Author's Response to the Second Response of Referee #2

In this response, the referee comments (in black) are listed together with our replies (in blue) and the changes to the original manuscript (in red).

Thanks a lot for your reviews on our manuscript. The comments are very helpful for revising and improving our paper. We have revised the manuscript according to the comments and the details are shown as follows.

L128: Calculation of relative errors: In this chapter, you are introducing all statistical measures to assess the wind product quality. I would like to see here also the equation of the scaled MAD, which you are showing later.

Responds: Suggestions accepted. The equation has been added in the manuscript.

L136:

added, "In addition, the scaled median absolute deviation (scaled MAD) is widely used in other Aeolus validation studies:

$$\text{scaled MAD} = 1.4826 \times \text{median}(|D - \text{median}(D)|), \quad (6)$$"

L204: Great that you now also calculate the MAD, you will see that your manuscript will be cited more often because the MAD (scaled MAD) is a much better variable for indicating the random wind error.

It would be even better, if you could remove the table here, and rather add the scaled MAD to Table 2 and Table 3, the overview of all errors for 2.5 deg and 1 deg. Please use the scaled MAD and not only the MAD. The scaled MAD is: MAD × 1.4826

Other Aeolus validation studies are all referring to the scaled MAD. Just multiply your result by 1.4826

Responds: Suggestions accepted. The scaled MAD has been added in the Table 2 and Table 3, while the Table 5 in L204 has been removed. Meanwhile, an error of MD calculation has been corrected.

L204:

Table 5 was removed.

L197:

removed,

"The MAD (Median Absolute Deviation) of different regions are showed in Table 5 to fit better with other studies. The MAD of the Aeolus wind data in a rectangle of ±1° lat/lon centered on the RS site are also calculated in Table 5, which have varying degrees of decline. The decrease of Shapingba group is not obvious because too few Aeolus data points meet the screening conditions (≤1° from RS site)."

L159:

Table 2, changed to,

	Aeolus vs L		Aeolus vs ERA5		ERA5 vs L	
	Mie-cloudy	Rayleigh-clear	Mie-cloudy	Rayleigh-clear	Mie-cloudy	Rayleigh-clear
R	0.92	0.94	0.97	0.96	0.95	0.97
N samples	38275	73131	38275	73131	38275	73131
Slop	0.95	0.97	0.97	1.00	0.98	0.96
Intercept(m/s)	-0.01	-0.05	0.07	0.05	-0.08	-0.09

MD(m/s)	-0.03	-0.03	0.05	0.05	0.21	0.24
SD(m/s)	6.47	7.61	4.14	6.09	5.39	5.04
Scaled MAD(m/s)	5.76	6.98	3.62	5.39	2.04	1.94

Table 2. Comparison between Aeolus, L HLOS and ERA5 HLOS wind

Table 3, changed to,

	Aeolus vs L		Aeolus vs ERA5		ERA5 vs L	
	Mie-cloudy	Rayleigh-clear	Mie-cloudy	Rayleigh-clear	Mie-cloudy	Rayleigh-clear
R	0.96	0.95	0.97	0.96	0.98	0.99
N samples	4482	8067	4482	8067	4482	8067
Slop	0.96	0.99	0.97	1.00	0.99	0.98
Intercept(m/s)	-0.22	-0.02	-0.01	0.19	-0.22	-0.19
MD(m/s)	-0.24	2.5E-3	-0.01	0.20	-0.23	-0.20
SD(m/s)	4.73	6.18	4.19	6.10	3.09	2.97
Scaled MAD(m/s)	4.11	5.42	3.55	5.26	2.54	2.30

Table 3. Same as Table 2, but for rectangle of ±1° lat/lon. The distance of 1° lat/lon is approximately 100km in the regions we studied.

L165:
"However, there was no significant difference between the comparison results of the L-band RS and ERA5 and the comparison results of the Aeolus and ERA5. Therefore, the Aeolus and ERA5 data were in good agreement, and the error caused by the space-time matching problem of the L-band RS data might be larger than expected."
changed to, "In addition, the scaled MAD value of group ERA5 vs L was significantly lower than that of other groups. This means that there is a great agreement between ERA5 wind and L-band RS wind, despite their temporal and spatial matching problems."

L168: Thanks for adding an extra table for the 100 km distance. It clearly shows that the results are improved. I would recommend to also mention the numbers in the text.
Something like: …. The correlation coefficient is increased and the standard deviation is decreased, when applying a stricter collocation criteria of 100 km.
Responds: Suggestions accepted. More details about the numbers has been added in manuscript.
L168:
added, "The correlation coefficient is increased and the scaled MAD is decreased, when applying a stricter collocation criteria of 100 km."

Now line L357: Thanks for updating the manuscript. However, I was suggesting to add some more information and not to remove the outlook to future developments of follow-on Doppler Wind Lidar missions. I like this outlook and would advise to take it back in the manuscript.
Responds: Suggestions accepted. We have taken the outlook back in the manuscript.
L357:
"Besides, this study is helpful to figure out the influence of clouds and wind direction on the

detection performance of spaceborne wind lidar”
changed to, “Besides, this study is helpful to figure out the influence of clouds and wind direction on the wind product performance of Aeolus, which will provide a reference for the follow-up development of spaceborne wind lidar.”