

## ***Interactive comment on “Atmospheric aerosol, gases and meteorological parameters measured during the LAPSE-RATE campaign” by David Brus et al.***

### **Anonymous Referee #3**

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General Comments: The manuscript by Brus et al. presents a summary of the data registered during the the Lower Atmospheric Process Studies at Elevation - a Remotely-piloted Aircraft Team Experiment (LAPSE-RATE) by the Finnish Meteorological Institute (FMI) and the Kansas State University (KSU) team. This campaign was conducted in the San Luis Valley of Colorado (USA) during July of 2018. Data collected with small Unmanned Aerial systems (sUAS) and ground-based instrumentation includes aerosol particle number concentrations and size distributions, concentrations of CO<sub>2</sub> and water vapor, and meteorological parameters. This review is exclusive of the material included in the manuscript and it is not an analysis of the datasets cited in line 11. This appears to be a straightforward manuscript to read but there are some major concerns in the

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specific comments below. Once the revision appropriately addresses all comments, the final manuscript should be evaluated again.

Specific Comments: 1) Because many other teams participated in the campaign and collected similar parameters, it is recommended to make the title specific to the participating teams in this manuscript (FMI-KSU flight team as mentioned in line 34). 2) l. 4: Define “FMI” here and remove it from line 35. 3) l. 5: Define “KSU” here. 4) l. 38: Define SLV. 5) l. 63 and l. 82: The manuscript should mention the thickness of the polylactide (PLA) foam cover to protect the sensors from solar radiation and display an image. This material is not really protective from the photons of the sun. The statement that “... the surface sensor module was covered from all sides with PLA foam to protect sensors from solar radiation ...” is also questionable as it would be expected that at least a percentage of photons should have made it through the PLA layer. 6) l. 64-69 and l. 153-154: From the cited paper by Barbieri et al. can be concluded that if the BME280 sensor was not forcefully aspirated, the measurements are not reliable (and there is a lag). This appears highly problematic for the work in the manuscript to provide valid data. The pressure, temperature, relative humidity sensors mounted in the second rotorcraft suffers the same problem. In conclusion, the applied compensation to the Vaisala GMP343 sensor for pressure, temperature, relative humidity (obtained from the BME280 sensor) in the postprocessing step for reporting data will only yield invalid data (for example data in Figures 2 and 3, which captions should clearly indicate the sensors used). The information in Table 1 is not valid for the BME280 sensor as mounted and operated in this work. 7) l. 89-90: Details of the custom electronics should be provided here for reproducibility. 8) l. 156: The laboratory calibration for both CO<sub>2</sub> sensors needs to be disclosed in this manuscript. 9) l. 20-23: There are a number of relevant publications in this sUAS research that should be included here to diversify the reference list and expand it from the work of the authors. The authors are encouraged to check for other new literature to be covered in this part of the introduction. 10) l. 186-187: Similar arguments for reporting only data in the ascent direction have been reported by others but have not been referenced here. 11) Figure 1 should

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include in panels A and B a reference line to indicate length.

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