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Climate of the Past Discussions

# *Interactive comment on* "Constraining the Last Glacial Maximum climate by data-model ($i$LOVECLIM) comparison using oxygen stable isotopes" *by* T. Caley et al.

**Anonymous Referee #2**

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The manuscript presents a coupled ocean-atmosphere simulation of Last Glacial Maximum (LGM) climate and water and calcite isotopic distribution, using the intermediate complexity model iLOVECLIM.

The main goal of this paper is to evaluate the simulation using a compilation of several temperature and oxygen isotopes datasets. This paper does not present any new idea or conclusion, does not directly address any science question. Rather, it presents a new tool that could be potentially used in the future to address science questions. It deserves to be published to the extent that it is one of the first attempts to simulate the LGM climate with water isotopes in both atmospheric and oceanic components.



The paper is well written, the results are presented clearly, the figures are nice. I have only a few minor comments.

- I don't think the title is well chosen. I don't understand how the paper helps to constrain the LGM climate. The paper is rather an evaluation of the iLOVECLIM simulation. The use of this evaluation to constrain the LGM climate is not clear. Either the title should be modified, or the "constrain" part should be clarified in the text.

- p108 l7-9: precise "with isotopes in both components".

- fig 1, 2 and 3: the color scales look saturated, especially in the red. I hope this is not to hide irrealistically high deltaO18 values. I think the color scales should be adapted to remove any suspicion.

- section 3.1.2, table 2, fig 5 on speleothems: more speleothem data could be added in the tropics and subtropics. Many more tropical speleothems than listed here show a depletion during LGM (e.g. Cruz et al, 2009). I expect including more tropical speleothems will highlight the fact that iLOVECLIM, like most GCMs, is too enriched during the LGM in the tropics. If the case, this should be pointed out and previous papers showing this bias should be cited.

References:

Cruz, F W , Vuille, M , Burns S J, Wang, X and Cheng, H, Werner, M, Edwards, R L, Karmann I, Auler, A S and Hanh Nguyen, Orbitally driven east-west antiphasing of South American precipitation, Nature Geoscience (2009)

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