

General Comments:

The paper entitled, 'High resolution wind speed measurements with quadcopter UAS: calibration and verification in a wind tunnel with active grid' presents the validation results of UAS-based wind estimates obtained by performing flight experiments in an open-section wind tunnel with an active grid. The UAS wind estimation performance was assessed by varying flow conditions and the aircraft's sideslip angle. This work is important to understand the reliability of UAS in measuring wind speed and turbulence within the planetary boundary layer. However, the authors need to address the following points before I can recommend publication in AMT.

Specific Comments:

Line 1: The manuscript states, "As a contribution to closing observational gaps in the atmospheric boundary layer (ABL), the SWUF-3D fleet of unmanned aerial systems (UAS) is utilized for in situ measurements of turbulence." Here it would be helpful to tell the reader what scales of turbulence the SWUF-3D platform is able to resolve.

Line 2: The manuscript states, "To date, the algorithm for wind measurement has only been calibrated in the free field." Here the authors need to specify which specific algorithm they are referring to. Additionally, it's unclear if the authors are using the words 'turbulence measurement' and 'wind measurement' interchangeably. If not, and therefore the authors need to make the distinction between turbulence and wind velocity measurement with more clarity.

Line 10: The manuscript states, "our analyses show that the uncertainty depends on the wind speed magnitude and increases with higher wind speeds, resulting in an overall root-mean squared error (RMSE) of less than 0.2 m s^{-1} ." However, it is not explicitly stated which type of uncertainty the authors are referring to.

Line 12: The manuscript states, "The maximal RMSE occurs in the most extreme velocity steps (i.e., a lower speed of 5 m s^{-1} and an amplitude of 10 m s^{-1}) and exceeds 1.3 m s^{-1} . This result seems to contradict the result reported in Line 10.

Figure 1: It would be helpful for the authors to denote the distance between the points a, b, and c, as well as the position of all 7 CTAs and the Prandtl probe in Figure 1. Additionally, since the calibration experiments were performed in a wind tunnel with an open test section, were any experiments performed to quantify the wind field differences across points b and c?

Line 100: The positional drift should be reported in units of distance (i.e., m) instead of units of speed (i.e., m s^{-1}).

Line 101: The manuscript states, "As wind speed increases, the intensity and direction of the drift change without a discernible systematic, which required constant adjustment counteracting the drift during the test flights. These adjustments were executed by the remote pilot through a manual trim." It would be useful for the reader to know if the manual trim remained constant across all test cases, and if any experiments were performed to quantify how the manual trimming affected the accuracy of wind estimates.

Line 123: The manuscript states, "Test runs with no UAS show that all CTAs measure the equivalent wind speed with sufficient accuracy: the standard deviation of the measured wind speed of the individual CTAs

is less than 0.05 m/s.” Is there a figure showing these results? Why not use instead the absolute error or root mean squared error to compare the performance of CTAs? Additionally, did the authors perform an analysis to determine the error between the CTAs and the Prandtl probe?

Line 135: The manuscript states, “Careful quality checks were carried out for the CTA measurement data and corrupted data was sorted out.” It would be useful for the reader to know the process or criteria that was used to validate the quality of CTA measurement data.

Line 148: It would be useful for the reader to know which specific optimization algorithm was used to estimate the calibration coefficients for Eq. 1.

Line 150: A reference is needed for ISO 17713-1:2007

Table A1 is missing entries in column two

Table A2 is missing entries in column one

Table A4 is missing entries in column one