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Global reorganization of atmospheric circulation during Dansgaard-Oschger cycles

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Ice core records from Greenland provide evidence for multiple abrupt warming events recurring at millennial time scales during the last glacial interval. Although climate transitions strongly resembling these Dansgaard-Oeschger (DO) transitions have been identified in several speleothem records, our understanding of the climate and ecosystem impacts of the Greenland warming events in lower latitudes remains incomplete.

Here, we investigate the influence of DO transitions on the global atmospheric circulation pattern. We comprehensively analyse d18O changes during DO transitions in a globally distributed dataset of speleothems (SISALv2; Comas-Bru et al., 2020). Speleothem d18O signals mostly reflect changes in precipitation amount and moisture source. Thereby this proxy allows us to infer spatially resolved changes in global atmospheric dynamics that are characteristically linked to DO transitions. We confirm the previously proposed shift of the Intertropical Convergence Zone towards more northerly positions. In addition, we find evidence for a similar northward shift of the westerly winds of the Northern Hemisphere. Furthermore, we identify a decreasing trend in the transition amplitudes with increasing distances from the North Atlantic region. This confirms previous suggestions of this region being the core and origin of these past abrupt climate changes.

References:

Comas-Bru et al., 2020, Earth System Science Data 12, 2579–2606