

Mesoarchean Cleaverivlle Iron Formation: DXCL2 drilling preliminary report

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The 3.1 Ga Cleaverville Formation is well-preserved black shale to banded iron formation sequences; only affected by low-grade metamorphism (prehnite-pumpellyite facies) without intensive deformation (Kiyokawa et al., 2002). The Cleaverville Formation situated above of chemical-volcano sedimentary sequences (3.2 Ga Dixon Island Formation and Dixon pillow basalt), which are identified by accreted immature island arc setting.

The ~350m-thick Dixon Island Formation which is overlie by pillow basalt consists mainly of highly silicified volcanic-siliceous sequences that contain apparent microbial mats and bacterial fossil-like structure within black chert and also includes a komatiite-rhyolite sequences bearing hydrothermal veins (Kiyokawa et al., 2006). The >300m-thick Cleaverville Formation, which conformably overlay pillow basalt, contains a thick unit of reddish shale, bedded red-white chert and banded iron formation. It partly contains chert fragments-bearing pyroclastic beds.

We did scientific drilling, which is called DXCL 1 and DXCL 2 drilling projects, at 2007 and 2011 summer. These drilling project had been selected two coastal sites; CL site (CL1, CL2 and CL3) at the Cleaverville Formation, and another is DX site at the upper Dixon Island Formation. A systematic combinations of geological, sedimentological, geochemical, and geobiological approaches will be applied to the fresh samples.

In detail lithology from the drill-core of the Cleaverville Formation, the CL1 and CL2 core sample mainly consist of the organic-rich massive black shale bed (20cm in thickness) with few cross-laminated fine volcanoclastic sandstone. The CL3 core, which is upper part of the Cleaverville Formation, preserved lithological change from black shale to Banded Iron Formation (BIF). Especially, hydrothermal cherty rocks preserved as about 30m thick between organic rich black shale bed to magnetite rich BIF. As a result of stratigraphy, the Cleaverville iron formation formed at the hydrothermal input to produced extra iron to the relative oxidative ocean by cyanobacteria activity.

Keywords: Archean, Black shale, Bedded chert, BIF, hydrothermal activity, preliminary report