

## ***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.***

**Anonymous Referee #2**

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In this interesting study the authors make an attempt to investigate the combined effects of mid- and late-Holocene orbital forcing and changes in solar activity on the oxygen isotope composition of precipitation. It is striking that purely orbital-driven simulations for the time slices 6 and 5 k show very similar results, but differs if solar activity forcing is added. The results of these simulations are certainly of some interest for paleoclimatologists working on speleothems and/or lake records in central Europe. However, while the authors present the results of nine ECHAM5-wiso simulations, only little attempts have been made to include climate archive proxy data from central Europe for a more comprehensive data-model comparison. However, this is not a major shortcoming per se, provided that the strength and weaknesses of the model simulations

C2271

are critically accessed. Although I am not an expert in this field, I wonder whether the results are possibly an artifact of the climate model simulations. It is well known that climate models have considerable weaknesses and uncertainties when simulating the hydrological cycle which will also affect modeled stable isotopes. I would like to see a discussion on possible biases in these climate model simulations, particularly in central Europe! This is crucial before the proxy quality of Holocene stable isotope records from Europe is challenged by the results of these. Statements such as “Our results indicate that a quantitative interpretation of single  $\delta^{18}\text{O}$  Holocene proxy records in terms of regional climate variability remains difficult” are correct, but this is certainly also true for single climate model simulation! Furthermore, the geographical position of a climate proxy site is also of crucial importance for constructing quantitative time series based on oxygen isotopes. There are also areas where the changes are quite consistent. Overall, I can recommend publication of this very interesting manuscript after an additional paragraph on possible uncertainties is added Detailed comments: Page 3792, Line 23: should be “. . .correspond to. . .” Page 3792, Line 23: “. . .such high frequency. . .” Page 3794, line 9: better “. . .variations in the amount of precipitation. . .” Page 3794, lines 14-15: “Like for other terrestrial records, regional effects may also influence the oxygen isotope records of speleothems (Scholz et al., 2012.” I find this sentence a little bit awkward, as paleoclimate research on speleothems aims at reconstructing regional climate variability and teleconnection patterns. The palaeoclimatologists are well aware of this. Page 3799, line 4: should be “. . .European speleothems is dominated by winter climate. . .” Page 3805, line 6: Should be “. . ., mixing and partial rainout. . .”. Page 3808, line 22: should be “. . .findings from. . .”

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C2272