The authors attempted to create a model for temperature lapse rates by establishing a linear relationship between temperature and elevation in near-Earth space. Through this model, users can calculate the corrected temperature value for a specific position and day of the year by providing coordinate information. The NGGTm model was developed by considering the detailed temporal characteristics of temperature. Global radiosonde data and ERA5 reanalysis data verified its accuracy and applicability. An improvement was found in the NGGTm model compared to the Bevis and GPT3 models. Precision and stability improvements have also improved when bias and RMSE ranges are considered.

To increase confidence in the results, this study requires further extension involving the application of the model to GNSS PWV retrieval tasks. However, as a first attempt, I recommend the article for publication.

Major comment:

The comment aligns similarly to the Anonymous Referee #2, which remains unanswered.

In line 125, the author mentions: "The ERA5 gridded data from 2012 to 2017 and the radiosonde data in 2017 on the global scale were used to analyze and develop the model in this study."
Furthermore, in line 446, the author mentions: "In general, the NGGTm model can provide real-time and high-precision Tm information without requiring the input of measured meteorological parameters at the global scale."

What does the author state by "real-time" here? Should the model be corrected by a dataset (preferably observational data or ERA5) before a real-time application of the model?

Minor Comments

Line 21
Put a comma: "0.50 K, 0.18 K, and 0.06 K"

Line 33
Please change "uneven" to "unevenly".

Line 47
Add the to "the zenith wet delay (ZWD)"; also add hyphen to high-precision.

Line 48
The words "the basic" is inappropriate here. Maybe change to "a primary"?

Line 52
Change "obtain an accuracy" to "obtain accuracy".

Line 54
Remove "by"

Line 62
Change "To improve.." to "In order to improve.."

Line 68
Remove "that is".

Line 76
It should be "a neural network.."

Line 79

Please modify: "The above models have achieved good results when providing the required measured meteorological parameters. However, most of the GNSS stations in the world do not have supporting meteorological sensors installed leading to difficulty in measuring meteorological parameters in real-time."

Line 81
Modify the sentence. Maybe "Therefore, these models are challenging to apply in real-time or near-real-time GNSS PWV detection tasks."?

Line 88
The sentence is not clear.
"Taking the lapse rate into account can not only improve the Tm model accuracy, but also showed significant performances in regions with undulating terrain (Huang et al., 2023b; Sun et al., 2021; Yao et al., 2018)."
Showed→show; What performance? Is it an improvement? Please clarify.

Line 94
Greatly→ significantly

Line 95
Certain → Maybe "specific"?

Line 98
Change "have been applied to" to "has been applied in"

Line 101
Change "developed jointing" to "developed by jointing"

Line 103
Modify the sentence to: "Although the GPT3 model is currently the most representative empirical model with a high precision on the global scale, it does not take into account elevation correction or detailed Tm lapse rate."

Line 110
Add "then"? →".. Tm and then developed a new global grid lapse rate model.."

Section 2.2: Please cite the literature to the mathematical equations for those used in previous research.

Line 214
Change "presents" to "present".

Line 424
Please change the sentence to: "The NGGTm-H model achieved excellent results in the precision verification performed by combining ERA5 reanalysis data and radiosonde data that were not involved in the modeling process."