

Life after the Sturtian

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Around the Neoproterozoic Snowball Earth events (717–635 Ma) Earth transitioned from a bacteria dominated ecosystem prior to the Cryogenian, to a mixed ecological community structure afterward the global glaciations. An increased nutrient influx caused by the melting of the global glaciations [1] has been hypothesized to have provided the evolutionary trigger for increased predatory pressure [2] and the ecological rise of stigmateroid-producing green algae [3] during the Late Neoproterozoic. The Snowball Earth events are therefore indicated as a pivotal point for the evolution of complex life on Earth. Yet, due to the poor preservation of post-Snowball organic matter, information about the post-Snowball Earth ecosystem is limited. Thus far only lipid hydrocarbons in post-Marinoan deposits have been systematically investigated to understand how life recovered in the direct aftermath [2].

We here present a comprehensive data set of indigenous lipid biomarkers preserved in sedimentary rocks deposited directly following the Sturtian glaciation (717–662 Ma). In combination with stable isotopes, inorganic geochemistry, and lithological signatures, we reconstruct the conditions under which life recovered. Our preliminary data indicates a dynamic ecological and environmental shift in the direct aftermath of the Sturtian, capturing the transition from an ice-covered environment with limited biological activity which is immediately succeeded by a bacterial dominated ecosystem with limited eukaryotic presence. These signatures combined with redox sensitive parameters allows us to reconstruct the environment and ecology after Earth's most severe glacial period and how life recovered from this.

[1] Reinhard, C. T., et al. (2017) *Nature* 541

[2] van Maldegem, L.M., et al. (2019) "*Nature Comm.* 10

[3] Brocks, J.J., et al. (2017) *Nature* 548