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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Influence of common assumptions regarding aerosol composition and mixing state on predicted CCN concentration" *by* Manasi Mahish et al.

Anonymous Referee #1

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The manuscript "Influence of common assumptions regarding aerosol composition and mixing state on predicted CCN concentration" by Mahish et al. presents the analysis of a multi-year dataset collected at a mixed land use site in Oklahoma in an attempt to examine the accuracy of the assumptions commonly used by the modelling community to study and predict the number of cloud condensation nuclei NCCN concentration. The analysis employs the κ-Köhler theory and data collected by a variety of relevant instrumentation. At this point I, unfortunately, have to recommend this paper to be rejected from the publication by the Atmospheric Chemistry and Physics journal due to the reasons outlined below.

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Discussion paper

In its current state the manuscript is of little relevance and utility for the atmospheric and CCN community as it does not present anything new, and the conclusions it does present are not well-explained or justified. The effect of mixing state on aerosol CCN activity has been examined in numerous previous publications, and the authors present a multitude of relevant references on the second page of the manuscript. The authors do not provide any information on how their study is different from the published ones, do not clearly state their objectives taking into account the already existing knowledge, and, therefore, fail to convince me that the presented study is new or important. It has long been known that aerosol mixing state plays a minor role in determining the ambient CCN and, even more so, cloud droplet number concentration CDNC, especially so in non-pristine regions (Moore et al., 2013). The effects of the total particle number and the size distribution are of much higher importance than the particle hygroscopicity or the mixing state (e.g. Conant et al., 2004; Dusek et al., 2006). On page 2, lines 21âĂŠ24, the authors reference previous studies that have shown that NCCN is most sensitive to the particle size distribution and that assuming an internally-mixed aerosol is sufficient for an accurate NCCN prediction. The main conclusion of the study by Mahish et al. is mostly identical to this abovementioned statement, demonstrating the absence of any novel aspects in the study and deeming it a mere repetition of the work that has already been done before.

In general, the paper reads as a last-minute effort at writing something for a publication. The paper is short and incomplete. The storyline is confusing, a problem exacerbated by the excessive segmentation of the text into many short sections. The objectives, methodology, and the results are all described in a superficial manner, preventing the reader from understating exactly what was done, why it was done and what the outcomes are. The authors fail to conduct an in-depth analysis of the data, put their results in perspective and convince the reader of the importance of their findings. The analysis performed is rather basic, not of the quality and complexity level that would warrant its publication in a research journal. The manuscript also contains several stylistic, grammatical and other random mistakes and omits many important references.

Unfortunately, the manuscript is not of the standard for a publication in a scientific research journal, and I, therefore, recommend the manuscript to be rejected from the publication in the Atmospheric Chemistry and Physics journal.

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