

Atmos. Meas. Tech. Discuss., referee comment RC1
<https://doi.org/10.5194/amt-2021-381-RC1>, 2021
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Comment on amt-2021-381

Anonymous Referee #1

Referee comment on "On the derivation of zonal and meridional wind components from Aeolus horizontal line-of-sight wind" by Isabell Krisch et al., Atmos. Meas. Tech. Discuss., <https://doi.org/10.5194/amt-2021-381-RC1>, 2021

Aeolus provides global height resolved observations of horizontal wind in the troposphere and lower stratosphere. Because Aeolus only measures wind components near the zonal direction, it can't retrieve wind vector with single line-of-sight measurement which is important for the analysis and interpretation of atmospheric dynamics. This manuscript presents a promising retrieval method of zonal and meridional wind from Aeolus HLOS wind observations by using ALADIN measurements during ascending and descending orbits. This work is relevant and timely, providing an interesting tool for large scale synoptic dynamics analysis, such as SSW and QBO etc. The manuscript is well written, logically organized, and contains clear figures that support the presentation of the analysis. I suggest acceptance of current manuscript for publications.

Comments:

- Eq 11. is expressed in a slightly different way as Eq 10 in the first line. Since $\cos \theta = \cos \theta$, it's better to rewrite the Eq.11 as $\epsilon_3 = -(\dots)$ for consistency and it's easy for reader to understand.
- All three methods produce reliable zonal wind estimates between 70° S and 70° N with absolute errors typically below 5 ms⁻¹. Method 3 is the only method able to produce reliable meridional winds at all latitudes. It's straightforward that the error of Method 1 and Method 2 depends on how well the zonal and meridional wind components is projected onto Aeolus Line-of-sight measurement. It's a latitude related error different from the equator to the poles. Method 3 is based on the combination of two measurements in the collocated analysis region, the error of which relies on temporal

and spatial interpolation. This method can be analogous to the velocity-azimuth processing technique, so called VAP method for single weather radar and wind lidar. The collocation analysis would be instructive for future Aeolus follow-on mission, for instance the two-satellite constellation to provide two independent measurements for zonal and meridional wind components. It would be great if authors can comment on that two points above.