The late Cambrian SPICE event as a chemostratigraphic tool for chronostratigraphic correlation of the base of the Furongian in Iowa, USA

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Abstract

Excursions in stable isotope records function as critical nonbiostratigraphic tools in constructing viable, consistent frameworks for global chronostratigraphic correlation. The base of the international Paibian Stage (Cambrian) is placed to coincide with the first appearance of the cosmopolitan species *Glyptagnostus reticulatus*. Extensive studies of upper Cambrian strata across several paleocontinents document a global +4–5‰ shift in the carbon isotope record (δ13C) in an event now known as the Steptoean Positive Carbon Isotope Excursion (SPICE). The SPICE is closely associated with the first appearance of *G. reticulatus*, and, combined with its widespread nature, is valuable for globally correlating the base of the Paibian. A handful of studies additionally recognize coeval excursions in the organic carbon isotope record and in the carbonate-associated sulfur and pyrite records, all of which have the potential for use in correlating strata. Here, we collected high-resolution paired carbonate carbon (δ13Ccarb) and nitrogen (δ15NTN) isotope data of the SPICE from the Rhinehart A-1 drill core from central Iowa. The data reveal a transient negative δ15N excursion that begins at the onset of the positive δ13C excursion, thus providing another geochemical marker for potentially refining the base of the Paibian Stage and developing a clearer understanding of global ocean nutrient cycling during the SPICE Event.

Keywords: Paibian, SPICE, carbon, nitrogen, correlation

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