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Decoupling between the tropics and the mid- to high-latitude North Atlantic region during Marine Isotope Stage 7

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Studies of subtropical speleothems, North Atlantic marine cores and Greenland ice cores covering the last glacial cycle suggest that the climates of the high latitude North Atlantic and the Asian monsoon regions were closely coupled. Heinrich Events in the North Atlantic triggered a weakening of the Asian monsoon, whereas abrupt warmings during Dansgaard-Oeschger cycles saw an intensification of the monsoon. It has also been argued that this coupling occurred during glacial terminations, with ice-rafting events during deglaciation leading to suppression of the Asian monsoon. The implication of these patterns is that close coupling between the high latitudes and the tropics in the Northern Hemisphere may be a persistent feature of Late Quaternary climate.

We present a replicate speleothem record from Corchia Cave (Italy) which shows that the tropics and high latitudes of the Northern Hemisphere were strongly decoupled during the MIS7d-7c transition, simultaneous with deposition of sapropel S8 in the Mediterranean Sea. Our cave record shows that the strong precession-driven intensification of Asian and African monsoons brought wet conditions in the Mediterranean region, yet at this time the high and middle latitudes of Europe were in the grip of a deep stadial. Unlike the millennial-scale climate swings of the last glacial and the inferred response to ice-rafting events through the last four terminations, the Asian monsoon was apparently unaffected by these high latitude stadial conditions. Furthermore, it seems the exceptionally strong insolation increase at this time had little noticeable effect on ice-sheet dynamics over the northern continents, suggesting that tropical – high latitude coupling maybe either a transient feature or, at the very least, more complicated than previously thought.