Japan Geoscience Union Meeting 2015
(May 24th - 28th at Makuhari, Chiba, Japan)

BCG28-P13 会場:コンベンションホール 時間:5 月 26 日 18:15-19:30

南アフリカ Josefsdal 周辺に産するフィグツリー層群下部層の地質学的・地球化学的研究
Geological and geochemical study of lower-Fig Tree Group in Josefsdal, South Africa

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Understanding extent of Archean bisophere and conditions of surface environments is important subject to understand evolution of the Earth. Accumulating more geological and geochemical data on Archean sedimentary rocks is necessary to approach the above problem. Therefore, geological and geochemical studies are performed on Fig Tree Group (~3.2 Ga) and Ovcerwacht Group (~3.4 Ga) in the Barberton Greenstone Belt, South Africa in the present study. The objectives of this study were (1) to survey lower-Fig Tree Group and upper-Onverwacht Group, which were not described in previous literatures and (2) to constrain paragenesis of minerals, including sulfides, in the sediments, and (3) to investigate the carbonaceous matter (CM) in the black chert in the Fig Tree Group using the raman geothermometer of Beyssac et al (2002) and to discuss microbial ecosystem through stable carbon isotopic compositions (δ^{13}C).

Result of the outcrop survey revealed that our research areas correspond to stratigraphy to that of Hoffman (2005), who studied area in the Fig Tree Group in the BGB. Mineralogical investigations showed that Ni-rich sulfide minerals were abundant and some of them were chemically zoned in the black chert. These observations suggest that represent carbonaceous sediments in the lower-Fig Tree Group were silicified by later hydrothermal fluids which contain abundant Ni, most likely coming from ultramafic rocks. Using the raman geothermometer, the peak temperature about CM in the black chert in the Fig Tree Group is estimated to be approximately lower than 330±50 ℃, suggesting very low metamorphic grade (lower green schist).

Additionally, δ^{13}C values of the examined samples in the Fig Tree Group ranged from -28.9 ‰ to -23.2 ‰. Carbon isotope compositions of Onverwacht Group samples are ranged from -30.63 ‰ to -26.5 ‰ (PDB), which is within a range of organic matter produced by Calvin cycle using atmospheric CO_2, such as cyanobacteria.

キーワード: 炭素質堆積岩, 熱水作用, バーバートン緑色岩帯, フィグツリー層群
Keywords: Carbonaceous sedimentary rock, Hydrothermal process, Barberton Greenstone Belt, Fig Tree Group