

## **Transient simulations of Marine Isotope Stage 3 with a $\delta^{18}\text{O}$ -enabled Earth System Climate Model**

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We perform transient simulations of Marine Isotope Stage 3 (MIS3, 60-28 ka B.P.) with the oxygen isotope-enabled University of Victoria Earth System Climate Model (UVic ESCM). Model results are compared with oxygen isotope records from ice cores in Greenland and Antarctica, as well as Atlantic sediment cores. We find that simulated  $\delta^{18}\text{O}$  calcite anomalies differ significantly between Heinrich stadials and non-Heinrich stadials, due to the amount of depleted water added in the North Atlantic as well as the changes in oceanic circulation and climate. In addition, temperature anomalies have a major effect on foraminiferal  $\delta^{18}\text{O}$  anomalies, particularly in the North Atlantic region south of Iceland. We also present EOF analyses of simulated sea surface temperature, sea surface  $\delta^{18}\text{O}$ , precipitation, and precipitation  $\delta^{18}\text{O}$ . Overall, the simulated  $\delta^{18}\text{O}$  timeseries are in a relatively good agreement with paleoproxy records.