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南アフリカ・バーバートン地域ワゴンロード鉱山周辺に産する堆積岩の地質学的、地球化学的研究
Geological and geochemical studies of sedimentary rocks at the Wagon Road gold mine, Barberton Greenstone Belt.

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Banded iron formations (BIFs) are common in Archean to early Proterozoic cratons. The formation processes of BIF are controversy as to if a variety of microbes (e.g., cyanobacteria and Fe-oxidizing bacteria) were involved or inorganic oxidation was responsible. Detailed studies on BIF and the surrounding sedimentary rocks may constrain factors to oxidize Fe and the role of microbial activities. Therefore, the BIF and the surrounding sedimentary rocks in the Fig Tree Group (~3.2 Ga in age) in the Barberton Greenstone Belt, South Africa, are investigated in the present study. The studied area is called Euryca syncline area, and abandon Au mine (Waggon Road mine) is located. Sandstone, shale, black chert, and BIF are found in the studied area. Besides petrographic characterization, SEM-EDS analyses were performed on the representative rocks. Concentrations of organic carbon and their $\delta^{13}C$ values were determined by EA and IR-MS. Siderite and hematite were found as ferruginous minerals in BIF and black chert samples. The grain size of siderite was larger (30-200 μm) than the surrounding quartz(<10 μm). Siderite is interpreted as a secondary mineral formed during early diagenesis. Euhedral hematite crystals (<5 μm) were found. Hematite is interpreted as a primary mineral, although some hematite, normally larger and more red color, are supergene origin. Black chert samples show separated features of organic-rich layers and Fe-rich layes Therefore, it is considered that the source of organic carbon is not related to Fe-oxidizing bacteria. The $\delta^{13}C$ values of all analyzed samples were range from -27.7 to -23.5 ‰. These values are made by metabolisms by Calvin cycle using atmospheric CO_2. Overall results of this study indicated that presence of 3.2 Ga oxygenic shallow oceans in where cyanobacteria were active.

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