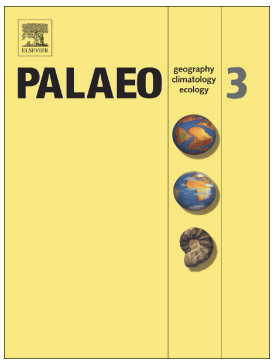

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Abstract

The Early Cambrian is a key interval in the global development of biological evolution, in which occurred many important environmental events and organic-rich sedimentary layers were deposited, which formed important hydrocarbon source rocks. The Lower Cambrian Niutitang Formation is one of the most important marine sedimentary layers in the Yangtze region, South China, and it records abundant important geological information that can be used for the reconstruction of the Lower Cambrian paleo-climates and paleo-environments.

Nitrogen isotope compositions record and reflect variations in the original sedimentary environment and the redox conditions of marine ecosystems. Trace elements are also reliable indicators of sedimentary environments. In this study, we collected samples from the Lower Cambrian Niutitang Formation shale in the upper-middle Yangtze region of South China and measured the nitrogen isotope values of bulk sediments ($\delta^{15}N_{bulk}$), as well as their organic carbon isotope values ($\delta^{13}C_{org}$), total organic carbon (TOC) contents, total nitrogen (TN) contents and trace element concentrations. The $\delta^{15}N_{bulk}$ values of the Niutitang shale range from 0.6‰ to 2.8‰; they show a certain positive excursion from bottom to top in the