

Organic geochemical approach to the paleomarine environment around the Marinoan glaciation

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The Marinoan glaciation, from ~665 Ma to ~635 Ma, is hypothesized to be a "snowball earth" period. The nature of the deposition of post-Marinoan sediments, and the role of living organisms, is still being debated. We conducted organic geochemical analyses of the sediments around the Marinoan glaciation in the Moonlight Valley type section, the East Kimberley region, northwestern Australia. Our results show: (1) the biomass of photosynthetic organisms was relatively small after the ice age, but rapidly increased just before the precipitation of "cap carbonate" unit (CCU) and was large during the CCU precipitation, according to pristane + phytane quantities; (2) the biomass of green sulfur bacteria was relatively large around the start of the CCU precipitation, according to the quantity of aryl isoprenoids; (3) anoxic water developed both just before and during the last of the CCU precipitation, evidenced by the pristane/phytane ratio and the quantity ratio of aryl isoprenoids and dibenzothiophene. These situations suggest the possibility that the CCU was precipitated by a medium of sulfate-reducing bacteria which existed in the remaining glacial euxinic water. A blooming of photosynthetic organisms during the deglaciation provided abundant organic matter to the sulfate reducers, that then produced the carbonate that precipitated to form the CCU.

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