



## Global patterns of climate change since the Last Glacial from speleothem records

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Speleothems (cave carbonates) provide highly resolved records with the potential to reconstruct past changes in mean regional climate and climate variability on annual to millennial timescales. The most common type of measurements made on speleothems – the stable isotopes of oxygen ( $\delta^{18}\text{O}$ ) – can be used to evaluate climate models that explicitly include isotopic tracers, although this has rarely been done because of the lack of a global synthesis of the records.

Here we compare speleothem isotope data from the SISAL (Speleothem Isotopes Synthesis and Analysis) database and the outputs of the isotope-enabled ECHAM5-wiso model for the Last Glacial Maximum (21 ka), the Mid-Holocene (6ka) and the modern (1850 – 2013) periods. We show how the SISAL database compares to GNIP (Global Network of Isotopes in Precipitation) measurements and model outputs in terms of temporal variability, the ability of ECHAM5-wiso to reproduce the SISAL observations both globally and for several key transects during the Mid-Holocene and the Last Glacial Maximum, and the extent to which the speleothem age-depth model uncertainties impact the mean isotope values obtained for the LGM.

We also highlight the use of metadata included in the SISAL database to screen the paleorecords used for such data-model comparisons. Finally, we will discuss the benefits and weaknesses of using speleothem records for data-model comparisons and how our approach can be applied to assess other isotope-enabled climate model simulations.