Response

Dear editor,

We would like to express our sincere gratitude for the time and effort you have dedicated to reviewing our manuscript and providing these constructive comments. We have carefully considered each suggestion and have prepared the following point-by-point responses:

1. ***L66: "PWV" term is first appearance. Reword to "OFFICIAL NAME (PWV)".***

Response: Revised. "precipitable water vapor (PWV)"

2. ***L70: Reword "The zenith hydrostatic delay (ZHD)" to "The ZHD".***

Response: Revised

3. ***L156: "were removes.," -> "were removed,"***

Response: Revised

4. ***L159: "(b) 394 GNSS stations": Do you intend to describe "394 IDS stations"?***

Response: Revised. "394 IGS stations"

5. ***L269: "the time series of errors in VMF1/VMF3": Define the word "error".***

Response: This paragraph has been revised, and the sentence "the time series of errors in VMF1/VMF3" is deleted now.

6. ***L269: Provide information on IQQE station: official name, latlon, and altitude.***

Response: Added. "The IQQE (IGS network) station is located in Iquique, Chile (latitude: -20.273542°, longitude: -70.131717°, height:38.9 m),…"

7. ***L247; 264; 265; 267; 269; 275: In general, "significantly" term is used to refer to "statistical significance" that is determined by statistical test p-value. Provide the p-value for each sentence to ensure the scheme 3 superiority.***

Response: This is a very good suggestion. We completely agree that p-value is important to prove the word "significantly". To evaluate the performance of the new model, nearly all available radiosonde stations and IGS stations are utilized, thus we believe that the RMSEs provided in the manuscript has demonstrated the performance of the proposed new model. The word "significantly" used in the previous manuscript is quite confusing, thus we revised all the words "significantly", "significant" to "considerably", "considerable" to improve the readability.

8. ***L270: "The figure indicates a significant effect of …": It was unable to identify "significant difference" among three schemes from given Figure 4 showing overlapped dot plots. Consider plotting with different types of graphs, such as scatter graph, and/or be sure to provide statistical information to ensure your description.***

Response: Thanks for this constructive suggestion. We have provided a new figure with statistical information to improve the quality of the manuscript. The new sentences and figure now read:

As an example, Figure 4 shows the correlation and accuracy analysis of ZTD interpolated from VMF1/VMF3 products using three schemes at IQQE station. The IQQE (IGS network) station is located in Iquique, Chile (latitude: -20.273542°, longitude: -70.131717°, height:38.9 m), which lies to the west of the Andes Mountains, thus this station exhibits substantial differences in height compared to its surrounding closest VMF1/VMF3 grid points: the maximum height differences reach 1562 m for VMF1, 4632 m for VMF3 (5°×5°), and 2750 m for VMF3 (1°×1°). As is shown in the figure, S Scheme 3 consistently demonstrated the lowest ZTD RMSE among all three schemes and products. Specifically, for the VMF3 (5°×5°) grid, the ZTD RMSE from Scheme 1 was 6.05 cm, while Scheme 2 resulted in a notably high RMSE of 29.67 cm, and Scheme 3's RMSE was only 2.87 cm. The figure indicates a substantial influence of height differences between a GNSS station and its neighboring VMF1/VMF3 grid points on the interpolated ZTD (ZHD+ZWD), and the new model proposed in this research is strongly recommended in such cases.

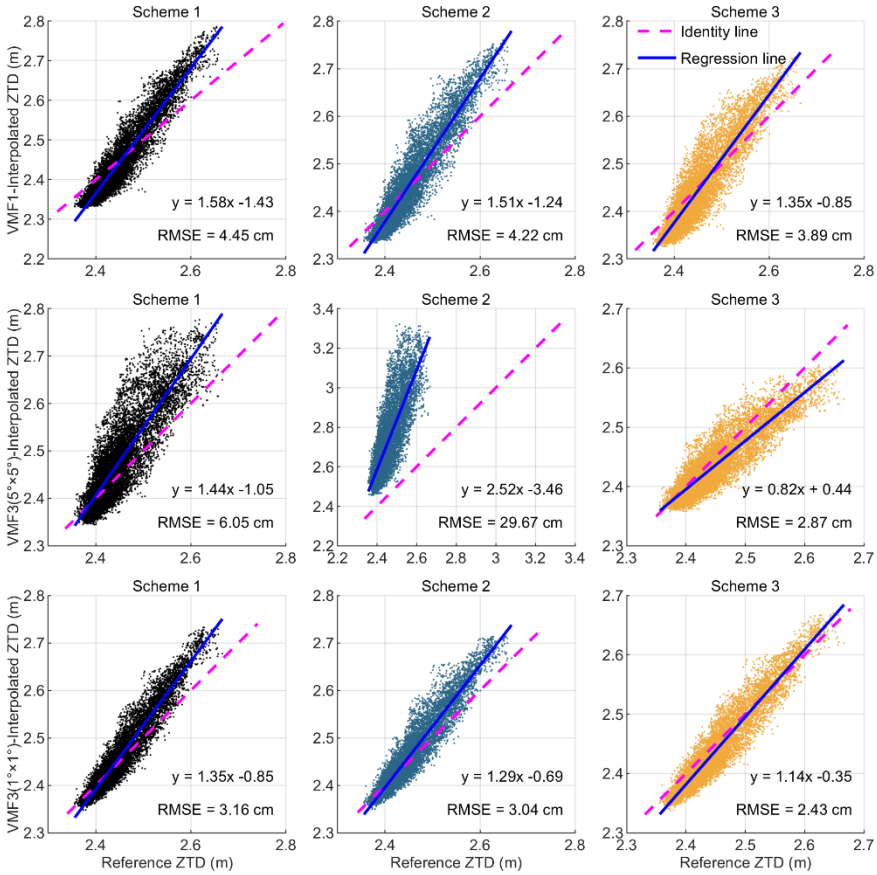

Figure 4 Correlation and accuracy analysis of ZTD interpolated from VMF1/VMF3 products and three schemes at IQQE station