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Cenozoic Nd isotopic variation of Asian dust in the northern Tibetan Plateau and the North Pacific Ocean

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Cenozoic changes in climate, erosion, and atmospheric circulation in Asian interior continents can be reconstructed from records of eolian dust deposition from sediments of the North Pacific Ocean (NPO). Through a careful investigation of Nd isotope as eolian dust source tracer, the well-known core GPC3 in the central NPO has provided so far the most complete Asian dust records since ~40 Ma. Nd isotope in the GPC3 eolian dust thus documented an integrated history of Nd isotopic change of very fine eolian dust contributed from various geological terranes in Asian dust source areas. Unraveling this ~40 Myr-long Nd isotopic change in the NPO provides a first order constraint on the provenance change of the Asian dust source areas as a whole. However, this work cannot be done without an explicit Nd isotopic history for each geological terrane within the broad Asian dust source areas, since the Asian dust source area can be at least divided isotopically into two regions with distinct Nd isotopic values, e.g., the northern Tibetan Plateau (NTP) and the Central Asian Orogen (CAO). In this work, we present new data of river sediment Nd isotopic data around the entire Qaidam and Xining Basins to yield a more comprehensive Nd isotopic regimes at the NTP with compiling previously reported data. We have established an integrated Cenozoic Nd isotopic records of finer dust in the NTP based on previous records and our new Nd isotopic records in the Xining Basin from 52 to 17 Ma and Linxia basin from 23 to 5 Ma using both bulk sediments and clay fractions (<2 µm). After comparison of the reconstructed Nd isotopic variation in fine dust at the NTP with that in the NPO, we have further assessed the relative contributions of NTP and CAO to the Asian dust preserved in the NPO during the last 40 Myr, which indicates a dominant late Oligocene-Neogene uplift and growth of the mountains at the NTP and the CAO regions.