Referee Report on
The DataHawk2 Uncrewed Aircraft System for Atmospheric Research

The authors present an overview of their updated version of uncrewed aerial system (UAS) designed to simultaneously measure different thermodynamic properties of the atmosphere including turbulencs. The paper does a good job of reviewing the different components of the systems on the aircraft and provides evidence of validation of the successful operation of these systems.

I found the paper to be well written and, as noted, each system is generally well described. This information is potentially useful for other researchers interested in developing their own UAS, or for researchers who are interested in the data produced by the DataHawk2 who may wish to know more details about the systems which produced the data. I therefore recommend the article for publication in Atmospheric Measurement Techniques.

I did feel, however, that although the authors described the aircraft systems in great detail, they did not provide much information about the sensor data acquisition process, particularly given the asynchronous mix of what I expect would be both analog and digital data streams. Given that the role of the UAS is to essentially be a platform to carry the sensors, it is important that the system used to acquire and store the sensors' signals be described in more detail. For example, presumably the output from the fine-wire array is analog, what is the resolution of the ADC? Does it support serial communications? if so, which ones? How many sensors of different types can it support? How does it handle the asynchronous messages and ensure their timing? etc.

Other, minor comments that I also feel should be addressed before publication are as follows:

1. [Line 84] Although the authors use the more contemporary description of uncrewed aircraft systems, they still refer to traditional aircraft as manned aircraft. Perhaps rephrase to refer to crewed aircraft instead for consistency.

2. [footnote on page 2] I would also add unmanned/uncrewed aerial vehicles to the list of other designations used to describe UAS.

3. [Line 147] The DH2 acronym used for DataHawk2 is already defined on line 106. Also, once DH2 is defined, the authors occasionally seem to return to using the full name of DataHawk2 (e.g. lines 158 and 171)

4. [Section 2.3] Is their a reason that solar shielding has not been used for the RSS-421?

5. [Line 324] The authors mention a post-flight calibration process but do not provide the details until much later. Perhaps indicate to the reader that this process will be described in a later section.

6. [Line 382] As above, the wind comparison to the radiosonde is conducted prior to the description of how winds are obtained from the platform.

7. [Line 428] The authors mention their use of both ascent and descent portions of the profiles during calibration to cancel out lag-induced-offsets. This is the first mention of these offsets and no information is provided about their source. Are they due to sensor time response? Data acquisition system timing? More details are required.

8. [Line 458] The authors are using the pitot sensor for calibration of the hot-wire through spectral comparison. Frequency response of the pitot probe will play a role in this calibration and should be mentioned.

9. [Line 465] Which Kolmogorov constant is used by the authors in the inertial subrange model used to determine the dissipation rate? More details about this process would be beneficial.

10. [Figure 5] The authors present example spectrum to demonstrate the cold-wire measurement capability. A similar plot for the hot-wire should also be provided.

11. [Line 542] I would argue that the difference between the hybrid approach and radiosonde is as high as 2 m s−1 in the lowest 200 m of measurement. Do the authors have any insight as to why the disagreement of is approach with the traditional approach increases at lower altitude?

12. [Line 543] The authors mention confidence intervals for the wind estimate, but I could not find a description of how these intervals were determined.

13. [Line 563] The authors use the more-traditional capitalization of Pitot here, whereas in the rest of the manuscript the contemporary non-capitalized form is used. I believe AMT prefers the more contemporary form.