Referee comment on

Aeolus wind lidar observations of the 2019/2020 Quasi-Biennial Oscillation disruption with comparison to radiosondes and reanalysis

egusphere-2023-285

This study provides a good investigation of the ability of the Aeolus data to contribute to the understanding of the QBO dynamics. To this end, Aeolus observational data from various range-bin settings were compared with ERA5 reanalyses and high-quality radiosonde observations. The results and discussions highlight both opportunities and limitations of the Aeolus DWL mission. The manuscript is well written, concise, and includes appropriate figures. I recommend publication after the following minor issues and suggestions are resolved or considered.

2. Data and Methods

- I think the order of the data description could be changed. In the subsection about the radiosonde data, there is already written about Aeolus measurement geometry, overflights and a special Aeolus setting. It would be easier for the reader to understand this if he/she has learned about Aeolus before.

2.2. Aeolus

- Somewhere it should be mentioned that Aeolus is a polar orbiting satellite.
- Line 72: Please consider making two sentences out of this (The satellite's orbit is sun-synchronous with 15.6 orbits each day and a repeat cycle of 7 days. For the duration of the observing period in this study there is a close overpass to the site of the Singapore rawinsonde station between 22:55 and 23:00 UTC every Wednesday.)
- Consider offering the reader a reference for more detailed information about the Aeolus data products and processing (e.g., Reitebuch et al., 2018 and Tan et al. 2008).
- Are there important changes between Baseline 11 and Baseline 14 that the reader should know about?
- What are random error sources that could be affect the data quality during the analyzed period?
- Please add a sentence as to why only Rayleigh winds are considered. In the upper troposphere in the tropics, I would expect good quality Mie winds at cloud top level or within thin clouds.

2.3. ERA5

- Consider including the formular how to calculate ERA5 HLOS wind.
- Please provide some information on the quality of the ERA5 data in the upper troposphere/lower stratosphere. NWP models typically have large uncertainties at these altitudes that could potentially affect the results(?).

3. Results

3.1 Aeolus observations of the QBO disruption

- Line 168: repeating information (see Line 129)

3.2. Validation against reanalysis and radiosondes

- Line 208: I'm not totally convinced, that ERA5 stratospheric wind errors are that small (due to large model errors at these levels). E.g., the warm bias is mentioned later in the text, what makes this statement slightly doubtful.
- Line 235/236: Is there any conjecture about this height dependence of the Aeolus bias?

3.3. Equatorial waves during the QBO disruption

- Please add a reference about the wave filtering method that is used here.
- Figure 6: What are the thick horizontal gray lines (early January 2020 and around March 2020)? I can't find a description in the caption or the text.

Introduction/Discussion

Regarding the current state of Aeolus research consider adding the reference Martin et al., 2023 (https://doi.org/10.5194/wcd-4-249-2023) about the impact of assimilating Aeolus observations on QBO (with and without QBO RBS) and ENSO in 2020 in the Introduction or Discussion

Technical stuff

- I believe the EGU guidelines say that there should be a space in between for the unit **m s^{-1}** .
- Sometimes you use **2019/2020,** sometimes **2019-2020** or **2019-20**. Please make this consistent.
- Line 83: please change **2,000 m** --> **2.000 m**
- Line 84: please write out the abbreviation UTLS once
- Line 105: please write out the abbreviation ECMWF once
- Line 155: please write out the abbreviation GNSS-RO once
- Line 272: please write out the abbreviation OLR once
- Line 358: abbreviation DWL is already defined in Line 174