The glacial Indian summer monsoon – precipitation changes during Heinrich and D-O events in NE India

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While glacial/interglacial changes in monsoonal precipitation and their link to external forcing's have been studied extensively for East Asia, little is known about the millennial scale variations of the glacial Indian Summer Monsoon (ISM).

Here, we present novel oxygen isotope data from an U-series dated stalagmite from a cave in NE India, which cover large parts of Marine Isotope Stage 3. Based on monitoring information, we interpret our stalagmite carbonate isotope profile to reflect ISM strength. Higher $\delta18O$ values in precipitation and in stalagmite carbonate indicate drier intervals, while lower $\delta18O$ values characterize wetter periods.

The 1.2 m long stalagmite MAW-3 has been sampled every 0.2 to 2 mm, which translates to (sub-)decadal resolution. The $\delta18O$ record varies from -1 to -7 permil, which is several permil higher than Holocene $\delta18O$ values (-6 to -9 permil).

Our record suggests that the ISM was significantly weaker during MIS 3, though still perceptible. Moreover, it shows the clear sawtooth pattern of Dansgaard-Oeschger (D-O) cycles. We argue that ISM precipitation was greatly reduced during the Glacial and especially during the Heinrich events, while increased during the interstadials of the D-O cycles. We argue that glacial climatic changes in the Northern Hemisphere rapidly influenced ISM precipitation via the westerlies and/or the Tibetan High. We compare our NE Indian stalagmite record with proxy records from other locations in order to identify teleconnection patterns.