

Attempts on constraining the oceanic and atmospheric changes during the Proterozoic: Insights from boron isotopes in Jixian section, North China

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The evolution of boron isotopic composition of seawater throughout the Earth's history is a key issue for the geochemical study of boron isotopes. The boron isotopic composition of marine carbonate can indicate the boron isotopic composition of $\text{B}(\text{OH})_4^-$ of the sea water, provides a powerful proxy for seawater pH reconstruct and further reveals the $p\text{CO}_2$, which can be indirectly acquired according to dissociation equilibrium between the seawater and CO_2 . The method of $\delta^{11}\text{B}_{\text{CC}}\text{-pH}_{\text{SW}}$ has been successfully applied in studying evolution history of seawater pH and the $p\text{CO}_2$ during different periods in the past 20 million years. From Archean to Proterozoic, boron isotopic compositions of the seawater have great changes in contrast to the modern ocean. However, it is poorly understood and previous studies focusing on the boron isotopic composition of the ancient ocean are rare. In this study we explored well preserved strata of the marine carbonate-dominated Jixian section in north China, which spanned from Mesoproterozoic to early Neoproterozoic with relatively continuous deposition, few major interruptions, and well preserved sedimentary features. Based on a combination study on oxygen, carbon, boron isotopic compositions of the marine carbonate, and their major and trace elemental contents, as well as a compilation of data all over the world, this study will provide basic information for the reconstruction of the evolution history of the Earth's environment during Proterozoic, especially the oceanic and atmospheric evolution.