

EGU24-4973, updated on 20 May 2024

<https://doi.org/10.5194/egusphere-egu24-4973>

EGU General Assembly 2024

© Author(s) 2024. This work is distributed under the Creative Commons Attribution 4.0 License.



Quantitative reconstruction of a single super rainstorm using daily resolved $\delta^{18}\text{O}$ of land snail shell

Guozhen Wang, Jibao Dong, and Hong Yan

State Key Laboratory of Loess and Quaternary Geology, Institute of Earth Environment, Chinese Academy of Sciences, Xi'an 710061, China (wangguozhen@ieecas.cn; djb@ieecas.cn; yanhong@ieecas.cn-corresponding author)

A “once-in-a-millennium” super rainstorm battered Zhengzhou, central China, from 07/17/2021 to 07/22/2021 (named “7.20” Zhengzhou super rainstorm). It killed 398 people and caused billions of dollars in damage. A pressing question, however, is whether rainstorms of this intensity can be effectively documented by geological archives to understand better their historical variabilities beyond the scope of meteorological data. Here, four land snail shells (*Cathaica fasciola*) were collected from Zhengzhou in 2021, and weekly to daily resolved snail shell $\delta^{18}\text{O}$ records from June to September of 2021 were obtained by gas-source mass spectrometry (GSMS) and secondary ion mass spectrometry (SIMS). The daily resolved records show a dramatic negative shift between 06/18/2021 and 09/18/2021, which has been attributed to is related to the “7.20” Zhengzhou super rainstorm. Moreover, the measured amplitude of the shell $\delta^{18}\text{O}$ shift caused by the “7.20” Zhengzhou super rainstorm is consistent with the theoretical value estimated from the flux balance model and local instrumental data within the error range. Our results suggest that the ultra-high resolution $\delta^{18}\text{O}$ of land snail shells have the potential to reconstruct local synoptic scale super rainstorm events quantitatively. And the proposed “best practice” of current work indicated that fossil snail shells in sedimentary strata can be valuable material for investigating the historical variability of local super rainstorms under different climate background conditions.