カナダ・ローブ層（２０億年）の地球化学が示す酸化的環境下での地球表層元素サイクルの早期確立

Geochemistry of the 2.0 Ga Rove Formation, Canada suggets an early establishment of the modern style elemental cycles

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**カナダ・ローブ層の黒色頁岩に対して地球化学的研究を行った。その結果、Mo,Uが有機炭素と良い相関を示す特徴が見い出された。これらは、すでにこの時代において、酸化的風化が行われ、それを生物が堆積物にもたらすという、現世と似た元素サイクルが行われて
いた事を示す。**

The 2.0 Ga Rove Formation, Animiki Group, Canada is composed mainly of carbonaceous shales (up to 3.9 wt %C). This formation is directly underlain by the Gunflint Formation (sideritic BIF) which is famous for the first discovery of eukaryotic microfossils. Approximately 40 drill core samples (covering 400 m depth) were analyzed for major and trace elements, in order to constrain the surface environments of this age.

Geochemical features of the Rove Formation change from the lower section to the upper section. High concentrations of Mo (up to 21.7 ppm) and U (up to 18 ppm) and their excellent correlations with C(org) are found in the upper section. Such correlations indicate that (1) the 2.0 Ga Animiki ocean was enriched in Mo and U and (2) the biological process was responsible for the enrichments of these elements into sediments. Oxidative weathering of continents is required to mobilize and enrich Mo and U from continents to oceans.

Therefore, the surface environments of the early Proterozoic was oxic enough to mobilize Mo and U. The modern style of elemental cycles mediated by biological activity were already established by 2.0 Ga.

Correlations of C(org) to Mo and U are poor in the lower section, suggesting that biological process was not responsible for the enrichment of Mo and U into sediments. High concentrations of chalcophile elements (such as Pb and Zn) in the lower section suggest that sediments were influenced by hydrothermal activities probably related to submarine volcanism.

Characteristics of rare earth elements (chondrite normalized pattern and total concentrations), Sc, Hf, Th and Zr suggest that the provenance of the Rove Formation changed rapidly from felsic (SiO_2 > 65 wt %) to intermediate (SiO_2 = 60 wt %) terrains during the deposition of the lower to upper sections. Such rapid change of source rock provenance may have been caused by rifting of the Animiki basin.