

“Reconstructing Asian Monsoon History from Chinese Speleothems”

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Abstract

While we know that modern anthropogenic climate change is superimposed upon significant natural climate variability, the instrumental record of climate is too short to capture the full range of this variability. In order to fully understand and predict future changes, therefore, high-resolution, well-dated paleoclimate records are needed to extend the record. This paleoclimate data allows us to quantify natural variability and learn how the climate system responded to past changes in boundary conditions and forcings and provides a vital test for state-of-the-art coupled climate models. Cave calcite deposits (speleothems) are widely studied paleoclimate archives that have led to significantly improved records of past climate variability over a wide range of timescales (seasonal to glacial-interglacial), most notably in low-latitude and monsoon regions. Speleothems are well-suited for terrestrial climate reconstruction because: they tend to be very pure and well-preserved; they usually contain clear visible growth banding which, like tree rings, is often annual in nature; they can be very precisely dated using uranium-series radiometric dating methods; and they contain numerous types of physical and geochemical proxy data. In this lecture, I will present an introduction to speleothem based paleoclimate proxies and describe ongoing modern calibration studies we are conducting at Heshang Cave, China to test and develop new seasonal resolution proxies of Asian monsoon rainfall. In addition, I will present multiple records of Asian monsoon rainfall obtained from stable isotope and trace element variations in Chinese speleothems and discuss the important role of the Asian monsoon in the global climate system.