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Comment on acp-2021-838

Anonymous Referee #1

Referee comment on "Frequent new particle formation at remote sites in the subboreal forest of North America" by Meinrat O. Andreae et al., Atmos. Chem. Phys. Discuss., https://doi.org/10.5194/acp-2021-838-RC1, 2021

This manuscript investigates atmospheric new particle formation (NPF), a topic that has been of wide interest during the recent years. Although a large number of papers on NPF in forested environments has been published, and although many of these previous investigations are based on much larger measurement data sets as employed here, I think that this paper manages to bring up some new idea on the topic by focusing on differences between pristine and anthropogenic-influenced forested environments. The paper appears to be scientifically sound in terms of both applied methodology and performed analysis. Although somewhat speculative, the paper is in general very well written. I recommend accepting this paper for publication after the authors have addressed the following, mostly minor issues.

Scientifically, the weakest feature of this paper is the shortage of data (less than one month of measurements), on which to base all the made conclusions. Previous long-term studies have pointed out a considerable variability in the characteristics of NPF from day to day, seasonally, and even between different years at a single measurement site. Therefore, one needs to be very careful how much to conclude from this data set. I understand that the number of data cannot be increased at this stage, and that the purpose of this paper is to raise up new scientific issues rather than to make firm conclusions. I also appreciate that the authors have tried to take the shortage of data into consideration when discussing the results. However, I still think that the authors should bring up this issue more explicitly throughout the paper when discussing the results. This would benefit specifically those readers that not very familiar with this research topic.

The end of section 1 lacks clear scientific objectives of this study. They should be added, especially when considering that the other parts of the introduction are very well written and informative.

Minor issues

The authors use 2-day air mass trajectories, yet make conclusions to 3 days of air mass transport back in time (line 205). Is this based on extrapolation of available air mass trajectories or what? Some justification here is needed.

Lines 218-222: Saying that observed mass concentrations are extremely high and number concentration extremely low is a vague statement. Extreme compared to what? And are they quantities really extremely high/low?

Figure 1 is not very helpful in its current form. The names of the locations/places in the maps are barely visible and should be written using larger font sizes. The maps should also include length scales, especially as the scale seems to vary from map to map.