

Climate Change Recorded in Aragonite Speleothems from Central Alabama

*** Lambert, W J**

jlambert@wgs.geo.ua.edu

*The University of Alabama, Department of Geological Sciences, 202 Bevill Building,
Tuscaloosa, AL 35487 United States*

Aharon, P

aharon@wgs.geo.ua.edu

*The University of Alabama, Department of Geological Sciences, 202 Bevill Building,
Tuscaloosa, AL 35487 United States*

The driving forces of global climate change are poorly understood in part due to the lack of high-resolution terrestrial climatic records. The study of carbonate cave formations (stalagmites) often provides uninterrupted annual to millennial records of past terrestrial climate conditions. It is well documented that the growth and isotopic composition of stalagmites are primarily controlled by climatic factors including air temperature, soil microbial activity, and rainfall. Stable isotope analysis of an aragonitic speleothem from DeSoto Caverns (Childersburg, AL) suggests the cave deposits reflect historic and prehistoric climate variations. The stalagmite provides approximately 350 years (determined by annual couplet counting) of climate record for central Alabama with $\delta^{18}\text{O}$ values ranging from ~ -2 to -5 (‰ PDB) and $\delta^{13}\text{C}$ ranging from ~ -4 to -10 (‰ PDB). High-resolution micro-sampling (~ 200 μm) along the growth axis reveals a significant negative shift at about 1850 AD in both $\delta^{18}\text{O}$ and $\delta^{13}\text{C}$ proxy records suggestive of changing land practices and increased air temperature. The proximity of the cave to the laboratory allows for detailed study of temperature, relative humidity, and ρCO_2 both inside and outside the cave allowing for a more complete understanding of the relationship between local climate factors and cave deposits. Future stalagmite analysis in DeSoto Caverns may reveal climate conditions for the southeastern United States during the Little Ice Age, Medieval Warm Period, and the 8200-year cold event. Additionally, the location of the study site may provide valuable information regarding the source of moisture (Gulf of Mexico) for the buildup and starvation of the Laurentide Ice Sheet during the last glacial maximum and the subsequent deglaciation.