Atmospheric
Chemistry
and Physics
Discussions

Interactive comment on "Aerosol-fog interaction and the transition to well-mixed radiation fog" *by* Ian Boutle et al.

Anonymous Referee #2

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Review of the manuscript acp-2017-765 Aerosol-fog interaction and the transition to well-mixed radiation fog by Ian Boutle et al.

Summary In this paper the authors study the impact of the interaction of aerosol and fog formation from both a modelling as well as observational perspective. They select a case study from the LANFEX campaign that took place at Cardington (UK). That case is modelled with a large eddy simulation model in which the aerosol concentration is varied. It is seen that default (which are excessive in this case) aerosol concentrations result in the emergence of optically thick fog too early. It is shown that a realistic lower concentration results in a better representation of life cycle of the fog, and this modification is subsequently implemented in an operational model as well as a climate model. As fog is a critical weather phenomenon that is challenging to forecast, this

study is a welcome contribution on the understanding of the fog.

Remarks: Abstract: -"Improvements to the representation of cloud droplet concentration" -> it is more correct to say that you implemented a reduction of the concentration.

Structure: In general the paper is well written, though I recommend the paper structure should be a bit more clearly presented in the beginning of the paper. The paper contains a discussion of observations, LES, and NWP model and a climate model. Some of these appearances appear a bit as a surprise or are only very briefly introduced, which give the reader a bit the uncertain feeling like "where do we go?". Hence the authors should better introduce why the chain of models presented in necessary to answer the research questions. Just some more details would be appreciated, which would also help to ensure reproducibility.

Figures: I suggest to plot observations in dots and model results as lines so they are more easy to distinguish without reading the caption twice.

Synthesis: I encourage the authors to strengthen the discussion section. Somehow I have the feeling the paper has a bit the nature of a technical report that present the impact of changes in model settings, that are in itself of course valuable, but the synthesis how the current results relate to other studies could be strengthened. At least I am aware of other studies that report on a much smaller sensitivity on the microphysical settings than presented here. As such a more complete synthesis would be valuable.

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