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Speleothem paleoclimatology for the Caribbean, Central America, and North America

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Speleothem oxygen isotope records from the Caribbean, Central, and North America reveal climatic controls that include orbital variation, deglacial forcing related to ocean circulation and ice sheet retreat, and the influence of local and remote sea surface temperature variations. Here, we review these records and the global climate teleconnections they suggest following the recent publication of the Speleothem Isotopes Synthesis and Analysis (SISAL) database. We find that low-latitude records generally reflect changes in precipitation, whereas higher latitude records are sensitive to temperature and moisture source variability. Tropical records suggest precipitation variability is forced by orbital precession and North Atlantic Ocean circulation driven changes in atmospheric convection on long timescales, and tropical sea surface temperature variations on short timescales. On millennial timescales, precipitation seasonality in southwestern North America is related to North Atlantic climate variability. Great Basin speleothem records are closely linked with changes in Northern Hemisphere summer insolation. Although speleothems have revealed these critical global climate teleconnections, the paucity of continuous records precludes our ability to investigate climate drivers from the whole of Central and North America for the Pleistocene through modern. This underscores the need to improve spatial and temporal coverage of speleothem records across this climatically variable region.