Evolution of oxygen isotope during the last deglaciation: An Update on iTRACE

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Major results

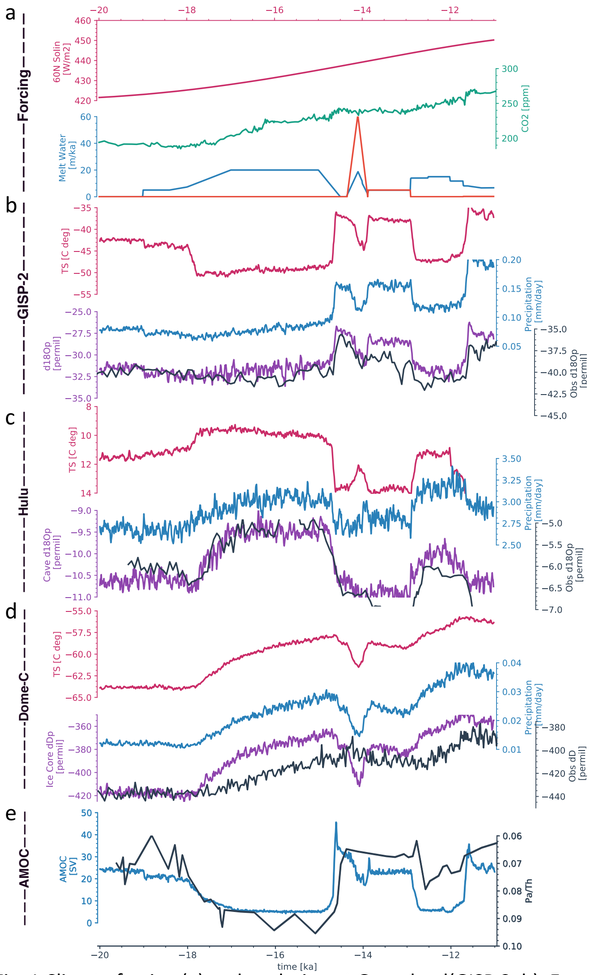


Fig. 1 Climate forcing (a) and evolution at Greenland(GISP-2, b), East Asia(Hulu cave, c), Antarctic (Dome-C, d) and the AMOC (e) during the last deglaciation. In (a), solar radiation at 60N (red), CO_2 concentration (green), and melt water forcing (blue NH, orange SH). In (b), surface air temperature (red), precipitation (blue), simulated $d^{18}O_p$ (purple), and ice-core $d^{18}O$ (black). In (c) and (d) as in (b) but for Hulu and Dome-C. In (e), the AMOC index and Pa/Th.

What is iTRACE?

The iTRACE is a transient climate-isotope simulation in fully coupled general circulation model (iCESM1.3) of the last deglaciation. The incorporating water isotopes in CESM enables us to simulate the $\delta^{18}O$ directly and perform more direct comparisons against the isotopic signals.

Data-Model comparison

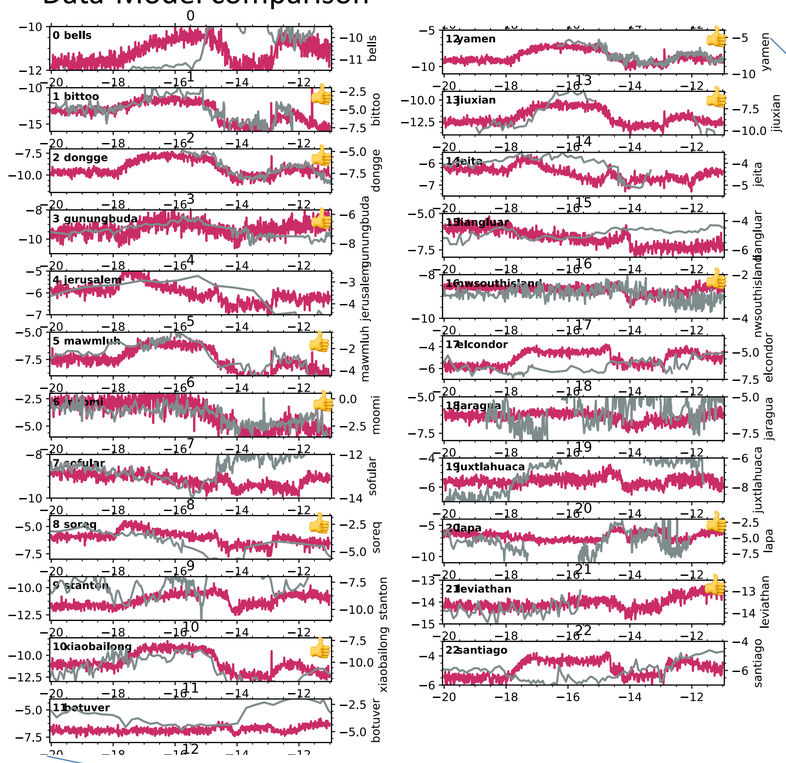


Fig. 2 speleothem $d^{18}O$ (grey) and simulated $d^{18}O_p$ in 23 caves around the globe (see cave locations at right).

Simulation Configuration

Model:
iCESM1.3, Physical climate similar to the CESM1

Model resolution:
Atmos: ~ 2° x 2°
Ocn: gx1v6

Four parallel simulations:

1.Ice Sheets and Paleogeography (ICE)

2.Oribital Forcing (ICE+ORB)

3.Greenhouse Gas (ICE+ORB+GHG)

4. Melt water Forcing (ICE+ORB+GHG+MWF)

LGM Initial Condition (spinup):
Physical State: ~3500 yrs;
Water Isotope : ~1000 yrs;
Radiocarbon: >5000 yrs.

H1-LGM $d^{18}O_p$ response.

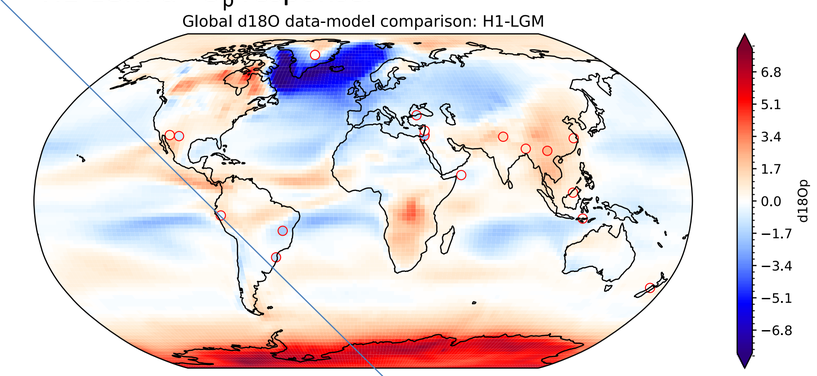
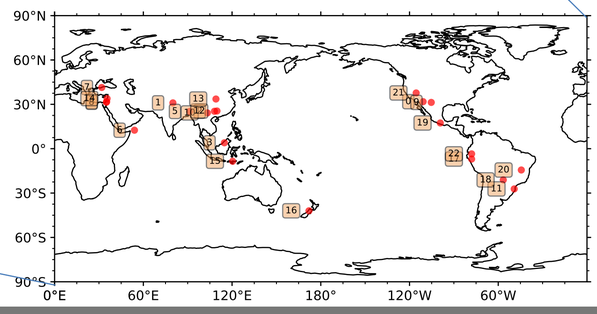


Fig. 3 $d^{18}O_p$ response between H1 and LGM (H1-LGM). Red circles corresponds to observational responses from ice-cores and speleothem, where data is available.



Primary Conclusion

1.The $d^{18}O$ evolution at Asia is well reproduced during the last deglaciation.

Acknowledgement

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