Atmospheric
Measurement
Techniques
Discussions

Open Access

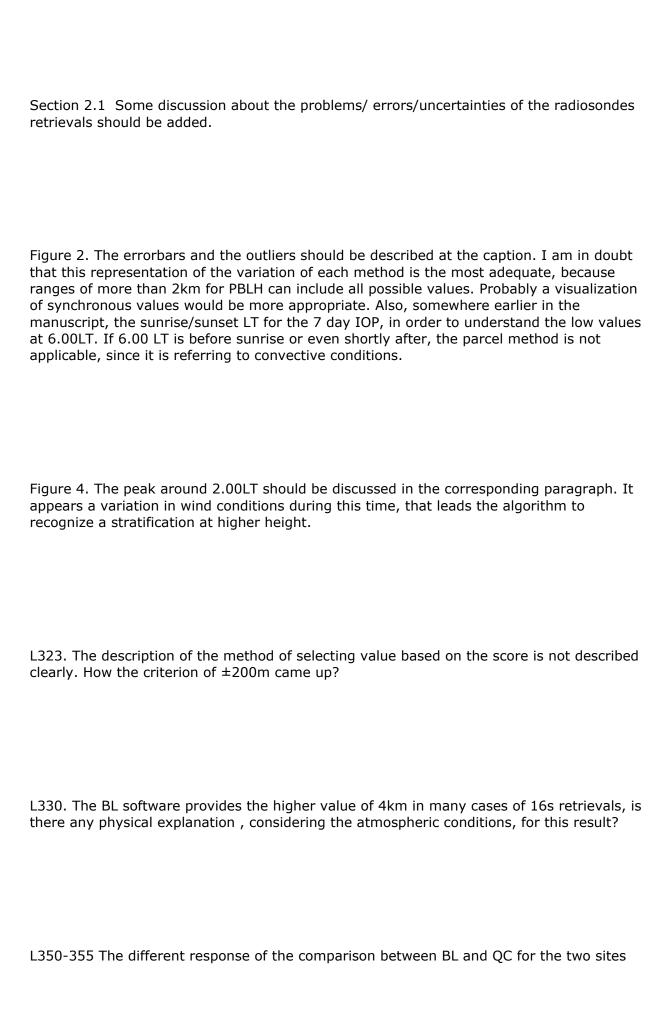EGU

Comment on amt-2021-363

Anonymous Referee #3

Referee comment on "Evaluating convective planetary boundary layer height estimations resolved by both active and passive remote sensing instruments during the CHEESEHEAD19 field campaign" by James B. Duncan Jr. et al., Atmos. Meas. Tech. Discuss., https://doi.org/10.5194/amt-2021-363-RC2, 2022

The current manuscript about the Planetary Boundary Layer Heigh (PBLH) analyzes and compares retrievals from different methods and instruments during during the CHEESEHEAD19 field campaign. This subject is within the agenda of AMT and is of high interest for the scientific community, since it is not common to have this number of instruments in a close range. The work focuses on the differences between methods and instruments and validates retrievals using collocated radiosondes for reference. Case studies of days with different cloud conditions offer a deeper insight of the inconsistencies between the retrievals. The manuscript is well written and all major issues of the methods and the results are discussed, hence I suggest to be accepted for publication after minor revisions.

Specific comments:

Introduction: I think some literature should be added, considering comparisons of retrievals from the instruments used in this study. Also, some discussion is expected about the different definitions of PBL and the known differences among the retrievals based on the variable in study.

Section 2.1 Some discussion about the problems/ errors/uncertainties of the radiosondes retrievals should be added.

Figure 2. The errorbars and the outliers should be described at the caption. I am in doubt that this representation of the variation of each method is the most adequate, because ranges of more than 2km for PBLH can include all possible values. Probably a visualization of synchronous values would be more appropriate. Also, somewhere earlier in the manuscript, the sunrise/sunset LT for the 7 day IOP, in order to understand the low values at 6.00LT. If 6.00 LT is before sunrise or even shortly after, the parcel method is not applicable, since it is referring to convective conditions.

Figure 4. The peak around 2.00LT should be discussed in the corresponding paragraph. It appears a variation in wind conditions during this time, that leads the algorithm to recognize a stratification at higher height.

L323. The description of the method of selecting value based on the score is not described clearly. How the criterion of ±200m came up?

L330. The BL software provides the higher value of 4km in many cases of 16s retrievals, is there any physical explanation , considering the atmospheric conditions, for this result?

L350-355 The different response of the comparison between BL and QC for the two sites

should be discussed. Is there some local or systematic effect that could explain the worst statistics for Lakeland?

L390 I think the idea of an independent dataset selected manually by visual inspection of the recordings can be a valid reference for evaluating the retrievals. Why don't include more data from other instruments for creating this reference databases , specially in cases of sharp gradients?

L420-425. I cannot see radiation information been used, only the cloud information. Please restate or explain. Also, the cloud fraction is the cause of different development of convective Boundary Layer, but the result is not immediate, since some time is needed to propagate the effect to the layer. Hence I suggest to investigate the possibility of correlating the with cloud fractions in a wider time window. More specifically a window including the previous time steps will correlate better due the delay response.

Figure 9, The caption should explain what are the black and grey lines.