

Atmos. Chem. Phys. Discuss., author comment AC1
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Reply on RC1

Tiziana Bräuer et al.

Author comment on "Reduced ice number concentrations in contrails from low-aromatic biofuel blends" by Tiziana Bräuer et al., Atmos. Chem. Phys. Discuss.,
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Thank you very much for your preliminary comments and your motivation to improve the paper. Please find our answers below:

- We will follow your suggestion and add the equation we used to calculate the extinction coefficient.
- We will follow your suggestion concerning line 101.
- We will consider to add a plot of the temperature and relative humidity distribution with altitude during the ECLIF II/NDMAX experiment (maybe as a subfigure of Figure 3 or 5).
You can find a corresponding plot in the publication 'Airborne Measurements of Contrail Ice Properties – Dependence on Temperature and Humidity' submitted to Geophysical Research Letters by Bräuer et al. in 2021, DOI: 10.1029/2020GL092166. This publication focused on the effects of ambient conditions during ECLIF II/NDMAX on contrail microphysics.
- We will consider to add particle size distributions. You can find three particle size distributions for different flight altitude ranges in the publication mentioned above. There is also a discussion of the FFSSP data extrapolation between a particle diameter of 0.5 and 1 μm in the supporting information of the above-mentioned publication. If you suggest it, we can add a detailed description of the FFSSP data extrapolation to the manuscript (see below).

To account for ice particles smaller than 1 μm , a correction factor was applied to the FFSSP number concentrations. The factor is based on contrail ice particle concentrations measured by the Cloud and Aerosol Spectrometer (CAS), which was also on board the DC-8 during the ECLIF II/NDMAX experiment (mounted at the wing-tip). It has a diameter size range between 0.5 and 50 μm . A function was fitted to the ratio between the total CAS number concentration and the CAS number concentration for particles larger than 1 μm . The CAS concentration ratios used for the fit were determined per second for the flight on 24 January 2018 and vary with the contrail effective diameter. By multiplying the FFSSP ice number concentrations with the size-dependent correction factor, which was determined through the above fit, we account for particles between 0.5 and 1 μm . The error of the correction factor increases with decreasing effective diameter. Particles smaller than 0.5 μm are still not considered as these ice particle sizes are not measurable by current in situ instrumentation.