

Decoupling of silicate weathering and Asian monsoon evolution during the penultimate glacial and interglacial

Meng Zhang¹, Xiuyang Jiang², *Chuan-Chou Shen³, Chun-Yuan Huang³, Fengtai Tong⁴, Jack Geary Murphy⁵, Yang-Yang Wang¹, Yilin Xiao¹

1. University of Science and Technology of China, 2. Fujian Normal University, 3. National Taiwan University, 4. Nanjing University, 5. University of Pennsylvania

The relationship between silicate weathering and monsoon evolution during deglaciation has been debated. Here, we present stalagmite lithium isotope ($\delta^7\text{Li}$) records from southern China covering 143-114 ka, to investigate silicate weathering dynamics during the penultimate deglaciation and the following interglacial. The results show a sharp decline in weathering at 138-135 ka, coinciding with the onset of a weakened 6-kyr Asian monsoon interval (WMI) during Heinrich Stadial 11. Weathering subsequently intensified during this WMI from 135 to 129 ka and further increased and reached its summit at 121 ka before the end of marine isotope stage (MIS) 5e. We propose that the decoupled enhancement of weathering during the WMI could be driven by temperature rise, inferred from our stalagmite Mg/Ca and global proxy records, induced by changes in insolation. The continuous intensification of weathering during MIS 5e resulted from both elevated precipitation and temperature. These findings indicate a more complicated response of silicate weathering process to glacial-interglacial transitions than previously recognized.

Keywords: Silicate weathering, Asian monsoon, Decoupling, Penultimate glacial and interglacial, Stalagmite lithium isotope