

Tectonic setting of the Paleoproterozoic (2.1 Ga) sedimentary basins in southeastern Gabon: A possible evolutionary hotspot of the early macrobiota

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The Paleoproterozoic is one of the most important transition periods in the Earth's history, marked by the oxidation of surface environment and the appearance of eukaryotic organisms. The centimeter-sized fossils (~17 cm in maximum), possibly multicellular organisms, were reported from 2.1 Ga black shales in southeastern Gabon (El Albani et al., 2010, Nature). These Gabon macrofossils occur only in the restricted area and only during the short time period. The uniqueness of the subsistence of the large organisms in the 2.1 Ga Gabon may be the key to solve the essential requirements for evolution of life; however, the detailed tectonic settings and geochemical conditions of the fossil occurrence are poorly constrained. In order to clarify these settings, we are going to conduct precise geological survey and investigate the multi-isotope chemostratigraphy of the Paleoproterozoic sequences in Gabon.

The Paleoproterozoic sedimentary sequences are distributed widely in the Francevillian Basin in southeastern Gabon, which consist of 4 sub-basins; Franceville, Lastoursville, Okondja, and Booue. The ca. 2 km-thick Paleoproterozoic sedimentary sequences in these rift-basins are subdivided into FA (sandstones with uranium-rich conglomerates), FB (black shales, siltstones and carbonates), FC (carbonates and cherts), and FD (black shales) in ascending order. The FA indicates fluvial and deltaic depositional setting, and the FB, FC and FD suggest marine deposition during the rifting and basin deepening. The Gabon macrofossils are reported only from the black shales of the FB in the Franceville Basin; however, nodule-like fossils are recently found in the black shales of the FB in the Okondja Basin (Moussavou et al., 2015, J. Geol. Geosci.), which is almost the same horizon as the macrofossils. The difference of tectonic setting and geochemical environment between the Franceville and Okondja Basins is essential to understand the uniqueness of the evolutionary hotspot. The Gabon macrofossils likely inhabited in a shallow water oxygenated environment. There might be an evolutionary influence of the well-known Oklo nuclear reactors, which is very near to the macrofossil site.

As a preliminary study, we analyzed strontium isotopes of the carbonate samples collected from the Lastourville Basin. In this presentation, we will discuss the tectonic setting of the Francevillian Basin at the time of Gabon macrofossil appearance.

Keywords: Paleoproterozoic, Gabon, strontium isotope