Title: Revisiting particle sizing using grayscale optical array probes: evaluation using laboratory experiments and synthetic data

Authors: O'Shea et al.

General Comments:

Very interesting work, with a mix of lab, model and field data.

Yes, it seems having an indication of at least one particle above 67 % on monoscale probes would be useful. It not clear to me, that gray scale probe is much better than a monoscole probe with such a flag.

While the paper states that monoscale OAPs, the ice particles less than 100 um are not usable. The gray scale probes, while better, also may not be that usable. The comparison between the CIP gray and the holographic imager don't agree.

There are many places where comma is missing for introduction phases. This should be correct throughout the manuscript. One example is on page 22 , line 13.

While the papers is typically consistent with the use of past and present tense. The paper's use of present tense for items published and hence "known", and past tense for items in the paper, make things harder to understand in my option. I like past tense for published work and present tense for what is presented in the papers. An example of switching between tense is on page 22 line 5-8, where one sentence is past, then present and then past. In the same paragraph. I would encourage the authors to consider a different tense usage to make things easier to understand of the reader.

Specific Comments:

Page 5 Line 20: Can it be stated what exact droplet generator was used?

Page 6 Line 16: What is the pixel size for your magnification, or range of pixel sizes?

Page 8 Line 8: How are these box and whisker plots, look like a histogram plot?

Page 9 Line 3 and 4: How is the droplet diameter estimated. Not just the print head size since Figure 3 and 4 and different. Figure caption should state how the estimate is done.

Page 15 Line 2: What is the difference between the left and right rows? How about a label across the top?

Page 16 Line 15: What type of particles? Assume it is liquid spherical droplets? Important to state that these are liquid droplets, right?

Page 17 Figure 9. Can the printhead size be include as label or title in the plots themselves?

Page 17 Figure 9. Can the figure caption state that this is for a 15 um CIP measurement?

Page 18 Line 6: "Similar" to what? Figure 8 and 9? Please state.

Page 21 Line 2: Figure captions should provide all details necessary to understand what is presented; Hence, should not include "this period" but directly state the time period and date. Move details about the figures out of the text and into the figure caption. Many figure captions do not provide the necessary details.

Page 21 Figure 10. For this time period. Are there out of cloud measurements? At is the minimum concentration for 1 Hz measurements for the time period? The CDP spectrum does not seem smooth like I would expect, at 30 um the concentration doubles from one channel to the next. Why such a change in concentration from one channel to the next?

Page 21 Figure 10: I don't understand having such a large range of values. Hard to see the CDP/CIP overlap, which is what is important. Can the plot not be done from 10 to 100 um diameter and on a linear scale?

Page 22 Line 8: Do you mean figure 11a instead of figure 10a? Again details need to be in the figure caption, not the text.

Technical Corrections:

Abstract: Page 2 Lines 1-3: Abstract states, "We make .. and We also raise..." Can the main specific recommendation about grey scale OAP and bias in OAP without Greyscale be simply stated in the abstract?

Page 6 Line 8: Need space between number and unit, dwelling for **3 s**.

Page 6 Line 12: Use complete sentence, no verb.

Page 11 Figure 5. Can you put the detector intensity on the left side of these images, adjust figure caption? Also, this is for CIP with 15 um pixels, right? Figure caption should include this information.

Page 11 Line 6 The “middle palnel” of what figure?

Page 14 Line 7: Need comma, “position, we” Likewise Line 8 needs comma.

Page 16 Line 1: Be direct and state equation. “Equation 3 allows ...”

Page 19 Line 4: Another example of not having a comma for the introduction clause. Please check full manuscript for this issue. “concentration, the” comma required. Another example, page 19, line 17.

Page 20 Line 2: Space between value and unit. 14 ^{0}C. This issue occurs several places in manuscript so check all units/values.