



## **Aeolian dust cycling from the inland Asia to North Pacific over the past 23 Ma**

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Aeolian deposits on the land and in the deep-sea provide valuable insights into past changes in source aridity and atmospheric circulations. Particularly, the dust depositions in East Asia and North Pacific have been investigated intensively to infer the impacts of the Tibetan growth and global cooling on the Asian inland drying and westerly-winter monsoon interactions. However, relative roles of regional tectonics and global climate on Asian desertification remain controversial. Here we present quartz flux data from the Chinese Loess Plateau (CLP) and the North Pacific spanning the past 23 Ma. The quartz flux from the North Pacific was relatively low before 7 Ma, in contrast to three remarkable peaks around 23-21, 15-13, 10-7 Ma. After 7 Ma, quartz flux from the land and ocean exhibits a weak peak around 7-5 Ma, followed by small-amplitude fluctuations between 5-2.6 Ma and large-amplitude oscillations after 2.6 Ma. Land-ocean discrepancy before 7 Ma reveals that three pulse increases of the quartz flux on the CLP during the Miocene might be attributed to phased uplift of the Tibetan Plateau. A widespread drying episode occurred from the land to ocean during 7-5 Ma, relating to a significant late-Miocene growth of the northern Tibet. After 5 Ma, both continental and marine records exhibit similar trend and variability of the quartz fluxes, indicating a close link of Asian drying to the northern Hemisphere cooling.