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Interactive comment on “ $\delta^{18}\text{O}$ water isotope in the iLOVECLIM model (version 1.0) – Part 3: A paleoperspective based on present-day data-model comparison for oxygen stable isotopes in carbonates” by T. Caley and D. M. Roche

Anonymous Referee #1

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General Comments

The authors present an evaluation of a pre-industrial simulation of carbonate delta O-18 in iLOVECLIM, a new version of the LOVECLIM Earth system Model of Intermediate Complexity (EMIC), described in a companion manuscript. A further companion manuscript provides an evaluation of the delta O-18 in water (precipitation and seawater). The model-data comparison is fairly comprehensive, addressing measurements

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of delta O-18 in both continental and marine carbonates. The authors acknowledge issues regarding the simulation of delta O-18 in late Holocene speleothems, as iLOVE-CLIM excludes both local detail and additional fractionation processes that may be important. The simulation of delta O-18 in marine carbonates is more encouraging, and iLOVECLIM is a promising tool for interpretation of glacial-interglacial changes of delta O-18 in carbonate from both pelagic and benthic environments (allowing for the ice volume effect), with a particular focus on signals of change in hydrography and circulation. Model fidelity already allows insights into species-specific discrimination (e.g., seasonality), and there are prospects for incorporating species-specific fractionation effects in the future. As a model evaluation, the manuscript should be suitable for publication in GMD, subject to technical revisions as indicated below.

Technical Corrections

1. p.2, l.2: “most useful tools”?
2. p.3, l.24: “proxies”
3. p.7, l.11: “obtained”
4. p.8, l.3: “preventing high elevations”
5. p.11, l.17: “has been found”
6. p.12, l.4: Fig. 8a shows mostly just the North Atlantic Ocean, so I suggest deleting “and the South Atlantic Ocean”
7. p.13, l.13: “Younger Dryas” (capitalized)
8. p.13, l.24: “too sparse” (rather than “rare”)
9. p.15, l.8,9: “could constitute an interesting tool for mapping”
10. p.30, Fig. 7 caption: “The exclusion of these points”
11. p.31, Fig. 8a: The delta O-18 contours associated with the Arctic Front (AF) and

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the Atlantic inflow (as discussed in the text on p.12) are not clear in the figure/from the caption - can this be remedied?

12. p.31, Fig. 8 caption: It should be noted that the legends are non-linear

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