

## General comments:

The observation of three-dimensional wind is of importance to weather forecast, air quality and renewable energy. The wind fields in complex terrain like Chongqing are affected by a variety of factors and thus difficult to be simulated or predicted. Ground- and space-based wind measurements, such as wind profiler radar (WPR) and ALADIN onboard Aeolus, provide an unprecedented opportunity to obtain the vertical profile of wind. Nevertheless, the data quality of Aeolus or WPR in Chongqing remains unknown. The authors conducted comparison analysis using one-year worth of WPR, Aeolus and radiosonde measurements, and revealed some interesting phenomena. The data processing methods, as well as the comparison analysis, are basically scientifically sound. The topic fits in the scope of AMT, and this work is worth of publication in AMT after the authors have fully considered the following comments:

## Major comments:

1. Apparently, only the wind profile measurements from one WPR station (i.e., Shapingba) is used for verification with Radiosonde observations. If my understanding is right, the comparison analysis between Aeolus and WPR are based on the wind measurements from both WPR stations. But I can not find any descriptions for the WPR at Youyang. For instance, does it have the same frequency? Besides, how far is the WPR station at Youyang from the radiosonde site? the readers are more willing to know the locations of both stations relative to the Aeolus tracks (daytime and nighttime). Therefore, the authors can add one figure in section 2 to illustrate this, and clarify or discuss the potential impact arising from the mismatch of station location.
2. Section 2.1.1 and 2.1.2 can be merged, and “Shapingba WPR is located at the same station as RS; therefore, the data verification of WPR wind observations was conducted based on RS data in this study.” can be incorporated to the original section 2.1.2.
3. Figures: The X-axis and Y-axis scale in Figure 2 can be shortened to better show the details of scatters. For example, both axis can be adjusted to -20 to 40 m/s. Figures 2–5: only major ticks in both axes are shown. It is inappropriate for a high-quality figure not to show the minor ticks.

## Minor comments:

Line 12: “vertical wind” can be expanded to “vertical wind profile”

Line 19-20: “Their root-mean-square deviation increased with height but decreased by 3 – 4 km.” is not clear to me. For example, grammar error exists in “decreased by 3 – 4 km.” Besides, I cannot find any figures in this manuscript can support this conclusion, and should be rephrased.

Line 27: “between  $\pm 5$  m/s” can be revised to “within  $\pm 5$  m/s” or “between -5 m/s to 5 m/s”

Line 28-29: Can you please clarify the specific characteristics in “the mean differences”? ? Otherwise, the sentence “the mean differences... below 1.5 km” makes nonsense.

Line 30: “, such that” can be modified to “. In this case” or similar expression.

Line 31: “large mean differences of 4-8 km” can be rephrased to “Larger mean differences at the height range between 4 to 8 km”.

Line 43-44: “to study” -> “for studying...and predicting extreme weather.”

Line 33: I wonder the logic behind “influenced by the topography of the Tibetan Plateau.” Chongqing (the elevation is less than 4000 m) is in the southwest China, lying far away from the Tibetan Plateau (TP). Besides, do you have any evidence for the connection between cloud liquid water in the middle troposphere and the topography of Chongqing (not TP)? If not, this conjecture can be deleted.

Line 84: “and three-dimensional spatial structure” can be removed.

Line 103: How about the accuracy of the RS measurement in Chongqing, or China? The authors may refer to the following important papers:

<https://doi.org/10.1007/s00376-010-9170-8>

<https://doi.org/10.5194/acp-16-13309-2016>

<https://doi.org/10.5194/acp-21-17079-2021>

Line 104: “Station Shapingba” -> “Shapingba”

Line 156 and 174: “Where” should be revised to “where” and no indent before “where”

Line 213: “which drift more than 10 kilometers away from the releasing station”, the drifting distance of RS balloons depends on the altitude, and this expression can be revised by referring to Figure 2 in Zeng et al. JGR 2019 (<https://doi.org/10.1029/2018JD029109>)

Line 67: Is the publication year in “Zhang et al. 2017” supposed to be 2015?