Responses to Comments on the Manuscript:

"Water vapor isotopes indicating rapid shift among multiple moisture sources for the 2018/2019 winter extreme precipitation events in Southeast China"

(MS No.: hess-2021-269)

Many thanks for the reviewer's constructive comments. Below are our point-to-point responses to the comments. The comments are in black, and our responses are in blue.

Extreme precipitation events can lead to great disasters to society. It is very essential to study the mechanism of extreme precipitation events with multiple approaches. With the development of continuous measurements of water vapor isotopes with high temporal resolution, tracing moisture source and water vapor transport through water vapor isotopes becomes an important tool for studying precipitation process (especially the extreme precipitation events). However, the complex variation patterns of water vapor isotopes and the atmospheric processes behind extreme precipitation events are unclear due to the lacking of observation studies. This study successfully reveals the complex variation patterns of water vapor isotopes and their controlling factors during the winter extreme precipitation events in Nanjing, which is important for further understanding the complex variation patterns of water vapor isotopes and the underlying mechanism. However, some issues listed below need to be addressed to improve the paper.

Lines 44-59: In this paragraph, I suggest adding some case studies on precipitation process (especially the extreme events) through water vapor isotopes observations, aiming to demonstrate the effectiveness of the water vapor isotope approach for studying the extreme precipitation.

Response: Following the reviewer's comment, we added additional literature to cover case studies of using stable isotopes observations to study individual precipitation event in the revised manuscript.

Lines 99-100: What's the basis for choosing 8 days and 1500 m for the HYSPLIT simulations?

Response: In this study, the backward trajectory was simulated for 192 hours (8 days) because the average residence time of water vapor in the atmosphere is 8 to 10 days (van der Ent and Tuinenburg, 2017). The 1500 m simulation height is chosen because the water vapor transport mainly occurs in the lower troposphere (Breitenbach et al., 2010; Bedaso and Wu, 2020).

Lines 115-171: In the Results section, you combined the results of isotopic variations during precipitation events and the discussion of controlling factors for isotopic variations. It is difficult for readers to follow. I suggest separating the results and the discussion and adding a new subsection for discussing the influencing factors of isotopic variations.

Response: Thanks for the reviewer's constructive comments. As suggested, we moved the discussion of controlling factors for isotopic variations to the Discussion section as the new **Section 4.1** "Controlling factors for water vapor isotopic variations during precipitation events" in the revised manuscript.

Fig.2: Array the sub-figures in the same way as Figs. 3-5

Response: Change has been made according to the reviewer's suggestion.

Line 101: Why the resolution of the CWT field is 0.5°×0.5°? But the resolution of the GDAS dataset you used is 1°×1°.

Response: We have recalculated the CWT with a resolution of 1°×1° in order to keep the same resolution as the GDAS dataset.

Line 111: What kind of reanalysis data do you use? ERA5 or ERA-Interim?

Response: The ERA5 dataset was used in this study.

References

Bedaso, Z. and Wu, S. Y.: Daily precipitation isotope variation in Midwestern United States: Implication for hydroclimate and moisture source, Sci. Total. Environ., 713, 136631, https://doi.org/10.1016/j.scitotenv.2020.136631, 2020.

Breitenbach, S. F. M., Adkins, J. F., Meyer, H., Marwan, N., Kumar, K. K., Haug, G. H.: Strong influence of water vapor source dynamics on stable isotopes in precipitation observed in Southern Meghalaya, NE India. Earth. Planet. Sc. Lett., 292, 212–220, https://doi.org/10.1016/j.epsl.2010.01.038, 2010.

van der Ent, R. J. and Tuinenburg, O. A.: The residence time of water in the atmosphere revisited, Hydrol. Earth. Syst. Sci., 21, 779−790, https://doi.org/10.5194/hess-21-779-2017, 2017.