Millennial-scale controls on monsoon precipitation in Madagascar during the deglaciation

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During the deglaciation competing effects acted on tropical precipitation in the southern hemisphere. Decreasing local solar heating and a northerly trending ITCZ opposed increasing sea surface temperatures, sea surface area and hydrological cycle vigour. Further the influence of abrupt millennial-scale climate events such as Heinrich Stadial 1, the Bølling-Allerød, and the Younger Dryas may have acted as temporary reversals or enhancements to longer term trends. As different tropical rainfall systems have different sensitivities to multiple forcings, their response is unlikely to be identical, and the *a priori* assumption of inter-hemispheric antiphase variability should be avoided. There is therefore a need for greater coverage of high resolution, precisely dated paleoclimate records to understand regional variability of past rainfall in southern hemisphere tropics. One of the largest gaps in our current understanding is the Madagascan monsoon in the south-west Indian Ocean.

We present a new southern hemisphere speleothem record from Mitoho cave, southwestern Madagascar, which spans the majority of the last deglaciation from 21-11 kyr BP. Speleothem growth phases and stable isotope records indicate significant variability conincident with millennial-scale events of the deglaciation. However, the response was not uniform to the alternating cold/warm pattern of the traditional northern hemisphere progression. This raises interesting questions and insights into competing influences on southern hemisphere tropical precipitation, and how different forcings may dominate at different times, as boundary conditions transitioned from glacial to interglacial.