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Records of the Lomagundi-Jatuli event in the North China Craton: formation mechanism and global corrections

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The Lomagundi-Jatuli Event (LJE) from 2.22 (or 2.33) to 2.06 Ga represents the largest magnitude and longest duration marine carbonate positive carbon isotope excursion ($\delta^{13}C_{V\text{-}PDB}$>10 ‰) in Earth's history[1]. Records of the LJE are well preserved globally and carbonates with extremely high $\delta^{13}C_{carb}$ values from 8‰ to >15‰ have been identified from many localities in North America, Russia, Finland, Africa, Australia, South America, Scotland, Norway, Sweden and India[1-3]. However, except for some Paleoproterozoic carbonates characterized by a low-amplitude positive carbon isotope excursion ($\delta^{13}C_{V\text{-}PDB}$<5 ‰)[4-5], no marine carbonates with high positive carbon isotope excursion ($\delta^{13}C_{V\text{-}PDB}$>10 ‰) have been identified from the North China Craton (NCC) for a very long period. Our researches during last two years have identified thick sequences of marine carbonate rocks with high positive $\delta^{13}C$ excursion ($\delta^{13}C_{V\text{-}PDB}$>10 ‰) from the Daposhan Formation of the lowermost Fanhe Group in the Longgang Block and the Gaojiayu Formation of the Liaohe Group in the Anshan area in the Jiao-Liao-Ji Belt in the northeast NCC, which provides solid evidence for the preservation of reliable sedimentary records of the LJE in the northeastern NCC[3,6]. Deposition of the high positive $\delta^{13}C$ excursion (>10 ‰) of marine carbonate rocks occurred at about 2.15 Ga. Lithological comparisons of different sections and whole-rock geochemical results show that the changes of sedimentary facies and diagenesis have no significant effects on reducing of the $\delta^{13}C$ values, which is different to some recent arguments that the $\delta^{13}C_{V\text{-}PDB}$ trend of the LJE is facies dependent[2]. The newly identified carbonates with high positive $\delta^{13}C_{carb}$ values in the NCC provide important constraints on formation mechanism of the LJE and its timing, magnitude and global significance.

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[1] Hodgskiss et al. (2023) *Annu Rev Earth Planet Sci* **51**, 301–330. [2] Prave et al. (2021) *J Geol Soc* **179(1)**, jgs2021-036. [3] Zhang et al. (2024) *Terra Nova* **36**, 25–36. [4] Tang et al. (2008) *Acta Petrol Sinica*, **24**, 129–138. [5] Tang et al. (2011) *Gondwana Res* 19, 471–481. [6] Wang et al. (2024) *Sci China Earth Sci* **67**, 2824–2844.