

ガボン・フランスヴィル堆積盆における大型化石出現前後の前期原生代有機炭素・窒素同位体層序

Paleoproterozoic organic carbon and nitrogen isotopic stratigraphy across the appearance of macrofossils in the Francevillian Basins, Gabon

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The appearance of eukaryotes in the Paleoproterozoic is one of the most innovative evolutionary events in the history of life on the Earth. The Paleoproterozoic macrofossils (ca. 2.2 Ga) are discovered successively from the Francevillian Basins in Gabon, and are regarded as microbial colony or possible eukaryote based on their complex structures and large sizes. In order to clarify the environmental conditions of the appearance of these Gabon biota, we investigated the litho- and chemo-stratigraphy in the Franceville (siliciclastic) and Lastoursville (carbonate-depositional) Subbasins. The sedimentary sequence in these intracratonic rift basins is subdivided into five lithostratigraphic units, namely FA to FE. We collected rock samples and analyzed $\delta^{13}\text{C}_{\text{org}}$ and $\delta^{15}\text{N}_{\text{TN}}$ of black shales and carbonates of the FB units, across the appearance of the fossils, in the Franceville and Lastoursville Subbasins. In the Franceville Subbasin, $\delta^{13}\text{C}_{\text{org}}$ decreases gradually from -28 ‰ to -35 ‰ within FB; $\delta^{15}\text{N}_{\text{TN}}$ changes from +1 ‰ at the bottom via +6 ‰ at the middle back to 0 ‰ at the top of FB. In the Lastoursville Subbasin, $\delta^{13}\text{C}_{\text{org}}$ decreases from -28 ‰ to -45 ‰ within the lower half of FB and slightly decreases to -48 ‰ in the upper half; $\delta^{15}\text{N}_{\text{TN}}$ changes from +2 ‰ at the bottom via +6 ‰ at the middle back to +4 ‰ at the top of FB. The extremely low $\delta^{13}\text{C}_{\text{org}}$ (less than -45 ‰) in the Lastoursville Subbasin suggests active methanotrophy. The difference of the $\delta^{13}\text{C}_{\text{org}}$ and $\delta^{15}\text{N}_{\text{TN}}$ chemostratigraphy in these two subbasins comes from the depositional settings. Through the correlation of litho- and chemo-stratigraphy in each subbasin, we will discuss the environmental conditions for the appearance of the macrofossils in the Francevillian Basins.

キーワード：前期原生代、炭素同位体、窒素同位体、ガボン

Keywords: Paleoproterozoic, carbon isotope, nitrogen isotope, Gabon