Southern Hemisphere-driven coupled ocean-atmosphere changes during the last deglaciation

YEMANE ASMEROM[1]*, VICTOR J. POLYAK[1] AND MATTHEW S. LACHNIET[2]

[1]University of New Mexico, 200 Yale Blvd. NE, Albuquerque, NM 87131

[2]University of Nevada Las Vegas, 4505 S. Maryland Parkway, Las Vegas, NV 89154

Coming out of the Last Glacial Maximum contrasting pictures emerge from North Atlantic proxies. The beginning of Greenland Stadial 1 (GS1), starting about 16.5 ka, is the first significant cooling recorded in the ice core data. While various marine proxies indicate early and significant lowering of North Atlantic sea surface temperature (SST) and the near complete shutdown of the Atlantic Meridional Overturning Circulation (AMOC), although precise chronology, independent of the ice core chronology, has remained a challenge. Whether this potential discrepancy was due to contrast in ocean-atmosphere response or is that one or the other set of data did not represent Northern Hemisphere climate has remained unanswered. We will present an independent proxy of Northern Hemisphere temperature variability based on precisely-dated (with mean age uncertainties in the range of 70 years (2σ) speleothem data. We show that these data track the meridional variability in the position of the polar jet stream, which in turn is dependent on changes on Northern Hemisphere temperature/pressure gradients. Our data show cooling profile that matches the marine SST and AMOC variability, demonstrating coupled atmosphere-ocean changes during deglaciation. The Greenland deviation may be a case of sea ice buffering of local temperature previously suggested. The coherent ocean-atmosphere variability, suggested by our data and the marine data match changes in the timing of Southern Ocean ventilation and are likely to be causally linked.