

Atmos. Chem. Phys. Discuss., referee comment RC1
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Comment on acp-2021-298

Anonymous Referee #1

Referee comment on "Study of the seasonal variation in Aeolus wind product performance over China using ERA5 and radiosonde data" by Siying Chen et al., Atmos. Chem. Phys. Discuss., <https://doi.org/10.5194/acp-2021-298-RC1>, 2021

In this study, the Aeolus L2B wind product quality is verified by ERA5 and L-band radiosonde (RS) data. The accuracy of the Aeolus Rayleigh-clear data and Mie-cloudy data in four regions and different seasons in China and the reasons for the errors are explored by accounting for various potential factors. The evaluation method is generally sound and the results of error analyses are highly valuable for using new satellite product for various applications in the region. However, the paper needs significant improvements before it can be considered for publication.

1. As the main objective of the study is to assess the validity and uncertainty of the Aeolus retrieval using the ERA5 and RS data, the quality and uncertainty of the latter two products must be well documented. While ERA5 data have widely used, its accuracy varies considerably, pending on the availability and usage of observation data used in the data assimilation system. Were ERA5 data accurate everywhere, there would be no need to launch the Aeolus.
2. The method needs to be described more clearly in terms of logical expression and working principles.
3. The paper needs to be edited extensively to correct many non-standard use of English such as "L34: relevant researchers...", "L42: deepened our understanding",
4. In Figure 2, add the number of points within and outside the thresholds.
5. Add a table of all data used in the study.

6. In section 2.4 (L105-110), add some related literature or a further explanation on the wind speed matching method of different data sets in the vertical direction.

7. In L116, how is the data represented by V_{ture} corrected? Are there corrections for ERA5, Aeolus and RS data? The correction process needs further explanation. Does V_{ture} on L125 refer to the same variable as that on line 116? If it is different, use a different expression.

8. Figure 5 shows the statistical results of the Chifeng station. Are the statistical results at other stations similar to this one? It is recommended to add a description of the table.

9. In L195, specify the time interval of the data with low laser energy.

10. In L256, the difference in r near the ground is caused by aerosols, but in eq 9 there are only clear and cloudy. Is the type of aerosol also classified into cloudy? Please clarify this.

11. L286, Daeolus represents the relative error value of the Aeolus data. There are many reasons for the error, SNR is one of them. Why can Daeolus represent SNR? The definitions of these two parameters are completely different.

12. L304: increases with what?