

$\delta^{13}\text{C}_{\text{carb}}$ and $\delta^{13}\text{C}_{\text{org}}$ Excursions in the Post-glacial Sinian to Early Cambrian Interval in Guizhou, South China

H.-Z. Feng , H.-F. Ling and J. Peng

Department of Earth Sciences, Nanjing University, Nanjing,
China (feng.h@jlonline.com)

The investigated area is located on the southeast border of the Yangtze platform. Five lithostratic units are recognized in ascending order: the Nantuo (NT), Doushantuo (DST), Dengying (DY), Gezhongwu (GZW) and Niutitang (NTT) formations. The DST Fm overlies conformably on the NT Fm characterized by glaciogenic diamictite. In the basal part of the DST Fm is a ~4 m thick dolostone bed (so called cap carbonate). Upon this bed is the main part of the DST Formation dominated by phosphorite intercalated with dolostone and dolomitic pelite. The overlying DY Fm is composed of pure dolostone, followed by another set of phosphorite deposits called the GZW Fm. The GZW Fm is rich in small shelly fossils of Cambrian age, and covered by the NT Fm, a set of black shales with copious sponge fossils.

The values of $\delta^{13}\text{C}_{\text{carb}}$ show a wide range from -6.20‰ to 4.00‰, roughly consistent with that illustrated by Jacobsen & Kaufman (1999) for the same interval. The $\delta^{13}\text{C}_{\text{carb}}$ curve starts with a moderate positive shift after the glaciogenic diamictite and then goes into a negative shift, which persists up to the boundary between the DST Fm and the DY Fm. The second positive shift of $\delta^{13}\text{C}_{\text{carb}}$ occurs within the DY Fm, followed by another negative shift in the GZW and NTT formations. The values of $\delta^{13}\text{C}_{\text{org}}$ vary from -21.99‰ to -33.58‰, leading to a maximum oscillatory amplitude of 11.59‰. Being similar to the $\delta^{13}\text{C}_{\text{carb}}$ curve in shape, the $\delta^{13}\text{C}_{\text{org}}$ curve also demonstrates two positive shifts in the NT Fm and the DY Fm, and two negative shifts in the DST Fm and the interval from the GZW Fm to the NTT Fm.

Some studies have provided paired analyses of $\delta^{13}\text{C}_{\text{carb}}$ and $\delta^{13}\text{C}_{\text{org}}$. Hollander & Mckenzie (1991) show that the temporal carbon-isotopic curves of calcite and particulate organic carbon in a modern eutrophic lake correlate with each other to some extent, and the carbon-isotopic difference ($\Delta B = \delta^{13}\text{C}_{\text{poc-calcite}}$) indicating the effect of photosynthetic isotopic fractionation increases in response to increasing concentration of dissolved carbon dioxide ($\text{CO}_{2(\text{aq})}$). However, the timing of the peaks or valleys of $\delta^{13}\text{C}_{\text{carb}}$ and $\delta^{13}\text{C}_{\text{org}}$ curves may not always coincide due to other factors besides photosynthesis, which complicates the use of ΔB for evaluating the relative variations of $\text{CO}_{2(\text{aq})}$ with geologic time (Kump *et al.*, 1999). In our study, the coincidence of $\delta^{13}\text{C}_{\text{carb}}$ and $\delta^{13}\text{C}_{\text{org}}$ profiles suggests a dominating effect of photosynthesis on carbon-isotopic discrimination. Thus ΔB may be useful to understanding the relative changes of $\text{CO}_{2(\text{aq})}$ that may have occurred in the investigated area during the post-glacial Sinian and the Early Cambrian. This work was supported by NSFC (Grant Nos. 40472014 and 40572017).

This abstract is too long to be accepted for publication in the *Geochimica* supplement. Please revise it so that it fits into the column on one page.