

Title: Constructing Precipitable Water Vapor Map from Regional GNSS Network Observations without Collocated Meteorological Data

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Ps and Tm are required during the conversion process from zenith wet delay (ZWD) to precipitable water vapour (PWV) from GNSS measurements. An alternative method for accurate determination of PWV was proposed for near-real-time applications using GNSS data and nearby synoptic observations, and a method to construct PWV maps with the use of GNSS network was presented. The demand for assimilating zenith total delay (ZTD) into numerical weather prediction (NWP) models is very high in meteorological practice, in particular its role in weather now-casting. The research conducted is of importance to improve weather predictions over the region investigated in HuNan China.

Overall I have no serious concerns with respect to the manuscript. Your analysis is sound and you show plenty of results upon which you draw your conclusions. Also the English is very good and generally your statements are clear. However, there are a few minor points I would like to raise (in no particular order):

1. Page 3 LINE 2, You stated that “None of them is however collocated with meteorological sensors”? Actually, more than 70 stations have meteorological observations collected by HuNan Meteorological Bureau. You need either remove this statement or make a different statement. In fact the HuNan CORS network does have significant amount of collocated radiosonde measurements since 2015. They are typically easily accessible.
2. In Figure 1, it seems RSCZ radiosonde station collocated with one of the CORS stations. Pls compare the CORS derived PWV with RS-derived PWV.
3. In page4, line 14, “The blind model global pressure and temperature (GPT)”, this sentence should be changed in a better order.
4. In page5, line 25, where do the formula (5-6) come from? Please show the references and the unit of parameters.
5. In section 4.1 please show the formula (4-8) coefficients estimated locally at each synoptic site using reanalysis products.
6. All the PWV maps show minor color variations, which is difficult to show the large moisture variations during a rainstorm. I would recommend add 2 more colors between blue and yellow, such as red and purple.
7. In Figure 9, the PWV maps should be compared to precipitation every 6 hours. The temporal span of 24h in Figure 10 is too large to explain the situation effectively.
8. Two recent journal publications to do the same region (and perhaps similar data and data sources are used) in China should be consulted. Their publication details are listed below.
 - Li L, Wu S, Wang X, Tian Y, He C, and Zhang K (2018) Modelling of weighted-mean temperature using regional radiosonde observations in Hunan China, Terr. Atmos. Ocean. Sci., Vol.29,No.2,187-199, doi: 10.3319/TAO.2017.05.26.01.
 - Li LI, Suqin Wu, Xiaoming Wang, Ying Tian, Changyong He and Kefei Zhang (2017) Seasonal Multi-Factor Modelling of Weighted-Mean Temperature for Ground-Based GNSS Meteorology in Hunan, China, Advances in Meteorology, volume 17, <https://doi.org/10.1155/2017/3782687>.