

Mercury records during early Permian icehouse to greenhouse transition

**CHAOSHENG YUE¹, JITAO CHEN¹, GUOZHEN XU¹,
BIAO GAO¹, JUSUN WOO², HUA ZHANG³, XIANGDONG
WANG⁴ AND SHUZHONG SHEN⁵**

¹Nanjing Institute of Geology and Palaeontology, Chinese Academy of Sciences

²School of Earth and Environmental Sciences, Seoul National University

³Nanjing Institute of Geology and Palaeontology, Chinese Academy of Science

⁴State Key Laboratory for Mineral Deposits Research, School of Earth Sciences and Engineering and Frontiers Science Center for Critical Earth Material Cycling, Nanjing University

⁵School of Earth Sciences and Engineering, Nanjing University

Presenting Author: csyue@nigpas.ac.cn

The Late Paleozoic Ice Age (LPIA) is one of the most significant glacial events during the Earth history, lasting for nearly 100 million years (360-260 Ma). It recorded the only complete transition from an "icehouse climate" to a "greenhouse climate" after the occurrence of advanced vegetation and complex ecosystems on land. This critical climate transition started in the Artinskian of the Early Permian (also known as the Artinskian Warming Event, AWE). Although the AWE was hypothesized to have been related to greenhouse gas emissions, its specific causative mechanisms remain unresolved. Widespread volcanic activities in the Early Permian were presumably considered to be an essential trigger for this warming event, but without direct evidence. Mercury (Hg) enrichment and isotopes have been widely used as a robust proxy for volcanic activities and paleoenvironmental perturbations in recent years. The combination of Hg enrichment and isotopes can effectively indicate volcanic activity and its association with climate events. This paper presents high temporal resolution time series of Hg concentration and isotopes in three continuous outcrop sections and one drilling core from the South China, Junggar, Spitsberg, and North China blocks, in order to explore the potential driving mechanisms for the AWE, particularly its linkage with volcanic activities during the critical climate transition.