New carbon isotope stratigraphy of an old section in southwest China: Implications for placement of PC-C boundary on Yangtze Platform

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We report a high-resolution carbon isotope profile from Laolin section on Yangtze Platform, in northeastern Yunnan Province, southwest of China. The Laolin section, located east to the Dianchi Fault, has more continuous strata around the Precambrian-Cambrian (hereafter PC-C) boundary than the Meishucun section located west to the Dianchi Fault, where exist depositional hiatuses between Baiyanshao member (including the Xiaowaitoushan member) and Zhongyicun member, and between Dahai member and Qiongzhusi Formation (Qian *et al*., 1996). Thus the Laolin succession has great value for placement of PC-C boundary on the Yangtze Platform and global correlations. Shen & Schidlowski (2000) studied the carbon isotope chemostratigraphy for the Laolin section, though their strata frame was doubted by Zhu *et al*. in 2001. Our study on carbon isotope stratigraphy of the Laolin succession based on careful stratum frame work yielded two negative excursions (L1´ and L3´) and a positive excursion (L4). The first negative $\delta^{13}C$ excursion (L1´) in upward order around the PC-C boundary occurs just below the first appearance data (FAD) of small shelly fossil (SSF) which was found at the base of the Zhongyicun member (Luo *et al*., 1991). Such combination of negative $\delta^{13}C$ and FAD of SSF is the same as the situation of eastern Siberia PC-C boundary. We correlate the Laolin succession with those in Mongolia, eastern Siberia, northern Siberia, Iran and Canada, where similar situations that the first negative $\delta^{13}C$ excursion occurs closely beneath or over the FAD of SSF, and provide a better PC-C boundary on the Yangtze Platform than the Meishucun succession. This study is supported by NSFC grant 40572017.

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ISODUST: A Nd-Sr isotopic database to trace the source regions of Asian dust

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Mineral dust emitted from Asian Interior has broadly environmental impacts as it is spreading in the atmosphere. The knowledge on the source regions of Asian dust and their temporal variations is critical for predicting the overall dust impacts and understanding the paleo-environmental proxies in the dust deposits. Radiogenic Nd-Sr isotopes have been proven to been reliable source tracers, but this method needs long-term accumulation of data. This database is designed to solve this problem. It contains more than 400 pairs of Nd-Sr isotopic data which belong to the following three sub-databases mainly based on our own measurements.

ISODUST1: Potential Source Regions

It covers all of the potential source regions in North China and Mongolia, including the deserts, sandy lands, Gobi, fluvial fans, dry riverbeds and dry lake basins. Most of the data are based on the fine (< 75 μm and < 5 μm) silicate fractions of the samples, which enable the direct comparison between the dust and their potential sources without the influences of weathering and transportation. It is shown that different source regions have distinct Nd-Sr isotopic compositions controlled by their tectonic settings. The tectonic control suggests that the Nd-Sr isotopic signatures of these sources could be quite stable on the sub-tectonic time scales, which enable the use of this database to trace the provenances of the ancient dust.

ISODUST 2: Ancient Dust Deposits

Silicate Nd-Sr isotopes of ancient dust deposited in North China, North Pacific and Greenland are collected. It shows that the vast distributed loess in North China is transported from their adjacent regions by the prevailing near-surface wind. The provenance of the eolian deposits in Chinese Loess Plateau is quite stable in the most times of past 7 Myrs. However, rapid changes in source regions have been detected, probably reflects some abnormal monsoon conditions. The Asian end members of the ancient dust in North Pacific and Greenland are mainly the deserts on the north margin of Tibetan Plateau, where the westerly jet passes by.

ISODUST 3: Modern Dust

It consists of the silicate Nd-Sr isotopic data of the atmospheric particles collected in the past years. The Nd-Sr isotopes provide a method to trace the sources of modern dust in addition to other observational techniques. Anthropogenic influence on the dust sources in Beijing has been detected by comparing the Nd-Sr isotopic compositions of the modern dust to those of the ancient dust deposits (loess) in this region. Dust emitted from the locally dry riverbeds caused by water management can explain the observed anthropogenic influence.