Lipid biomarker and stable isotopic records track the Neoproterozoic rise of eukaryotes and nutrient controls on marine community structures

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Lipid biomarker assemblages in thermally well preserved rocks from a variety of Neoproterozoic marine environments track the first-order rise of eukaryotes to ecological prominence. Eukaryotic steranes become detectable and ubiquitous during the middle interval of the Neoproterozoic Era, but are conspicuously absent in rocks older than 800 Ma [1,2]. This development commences prior to the Sturtian glaciation and may be interpreted as representing a switch in the mode of marine primary productivity and ecosystem structure. This eukaryotic expansion was perhaps triggered by a growth in the marine nutrient reservoir (e.g., P) and/or environmental redox conditions, although the mechanistic underpinnings remain debated.

Despite progressive ocean ventilation, and increased chemical weathering and nutrient supply during the breakup of Rodinia, the Neoproterozoic ocean maintained a variety of chemical conditions including eutrophic and nutrient-poor environments [3]. Such regional heterogeneties, continuing through the Ediacaran Period, may have fostered eukaryote evolution that ultimatively culminated in the rise of macroscopic metazoans. Late Ediacaran successions from the Eastern European Platform are particularly interesting in this regard as they record profound environmental variabilities [3]. Paleogeographic mapping of biomarker assemblages and stable isotopic characteristics is allowing us to evaluate the degree of regional heterogeneity in biological communities in Neoproterozoic marine shelf environments, potentially linked to variability in the the local redox and nutrient budgets.

[1] Brocks *et. al*. (2017) Nature **548**, 578-581. [2] Isson *et. al*. (2018) Geobio **16**, 341-352 [3] Pehr et al. (2018) Nat. Commun. **9**, 1807.