The manuscript of Mason et al. deals with optimization and validation of a combined aerosol particle collection and freezing technique to determine atmospheric ice nucleating particles (INP), which is relatively new in its current state (2013). As actual INP measurement decades still differ by an order of magnitude in their concentration readings, such work is crucial for the progress of INP research. The authors come up a the end of their experiments with correction parameters for the MOUDI-DFT technique, which are in the range of 0.7 to 2.0, in average correcting for an underprediction of INP by this technique. Given the comparatively large differences between MOUDI-DFT and their reference technique CFDC (factors of 1.1 and 3.8), however, obviously there are more biases to be regarded in future (not necessarily in the MOUDI-DFT technique only). The paper is concisely written and the results are adequately presented. Appropriate reference to previous work is given. Therefore, I recommend publication after some minor corrections.

We thank the referee for his helpful comments!

General remarks 2233/13-16: 3 or 4 samples were used for calculation the correction parameters. It didn’t become clear to me from the manuscript, however, whether the aerosol density data and the confidence intervals were calculated from all samples as a single dataset or for each sampled glass slip separately. Basic question: is there a difference from sample to sample in the corrections derived from the data displayed in Figs. 4 to 6 and the resulting functions shown in Fig. 9, or are they identical or at least very similar for each sample? I would suggest demonstrating this at least in one graph.

The normalized particle concentration as a function of distance from the deposit center was calculated for each cover slip individually. What is reported in Figs. 4–6 is the average of all cover slips with uncertainty as the 95 % confidence interval, which is related to the sample-to-sample variation. In the revised manuscript, instead of 95 % confidence intervals we report the standard deviation as this better illustrates sample-to-sample variability. For clarity the sentences of 2235/10-16 have been revised to the following:

“The normalized particle concentration, which is the quotient of the particle concentration of a given step divided by the maximum particle concentration, was calculated as a function of distance from the center of the MOUDI aerosol deposit for each hydrophobic glass cover slip at spatial resolutions of 1 and 0.25 mm. Visual inspection of aerosol deposits showed that there was spatial variability of the particle concentrations at a spatial resolution as low as 0.10 mm for MOUDI stages 6–8, so
these stages were also analyzed at this spatial resolution. A total of three hydrophobic glass cover slips were analyzed for stages 2 and 8 and four hydrophobic glass cover slips for stages 3–7.”

The statement at the beginning of Sect. 3.1 (2238/3-6) has also been revised for improved clarity:

“Shown in Figs. 4, 5, and 6 are the normalized concentrations of aerosol particles as a function of distance from the center of the MOUDI aerosol deposit at spatial resolutions of 1, 0.25, and 0.10 mm, respectively, when averaged over all analyzed samples. The uncertainty in Figs. 4–6 is the standard deviation of these samples.”

There are some forward references (‘see below’, etc.), which make the manuscript at some points not so easy to read. Please give this a critical read and revise, if possible.

References to “see below” or similar directions have either been removed or revised to direct the reader to specific sections.

Minor remarks/corrections: 2227/14-15 and 2228/1: Why were these previous methods limited to > -25°C and the current one not?

Previous methods were likely limited to ice nucleation temperatures of approximately -25 °C or greater due to significant interference from background freezing events at lower temperatures. In the current technique, background freezing events didn’t occur until close to homogenous freezing temperatures, approximately -37 °C. Background freezing events at temperatures of -25 to -37 °C were prevented by using small droplets and hydrophobic glass cover slips, which do not provide efficient heterogeneous nucleation sites. The sentence at 2227/14-15 has been revised to the following:

“These methods have all been limited to freezing temperatures of approximately -25 °C or greater, likely due to significant background counts at lower temperatures.”

2228/24-2229/16: This reads rather like a summary of a part of the paper than an introduction. I suggest revising and shortening to a few sentences just outlining the approach.

This section has been revised to the following:

“In the following paper we improve on the MOUDI-DFT approach. We first measure the concentration of particles on the MOUDI aerosol deposits as a function of distance from the center of the deposits to determine aerosol deposit non-uniformity. We then use these non-uniformity measurements to build substrate holders for the different MOUDI stages and calculate correction factors to be used when determining INP concentrations using the new substrate holders.”
Having as first Fig. reference a no. 9 might raise objections from the technical editor.

The discussion of the blank freezing experiments has been moved to Sect. 3.5 to avoid Fig. 9 being the first figure referenced in the text.

Consider a new paragraph before ‘To determine. . .’

As suggested, a new paragraph has been inserted before “To determine…” on page 2230.

It appears to me that Eq. 2 is only valid if the aerosol density on the substrate is low, i.e. no particle is deposited touching another. Could you comment on that, and if the case, include the restriction?

We are not sure why Eq. 2 should only be valid if the aerosol density is low on the substrate. In order to comment on this, we will need additional information. Sorry that we don’t understand.

This figure is practically useless in current state due to poor resolution. However, I think it makes sense in the manuscript to present it, so I suggest a) taking care that it comes with sufficient resolution in online / print version (let it span the whole page) and b) additionally somehow illustrating the changes in particle density, e.g., by drawing a graph showing the particle density per area as function of the distance of the deposit center in parallel above the image.

The resolution of Fig. 3 was improved and a panel showing the change in particle concentration has also been included:

**Fig. 3.** (a) The concentration of aerosol particles on MOUDI stage 8 as a function of distance from the center of the aerosol deposit, measured at a spatial resolution of 0.10 mm. (b) A subsection of the continuous cross-section of the aerosol deposit of MOUDI stage 8. The images have been background corrected by subtracting the sample image from a particle free image. Background correction was done to remove spots on the image from dust on the optics. When overlapping individual images to produce the continuous image, the individual images do not align perfectly in the vertical dimension because moving the hydrophobic glass cover slip in the x
direction using the XY translation stage of the microscope causes slight movement in the y direction.

[9] 2243/22: The following section is rather a summary than conclusions.

[A9] To address the referee’s comment we have changed the title of this section from “Conclusions” to “Summary”.