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TITLE: Southwest U.S. Paleoclimate Over the Past 30,000 Years: Insights from Speleothem $\delta^{18}O$ and Growth Rate Time Series

SESSION TYPE: Poster

SESSION TITLE: PP31C. Climate Reconstruction From Speleothems: Spatial and Temporal Interrelationships of Global Climate Events and Their Local Characteristics III Posters

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ABSTRACT BODY: A 30 ky growth rate and high-resolution $\delta^{18}O$ time series from a central Texas (TX) speleothem provides new insights when integrated with recently published speleothem $\delta^{18}O$ and growth rate records from New Mexico (NM) and Arizona (AZ), along with Gulf of Mexico (GOM) foraminifera $\delta^{18}O$ records. This comparison enables a regional assessment of factors which may control temporal variations in rainfall amount and moisture sources in the Southwestern U.S. The three speleothem locations (TX, NM, AZ) span ~ 1,200 km. A regional east-to-west decrease in speleothem $\delta^{18}O$ values of up to 9 ‰ is observed throughout the record. This is the same direction of regional decrease as in modern rainfall. This suggests 1) mixing of moisture from two sources, Pacific moisture (low $\delta^{18}O$), and GOM moisture (high $\delta^{18}O$), and 2) that these two sources have contributed moisture to the region for most of the last 30 ky. Prior to 15 ka, relatively large magnitude, millennial-scale oscillations (up to ~3 ‰) occur in the NM $\delta^{18}O$ record while the TX and AZ records show smaller variations (~1 ‰). Starting at ~ 15 ka, both AZ and NM records show a rapid increase in $\delta^{18}O$ values, whereas TX shows a decrease prior to a rapid increase. This dip in the TX $\delta^{18}O$ record approximately corresponds with $\delta^{18}O$ shifts in the GOM that have been attributed to glacial melt water inputs. All three records show peaks in growth rate between 15 and 12 ka, and significant decreases in growth rate in the Holocene. The speleothem $\delta^{18}O$ time series appear to reflect changes in rainfall amount and composition. The correspondence of the TX and GOM records implicates GOM moisture composition as the major control on Late Pleistocene to Holocene TX precipitation $\delta^{18}O$ values. NM and AZ, by contrast, apparently received varying proportions of Pacific and GOM sources over this time period. Periods of high $\delta^{18}O$ values in the NM and AZ records, when combined with relative high growth rates, may suggest increased overall water availability and GOM moisture contributions. The growth rate records are consistent with a regional transition to a drier climate from the latest Pleistocene to the Holocene.

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