “M. Boy and M. Kulmala”***

**Anonymous Referee #2**

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The paper describes a comprehensive data analysis of long-term nanometer particle measurements at a forest measurement station in Finland. The major part of the paper deals with the discussion of the influence of potential parameters (radiation, humidity, temperature, preexisting aerosol, boundary layer conditions etc.) which might influence the formation of new aerosol particles for the year 1999.

The authors comprehensively discuss whether or not a correlation can be observed in the tremendous amount of data analysed. Finally, the authors define a "nucleation parameter", which contains radiation (UVA), humidity and temperature. Certainly, a

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series of very interesting results were obtained on the most important "non-chemical" parameters that might have an impact on the formation of new particles, such as the potential influence of UVA or the water concentration. This kind of data evaluation from field measurements is urgently needed since atmospheric nucleation is still poorly understood and such a detailed analysis of long-term data surely will help to shed light on the underlying processes under atmospheric conditions. Therefore, the content the paper is appropriate to be published in ACP.

However, some specific remarks might be considered by the authors:

The authors are claiming that "... The linear equation leading to the "nucleation parameter" currently used is inadequate..." (page 256, line 8) and suggest to use additional parameters, such as the number concentration and size of the existing particles. However, very few long term measurements exist in which all these parameters have been measured, except the data set presented. Why do the authors are not realising what they suggest by themselves: "... use UVA solar irradiance, the concentration of water molecules, temperature **and the existing particle concentration and size distribution...**" (page 258, line 12) for the "nucleation parameter" ?

Another part of the discussion which I cannot follow completely is the approach to discuss the chemical pathways to form new particles (summary and conclusions). Although the explanation given by the authors that the correlation between UVA and new particle formation could be explained by precursor vapours that absorb in the UV range is certainly correct (indicating a direct connection), I am not convinced that this conclusion is sound. Obviously, UV radiation influences a series of photochemical reactions and the formation of condensing species is likely to be a secondary process.

I would also suggest to be more careful when formulating the dimethylamine hy-

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pothesis (summary and conclusions). The authors claim that Kulmala et al. found high concentration of dimethylamine in the analysis of impactor data. However, dimethylamine is a highly volatile compound (boiling point 7°C). Obviously the authors are discussing salts of dimethylamine in the particle phase (correct?).

Finally, I don't see a reason to use the expression "mysterious reactions" (page 258, line 1) to link new particle formation above a forest site with photochemistry.

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Interactive comment on Atmos. Chem. Phys. Discuss., 1, 239, 2001.

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