

Interactive comment on “Influence of orbital forcing and solar activity on water isotopes in precipitation during the mid and late Holocene” by S. Dietrich et al.

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We thank the editor Dr. Mangini for editing our ms. and for his thoughtful comments.

Our aim for this study was to make the first attempt to evaluate the interference of solar activity and orbital forcing on $\delta^{18}\text{O}$ in rainwater that drives the calcite $\delta^{18}\text{O}$ signal in speleothems. It could be shown that this interference lead to highly non-linear responses.

The comments of two referees were very helpful to improve the manuscript, and we have taken their recommendations into account in the revised version of the manuscript. The changes we made on the revised manuscript are listed in the replies

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to both referees and in the response letter.

The two reviews have in common that they question whether the results are highly model dependent or whether internal climate variability might dominate the simulated results. ECHAM5-wiso has already shown in a number of publications to perform well when comparing simulated results for present-day conditions with observational data. In order to demonstrate that a model bias due to internal variability can be neglected we investigated results of a 40 years long ECHAM5-wiso simulation. Here, we found that ten years are sufficient long enough for an adequate representation of mean $\delta^{18}\text{O}$ values in precipitation if ECHAM5-wiso is forced with climatological mean boundary conditions (see details in the reply to the anonymous referee #1). We suggest attaching this information as supplementary information to a potential article in Climate of the Past.

We further revised the abstract as recommended by Dr. Mangini and replaced the last sentence of the abstract with: “We conclude from our simulation results that non-linear effects and feedbacks of the orbital and solar activity forcing substantially alter the $\delta^{18}\text{O}$ in precipitation pattern and its relation to temperature changes.”

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