A drying event at 8.2 kyr in a high-resolution Borneo speleothem record

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A well-dated stalagmite from Bukkit Assam Cave, Gunung Buda National Park, Borneo shows high growth rates (average ~100 μm/yr) and extends from 12 ka to recent times. The rapid growth rates allow high resolution reconstruction of environmental conditions in the Western Pacific Warm Pool (WPWP) throughout the Holocene. Speleothem $\delta^{18}O$ at the site primarily reflects the strength of regional atmospheric convection and resulting precipitation[1], with higher $\delta^{18}O$ values indicating drier conditions. A decadal-scale $\delta^{18}O$ time series resolves a trend consistent with increasing precipitation from the early to mid Holocene, maximum precipitation between 6 and 3 ka, with drier conditions thereafter, consistent with published low resolution speleothem records from Gunung Buda [2]. Subannually-resolved sampling between U/Th-dated horizons at 8130±60 yrs BP and 8360±86 yrs BP reveals a 0.7‰ increase in $\delta^{18}O$ beginning at approximately 8225 yrs BP. High $\delta^{18}O$ persists until ~8190 yrs BP, yielding a duration of 30-40 years for the isotopic excursion. This result suggests reduced precipitation beginning at ~8225±105 yrs BP (±2σ), within age error of the 8.2 kyr event recorded in Greenland (8210 ±50 yrs BP [3]). The global 8.2 kyr event is associated with reduced Atlantic overturning circulation; the isotopic enrichment reported here is consistent with enrichments in Borneo stalagmites synchronous with reduced Atlantic overturning during Heinrich events [2,4]. Our results are also broadly consistent with work showing dryer events in East Asia and Oman beginning between 8.3 and 8.2 ka [5]. This new record, when combined with records of precipitation change from both sides of the Pacific, provides information on ITCZ migration and zonal variation in the Pacific across the 8.2 ka event.

[1] Moerman *et al* (2013) *EPSL* **369-370,** 108-119. [2] Partin *et al*. (2007) *Nature* **449**, 452-455. [3] Vinther *et al* (2006) *J. Geophys. Res*. **111**, D13102. [4] Carolin *et al Science* **340**, 1564-1566. [5]Cheng *et al* (2009) *Geology* **37**, 1007-1010.