

*The revised manuscript is acceptable, but in light of the argument that the model results "do not actually exclude an impact of aviation soot at the local level under certain conditions" they should actually compare their predicted Ni for the conditions sampled and reported in Gross et al (2023). Gross et al. found a median Ni of 0.05 / cm<sup>3</sup> in their high PLDR region and 0.11 / cm<sup>3</sup> in their low PLDR region. If your model does not find such a difference for these same conditions, either the model parameterization of aircraft is incorrect or perhaps the metallics emitted from aircraft could explain the Gross et al (2023) observations. This comparison could thus point to the need for further research or further support your simulations.*

We are grateful to the referee for this suggestion.

We have repeatedly carried out this analysis as part of our long-standing collaboration with Silke Groß's group at the DLR Institute of Atmospheric Physics.

A first attempt was done with the help of the pioneering measurements by Urbanek et al. (2018), but with an earlier model version that lacked full ice-cloud physics. We recently repeated the analysis with the current model, which incorporates an enhanced cirrus parametrization and additional diagnostics that extract simulated data along the flight trajectories, thereby improving comparability.

While the model reproduces the correlation between  $N_{ice}$  and depolarization ratio in some cases, it fails to do so in others, and no clear trend emerges from the simulations. Consequently, robust conclusions cannot be drawn.

A major challenge in these analyses is the difficulty of matching the campaign conditions in the model (weather, cloud cover, dynamics, emissions, etc.). We therefore approached the problem from a climatological and statistical perspective, which again showed that internal climate variability is too high to isolate a clear effect.

The influence of aviation soot on ice-crystal number concentration is also hard to disentangle when comparing different flights, because other ice-nucleating particles (e.g., dust) and local dynamic conditions such as updrafts vary between cases.

Despite these challenges, these comparisons remain an active focus of research at our institute and we aim to provide more robust insights in the future. A sentence has been added in the conclusions to remark this perspective: **"Targeted model experiments that more closely match the conditions of the measurement campaigns could help disentangle the causes of the observed correlation, although global climate models struggle to reproduce such specific conditions at fine temporal and spatial scales. This is nevertheless worth to be investigated in follow-up studies."**

*Optional on line 241: "coinciding with ice crystal size" => coinciding with larger ice crystal size.*

This has been corrected. Thanks for spotting.