Review: "A multi-instrument fuzzy logic boundary-layer top detection algorithm"

The revised manuscript improved a lot. However, there are still several noteworthy concerns as outlined in comments below. All line and page numbers are based on the tracked revised manuscript.

Major comments:

1. How do the authors know the new algorithm, i.e., the second-generation step, improves boundary layer height estimation, compared with the first-generation step? It should be noted that including low-quality data or including non-critical data could jeopardize BL estimates. For example, in Fig. 3, the second-generation algorithm estimated BL height is almost the same as the first-generation ones during the nighttime, only show some differences during the daytime. However, from the description between line 135-139, it indicates that the first-generation estimation is expected to work well during the daytime, but has issues during the nighttime, which is contradictory to what Fig. 4 shows. The new added figure, Fig. 10, shows the same that the second-generation BL height is almost as the first-generation BL height during the nighttime. Fig. 10 b) (top right) even shows that the first-generation BL heights are closer to sonde-estimated BL height at ~18 UTC and 22 UTC. For Fig. 8, it might be better to include the comparison between the first-generation BL heights and sonde-estimated BL heights.
2. The caption of Fig. 2 is still not clear. The caption should be able to roughly explain the figure so that readers do not need to read carefully in the text to understand the figure. For example, what are first- and second- generation variables? Those need to be clear in the caption. Fig. 2c and line 144, how is the temperature inversion height derived from the first-generation step as it only calculates the vertical wind variance? Fig. 2d, is it the inversion height or weighting function? 'inversion weight' is not defined in the text.
3. Line 139-141: the logic is confusing here. It is indicated that a complete failure to detect BL height in the first-generation step occurs when the 'buoyant processes' dominates. If the first-generation step fails, the second-generation step is 'unable to recover'. However, according to the manuscript, the main advancement of the second-generation step is to improve 'buoyant processes' dominated (nighttime) BL height estimates. The question is that if the first-generation step failed and the second-generation is 'unable to recover', how does the second-generation step improve BL height estimates?
4. The terminologies 'buoyant processes' and 'mechanical processes' are confusing. What exactly are 'buoyant processes' and what exactly are 'mechanical processes' in BL? Any references using these terminologies? In BL, we often use 'shear- or buoyant- driven' turbulence.
5. The manuscript states that 'the Harr wavelet transform is not sensitive to the dilation', which contradict with previous studies (e.g., Sawyer and Li, 2013). Why physically 'the

Harr wavelet transform is not sensitive to the dilation' in this case? If it is not sensitive to the dilation length, why choose to use 100 m instead of, for example, 50 m or 300 m?

6. The author's reply to my comment 6: '*The resulting vertical resolution varies with height, from O(10) m to O(100) m spacing; 300 m is the average.*' It is not clear what does 'O(10) m' and 'O (100) m' mean. How come the average is 300 m?
7. Line 315: From Fig. 6 and Fig. 7, it is not sufficient get the assertion that 'there is no indication from this analysis that using high-resolution data necessarily yields more accurate BL height values'. 1) Fig. 6 shows that the differences between high- and low-resolution mainly occurs at small BL height values., e.g., during time. While Fig.7 shows the absolute BL height ranges for all cases. Small BL heights generally have smaller absolute BL height estimation ranges (across different methods), which large BL heights generally have large absolute BL height estimation ranges. Therefore, Fig. 7 is biased by the large BL heights. 2) there is a clear trend that High-res BL height estimations are much smaller than coarse-res BL height estimations for majority of the methods, as show in Fig.7. Therefore, it is hard to believe that 'coarse-resolution data' has neglected impacts on BL estimations.
8. For the answers to my comment #9: These conditions are also the major reason for many other BL estimates fail too. How does the first-generation BL estimates compare with sonde BL estimates if these conditions were excluded? The core question is still that: how does the author prove that including other data/measurements improves the BL estimation?
9. For the answers to my comment #10: 'deciding the threshold for 'what is a cloud' … is non-trivial'. Can't the DL backscatter intensity be used for cloud detection?