

## Accepted Manuscript

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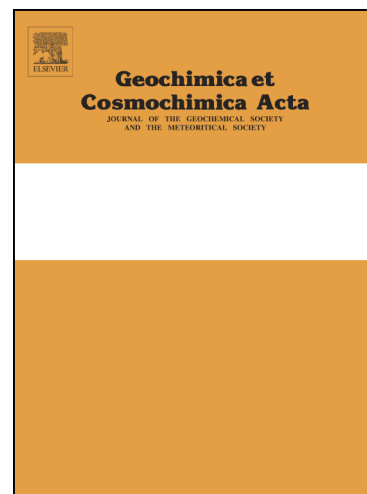
PII: S0016-7037(16)30706-2  
DOI: <http://dx.doi.org/10.1016/j.gca.2016.12.009>  
Reference: GCA 10061

To appear in: *Geochimica et Cosmochimica Acta*

Received Date: 6 April 2016  
Revised Date: 29 September 2016  
Accepted Date: 4 December 2016

Please cite this article as: YanYan, Ma, L., Sun, Y., Tectonic and climatic controls on provenance changes of fine-grained dust on the Chinese Loess Plateau since the late Oligocene, *Geochimica et Cosmochimica Acta* (2016), doi: <http://dx.doi.org/10.1016/j.gca.2016.12.009>

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## Tectonic and climatic controls on provenance changes of fine-grained dust on the Chinese Loess Plateau since the late Oligocene

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### Abstract

Provenance variations of Late Cenozoic aeolian deposits on the Chinese Loess Plateau (CLP) were closely associated with regional tectonic activity and climatic change. Previous studies, however, have not reached a consensus regarding the nature and origin of past variations in source. This study presents the results of oxygen isotope ( $\delta^{18}\text{O}$ ) analyses of fine-grained quartz ( $<16\ \mu\text{m}$ ) extracted from aeolian deposits on the CLP since the late Oligocene. The quartz  $\delta^{18}\text{O}$  variations exhibit distinct trends and patterns of variation over six time intervals (i.e. 25-20, 20-12, 12-7, 7-2.6, 2.6-1.2, and 1.2-0 Ma). In comparison with quartz  $\delta^{18}\text{O}$  results from East Asian dust sources and previous provenance studies of the same aeolian sequences, we identify three significant composition changes of the dust source system at around 20, 12, and 2.6 Ma. The dust source system was also rather unstable at 25-20, 12-7 and 1.2-0 Ma, while three stable stages occurred at 20-12, 7-2.6 Ma, and 2.6-1.2 Ma. The correlation between the provenance changes and paleoclimatic and tectonic evidence suggests that both tectonic and climatic factors were important in driving the observed stepwise provenance changes. However, the changes were mainly constrained by Tibetan Plateau uplift prior to the Quaternary, and by global climate change thereafter.

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