

133-4 - MIDDLE PLEISTOCENE HYDROCLIMATE CHANGES IN THE TROPICAL ANDES INFERRED FROM CARBON AND OXYGEN ISOTOPE RECORDS OF SPELEOTHEMS FROM HUAGAPO CAVE, PERU



Monday, 16 October 2023



2:20 PM - 2:35 PM



310 / 311 (3, David L Lawrence Convention Center)

Abstract

Glacial-interglacial transitions and abrupt millennial-scale events are the most prominent features in many paleoclimate records. Understanding these oscillations requires high-resolution time series from multiple locations to constrain the latitudinal response to forcings. Few high-resolution records exist from the Southern Hemisphere tropics that predate the last two glaciations. We present a high-resolution speleothem oxygen and carbon isotope record from Huagapo Cave in the Central Peruvian Andes covering Marine Isotope Stage (MIS) 8 glacial and MIS 9 interglacial (339 to 249 ka). Uranium-series dates on three stalagmites ($n=18$) with small age uncertainty $\pm 1\%$ allows us to resolve abrupt climate events similar in structure and duration to Dansgaard-Oeschger and Heinrich events. The South American Summer Monsoon (SASM) controls modern hydroclimate variability in the Andes, and previous records from Huagapo Cave have provided records of past SASM variability. Termination three (T-III) in our record has a steep increase in $\delta^{18}\text{O}$ values of 5‰, punctuated by two stadial event decreases of $\sim 3\%$ (S8.1 and S8.2). This pattern is mirrored in the $\delta^{13}\text{C}$ record, indicating that these millennial-scale events record hydroclimate and vegetation productivity changes. The same structure as our T-III record is found in other records globally, where they are noted to be Heinrich-like events. Frequency analysis indicates that the occurrence of these abrupt events changes between glacial cycles. Precession is weakly expressed in the $\delta^{18}\text{O}$ record during MIS 8; similar to speleothem records from the region dating to the Last Glacial Maximum (LGM). Global ice cover and sea levels were similar in the LGM and MIS 8, but the Milankovitch insolation forcing differed. This change in SASM behavior is not observed in the East Asian monsoon, where the precession signal is dominant throughout. Interglacial precessional control is apparent during the latter half of MIS 9 and during Huagapo Cave intervals dating to MIS 6 and 7. These data indicate that the response to high-latitude forcing in the Southern Hemisphere tropics fluctuates through time, and potential explanations for low-latitude sensitivity to forcing factors are further explored.

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