

Referee 1

This manuscript presents a comprehensive and insightful investigation into the orbital-scale hydroclimate variability over the Korean Peninsula, integrating new speleothem $\delta^{18}\text{O}$ records with a series of isotope-enabled transient and time-slice model simulations. The authors convincingly demonstrate that the precessional signal in both precipitation and $\delta^{18}\text{O}_p$ is muted over the Korean Peninsula due to compensating effects between oceanic and continental moisture sources, a finding that aligns with the recently proposed grand dipole pattern of the Asian summer monsoon. The study further highlights the potential utility of deuterium excess (d-excess) as a complementary proxy for capturing precessional moisture-source dynamics in this nodal region.

Overall, I find the analyses to be thorough, the model–data comparison carefully executed, and the interpretation physically coherent. The manuscript is rich in content, well-structured, and makes a valuable contribution to our understanding of pan-Asian monsoon dynamics on orbital timescales. I only have some minor comments.

We sincerely thank the reviewer for the positive and encouraging assessment of our work. We are grateful for the reviewer's constructive comments and have addressed all comments below.

Please Note:

- **Responses are in blue bold text**
- Manuscript changes are in blue normal text

Abstract: please add 1.2 in the first iCESM.

Reply: Corrected

Please consistently use the “precession timescales”, “precession scales” or “precession scale”

Reply: Thank you for pointing this out. We have ensured that the terms “precession timescales” or “precession-scale” are used consistently throughout the manuscript.

“To this end, we consider new and previously published $\delta^{18}\text{O}_p$ records from two Korean stalagmites: ED1 (Eden Cave, (Jo et al., 2014)) and GE1 (Gwaneum Cave, (Jo et al., 2010)).” This sentence is **ambiguous, please clarify which one is new?**

Reply: We thank the reviewer for pointing out this ambiguity. We have revised the sentence to clearly distinguish between the newly generated and previously published records. Specifically, the Eden Cave (ED1) $\delta^{18}\text{O}_c$ record presented in this study is new, whereas the ED1- $\delta^{13}\text{C}_c$ and Gwaneum Cave (GE1) records have been published previously (Jo et al., 2010, 2014).

Text revised. “To this end, we consider the Korean stalagmites’ 550,000-year stable-isotope records (discontinuous), which include a new $\delta^{18}\text{O}_\text{c}$ record from the Eden Cave stalagmite (ED1) and previously published records from ED1 and Gwaneum Cave (GE1) (Jo et al., 2010, 2014).”

Line 171: realistic ice-sheet forcings. I don’t think it is realistic, as there is no realistic reconstructions before LGM.

Reply: Corrected. “realistic” word removed

Section S1; Figure S7 is not the source region.

Reply: Corrected. It is Figure S8

Line 314: please check the Fig. S3a, d. It’s not WNPSH.

Reply: Corrected. WNPSH is plotted in Fig. S5c and S5f

Fig. 6: coastal line should be black.

Reply: Fig. 6 revised

