



The quantitative reconstruction of paleoprecipitation from Chinese loess ^{10}Be

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Cosmogenic ^{10}Be is a promising precipitation index, because its fallout flux in sediments is mainly controlled by wet precipitation after its production in the atmosphere. Here we report on a new study for reconstructing precipitation during the last 130 ka using ^{10}Be measurements from Chinese loess, with multivariable linear regression to remove the geomagnetic field modulation and dust flux dilution effects from the loess ^{10}Be record. The broad similarity between our result and speleothem $\delta^{18}\text{O}$ indicates that the new precipitation record is robust. It also records an interesting increase in precipitation that occurred during Marine Isotope Stage 3 (MIS 3), exhibiting a similar rainfall amount with that of MIS 5, suggesting that MIS 3 is a special period with strengthened summer Monsoon intensity. By comparison with a stacked marine isotope record and a summer insolation record, our precipitation data clearly show a close correspondence with Northern Hemisphere summer (June, July, and August) solar insolation changes on orbital timescales. During MIS 3, our record follows the insolation differential between 30°N and 30°S , suggesting that rising rainfall changes during MIS 3 are a response to the interhemispheric summer insolation differential forcing.