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Cambrian SPICE event on the North China craton: a high-resolution case study from the Liaoning Province, China

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The Steptoean Positive Carbon Isotope Excursion (SPICE) event has been well-documented globally, yet there is still not enough data to thoroughly investigate this phenomenon on the North China craton. Ng et al. (2014a; 2014b) reported two SPICE records from this paleo-continent, however, these sections are quite condensed and required more detailed study to reveal the geochemical and stratigraphic significance of the North China SPICE event.

A new section with SPICE data is reported here. The Baijiashan (BJS) section is located about 70 km north of the city center of Dalian, Liaoning Province, north China. This old quarry section is measured to be more than 20 m thick, from the top of the Guzhangian Stage through the entire Paibian Stage to the bottom of the Jiangshanian Stage. This site primarily composed of shallow marine, massive to thin-bedded limestone; mainly bioclastic grainstone, wackestone, to lime mudstone layers, with numerous horizons of flat-pebble conglomerate deposits.

Over 85 whole rock samples were collected for isotopic analysis. The high-resolution stable carbon and oxygen isotope data of this ongoing project shows that the SPICE event is, indeed, preserved in this area. These new data are consistent to our earlier predictions on the lower peak δ13C and difference values (Δ13C) of stable carbon isotope on the North China craton, compared to the global average.

Fossil samples are still in the prepping phase, and more precise biozonal data could reveal the different stages of trilobite mass extinction across the boundary of the Guzhangian-Paibian stages. Continuation of this work is expected in the near future and more new data could enhance our understanding of the SPICE event and its possible relationship to trilobite mass extinction event(s) on the Cambrian North China craton.