High-resolution hydroclimate variability in eastern Amazon over the past 800 years

XIANFENG WANG[1,2], KE LIN[1]

[1]Earth Observatory of Singapore, Nanyang Technological University, Singapore
[2]Asian School of the Environment, Nanyang Technological University, Singapore

We established an annually resolved speleothem d18O record from Paraiso Cave located in eastern Amazon lowlands. The record covers continuously through the past ~800 years, with a chronology determined by high-precision U/Th disequilibrium dating methods. The d18O varies between -4.5‰ and -6.5‰ VPDB in the record, and relatively high values appear between ~1,500 A.D. and 1,850 A.D., within the Little Ice Age (LIA) interval. The record broadly resembles other cave d18O data from the region over their contemporaneous time periods. Considering the proximity of the cave site to the tropical Atlantic Ocean, meteorological observations and modeling results, we interpret the speleothem d18O as a proxy of regional rainfall. So, higher speleothem d18O values indicate lower rainfall over the region, and vice versa.

The record is characterized by multi-decadal as well as interannual variations. When comparing with the Atlantic Multi-decadal Oscillation (AMO) index, we found that eastern Amazon was relatively dry (wet) during the negative (positive) phase of the AMO. The dry anomaly during the LIA therefore cannot be accounted by the meridional shift of the Atlantic intertropical convergence zone (ITCZ) associated with the AMO. Instead, rainfall variations were likely controlled by changes in zonal energy fluxes, as suggested by the dominant interannual variations in the record. An El Nino-like condition during the LIA can further be confirmed by the tight correlations between the Paraiso record and those from the eastern tropical Pacific and the Andes.