As I said in my previous review, I am a strong supporter of the utility and benefit of automated aircraft reports to fill the time and space gaps left between other in situ observing systems. Upon rereading the article "Drone-based meteorological observations up to the tropopause a concept study" by Barfüss, Schmithüsen and Lampert, I feel that it is now ready for publication after a few minor changes. Some of my reasoning for this decision for the suggested changes is summarized below. I apologize for some possible disjointedness in the review, but that may in places reflect the need for more organization in the paper's organization.

To start, I thank the authors for their continued efforts to improve the paper. The current version is much more informative and leave many fewer points unresolved.

The introduction remains essentially unchanged and includes very little discussion of problems that other authors have documented with automated reports from commercial aircraft that should provide a far more stable platform for collecting data and providing representative measurements or the atmosphere without being affected by artifacts related to aircraft stability. For example, AMDAR wind observations from longer-range aircraft are much more accurate (by a factor of 2) than TAMDAR reports obtained from smaller/lighter regional jets. Possibly more distracting to is the statement in the first sentence of the Abstract reads "with large data gaps in the atmospheric boundary layer, above the oceans and in polar regions", with only a brief mention of that "the feasibility of reaching an altitude of 10 km with a small meteorologically equipped drone is shown." Through the remainder of the text, the utility of the drone observations, however, is judged by the ability to reach 10km in a polar environment. The Abstract should be revised accordingly.

Grammar and word choice continue to present problems throughout the paper. For example. In line 77, the term "Breakthrough requirements" is not defined. Are these "new' requirements or mesoscale requirements that were never intended to be fully met by GOS. Although lines 77-83 attempt to clarify this issue, inferring that 100 km horizontal and 1 km vertical resolution will not be sufficient to meet also local and regional needs, especially without a clear statement of temporal frequency.

In line 89, the term "back in the 60ies" should be "60s", or better should be simplified to "at that time". Also, in line 89, replacing "using binoculars" with "using theodolites" would suggest that the observations could be quantitative, not just qualitative.

Lines 98-105 – The idea of using this application in the future is intriguing, but it must be noted that it will only have benefit if the full-resolution data can be downlinked and distributed in real time, which can't be done with the current system.

Line 122 – Add "extremely low specific humidities" to the list of challenges after "temperatures"

Line 131 – Replace "to play . . . and" with "as a future alternative to"

Line 156 – Replace "for a time period of" with "episodically over"

Line 167 – Be more direct at beginning of sentence by eliminating “trade-off” notion with “The LUCA system was designed . . .”

Line 171 – Replace ‘Applying wind speed condition” with “Restricting wind speed conditions”

Line 178 – Are you saying that LUCA will operate at times when radiosondes will fail, e.g., in conditions of “rainfall, snow, heavy turbulence and within clouds”. No proof for that statement is shown, unless drones were launched alongside every radiosonde launch. This needs to be clarified.

Line 190 – The fact that 45% could severely reduce the number of drone profiles that are available, making the system appear to not be “all weather”. Can you estimate how many LUCA flights would be missed due to the potential for icing?

Line 198 – Add “shown here” after “flights” and be clear whether an icing sensor was in fact installed, not just “prepared to be installed.”

Line 220 – It would be good to include the typical ascent rate values along with the other performance specifications here so the reader doesn’t have to hunt through the paper to find them

Line 236 – What is the meaning of the first sentence? It could be read to imply that multiple sensors were used for each atmospheric parameter being measured. Eliminating it removes nothing of value from the text.

Line 241 – Mention should be made both that the radiosonde sensors were designed to have a low ventilation rate as the balloon drifts with the wind and that a drone travelling at constant air speed of 28 m/s will have much greater ventilation rate. How is these accounted for? If this is discussed later, say so.

I will stop with individual comments here but suggest that the authors review the text thoroughly for other wording errors or inconsistency, if any. Overall, the details of the presentation have improved significantly since the first version.

Lines 290-564 – The authors have provided a very good description of the data processing and error estimation procedures. While the information is extremely helpful, I found that the amount of detail presented distracted the reader from the flow of the paper’s primary messages. As such, I highly recommend that this portion of the paper be moved to an appendix dedicated to the subject.

Line 334 – Are the coefficients the same during ascent and descent? Are these results consistent with documented hysteresis issues using radiosonde-like sensors for TAMDAR aircraft? Table 2 seems to imply that there is no hysteresis during ascent with a warm bias during descent, which is opposite of the TAMDAR results. How much is this a function of the choice of $M \sim 0.07$ in Equation 5?

Line 451 – If the time constant for temperature reports is 21 seconds, please show how that translate into spatial and vertical averaging distances. E.g., does 21 seconds for a drone travelling at 28 m/s (and 10 m/s vertically) in still winds conditions equate to 0.588 km horizontal averaging distance and a 210 m vertical average (~21 hPa near the surface). How would this change with tailwinds and headwinds?

Line 460 – For RH, the question becomes more complicated. For the same still conditions, do3s this mean that the spatial and temporal smoothing at the surface are 0.420 km and 150 m (~15 hPa) respectively, which at 3 km elevation become1.68 km and 600 m (~40 hPa) and at 10 km are longer than the entire flight length (2000 s = 33.33 minutes), therefore making the RH values at high levels reflections of the average RH throughout the entire flight.

---Please include vertical profiles of the horizontal and vertical averaging distances that have been applied to each type of observation somewhere in the text. Figure 11 might be a candidate location.

Figure 5 and text that goes with it. – I like this example. Thanks for creating it.

Line 664 – Clearly state the data set details. As it stands, I don't know whether the statistics were obtained from the profiles in Fig. 9 or from all profiles in Fig. 8 until the second paragraph into the section.

Line 666 – The word "treats" is clearly not correct. Should this have been "threats" or better yet, "factors"?

Figure 10, center top panel (RH) – A shift of the apex of a probability density plot away from zero (in this case toward -2.5%) usually reflects a bias in an observing system. Please include a statement of how the variable time averaging that was applied in line 460 affected this.

Table 2 – Please ad the number "6" before "ascent" and "descent" in the last sentence of the caption. It makes it easier for the reader to understand the sample size.

End of paper – I think that it is still important not to ignore the issue of system and operations costs. That could be incorporated in the future, more extensive testing that was suggested. Because much of the thrust of the paper was addressed at substituting for radiosondes, lack of mention of the question weakens what has become a very good paper.

As I said in earlier reviews, I support concept presented here. With the enhancements that the authors have provided, the paper is now essentially ready for publication, after the small number comments are addressed. Again, my intent here has been to provide constructive suggestions for improving the paper. I do not need to see the final revised version.

I look forward to seeing the article in print – Ralph Petersen