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North Atlantic cold events pushed ITCZ southward and weakened Indian summer Monsoon in northern India

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We present stable isotope (δ^{13}C and δ^{18}O) data from a 1.600 year long annual to decadal speleothem record collected from the Indian Lesser Himalaya west of Nepal. Our age model is based on 27 multi-collector inductively coupled mass spectrometry (MC ICPMS) U/Th dates. We demonstrate that Indian summer monsoon precipitation is related to the migration of the Intertropical Convergence Zone (ITCZ).

The data show variation of $\sim$4‰ (-5.5 - -9.0‰) in the δ^{18}O with a stronger than today monsoon between 3.9 and 3.3 kyr BP. Before 3.9 kyr and after 3.3 kyr until 2.6 kyr BP, the ISM was weaker than today. Superimposed on this long-term pattern are decadal to centennial drought events. Around 4.15 kyr BP we find a very rapid $\sim$70 year shift to very dry conditions. This drought then lasted until 3.95 kyr BP, when ISM strength recovered and reached a maximum around 3.66 kyr BP. Within this wet interval there are several dry spells, lasting only 50-90 years. From 3.3 kyr BP until 2.95 kyr BP ISM declined gradually, followed by a 60 year long shift of $\sim$1‰ to again very dry conditions. This second drought was lasting $\sim$150 years, when it ended with an only 30 year long increase in ISM strength, though not reaching the modern level.

During normal conditions ITCZ is located over the cave location and clear monsoonal precipitation pattern is observed. There is evidence that in response to centennial-scale cold Bond events in the North Atlantic, the mean latitudinal extent of the ITCZ shifted southward of the cave location and ISM precipitation over the study area decreased.

Strong decadal to centennial drought events seem to have highest impact during times of already weakened monsoon (e.g. during Bond events). This may lead to decline of water supply for irrigation networks and subsequently famines in rural communities.