

Earth Syst. Sci. Data Discuss., referee comment RC3  
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## Comment on **essd-2022-274**

Anonymous Referee #3

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Referee comment on "An enhanced integrated water vapour dataset from more than 10 000 global ground-based GPS stations in 2020" by Peng Yuan et al., Earth Syst. Sci. Data Discuss., <https://doi.org/10.5194/essd-2022-274-RC3>, 2022

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Comments on "An enhanced integrated water vapour dataset from more than 10,000 global ground-based GPS stations in 2020" submitted by Yuan, P., Blewitt, G., Kreemer, C., Hammond, W.C., Argus, D., Yin, X., Van Malderen, R., Mayer, M., Jiang, W., Awange, J., and Kutterer, H to "Earth System Science Data"

The study of IWV is an important topic in GPS, geodesy and other areas such as climate. This work did a comprehensive analysis of the two sets of IWV data from more than 10,000 GPS stations. One is from the Nevada Geodetic Laboratory (NGL) and the other is generated by the authors who used the European ReAnalysis (ERA5) for the GPS IWV retrieval. It showed that the IWV dataset generated by the authors had a better quality than that from the NGL. The authors did extensive analysis and evaluation of the two datasets using IWV data from 182 radiosonde stations.

The comments are given below:

Line 44 "For instance, satellite measurements have good spatial coverage, but their spatiotemporal resolutions could be low" This is not completely correct. The remote sensing satellite water vapor data can have spatial resolution of 1 km or even dozens of meter. The temporal resolution can also be dozens of minutes e.g. geostationary satellites.

Line 46, IWV should have its full spelling in its first use.

Line 111, the first citation of the Figure 1 is at line 111. However the Figure 1 is placed ahead of line 111. It is suggested to move Figure 1 after line 111.

In Figure 1 and in the whole paper, only 182 radiosonde stations were used. There are many more radiosonde stations around the world. Why are only 182 radiosonde stations used?

Line 650, "Yuan, P., Blewitt, G., Kreemer, C., Hammond, W.C., Argus, D., Yin, X., Van Malderen, R., Mayer, M., Jiang, W., Awange, J., and Kutterer, H.: An enhanced integrated water vapour dataset from more than 10,000 global ground-based GPS stations in 2020, <https://doi.org/10.5281/zenodo.6973528>, 2022." Why do you cite this? Your paper is citing your paper?

The number of citations to your own papers is relatively high. Just cite closely relevant papers only.

In eq. (6), it seems you just consider the error in the conversion factor II. Why didn't you consider the error in ZWD and its impact on IWV?

Below 2.4 Screening of IWV, "The 5-min enGPS IWV data..." I am puzzled how you got the enGPS data. It is understandable you got opGPS data from NGL.

Line 462, it reads "Both the mean LMS6-enGPS IWV differences at daytime and nighttime are negative with values of -1.5 and -0.7 kg m<sup>-2</sup>, respectively." On line 464, it reads "By contrast, both the mean LMS6-enGPS IWV differences at daytime and nighttime are positive with values of 0.8 and 1.1 kg m<sup>-2</sup>, respectively."

It seems these two are contradicting with each other.

Line 489, "Finally, it is noted that the enhanced conversion of GPS-estimated ZTD to IWV does not affect GPS position estimates." It is not clear. Do you mean that the GPS positioning accuracy cannot be improved if the IWV is used in tropospheric error correction during GPS positioning calculation?

Line 490, "If higher resolution numerical models were implemented at the GPS data processing stage, then that should result in better position estimates together with the simultaneously estimated ZTD." What higher resolution numerical models are to be implemented? Higher temporal resolution or higher spatial resolution or both? What numerical models are you talking about? Do you talk the ERA5 model or other models?