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Paleoprecipitation reconstruction on the Chinese Loess Plateau using ^{10}Be

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The Chinese Loess Plateau is located along a semiarid to semi humid zonal boundary under the influence of the Asian Monsoon, and is a very important agricultural region in central China [Liu, 1985]. The Monsoon associated precipitation in the region is important to the maintenance of living environments and socially sustainable development [An, 2000]. To better understand the present process and future trend of Monsoon precipitation changes in this area, it is essential to quantitatively reconstruct the paleoprecipitation variation In the Chinese loess plateau since the last 130 ka. 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 $\delta^{18}O$ 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.