

Interactive comment on “A new tropospheric tomography model combining the pixel-based and function-based models” by Yibin Yao et al.

Anonymous Referee #1

Received and published: 10 July 2018

Review angeo-2018-34

The authors have tried to estimate the amount of water vapor at any desired point in the tomography area. For this purpose, they have used the results of the tomography technique. In other words, a kind of interpolation is used to calculate the water vapor density at the points among the centers of tomographic voxels. This article is well written but now, after many years of using the troposphere tomography, this technique requires more innovations. Using different methods of interpolation has always been inevitable since the voxel-based tomography process. The main problems are:

a. Function-based tomography is the direct calculation of water vapor density using signal delays at arbitrary points and it is independent of the voxel-based method. In this paper, the voxel-based tomography has been used to model the water vapor density

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at each voxel and water vapor density has not been calculated directly at arbitrary points. Therefore, the use of the phrases “function based model” or “function based tomography” is not correct.

b. Why did not authors use the function based method directly and without voxel-based tomography? In other words, why the slant tropospheric delay (SWD) of the signals is not considered as a function of the geographical location?

c. In this paper, the polynomial function is used for interpolation. This interpolation method causes fluctuations between interpolation points. Due to the small size of the study area, these fluctuations increase the error of interpolation results between interpolation points. In these cases, other interpolation functions or method with less variation between interpolation points could be used.

d. In order to show the efficiency of the proposed method, it is better to give the map of water vapor density from voxel-based tomography and from the paper method.

e. Due to the presence of the radiosonde station in the study area, it is necessary to compare the results of voxel-based tomography and result of the paper method with radiosonde observations to show that the proposed method in this paper is more efficient than voxel-based tomography.

f. In this paper, many self-citations have been used. Also, in the introduction section authors did not refer to the new and valid articles, which used new techniques in different steps of tomography such as choosing the best dimensions for Voxels, Applying 3d ray tracing, using AIRS measurements, for example: “HajiAghajany, S., Amerian, Y. (2017). Three-dimensional ray tracing technique for tropospheric water vapor tomography using GPS measurements. *Journal of Atmospheric and Solar-Terrestrial Physics*, Volume 164, 2017, Pages 81-88. ”

g. The first and appropriate references for virtual stations topics are the follows: * Volath U, Buecherl A, Landau H, Pagels C, Wager B (2000) Multibase RTK positioning

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using virtual reference stations. In: Paper presented at the Proceedings 13th International Technical Meeting of the Satellite Division of the US Institute of Navigation, ION GPS-2000, Salt Lake City, September, 19–22. * Mareel H-v-d (1998) Virtual GPS reference stations in the Netherlands. In: Paper presented at the Proc 11th International Technical Meeting of the Satellite Division of the US Institute of Navigation, ION GPS-98, Nashville, TN, September 15–18.

Interactive comment on Ann. Geophys. Discuss., <https://doi.org/10.5194/angeo-2018-34>, 2018.