

# ***Interactive comment on “Water isotopes – climate relationships for the mid-Holocene and pre-industrial period simulated with an isotope-enabled version of MPI-ESM” by Alexandre Cauquoin et al.***

## **Anonymous Referee #2**

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In this study, Cauquoin et al. conducted a set of time slice experiments with newer version of isotope-enabled coupled climate model, namely MPI-ESM-wiso, and comprehensively validated the results by fully using the currently available isotopic data over the world. Moreover, they made analyses on how isotopic information can be proxy of climate information by using isotope-temperature, isotope-precipitation, isotope-salinity relationships. In conventional method, isotope-climate relationship is assumed to be stable (meaning that the same linear relationship is assumed for both climates), but it is highly doubtful. This study revealed that such simple relationship is indeed not same

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in different climates because the isotope information is determined by complicated processes.

The manuscript is very well written. The results are nicely illustrated by the figures, and the findings and conclusions are logically reasonable and convincing. Thus I have only minor comments.

1. Abstract is perhaps too long. So that the important essence of the paper is diluted. I would like the authors to make the abstract more concise.
2. In abstract and conclusions, the authors cautioned that interpretation of isotope information is more complex than previously thought. It is true, but is there any recommendation?
3. Almost all abbreviations are directly used without telling the long names.
4. Figure 4c and 4d show that the modeled sea water D-excess is significantly less fluctuated than the observation. But isn't it due to the layer thickness? The observed depth is very shallow, so surface kinetic fractionation is highly influential. For more appropriate comparison, some sort of simulator (for bucket sampling?) would be needed.
5. Mid-Holocene climate is shown in 3.2.1, and the authors try to explain its plausibility. But isn't it simply the same as the MPI-ESM results? If so, the part can be omitted only by referring appropriate paper for PMIP6.
6. Figure 8 and 9 show isotope-climate relationships in pre-industrial period. Why don't you show the same quantities for MH and the difference between PI and MH?

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