

Reply to Reviewer #1.

We thank, once again, Reviewer #1 for the positive review and thoroughness, which have helped this paper attain a better level of quality.

General comments: in general I am pleased with the response of the authors to my previous review comments and the way they improved the paper in response of this. I have only a few small minor comments on this new version.

specific comments:

line 146: in the lines above some explanation was added to the changes that happened in the classification algorithm, especially the change in using a threshold on scattering ratio to using a threshold in Mie SNR.

However on line 146 you state that "The method currently applied by ESA is to use the scattering ratio" and this is not correct. Currently a threshold on Mie SNR is used for classification of the Rayleigh channel. Only before baseline 2B11 the Rayleigh channel applied a threshold on the scattering ratio as derived from the Mie channel.

So please correct this.

We indeed forgot to change subsequently the rest of the paragraph, creating a confusion. Thanks to your observation, it has now been changed to "The method currently applied by ESA is to use the Mie SNR threshold for classification of the Rayleigh channel ". The following scattering ratio mentions have also been changed to SNR.

line 162: You write "except we do not apply any HLOS error threshold." But it is not entirely clear to me what you intent to say here. Do you mean you do not apply a threshold check on the estimated error? Or does this refer to a check on the difference between Aeolus wind and reference NWP wind?

We are referring to the estimated error, which is the value Aeolus self-diagnoses concerning his own uncertainty. We added "[...] except we do not apply any HLOS estimated error threshold."

line 306: here you write: "Also, near-real-time and reprocessing results are separated" I think it may not be obvious for the reader what the main differences are between both periods for baseline 11. The main improvements I think are that the hot-pixel correction has been improved upon by also carefully considering the steps that occurred between the DUDE calibrations. This should mitigate the problems created by hot pixels. Also the M1 telescope temperature correction procedure was applied in a different way, using data of the day itself rather than data of the day before to tune the correction parameters. This should clearly improve the overall and local biases. See: <https://earth.esa.int/eogateway/documents/20142/0/Aeolus-Summary-Reprocessing-2-DISC.pdf>

We thank the reviewer for sharing this very interesting and synthetic report. We decided to add a reference to the document, along with a short explanation in the text: "The split is needed since the reprocessing used different calibration data than the near-real-time processing, along with several changes in the correction. The main refinements in the reprocessed dataset are improvements in the hot pixel correction by a more careful application of the method, along with using the data of the day itself rather than the day before for the M1

telescope temperature correction. The newer baseline should expect improved overall and local biases (ESA., 2021b)."

line 525 Figure 6 I really like this new figure, clearly giving the periods when the different baselines were applied. Very nice to see also that the change between the reprocessed and NRT period of baseline 11 is very small. Just one suggestion would be to also provide the bias results in a similar way. It would be interesting to see how these changed (or not) with time

Thank you for your feedback on Figure 6. We are glad that you found it informative. We have taken your suggestion into consideration and have added a similar figure displaying the bias results over time. This helps to show the changes in bias, if any, along with the different baselines applied. We added this description as well: "In addition to the standard deviation observed in Fig. 6, the bias can offer another opportunity to assess the evolution of the satellite's performance over time. The evolution of the bias shows a structure very similar to the previous figure, reducing its variability along the newer baselines. The expected higher variability for the OHP site is also observed, and the average value tends to be slightly lower (-1 ms⁻¹ for OHP to 0 ms⁻¹ for Mado) in the latest 2B13 Baseline (December 2021). This figure suggests that the newer baselines help the bias converge to zero but do not have a definitive impact on the variability of the values. Additionally, the transition from reprocessed to real-time reprocessed data, which occurred on the 8th of October 2020 (ESA., 2021b), does not offer any apparent enhancements. Therefore, it does not support the assumption of any beneficial or detrimental changes to the data quality."