

Atmos. Meas. Tech. Discuss., referee comment RC1
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Comment on amt-2021-277

Anonymous Referee #1

Referee comment on "Exploiting Aeolus Level-2B Winds to Better Characterize Atmospheric Motion Vector Bias and Uncertainty" by Katherine E. Lukens et al., Atmos. Meas. Tech. Discuss., <https://doi.org/10.5194/amt-2021-277-RC1>, 2021

Dear writers,

I send you here my Review comments for this paper.

My best regards.

"General comments"

The paper is important and covers an important Task since Aeolus was launched: the comparison of Aeolus Winds with AMVs, for the continuous improvement of both sources of wind observations. The paper should be accepted after some a minor revision/correction. Please consider all following items.

"Specific comments - Important comments":

1a. Please include a description, including a formula, of the Statistics used in your paper (MCD, SD, SDCD,...; possibly also the Speed Bias, Speed SD, RMS, Vector Diff, Vector RMS included in Table 1), and their relationship with the Statistics used as Standard procedure for AMV validation

defined by the International Winds Working Group in its 1996 Workshop

(http://cimss.ssec.wisc.edu/iwwg/iww3/index_3rdWindsWorkshop.htm)

in following report: http://cimss.ssec.wisc.edu/iwwg/iww3/p17-19_WGReport3.pdf.

This is important; if I look throughout the internet "Mean collocation differences (MCD)",

I find very few references, and all of them are from the year 2021.

1b. Why were the original Statistics for winds in this IWW3 Report not used?

1c. The collocation criteria used between AMVs and Aeolus winds in lines 180-183 are also different to those defined by the International Winds Working Group in its 1998 Workshop

(https://cimss.ssec.wisc.edu/iwwg/iww4/index_4thWindsWorkshop.htm)

in following report: https://cimss.ssec.wisc.edu/iwwg/iww4/p19-20_WGReport3.pdf.

Please comment on the differences on both criteria, and if you could expect some impact in using one or the other procedure.

2a. There is an important error in lines 48-50: with the text:

"(1) water vapor cloud-top (WVcloud) channels are used to track upper-level cloud top motions,

and (2) water vapor clear-sky (WVclear) channels are used to detect upper-tropospheric features (e.g., jet stream and waves) by tracking water vapor motions in clear air

you seem to say that some WV channels are used for Clouds and other ones for Clear sky,

and this is completely wrong. The same channel (f.ex. WV062) can be used to calculate

Cloud AMVs (tracking clouds) and Clear air AMVs (tracking moisture patterns in other parts

of the image). Please correct the text.

2b. Related to the previous comment, please change throughout all the text all

expressions

"AMV channel" and "AMV channel type" to "AMV type", to avoid the same error.

And for example change in line 142-143: "IR, WVcloud, and WVclear channels" to "IR, WVcloud, and WVclear AMV types". Please be careful with this.

3. Lines 73-74: "Such a direct comparison has not previously been possible due to the sparse

spatial coverage of other available reference datasets, e.g., rawinsonde winds".

I am not so sure you cannot use rawinsonde winds for this; please provide more detail to this

sentence, so that you can conclude what you say.

4a. Line 110: please try to give more detail or reference about why in spite of the "M1 bias

correction", there are still some "remaining biases" which you mention in line 26.

4b. Line 110: please give some detail or reference about the "Quality Controls" used in Aeolus.

4c. Line 110: please give some detail or reference on why there are "Aeolus black-listed dates".

5a. What is the "horizontal/vertical accumulation lengths" you mention in lines 198-199?

5b. What is the "L2B uncertainty" you mention in line 201?

6. Differences in time and location between the two observations can be not so important as the ones you mention in lines 230-231: "differences due to collocation (i.e., due to different times and locations 230 of the two observations) could play a role in increasing the differences between the collocated HLOS winds".

Please check as an example:

"Chapter 2.3 IMPACT OF THE REPRESENTATIVITY OF THE RADIOSOUNDING WINDS"

in following reference:

[https://www.nwcsaf.org/AemetWebContents/ScientificDocumentation/Documentation/GE O/v2016/NWC-CDOP2-GEO-AEMET-SCI-VR-Wind_v1.0.pdf](https://www.nwcsaf.org/AemetWebContents/ScientificDocumentation/Documentation/GE%20v2016/NWC-CDOP2-GEO-AEMET-SCI-VR-Wind_v1.0.pdf).

Then comparatively check how much the wind can change considering the time and distance

implied in your collocations, and update your sentence if needed.

7. Important: In chapter 4.1.2 line 419 you say you compare only IR cloud AMVs and WV cloud

AMVs with Aeolus Mie Cloud winds.

Why don't you do the same in chapter 4.1.1, comparing Aeolus Rayleigh Clear Air winds with

WV clear air AMVs only? Please include in the text an explanation of why you are acting differently in both chapters.

Evaluate also if there could be two different elements here, which behave differently:

- flow related to cloud features, evaluated by both Aeolus Mie winds and cloudy AMVs,
- and flow related to clear air features, evaluated by both Aeolus Rayleigh winds and clear air AMVs.

"Technical corrections".

1. I do not like very much the expression "enhanced wind shear". "Enhanced" reminds me of the word "Improved", which has nothing to do with the wind shear.

I would prefer something like "strong wind shear" (throughout all the text).

Please update or comment back.

2. You use "rawinsonde" and "radiosonde" in different parts of the text. I assume you are referring with both to the same. Aren't you? This way, use the same word all throughout the text for homogeneity (the one you prefer).

3. Line 150: I think you are listing all the LEO satellites and radiometers you are using.

So I would remove the text: "including but not limited to".

4. Tables 2 to 5: your options "Bolded and bolded/underlined statistics" do not differentiate

well in the text. I suggest to use "Cursive and cursive/underlined statistics" to appreciate better

the differences.

5. In lines 321-322, I think the clouds in "Surface effects may also play a role, as very cold

brightness temperatures at or near the polar surface may be misinterpreted as very high cloud

tops due to the low temperature contrast between clouds and the surface snow or ice"

can actually be located in any height. I would simply change "very high cloud tops" for "cloud tops".

Please consider.