The authors would like to thank Reviewer 3 for their comments on this paper. These comments have been reproduced here in black font color, and author responses are included in red.

summary: The authors describe measurements of the CopterSonde 2 remotely piloted aircraft systems (RPAS) over complex terrain in the San Luis Valley, Colorado. TheCopterSonde 2 and the flight strategy is briefly described, the data processing, availability and quality are discussed. The operations focused on convection initiation studies, diurnal transition studies, internal comparison flights and cold air drainage flows.Coordinated flights shell provide insight into the horizontal heterogeneity. The data set,as a part of the LAPSE-RATE campaign is publicly available.

general remarks: The introduction should explain the scientific goals of the LAPSE-RATE field campaign into more detail. Choice of location, previous measurements on the sight, typical and/or seasonal conditions, wind speeds and direction in this com-plex terrain with regard to synoptic conditions and so on. Further, the applied remote sensing techniques and the other measurement efforts during the campaign should be outlined in the introduction. A global overview of RPAS efforts for ABL studies should be given, rather than highlighting only OU's efforts in the field. The data processing chapter (4) should be moved to the description of the RPAS in Chapter 2 and the Data availability could be mentioned in Flight Strategies (2.2) alongside table 3, for example.The whole section 3 should be strengthened with more plots and details, comparisons to other measurement systems and further evaluations of the described atmospheric thermodynamic and kinematic state.
We have added additional clarification regarding the efforts and remote/in situ instrumentation that supplemented the RPAS data. We agree with the restructuring of the order of sections and have moved the data processing section to be Section 3. As this is an overview of OU's contribution to the campaign, we do not believe it is appropriate to provide a review of the state of the science in this article or detail the other institutions advancements. We have added additional citations to point to our collaborator's efforts in this campaign (lines 51-53) as well as direct interested parties to existing comprehensive reviews on the utilization of RPAS in weather and atmospheric science (lines 24-26).

We believe that providing additional plots and analysis is outside the scope of this article as it is meant to present the data set, discuss how it was collected, and how it can be utilized by other parties. Further analysis on these topics is forthcoming in Lappin et al 2021 and other planned publications.

specific comments:

L6 ff: The data from these coordinated flights provides insight into the horizontal heterogeneity of the atmospheric state over complex terrain as well as the expected horizontal footprint of RPAS profiles. What is meant with footprint? Footprint of the RPAS is confusing.

We agree that footprint is confusing here. We have deleted this phrasing from the sentence and have left the first half of the sentence to highlight how data from all teams could be utilized to highlight variations across the valley.

L18: What kind of conventional remote sensing techniques were applied?

Radiosondes, mobile mesonet units, CLAMPS, and LIDARs were all utilized as a part of the ground based in situ and remote sensing techniques that complimented the RPAS data collected by the participating institutions. That data will be presented in another publication in this special issue, Bell et al (2020b). The reference in the text has been clarified to include both remote and in situ sampling as well as point to this reference, around line 18.

L21: What are the scientific objectives?

As mentioned in lines 17-18 of the previous version, the objective of the campaign was to collect “targeted observations of cold air drainage flows, convection initiation, and morning boundary layer transitions” with RPAS, in situ, and remote sensing instruments. We have rephrased lines 14-20 and added to lines 38-40 to further clarify the campaign's objectives and how we contributed to them.

We have also added additional citations to direct readers to the campaign overview papers in the special issue and the Bulletin of the American Meteorological Society in lines 50-51.

L24-34: What about similar efforts of other institutions?

As this work focuses on OU’s efforts to the campaigns, we will not be discussing our partner institutions here. However, we have added references to these teams’ efforts that are also presented in this special issue in starting at line 51 to assist readers in finding this material.

Figure 1: Does the manuscript include any data of that tower?

No, because this is a photo taken back at our field laboratory in Washington, OK to showcase the RPAS. The data was collected in CO.

L64: Why is Table 4 in the very end and where are the accuracies coming from? What is meant by indirectly?

Table 4 has been brought to Section 2.1 and is now Table 2. The original thinking was that this table is the culmination of the processing and shows explicitly what users will find in the data files, but we acknowledge that this information is useful much more early on in the manuscript. The accuracies originate from the Bell et al. (2020a) study cited in the caption as compared to Vaisala RS92-SGP radiosondes. The “indirectly” comment has been removed for clarity.

L64/L68/L69: Measurements at 10 and 20 Hz should be shown with a spectral analysis. Do the sensor resolve fluctuations that fast? Please provide spectra of an ascend ofthe copter to further discuss the resolution of the sensors.

As described in Section 3, the thermodynamic and kinematic observations are averaged to 3 m altitude bins, which effectively removes the spectral information at the original sampled frequencies. Spectral analysis of these sensors is therefore out of the scope of this data overview paper.

L103-118: Is this section needed?

Yes - it is important to outline how one gets authorization to operate in the National Airspace for people wishing to conduct RPAS work in the future. This is a very important part of collecting the data and may not be obvious to individuals wishing to work with RPAS in the future.

Figure 3 and Figure 4 should be next to each other

Figure 3 and 4 have been combined into one figure.

L137-143: Vague explanations. Please provide further details of how, where and when the feature of interest occur and why this implies the location of CI.

This topic is further investigated in an Atmospheric Measurement Techniques paper, currently in preparation. Commentary about the motivations and methods in the upcoming paper were added in lines 206-209.

Section 3.2: The comparison should include other measurement systems like remote sensing devices, that were on sight. Further, the wind speed is too low in order to compare something. Both systems show unusual wind speed profiles, that do not agree. Maybe not much related to wind speed at all, but to attitude control parameters of the pixhawk autopilot system. Also the wind direction should be shown. Furthercomparison is needed, otherwise this section is not useful.

Because this paper specifically discusses the CopterSonde data collected during LAPSE-RATE, we intentionally chose not to include comparisons to other instruments; however, we have added citations to accompanying datasets in this section. As for the wind profiles, we agree that the comparison presented is not a perfect agreement. We have added a profile of wind direction to Figure 4d. While deeper discussion into the mechanisms behind the possible disagreement is beyond the scope of this data paper, the following context has been added about how winds are derived (lines 234-241): “As discussed previously, the CopterSonde estimates horizontal wind speeds and directions based on a second-order least-squares regression fit between the aircraft's tilt angle into the wind (calculated from three-dimensional Euler rotation matrices) and an Oklahoma Mesonet 10 m wind reference (Greene et al. 2018, Segales et al. 2020). As more sophisticated autopilot-based adaptive wind estimation techniques become available, future studies should leverage this particular dataset along with other ground-based sensors (Bell et al. 2020b) or large eddy simulations (Pinto et al. 2020) to examine the effects of spatial and temporal heterogeneity on instruments located less than 100 m apart.”

Section 3.3: Please provide further information. Time of sunrise and so on.
Local sunrise time in MDT has been added as suggested.

L167 ff:Surface-based vertical mixing, above 300 m relatively steady-state for most of the early growth and entrainment-based heating of the growing ABL are only very briefly derived and need further
Further discussion and analysis is beyond the scope of this paper, whose primary purpose is just to demonstrate the type of data included in this dataset.

Figure 6 and Figure 7: It would be helpful to mark the features in the graphs and provide further data and graphs of the phenomena under discussion.
These figures have been updated with larger font size and annotations.

Section 3.4: Please provide further data and plots. What about wind speed and direction during this period?
We have added a figure summarizing the wind speed and direction profiles during this timeframe. This is now Figure 7.

L208: averaging intervals and time constants are fundamental. Why is it 1 s? Please provide further details and analysis.
The following details have been added (lines 173-179): “Finally, the 3 m averaging interval was chosen under consideration of the average ascent rate (3 m/s) and an approximate time constant of the sensor payload of 2 s. This time constant is based upon experiments during the ISOBAR18 campaign with an older version of the CopterSonde and identical sensors (Kral et al., 2020; Greene et al., 2021, in preparation) where the aircraft was subjected to a series of quasi-step-function inputs between a sauna and the below-freezing environment of Hailuoto, Finland. The averaging interval of 3 m is therefore

approximately double the vertical resolution as predicted by the response time and ascent rate, so further studies will be needed to elucidate the impacts of these decisions."

L210: subjectively omitted? By hand? Algorithms should detect outliers systematically
We agree, and this is an ongoing effort to automate an objective process. With only 3 T and 3 RH sensors and no true "reference" for each vertical profile aside from a ground station (only occasionally), it is not always possible to determine a "most correct" sensor based just on simple statistics like mean and standard deviation. Therefore, our current method requires subjective inspection of each profile to determine which sensors perform the most similarly (i.e., highly correlate together). Usually there is high correlation and low spread, but occasionally the sensors strongly correlate but are separated by a large offset; other times, sensors weakly correlate but have a small offset. Since we have thus far been unable to determine objective thresholds for these features, a subjective perspective is required. This is the same technique in data processing for the vertical profiles compared in Bell et al. 2020a, which identified accuracies of +/-0.5 °C in temperature and +/-2% RH when compared to Vaisala RS92-SGP radiosondes often regarded as a "gold standard". We are therefore confident in this approach, although we do agree that more explanation is warranted.

Lines 180-185 now read as follows: "Because the CopterSondes were outfitted with 3 temperature and 3 RH sensors each, it was necessary to inspect each of their time-series outputs with respect to one another to determine potential outliers. Although an objective method of doing so is ideal, research into this is still ongoing and thus we chose to subjectively analyze each sensor individually. A given sensor was omitted from further consideration if it did not correlate with the other sensors and/or there was a large bias between them (greater than 0.5 °C)."