

Reply to editor

Italics below indicate new text which is included in our revised manuscript.

The following changes were made:

- Figs. 9 and 10 were modified to include plots with the numbers of data points. Figure captions were modified by adding a sentence:
The bottom plot shows the number of data points that are included in the comparison.
- Figs. 7 and 8 were modified by changing the labels on the horizontal axes. They read now:
Rayleigh wind error with respect to MARA
and
Mie wind error with respect to ESRAD.

Additional changes were made based on comments by both reviewers.

Reviewer #1:

1. When discussing the fact that the Mie random error did not change much over time as opposed to the Rayleigh random error (1. 443 f.), the authors should add that the Mie wind precision was less affected by the signal degradation of Aeolus, as the Mie winds are mainly retrieved from strong cloud backscatter.

We add a sentence at the end of section 6 (l 452):

We note also that the precision of Mie winds should be less affected by laser-signal degradation as Mie winds are mainly retrieved from strong cloud scatter.

2. I also noticed that the authors added a line to Tables 1 through 4 providing the median Aeolus HLOS wind speed in each data subset as well as the lower and upper quartiles of the distribution. However, they do not refer to these statistical parameters in the text. I suggest to discuss the variation of the added parameters among the different data subsets or remove the corresponding lines from the tables.

This information was added to the tables at the request of the other reviewer.

Reviewer #2:

Specific comments:

1. Please make a general statement or add to the fig. captions, to clarify if 100 km / 25 km collocation data is the source for the respective plots.

We added two sentences to address this point:

(Note that results restricted to Aeolus measurements only within 25 km from the radar are shown only in the Tables. All of the figures include points up to 100 km from the radar)

2. L 364: ... Could you please check for vertical wind speeds at the ESRAD site and add a sentence on a possible contribution or explanation for the skewed distribution.

The contribution of vertical components was checked and found to be negligible - this is already stated on line 97: " Radar 'HLOS' winds are calculated from the radar vector winds (ignoring the vertical component, which is found to be negligible in the 1 h averages) ". We added additional explanation after L 364:

In general, vertical winds of up to 2 m/s can be found in the troposphere in mountain lee waves at ESRAD (Kirkwood et al., 2010). However, the horizontal wavelengths of the lee waves are only a few 10s of km and would be averaged along the Aeolus track. In the comparison data set here, 99% of the data points have vertical winds within +0.4/-0.4 m/s at ESRAD and there is no correlation between vertical wind and the difference between ESRAD and Aeolus HLOS winds. So vertical winds cannot explain the skewed distribution. Preferential locations for cloud formation within the wave wind field could affect Mie winds differently from Rayleigh winds. Extensive case studies would be needed to test this possibility.

The reference Kirkwood et al. (2010) was added to the list of references at the end of the manuscript.

3. L444: For Q2-2020 the ScMAD stands out in Fig 9, and is unexpectedly higher than the SD. Please check for consistency in the data analysis and elaborate on this. Please add the respective evolution of the number of data points to Fig. 9 and 10 or a general comment ($\# > x$, e.g. 50), which also might be part of an explanation or reason to flag this data as an outlier or even statistically non-significant.

The number of data points is added to the figures 9 and 10. Although not very high for the points in question (99 / 44 for Rayleigh/Mie for Q2-2020 in Fig. 9) these are not low enough to mean the data should be rejected.

4. Please consider adding a sentence or two on the outlook, e.g. if you would consider re-validating reprocessed data, for which your long time-series, high latitude radar validation would be a very valuable contribution...

Funding and personnel constraints are unlikely to allow us to make further analyses at this time, and future operation of both radars is very uncertain so we prefer not to comment on the outlook.

Specific comments:

a) L20: Please consider adding “2B11 data is considered...” or otherwise refer to the major used baseline already in the abstract.

We added a paranthesis to indicate the baseline we considered.

b) - d) We corrected the manuscript accordingly.

e) Screen for units to not be disconnected from the values during line breaks.

We tried to correct all instances we found. However, this seems to be an artifact of the layout that is provided by the word processor software and that is not always correctable.