



EGUsphere, referee comment RC1  
<https://doi.org/10.5194/egusphere-2022-822-RC1>, 2022  
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## **Comment on egusphere-2022-822**

Anonymous Referee #1

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Referee comment on "Validation of Aeolus wind profiles using ground-based lidar and radiosonde observations at Réunion island and the Observatoire de Haute-Provence" by Mathieu Ratynski et al., EGU sphere, <https://doi.org/10.5194/egusphere-2022-822-RC1>, 2022

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General comments:

I am very happy to read this article. It clearly outlines the data and methods used, and provides an important new result for the validation of the spaceborn Aeolus lidar.

Specific comments:

I am worried about the presentation of the overall statistics, which are an accumulation of Aeolus data for different baselines (for example in the abstract on lines 25,26). The Aeolus instrument settings as well as the ground processing has seen several major changes during its mission. These will have an effect on statistical properties like bias and standard deviation/MAD. In addition to the combined statistics I think it would be better to split the results and also present them separately for the different baselines. Also it seems near-real-time and reprocessing results are mixed, i.e. baseline 11 was introduced in near-real-time processing on 8-Oct-2020, so the baseline 11 results before that date must be based on reprocessed Aeolus data. I think it would be better to split this as well, since the reprocessing used different calibration data than the near-real-time processing.

line 47: you state that Aeolus covers nearly the whole globe within 7 days. This is not really the case. With a 7 day repeat cycle of the orbit the instrument observes a specific pattern on the earth and the slant curtain above this pattern, but it certainly does not observe every location on earth.

line 453: The figure depicts a very specific pattern of oscillating nature.

This pattern is indeed striking, and I have not seen such a thing before in previous Aeolus publications. I think it is important to try and understand what is happening here. But I think you should not call this "instrument induced", since you cannot yet prove that this indeed is the case. There could also be some bug or unforeseen effect in the ground processing or in the data handling of this paper. So I would suggest to find another name and not use the acronym I2OPs. Please contact the Aeolus DISC team and work with them to try and find what is happening here.

Technical corrections:

line 13: Aeolus is now flying for over 4 years, so please correct your statement that it is operating for 3 years.

line 32: wind profiling crucial => wind profiling is crucial

line 49: the first ever Doppler-Rayleigh Wind Lidar =>the first ever Doppler-Rayleigh-Mie Wind Lidar

line 135: classified using particle backscatter coefficient

The classification method was changed to use SNR threshold on 31-Oct-2019 with the start of baseline 7 for the Mie channel, and on 8-Oct-2020 with the start if baseline 11 for the Rayleigh channel.

line 159/160: the end of the mission's extended life in November 2022. ==>the end of the mission's extended life in spring 2023.

line 168: the difference between vLOS and HLOS becomes negligible

No this is not true. If  $w$  is small, than the sine term in equation (1) becomes negligible, but the cosine term stll remains. Therefore there still is a difference by a factor of  $\cos(\Psi)$  between vLOS and vHLOS.

line 181/182: multiple RBC settings are activated at the same time.

No this is not true. Each channel has just one RBS at any given time. But the RBS can be changed multiple times per orbit.

line 192: The downsampling begins with an averaging of the reference measurements between the middle points of the reference bins  
This phrasing is confusing and maybe I misunderstood.  
Each Aeolus wind result has just one middle point, so there is no in between. So I think the correct way is to take the reference measurements between the top and bottom edge of the Aeolus measurement bin, and average these results, before comparing to the Aeolus result. That way no interpolation at all is needed.

line 311: to average every profile => to average every Aeolus profile

line 345: shown in Fig. 5a => shown in Fig. 4a

line 387: One reason Sun et al. (2014) raised  
One important contribution for orbital phase biases is the telescope temperature effect explained by Weiler et al., 2021.  
I think you should mention this as well here.

line 439: At the same time, the radiosonde drifts along  
You could mention here that not only the distance between Aeolus and radiosonde changes with time, but also the time difference between the two systems changes with time and therefore also with altitude.

line 512: Once can thus conclude => One can thus conclude

line 530/531: the end of the extended mission lifetime in November 2022, =>the end of the extended mission lifetime in spring 2023,

line 580/581: there are fewer particles at higher altitude levels. =>there are fewer molecules at higher altitude levels.

line 603: higher by and average => higher by an average