

Atmos. Meas. Tech. Discuss., referee comment RC1  
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## Comment on amt-2022-233

Thomas Flament (Referee)

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Referee comment on "Validation of the Aeolus L2B wind product with airborne wind lidar measurements in the polar North Atlantic region and in the tropics" by Benjamin Witschas et al., Atmos. Meas. Tech. Discuss., <https://doi.org/10.5194/amt-2022-233-RC1>, 2022

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### Overview:

This paper presents results from two DLR flight campaigns in the frame of the Aeolus Calibration and Validation activities. Beyond the presentation of the data, the analysis focuses on the validation of Aeolus observations. The method is clearly explained and limitations of the analysis are properly acknowledged.

I only have minor comments on this paper.

### Specific comments:

- line 351: Could you think of a reason why the later dataset (AVATAR-T) has a lower EE threshold than the earlier one, when the signal quality was higher?
- line 362: Is it visible somewhere that the number of colocation is small for the last 6 flights? You could point to where that can be seen, or mention that it is "not shown".
- line 387: random error of the 2micron lidar: You give only one value and do not discuss it much. Is the random error stable in time? You mentioned some loss of signal during the last flights, could this affect the random error for instance?
- lines 406-407: Rayleigh-clear winds in aerosol loaded parts of the sky: can you provide a quick explanation of why there are valid Rayleigh winds with high scattering ratio (SR). Is it possible to estimate how much these winds are affected by the aerosols? (e.g. Can the additional error due to the high scattering ratio be quantified?) Or could you maybe give a reference that further discusses this point?

I realize that some Rayleigh winds with high SR are shown in fig. 7, but I am not really convinced that the errors are negligible because of the small number of points above SR=4.

- line 464: "confirming that Aeolus calibration is working properly": the airborne lidar dataset provides a validation of Aeolus, and it's good news that they agree! But we also know some limitations of the calibration do appear in other analyses. Can you discuss the precision of the current analysis? The sensitivity is probably limited by the relatively small number of points, and because of that, smaller calibration imprecisions cannot be detected. I am thinking about the bias depending on atmospheric temperature, for instance. If you could give an estimation of the possible range of undetected calibration errors, it would be even better!
- lines 538-540: "No Mie winds are available in the SAL": Do you have hypothesis to explain why there are no Mie winds from the SAL layer? (e.g. depolarization is too strong, accumulation length in the L2B processor is too short?)

Grammar, phrasing, typos:

- line 89-90: "It can be seen that most of the CalVal activities using observations as a reference to determine the systematic and random errors in specific geographical regions for random wind situations above the measurement sites." I didn't understand this sentence.
- line 92 "whereas"?
- line 161 replace "time-resolved" by "In a time-resolved manner"?
- line 176 precise "any differences **in atmospheric conditions** between instrument response calibration and wind observation"?
- line 297 "the the"
- lines 343-344 Do you mean that the difference between both quantities start to increase?
- line 423: "altituds"
- lines 443-445: Wouldn't it be more readable if the numbers were presented in a table instead?
- line 490: "where is goes" -> "where it goes"
- line 500: "up 10 and higher" -> "up to 10 and higher"?
- legend figure 10: "AVATAR-E" -> "AVATAR-T"
- line 549: "provides not enough" should be rephrased into "does not provide enough"
- line 598: "that Aeolus the Aeolus (alomst)"