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Faunal dynamics across the Silurian–Devonian positive isotope excursions (δ13C, δ 18O) in Podolia, Ukraine: Comparative analysis of the Ireviken and Klonk events

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Two global isotopic events, the early Sheinwoodian (early Wenlock) and that at the Silurian–Devonian transition, have been comprehensively studied in representative carbonate successions at Kytayhorod and Dnistrove, respectively, in Podolia, Ukraine, to compare geochemistry and biotic changes related correspondingly to the Ireviken and Klonk events. These two large−scale isotope excursions reveal different regional ecosystem tendencies. The well−defined increasing trend across the Llandovery–Wenlock boundary in siliciclastic input, redox states and, supposedly, bioproductivity, was without strict correlative relations to the major ^{13}C enrichment event. The environmental and biotic evolution was forced by eustatic sea−level fluctuations and two−step climate change toward a glaciation episode, but strongly modified by regional epeirogeny movements due to location near the mobile Teisseyre−Törnquist Fault Zone. Thus, the global early Sheinwoodian biogeochemical perturbation was of minor depositional significance in this epeiric sea, as in many other Laurussian domains. Conversely, the Podolian sedimentary record of the Klonk Event exhibits temporal links to the abrupt $\delta^{13}C$ anomaly, overprinted by a tectonically driven deepening pulse in the crucial S–D boundary interval. This carbon cycling turnover was reflected in the regional carbonate crisis and cooling episodes, paired with a tendency towards eutrophication and recurrent oxygen deficiency, but also with major storms and possible upwelling. Faunal responses in both Podolian sections follow some characters of the Silurian pattern worldwide, as manifested by conodont changeover prior to the major early Sheinwoodian isotopic/climatic anomaly. This contrasts with the relative brachiopod and chitinozoan resistances in the course of the Ireviken Event. Also, during the Klonk Event, a moderate faunal turnover, both in benthic and pelagic groups, occurred only near the very beginning of the prolonged ^{13}C−enriched timespan across the system boundary, possibly due to progressive dysoxia and temperature drop. The characters point to a peculiarity of the Klonk Event by comparison with the Silurian global events, and some similarity already to the succeeding Devonian transgressive/anoxic episodes.

Key words: Brachiopoda, Conodonta, Chitinozoa, carbon isotopes, oxygen isotopes, geochemistry, faunal dynamics, Ireviken Event, Klonk Event, Silurian, Podolia.

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