Title: Coupled Warming and Megadroughts in New Mexico During the Mid-Pleistocene: The Valles Caldera Record

We present a high-resolution lacustrine paleoclimate record from the Valles Caldera, New Mexico, which spans 200,000 years across the mid-Pleistocene (Marine Isotope Stages (MIS) 14 to 10). Within this record, periods of climatic aridity (megadroughts) lasting centuries to millennia occurred during the warmest parts of the long interglacials (MIS 13 and 11) and were climatically similar to projected future aridity in the southwest. We used the MBT/CBT index to reconstruct mean annual temperatures downcore and found that the warmest phases of interglacial periods were also the driest, as shown by the presence of mudcracks and elevated calcite concentrations. During these episodes, MATs were similar to, or higher than modern MATs. Three warm peaks with amplitudes of 2^{o}C occur during MIS 11, an interglacial with an orbital configuration similar to the Holocene, and appear to correspond to the low amplitude precessional cycles within MIS 11. Much of interglacial MIS 13 was warmer than MIS 11 and larger amplitude variations in MAT (4 to 6^{o}C) during this interval when precessional cycle amplitudes were larger suggests that local insolation variations were important to southwestern interglacial climate variability.

Glacial periods in the Valles Caldera record exhibit millennial-scale climatic variability. High-resolution analysis of proxies from the VC-3 core show the occurrence of approximately 23 oscillations with an average duration of ~2,200 years. Many of these oscillations are characterized by relatively gradual coolings that are followed by abrupt warmings of up to 6oC, similar to the Dansgaard-Oeschger events in the Geenland ice core record. Stadials in the VC record correlate with high percentages of boreal pollen taxa (Picea, Abies) while interstadials have lower percentages of boreal pollen but have local maxima in Juniperus and Quercus pollen. We argue that MIS 12 glacial climatic variability in northern New Mexico was driven by changes in continental temperature as well as changes in the strength and track of the winter polar jet, which affected the local hydrologic cycle and isotopic composition of precipitation.