

Interactive comment on “Chemical composition, optical properties and radiative forcing efficiency of nascent particulate matter emitted by an aircraft turbofan burning conventional and alternative fuels” by Miriam Elser et al.

Anonymous Referee #2

Received and published: 11 January 2019

The manuscript "Chemical composition, optical properties and radiative forcing efficiency of nascent particulate matter emitted by an aircraft turbofan burning conventional and alternative fuels" describes test rig measurements on a CFM56 engine using a series of different HEFA blends. Particles in the engine exhaust were characterized with filter OC/EC measurements and PAX/CAPS instruments. The results were used to estimate the radiative forcing of the particles in the atmosphere.

The manuscript covers a topic of current scientific interest and the experimental details are sound. However, some assumptions with regard to the radiative forcing are rather

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bold. It is presumed that the particles at the engine exit plane on a test rig are similar to particles behind the engines inflight. It is not clear to me if the authors considered changes to the particles in the contrails. The authors do not discuss limitations of their study but I think this is vital for the manuscript.

With regard to the impact of the HEFA blends, the authors conclude that “the particles originated from the combustion [...] seem to be equivalent in terms of their normalized optical properties and only their concentration change” (page 11). Huang et al. analyzed the particle morphology in the APEX III campaign. They conclude that “Such dependence upon combustion indicates that PM from alternative fuels will be different from that by JP-8. Models of PM formation in turbulent reaction environments will need to include such variations for accurate prediction. Accordingly optical properties and surface chemistry will vary too.” (Huang, C.H., Bryg, V.M., Vander Wal, R.L., 2016. A survey of jet aircraft PM by TEM in APEX III. *Atmospheric Environment* 140, 614-622). This finding does not fit to the statement in the current manuscript. The authors are recommended to discuss this discrepancy and the uncertainty of their findings.

Overall, estimating the global impact of particles in the atmosphere based on one ground measurement of an in-service engine might be not valid enough. Nevertheless, the fuel variation experiment and its results are important for the current discussion of extended use of alternative fuels in aviation.

Interactive comment on Atmos. Chem. Phys. Discuss., <https://doi.org/10.5194/acp-2018-1171>, 2018.

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