

## **Response to Anonymous Referee Comments**

We would like to sincerely thank the anonymous referee for once again taking the time to review our manuscript and for their helpful comments. Each referee comment is given below in ***bold italics*** followed by our response to the comment. The line numbers provided in our responses refer to line numbers in the revised manuscript.

***Review of the second revised version on***

***An overview of the vertical structure of the atmospheric boundary layer in the central Arctic during MOSAiC***

***By***

***Gina C. Jozef, John J. Cassano, Sandro Dahlke, Mckenzie Dice, Christopher J. Cox and Gijs de Boer***

***In my view, most of my criticisms of the 2nd version have been satisfactorily addressed and the manuscript is now much improved and much easier to read. Above all, the quality of the illustrations is now quite convincing, especially in comparison with the first version. I still have a few minor points to consider and then the paper can be accepted.***

***In Table 1: How can the inaccuracy of the friction velocity in the METEK-Sonic be less than the velocity measurement itself? This doesn't make sense to me at first glance, but it may still be correct, especially since the inaccuracies seem to be defined differently.***

$u^*$  (friction velocity) is an expression of the Reynold's stress normalized by the fluid density. While the units of  $u^*$  are m/s, the metric is not comparable to the horizontal wind velocities.  $u^*$  is a fictitious velocity whose absolute value is even generally smaller than the uncertainty in wind speed. It is derived from the covariances of the components of the 3-dimensional wind field. While these vector components have the larger uncertainty you refer to, they are themselves derived from a common acoustic measurement such that the error is shared, reducing the uncertainty in a relative calculation of their co-variability, e.g.,  $u^*$ .

***In Figure 6, the figures at the upper edge could be enlarged a little; I think there should be enough space and if it is not too much effort, I would do it.***

Did you mean to say that “the numbers at the upper edge could be enlarged a little” in Figure 6? Assuming this is what you had intended to say (as I cannot determine what “figures at the upper edge” would mean), we have made this change (line 544).

***About the LLJ and the interpretation of Egerer et al, 2023:***

***Probably this was a misunderstanding as Egerer et al. provide one of the most comprehensive sets of observational data including local turbulence, so I would not suggest deleting this citation, but I agree with your revised sentences and think it would be fair to include Egerer et al. like the other references.***

We have added the Egerer et al., 2023 citation back into the manuscript at this point (line 81).