Atmospheric Measurement Techniques Discussions

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Comment on amt-2021-135

Anonymous Referee #2

Referee comment on "An unmanned aerial vehicle sampling platform for atmospheric water vapor isotopes in polar environments" by Kevin S. Rozmiarek et al., Atmos. Meas. Tech. Discuss., https://doi.org/10.5194/amt-2021-135-RC2, 2021

ref report notes

An Unmanned Aerial Vehicle Sampling Platform for Atmospheric Water Vapor Isotopes in Polar Environments

Rozmiarek et al, AMTD

This paper describes the use of a professional UAV for atmospheric sampling, in this example for water vapour isotopes above central Greenland. Such a platform is a welcome addition to ground-based measurements, especially under hars conditions such as in this paper.
The data presented are still only a few, not enough for new scientific insights, but enough for the proof of principle, and as such this paper fits the AMT journal.

I have several (smaller) comments and remarks, and I invite the authors to use them for slight changes in the paper.

2.4 I'd like a bit more details on the used UAV: power, total stored energy, the actual payload in kgs, and the way of launching (only later in the paper it becomes apparent it is launched by some 12G launching system). Of course, the list is in the appendix, but some key numbers in the main text would be welcome.
What is the mass of the flasks used?

Table 1: the numbers within parentheses seem too large, especially for SPGSW, which is

so close to SLAP2 that virtually only that uncertainty would add up to the primary uncertainty: (0.2^2+0.3^)≈0.36‰

line 290 the ‰ sign (or the word per mil) is lacking twice

Figure 5 and text. Sure d-excess is a powerful comparison; nevertheless, the individual isotopes D and 18O themselves would be equally interesting. As d-excess from the pods is somewhat higher than that of the tower, it would be interesting to see if this is caused by D or 18O, or an interplay of both.

Line 308: The "Euclidean distance in the measurement domain" is also explained in appandix D, please mention that in the text.
And what is the difference between that and 'just' taking for example the average of the height of the max gradient in water vapor content and similar in other parameters?

Figure 6 also indicate the PBL that you actually took, based on your in-flight method at the time.

lines 345-350. While I of course see the advantage of taking duplicate samples, the alternative would have been 6 (or 8) altitudes, with also advantages! Why has the duplicate choice been made? (or one duplicate and 4 single ones, or any other combination). Would you choose differently for the next campaigns? May be something to discuss in the conclusions and outlook chapter?

Line 373 what is AGL ? Caption figure 7 gives meters ABL ? The plots all simply state "height"

Fig 8 only shows the d2H (18O is in the appendix). Apparently the authors do not think the isotope measurements are worth a 2H-18O relation plot (or d-excess for that matter)? Perhaps the July 12 points would be worth a plot or table for the 2H-18O relation?
Or alternatively still a third horizontal axis in fig 8 and show the 18O's as well (different marks color, and slightly displaced in height).

The conclusions are a bit long compared to the rest of the text, so it can be shortened, and renamed "conclusions and outlook", as the last paragraph is about the future perspective (and need not be shortened).