Comment on amt-2021-79

Anonymous Referee #1

Referee comment 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-RC1, 2021

Review of GNSS-based water vapor estimation and validation during the MOSAiC expedition, by Mannel et al, amt-2021-79

This is an article on our present day ability to derive good quality ZTDs from GNSS data obtained on a moving platform, in this case a slow moving ship.

It is interesting, wellwritten, easy to read, and deserves publication.

In principle the manuscript can be published as is, but
I have a few suggestions for improvements for the authors to consider.

1 The term "crows nest" will to most readers mean something else. Consider to just remove the first entry and say "top of ship" or "top of mast" in the second.

2 Consider to include statistics on ZTDs from NYA2 versus ERA, possibly also from NE Greenland if you have easy access to GNSS data from there. Those from NYA2 you have already.

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.

4 Ground based ZTDs are (to my knowledge) not assimilated in ERA, which strengthen then use of ERA as an independent data source. You could mention that.

Then two comments that are more ment for eventual future work.

Presumably a research wessel will carry a high quality pressure sensor. It can be expected to provide better quality ZHD than ERA on average. On top, with respect to daily variability it will be effected by the earthly and atmospheric tides as the ZHD proper, while those effects are not well represented in an NWP model such as ERA. The barometer could be used for the derivation of ZHD, to derive ZWD from the GNSS ZTD.

The on-board barometer could also provide an a priori for the ZHD in the GNSS data processing, when deriving GNSS ZWD to obtain the GNSS ZTD. As humidity levels are very very low in part of the year in the Arctic, a dominant part of the ZWD estimated in the GNSS data processing is in reality due to variability of the pressure (and hence ZHD). Using a better apriori for ZHD would reduce the problem that the mapping functions for ZHD and ZWD are not identical in the GNSS data processing.