The Lomagundi-Jatuli $\delta^{13}C$-Event revisited

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The Lomagundi-Jatuli Event (LJE) is characterized by a positive carbonate carbon isotope ($\delta^{13}C_{carb}$) excursion [1, 2] in the aftermath of the Great Oxidation Event (GOE). Results reported from different successions, ranging in age from 2.4 to 2.2 Ga, imply that the LJE is global in nature [3, 4, 5, 6]. Assuming that the atmospheric/ oceanic dissolved inorganic carbon pool is faithfully archived in respective carbonate rocks, this carbon isotope excursion would indicate a shift in $\delta^{13}C$ of atmospheric CO_2 of at least ~5‰ for the duration of the LJE. The most likely explanation for this strong shift in $\delta^{13}C_{carb}$ is an enhanced biological CO_2-fixation and organic carbon burial leaving the residual pool enriched in ^{13}C. However, an alternative view has recently been proposed [7].

Here, we report paired analysis of $\delta^{13}C_{carb}$ and $\delta^{13}C_{org}$ for rocks capturing the LJE. These were obtained by the Fennoscandian Arctic Russia-Drilling Early Earth Project (FAR-DEEP). Carbonates show the typical positive $\delta^{13}C_{carb}$, values. In contrast, however, the organic matter does not record a corresponding positive shift in $\delta^{13}C_{org}$. Standard isotope mass balance provides no satisfactory explanation. Hence, alternative explanations are in need!

[1]Schidlowski *et al*. (1975), *GCA* **40**, 449-455. [2] Melezhik *et al*. (1999), *Earth Sci. Rev*. **48**, 71–120. [3] Baker & Fallick (1989) *Nature* **337**, 352-354. [4] Karhu & Holland (1996), *Geology* **24**, 867-870. [5] Maheshwari *et al*. (2010), *Precambr. Res*. **182**, 274-299. [6] Tang *et al*. (2011), *Gondwana Res*. **19**, 471-481. [7] Hayes & Waldbauer (2006) Phil. Trans. Roy. Soc. B **361**, 931-950.

Coupled geochemical and foraminiferal response to environmental changes during the deposition of Upper Cretaceous oil shale in the Negev, Israel

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The accumulation of a 40 m thick oil shale sequence during the latest Campanian marks a major change in the dynamics of the Late Cretaceous southern Tethys upwelling system. Based on the vertical distribution of foraminiferal taxa, Ashckenazi-Polivoda *et al*. [1] established a high resolution paleoenvironmental scheme, defining five planktic (P-Type) and five benthic foraminifera (B-Type) assemblages which thrived under distinct bottom-water aeration and surface water productivity conditions.

Principal component analysis of major and trace elements concentrations in the studied sequence allows distinguishing three factors. The first reflects the interplay between biogenic-carbonate (Ca, Sr) and terrigenous input (Al, Si, K, Ti, V, Fe, Ga, Nb, Ba, Pb, Th). The second mirrors the degree of bottom water oxygenation (C_{org}, S, Ni, Cu, Zn, As, Cd, Mo, U vs. Mn), while the third factor stands for conditions that promoted phosphorite deposition (P, Y, La, U). The comparison of these chemostratigraphic features with the distribution of the foraminiferal assemblage types as defined in [1] points to a strong interdependence between these geochemical and micropaleontological environmental indicators. The distribution of the planktic assemblages P-Types 1 and 4, and the benthic assemblage B-Type 4 parallels the variations in the degree of bottom water oxygenation and detrital input. P-Type 1 and 2 (high *Heterohelix*) assemblages coincide with a gradual decrease in biogenic carbonate production and a relative weak anoxic response to the increase in terrigenous input. In contrast, assemblages P-Type 4 (dominance of *Globigerinelloides*) and B-Type 4 (triserial buliminids and *Gavelinella*), limited to the base of the oil shale, are characterized by strong anoxia and high carbonate production, as reflected by scores of factors 1 and 2.

[1] Ashckenazi-Polivoda *et al*. (in press) *Palaeogeogr. Palaeoclimatol.Palaeoecol*. DOI10.1016/j.palaeo.2011.02.018