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Does the North Atlantic influence the monsoon signal in Asian speleothems?

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Speleothems from Indian and Chinese caves have been broadly used to infer past monsoon strength, since the oxygen isotopic composition of the spelothems is primarily controlled by the oxygen composition of the precipitation. However, the $d^{18}O$ changes recorded by the speleothems could be due not only to a change in the strength of the monsoon but also to other causes, such as changes in the precipitation source or the isotopic fractionation at the source. Here we present a modelling study where we examine water isotope and moisture source changes between a stadial climate (Last Glacial Maximum, LGM, 21 Kyr BP, before present) and a cold abrupt event (Heinrich event 1, H1, 17 kyrs BP). Our study aims to understand what causes the $d^{18}O$ change observed in the speleothems during this period and what type of signal, whether local or large scale, the Asian caves are recording. Simulated water isotope archives match well those recorded by speleothems in China and India. Our study shows that water isotopes changes in Asian speleothems are primarily linked to changes in the isotopic fractionation at the source, but partially also to the total amount of local precipitation. The change in sea surface temperature (SST) over the Indian Ocean is necessary in order to give an isotopic signal at the cave's locations. Our results show that the $d^{18}O$ changes recorded in the speleothems are mainly driven by changes in the isotopic composition of monsoon precipitation (MJJA). The Indian caves (e.g. Timta) are perfect proxies for recording the Summer Indian Monsoon (SIM). On the other hand, Chinese caves (e.g. Hulu, Sanbao, Dongge) records not only the East Asian Summer Monsoon (EAS), but they are also influenced by the SIM. Our study shows a weakening of the monsoon during cold abrupt climate changes, due to a teleconnection with the North Atlantic, cooling the Asian continent and reducing the temperature gradient between the continent and the ocean.