Reply on "GNSS-based water vapor estimation and validation during the MOSAiC expedition" by Benjamin Männel et al., Atmos. Meas. Tech. Discuss., https://doi.org/10.5194/amt-2021-79-RC2, 2021

Our answers are indicated by „A:"

Editor:

Thank you for your responses to the reviewers and the modifications in the manuscript. I'm quite satisfied with most of your responses, but take into account that those responses should also be reflected in the manuscript. This latter is sometimes missing. Could you therefore provide the necessary additional information in the manuscript to the third point of reviewer 1 (more a philosophic consideration than your practical answer), and the following comments of reviewer 2: the one regarding line 86, the 2 remarks concerning Table 1, the increase of MP1 in May 2020 in Fig. 3, the remark about line 156 w.r.t. providing more details of ERA5, and the comment addressed about line 161.


Dear Roeland Van Malderen,

Thank you for your reply and for insisting on adding the answers to the manuscript which certainly helps to improve its quality. We updated the manuscript by adding the requested information. Please find a detailed list below. We highlighted the new changes in blue.

1.  third point of reviewer 1 (more a philosophic consideration than your practical answer) [3 The processing is done after the expedition. Include a few sentences whether the quality of the GNSS ZTDs would be different was it done in near real-time, which is important for the potential use of ZTDs from ships in NWP.]

A: In general, near-realtime processing is beneficial and important. However, given the concept of the MOSAiC campaign this wasn't possible at all due to bandwidth limitations. Nevertheless, we added short paragraph to the processing section describing the differences (lines 111-116). As the impact of the different products should be small for ZTDs derived in a kinematic PPP for ship-based antennas we expect almost similar quality.

1.  and the following comments of reviewer 2:
    a.  the one regarding line 86 [line 86: you chose a low cutoff angle (3 deg), I guess, in order to decorrelate ZTD and height in estimation; however a low cutoff angle is more subject to multipath. Do you evaluate higher cutoff values?],

A: We added a statement that larger cutoff angles were not tested (lines 87-88). We rephrased the sentence accordingly as we selected the 3° cutoff angle to have access to the portside observations. In addition, using a cutoff angle of 3° is commonly used.

    b.  the 2 remarks concerning Table 1 [Tab1: what do you mean by "pre-eliminated" for coordinates and receiver clocks?],

A: We added an explanation directly to the table and hope that this sentence is sufficient to describe the basic idea of parameter pre-elimination. Further information can be found e.g., Sec. 7.1.1. on pages 182-183 in Dach et al. (2015, http://www.bernese.unibe.ch/docs/DOCU52.pdf)

    c.  the increase of MP1 in May 2020 in Fig. 3 [Fig3: How did you explain the increase of mp12 in May 2020?],

A: In the revised version, we did not add this information as we think, that the increase is not extraordinary nor important for the derived ZTDs. Observations causing moderate multipath are usually excluded a outliers or bad observations. Periods with large multipath are critical as discussed. However, we added our guess regarding additional equipment to the manuscript (line 107).

d. the remark about line 156 w.r.t. providing more details of ERA5 [line 156: Why did you use only 3-hourly ERA5 grids and not the hourly grids? Do you use the nominal ERA5 horizontal resolution (0.25° x 0.25°)?],

A: We added the explanation to the manuscript and mention that the differences were formed only for epochs with ERA5-ZTD and GNSS-ZTD (lines 169-171).

e. and the comment addressed about line 161 [line 161: since the ERA5 time resolution is 3h and the GNSS derived ZTD is 1h, how do you perform the outlier detection test for each ZTD values? From here, all the comparisons were realized using this "screened" dataset? (Fig8 too?)].

A: We added both information (only 3h ZTDs were used, line 170) and outliers were removed only to compute the mean (line 175).