

Reconstructing North Atlantic climate over the past six centuries using a high resolution stalagmite multi-proxy approach

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Stalagmite BER-SWI-13 from Leamington Cave, Bermuda, reflects North Atlantic climate variability over the past six centuries. The stalagmite chronology is well-constrained by a composite of multiple independent annual Mg cycle counts anchored to the 1955 A.D. bomb spike. The mean Mg cycle count chronology is within error of an independent modelled radiocarbon chronology using twenty-two high-precision graphite ¹⁴C ages. Annual-scale $\delta^{13}\text{C}$ values are significantly correlated with local temperature over the instrumental period. Low frequency stalagmite $\delta^{13}\text{C}$ variations and the long-term trend are consistent with records of Northern Hemisphere temperature. Within the BER-SWI-13 $\delta^{13}\text{C}$ record, maximum cooling is observed during the late 15th Century. Following approximately 100 years of warming until the mid-16th Century, the stalagmite $\delta^{13}\text{C}$ record suggests an abrupt return to cooling into peak Little Ice Age conditions and gradual warming thereafter. The BER-SWI-13 $\delta^{18}\text{O}$ record is significantly correlated with rainfall and North Atlantic tropical cyclone activity (i.e., tropical storms and hurricanes that passed within 200 miles of Bermuda) over the Observational Era. Observed links with other large-scale modes of North Atlantic climate variability including the North Atlantic Oscillation and Atlantic Multidecadal Oscillation as well as potential teleconnections with El Niño Southern Oscillation (ENSO) will also be presented.