

## ***Interactive comment on “Assessing water vapor tomography in Hong Kong with improved vertical and horizontal constraints” by Pengfei Xia et al.***

**Pengfei Xia et al.**

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Dear Reviewer,

First of all, we would like to thank the anonymous reviewer very much. All the comments helped us improve the manuscript a lot. We are very appreciative of that. For each comment, we have carefully examined and answered with our best efforts. The paper is significantly revised and structured based on the reviewer's valuable comments and suggestions. Thank you! Please kindly find enclosed our updated manuscript and our responses to each comment below. Anonymous Referee #1 Received and published: 4 June 2018

This paper focus on the optimizing of tomography technique in three aspects, 1) es-

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establishing a new  $T_m$  model; 2) determining the scale height of water vapor, which used to construct the vertical constraint; 3) Obtaining the smoothing factor in the horizontal constraint. This paper has plenty of merit and is fairly well written. Therefore, I would recommend it for publication after the following corrections. Thank you very much for your comments.

General comments: P254 Figure 3 only give three kinds of result while five kinds of result presented in the caption. Please correct. Response: Thank you very much for your comment! In order to evaluate the new  $T_m$  model, using the radiosonde-derived  $T_m$  and COSMIC-derived  $T_m$  as references, the new model was compared with two traditional models. As shown in the Figure 3,  $T_mC$  is the  $T_m$  derived from COSMIC products;  $T_mR$  is the  $T_m$  derived from radiosonde products;  $T_mN$  is the  $T_m$  derived from the new model;  $T_mB$  is the  $T_m$  derived from the Bevis model;  $T_mW$  is the  $T_m$  derived from the Wang model.

If possible, please added some comments about the reasons why the improved result is not evident, as it can be seen from the comparison of tomographic result with radiosonde data, the improved performance of the optimized tomographic result (Figure 5) seems not so good. Response: Thank you very much! It can be observed in Fig. 5, the optimized result is closer to the “Rad”. The spatial distribution of water vapor density presents an exponential function of discontinuity. However, GNSS tomography techniques cannot inverse the spatial characteristics of water vapor density.

Minor revision: P38, please revise “Flores et al., 2001” to “Flores et al., 2000” and cite the reference “Bevis et al., 1992”. Response: Thank you very much! Revision has been made.

P113 please revise “Flores et al., 2001” to “Flores et al., 2000”. Response: Thank you very much! Revision has been made.

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Interactive comment on Ann. Geophys. Discuss., <https://doi.org/10.5194/angeo-2018-37>, 2018.