

Quantitative reconstruction of Quaternary rainfall variability in northern China based on silicate weathering record at IODP Site U1429

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On the orbital scale, climatic conditions including temperature and rainfall have been recognized as the critical factors in controlling land weathering process in East Asia during the late Quaternary. This provides us a way to reconstruct past rainfall changes with silicate weathering record based on relational expression established with weathering proxies, rainfall and temperature of present. Here we provide a sediment record from IODP Site U1429 in the East China Sea spanning the last 400 ka. Provenance tracing based on Nd isotope and trace elements from clay-sized sediments suggests their Yellow River source. The reconstructed silicate weathering history of source region shows an obvious 21-ka cycle, which is distinct with 100-ka cycle shown by the classic East Asian summer monsoon record of loess magnetic susceptibility. A set of sediment samples distribute from upper to lower reaches of Yellow River have further been selected to establish a model covering variables including K/Al ratio, rainfall and temperature based on the multiple statistical analyses. Quantitative rainfall changes in the northern China during the last 400 ka has thus been reconstructed. Our rainfall record shows strong cycle of 23-ka and is consistent with the paleoclimate model simulation of annual rainfall in northern China, suggesting the insolation forcing, rather than Northern Hemisphere ice sheet forcing on local rainfall variability during the late Quaternary.