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Pluvial Period over NE Brazil linked to Heinrich Stadial Event 1

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The precise timing of Heinrich Stadial (HS) 1 and its impact on tropical regions remain a topic of active debate. We present a high-resolution precipitation record of HS-1 using a stalagmite collected from Toca da Barriguda cave located in the interior of NE Brazil (40^{o}51'39"W 10^{o}09'36"S, 600m asl). Stalagmite growth in this region is caused by increased rainfall due to a southerly displacement of the Intertropical Convergence Zone (ITCZ) during HS Events. Stalagmite TBR14 includes a 107mm calcitic growth phase ^{230}Th dated from 17070 $\pm$40 to 15640 $\pm$65 BP, which we interpret to be the period of rainfall maximum over NE Brazil in association with HS-1. Oxygen isotope analysis reveals a two-stepped structure to the HS-1 pluvial period: starting with a 970-year period of δ^{18}O values averaging -5‰ followed by an abrupt 2.5‰ drop between 16100 to 16080 BP ($\pm$20). We infer that rainfall amount increased during this time, as supported by the modern day observation of anti-correlated δ^{18}O values and precipitation amount. A second step of the HS-1 growth phase shows a gradual increase from -7‰ over 440 years followed by the termination of stalagmite growth. Fluorescent banding was discovered throughout the stalagmite using confocal laser fluorescence microscopy. If annual, band counts may add additional constrains to the duration of the abrupt decrease in δ^{18}O values observed at 16100 BP ($\pm$20). The two-stepped δ^{18}O pattern observed in our stalagmite record may correlate in detail with other low-latitude high-resolution records of HS-1 such as the Hulu Cave record (Wang et al. 2001) from China, in which an abrupt (2.2‰) weakening of the East Asian Monsoon at 16070 BP ($\pm$40) is followed by a 600 year recovery (decreasing) of δ^{18}O values. The possible anti-phase relationship between these two distant records is concurrent with the hypothesis of a southward migrating ITCZ, and suggests rapid transmission of atmospheric signals during HS-1.