

## **A Seven-million-year hornblende mineral record from the central Chinese Loess Plateau**

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Previous studies of the late Cenozoic erosion rate have yielded different views—long-term stable rates or a significant increase at climate transitions—leading to uncertainty concerning the hypothesised global erosion rate either by tectonic uplift or climatic changes. Here, we present a seven-million-year hornblende mineral record along the Lingtai section of the Chinese Loess Plateau. By examining the spatial distribution of hornblende minerals in seven desert basins, which are potential loess source areas, we constructed a ratio of hornblende versus total heavy minerals to reflect past changes in physical/chemical weathering strength. Our results demonstrate that the ratio has generally increased since 7 Ma, with three significant shifts recorded at 2.6 Ma, 1.4 Ma and 0.5 Ma, linked to the onset, continuation and expansion of the Northern Hemisphere glaciation, respectively. Given that chemical weathering during the diagenetic history produces a trend of smoothly increasing hornblende moving upwards, the three shifts at these boundaries can be interpreted as changes in the bedrock erosion rate on the northern Tibetan Plateau, which may be related to tectonic uplift events and incision of the Yellow River. Evidence presented here supports the idea of coupling between climate change, tectonic uplift and regional erosion.