

Atmos. Meas. Tech. Discuss., referee comment RC3
<https://doi.org/10.5194/amt-2020-515-RC3>, 2021
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Comment on amt-2020-515

Anonymous Referee #3

Referee comment on "Drone measurements of surface-based winter temperature inversions in the High Arctic at Eureka" by Alexey B. Tikhomirov et al., Atmos. Meas. Tech. Discuss., <https://doi.org/10.5194/amt-2020-515-RC3>, 2021

The authors present field deployments testing two types of quad-copters in the harsh conditions of the high-Arctic in winter. The technical description and challenges are relevant and clearly articulated. In general, the work presented here seems very useful for the establishment of high Arctic measurements by drones. Nevertheless, some of the technical issues discovered were only stated but no possible amendments were suggested/applied. Also, the presentation of the results needs some augmentation, especially when comparing to local measurements. More statistical analysis and discussion might be warranted, especially since the current study findings show much deeper inversions than previously suggested for the Arctic (versus the Antarctic).

Minor comments:

Line 17 in the abstract: agrees well with the one (one comparison seems odd)

Line 56, positively correlated with what?

Line 99-100, sentence too long; consider parsing

Line 123, on SBI shaping

Line 144, specification of 0.1 m

Line 168, the results showed good agreement (can you please specify the correlation coefficient? Number of data points?)

Figure 5 and its discussion: the results shown are for one short profile. I would expect seeing some additional statistics and comparisons with the FT and radiosonde data during the campaign duration, to support or decline the proposed biases and/or agreements.

Also, the temperature measurements show lapse rates much higher than previously observed in the Arctic region and this also calls for some additional discussion.

Lines 355-357, the temperature profile differences between the passes in Figure 7 are not always "slight"; there are some variations of 1 degree (subplot c), which warrants more attention. Is there a reference instrument that can attest to the change in ambient conditions over this time?

Figure 9 caption: probably course and not coarse

Line 370, not able to maintain

Figure 10, it is interesting to see the better agreement for the FT flights; is this a coincidence or the result of the location/specific conditions? Were additional comparisons were made with the FT?

Fig.11-12, I think there is room for further discussion of the results, especially on the different profile shapes on the different days and their similarity (dissimilarity) on the different days in the gully vs. the runway. For example, profile shapes in Fig. 12 seem similar but shifted between the gully and runway, while Fig. 11 shows more similar trends. More discussion on the conditions and why we see these results.

Line 413: Field instead of Filed

Lines 413-415, while IR sensor and a Lidar can be a valuable addition, these are much heavier instruments and more complicated installations, so mentioning their addition as a side-note might not be appropriate without further scrutinization. Maybe state the expected challenges from such add-ons.