A gradual transition into Greenland Interstadial 14 in southeastern China based on a sub-decadally-resolved stalagmite record

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Greenland stadials and interstadials (GS and GIS) are prominent features in ice core records of the last glacial period and are characterized by millennial-scale climate oscillations with sub-decadal- to decadal-scale hydroclimatic shifts. Over the past two decades, studies of Chinese stalagmite records have revealed corresponding Chinese stadials/interstadials (CS/CIS). However, the CS/CIS shifts and their corresponding forcings across the Asian monsoon region are still not fully understood. In this study, we present a ^{230}Th-based sub-decadally-resolved stalagmite δ^{18}O record from Xianyun Cave in southeastern China covering the period 58.2–50.8 kyr BP (before 1950 AD) and including GIS (and CIS) 16–14. We used GIS (CIS) 15.1 (peak point) and 15.2 (first point) to chronologically link the high and low-latitude records. We found that the onset of GIS 14 in our record occurred earlier than in an ice core record from Greenland and stalagmite records from northern China. This finding implies that low-latitude tropical climate likely played a key role in triggering abrupt millennial-scale event. Moreover, the transition into GIS 14 lasted 1.49 kyr in our record, which is in contrast to the abrupt temperature rise observed in NGRIP (the North Greenland Ice Core Project, 0.02 kyr). Compared with previous stalagmite records, we identified two transitional patterns into GIS 14 in monsoonal China: 1) a rapid transition in northern China and 2) a gradual transition in southeastern China. The gradual transition in our Xianyun record is analogous to a sea surface temperature (SST) record in the western tropical Pacific, highlighting a possible inherent connection between the changes in western tropical Pacific SSTs and East Asian summer monsoon variability in southeastern China. Paleoclimate records in southeastern China are therefore critical for understanding the mechanisms of abrupt millennial-scale climate events, as they can act as a bridge between the high- and low-latitude records.

