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High-resolution Records of Atlantic Climate Variations in Stalagmite Records from the Bahamas

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We have obtained a number of stalagmite samples from a range of depths below sea-level in the Bahamas. Using U-Th dating these samples fall into three distinct age ranges. The majority of the samples fall in age from ∼14K to 80K, forming during glacial stages 2-4 when sea level was much lower than the present day. The stalagmites ceased to form significantly before the caves were flooded by seawater indicating a climatic control on their formation. The remainder of the samples formed during stages 8 and 10. Preliminary analyses of two samples (ranging in age from 14 to 60K) using a x-ray scanning fluorescence technique has revealed that the Heinrich events are visible in the stalgmites as intervals significantly elevated in iron. As the Bahamas is isolated from riverine inputs, we believe that the iron originated from atmospheric dust, probably derived from the Sahel region of Africa. Clearly the Sahel region was very arid during these events. At the present time we have analyzed the stable isotopic composition of C and O across Heinrich events 1 and 2 (H1 and H2) in one of the samples. The change across H1 is very abrupt changing by as much as 4.5 ‰ in C and 2.5 ‰ in O. Based on our preliminary age analysis of the core, these changes occurred over a period of ∼50 years. The change associated with H2 is less severe and extended over a much long time period (100s of years). These variations are consistent with a change from an arid to a much wetter climate in the Bahamas. Further analyses will reveal the changes associated with other Heinrich and Dansgaard-Oeschger events.