

Atmos. Meas. Tech. Discuss., author comment AC4
<https://doi.org/10.5194/amt-2021-113-AC4>, 2021
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Reply on RC2

Longjiang Li et al.

Author comment on "A new zenith hydrostatic delay model for real-time retrievals of GNSS-PWV" by Longjiang Li et al., Atmos. Meas. Tech. Discuss.,
<https://doi.org/10.5194/amt-2021-113-AC4>, 2021

My response:

Thanks for the reviewer's suggestions and the modifications made accordingly in the new manuscript are as follows.

1) The GZHD model was evaluated using out-of-sample data: the radiosonde and ERA5 data during the one-year period of 2020 (in which no data were used to train the model). Results showed that the performance of GZHD was almost the same as that in the training period (please see Section 3.3 in the new manuscript).

2) The effect of the GZHD model was tested on real-time GNSS-PWV and results showed that GZHD outperformed GPT3 (please see Section 3.4 in the new manuscript). Note that the real-time ZTD used to retrieve GNSS-PWV was for 154 days in 2020, and it was processed by a modified BNC software package, more details can be found in the following paper:

Sun, P., Zhang, K., Wu, S., Wang, R., and Wan, M.: An investigation of real-time GPS/GLONASS single-frequency precise point positioning and its atmospheric mitigation strategies, Meas. Sci. Technol., <https://doi.org/10.1088/1361-6501/ac0a0e>, 2021b.

3) A reference of GPT has been added in line 52.

4) The color in Figure 1(d) agrees very well with the terrain, e.g. the Tibet Plateau. This is because the penetration depth of a profile has to be above the earth surface. In addition, there are over 3,000,000 profiles in this figure, thus some of the profiles are covered by others.

5) In addition to the above suggestions, we also found a new problem: when the integral method was used to calculate the ZHD, geoidal height or ellipsoidal height should be used, so the geopotential height contained in what data?? at each pressure?? level needs to be converted to geoidal or ellipsoidal height. However, in the previous manuscript, the height was not converted. Although this fault might cause large biases in the ZHD, it is not necessarily to largely affect the RMSE of the ZHD. This is due to that the effect of this fault changes biases from positive to negative, but the values are about equal. In the new manuscript, all the problems have been corrected.

Please also note the supplement to this comment:

<https://amt.copernicus.org/preprints/amt-2021-113/amt-2021-113-AC4-supplement.pdf>