



Episodic speleothem growth at Oregon Caves National Monument and paleoclimatic implications

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Oregon Caves National Monument (OCNM) is situated in the Klamath Mountains of southwestern Oregon, approximately 65 km inland of the Pacific coast ($42^{\circ}05'N$, $123^{\circ}25'W$). The cave is developed along joints and fractures of Triassic marble at an elevation of 1150 to 1270 meters. Deep in the cave the temperature is approximately constant over the whole year and averages $6.5^{\circ}C$. The modern climate of southwestern Oregon is strongly influenced by atmosphere-ocean interactions that originate in the Pacific Ocean with relatively warm and dry summers associated with high-pressure over the North Pacific, and cool and wet winters that occur in response to an intensification of the Aleutian low-pressure cell. Here we use new and previously published U-series dating results of speleothems from OCNM and discuss possible mechanisms and paleoclimatic implications of growth episodes. A total of 57 U-series dates indicate that OCNM speleothem growth, which extends back to 359,000 years, only occurred during interglacial periods, with the exception of several brief glacial growth intervals corresponding with insolation peaks at $45^{\circ}N$. The stratigraphy indicates that glacial periods were otherwise characterized by nondeposition and little or no dissolution. Potential causes for the minimal growth during glacial periods include the presence of permafrost above the cave preventing water infiltration, changes in precipitation, changes in soil pCO_2 , and cave flooding. We assess the importance of each of these factors for speleothem growth at OCNM in the context of environmental changes that have occurred during the past 350,000 years.