

## The grandest of them all: the Lomagundi-Jatuli event and the carbon cycle

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The Palaeoproterozoic Lomagundi-Jatuli Event (LJE) is the largest, in both amplitude and duration, positive carbonate C-isotope ( $\delta^{13}\text{C}_{\text{carb}}$ ) excursion in Earth history. Conventional thinking is that it represents a cause-and-effect perturbation of the global C cycle between c. 2.3 – 2.1 Ga linked directly with the Great Oxidation Event. We compiled 14,943 published  $\delta^{13}\text{C}_{\text{carb}}$  values obtained from marine carbonate rocks deposited between 3.0 and 1.0 Ga, as well as those for selected Phanerozoic time intervals, as a comparator of the LJE. Combined with careful scrutiny of the sedimentology of the LJE-bearing rock record worldwide, our integrated datasets reveal that, contra to consensus, the LJE is entirely facies (i.e. palaeoenvironment) dependent. During the LJE, the C-isotope composition of open- and deeper-marine settings maintained a mean  $\delta^{13}\text{C}_{\text{carb}}$  value of 1.5‰, a value comparable to those settings across the span of Earth history. In contrast, nearshore-marine and coastal-evaporitic environments attained means of 6.2‰ and 8.1‰, respectively, far exceeding values typifying such environments in other time periods. Our work refutes and obliges re-evaluation of conventional thinking and offers new avenues of investigation in the search for understanding the genesis of the grandest of all positive C-isotope excursions and its postulated linkage to oxygenation of the atmosphere.