

## Observation result of 3.1 Ga Cleaverville Banded Iron Formation in the Coastal Pilbara Craton, Western Australia.

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The Cleaverville Formation was well identified as Mesoarchean banded iron formation (CL BIF) in the coastal Pilbara terrane in Western Australia (eg. Kiyokawa et al., 2019). The CL BIF was a key formation to know correlation with east and west sedimentary sequence in Pilbara Craton (eg. Hickman, 2012). The CL BIF is also one of the best preserved iron formation before GOE event. Therefore, CL BIF is deposited before oxygen is produced in the atmosphere, so the cause of precipitation of iron is discussed. However, the cause is not clear (Holland et al. 1973). Therefore, CL BIF is one of key formation to estimate 3.1 Ga environment. Moreover, we collected fresh core samples from DXCL drilling project in 2007 and 2012 (four cores: DX, CL1, CL2 and CL3). Especially CL 3 core contains flesh BIF and black shale sequence. In this study, we show some result of very detail observed samples of CL3 core, which contains CL BIF, and form very detail stratigraphy, lithological characteristics and some geochemical result. We did core surface description, thin section observation by microscope, and SEM and chemical analysis by EDS, XRD.

Thickness of the Cleaverville Formation is about 370m, and it is composed of the Black Shale Member (about 150m) and BIF Member (about 220m) to top. We collected 210m long core from 60 m below surface. The Black Shale Member contains organic rich black shale with few cm thick volcanic very fine sandstone, which contains cross lamination. The BIF Member composed of siderite/greenish shale unit (SG unit), magnetite/greenish shale unit (MG unit) and siderite/black shale unit (SB unit), and overlay SG unit1, MG unit1, SG unit2, MG unit2, SG unit3 and SB unit.

The SG unit form stratify laminated siderite/chert layer and massive greenish shale layer (about 10cm thickness). Laminated siderite/chert layer is composed clay lamination and white chert lamination alternately (1mm-1cm). Clay lamination is composed siderite corted quartz grain (10-30  $\mu$ m). However, the siderite doesn't have idiomorphic. White chert lamination formed fine quartz. Moreover, recrystallized idiomorphic siderite is observed at the boundary of clay lamination and white chert lamination. The massive greenish shale is mainly composed siderite and chlorite, and have homogeneous structure.

The MG unit become stratify magnetite/chert layer and massive greenish layer alternately (about 10cm thickness). Moreover, stratify magnetite layers become magnetite lamination and quartz lamination alternately (1mm-1cm). Magnetite lamination is formed idiomorphic cubic magnetites. The idiomorphic magnetite crystals formed only clay layers of siderite/chert layer of SG unit. Quartz layer and the massive greenish shale are similar to that of SG unit.

The SB unit become stratify siderite/chert layer and black shale (about 10cm thickness). There is wave shape organic carbon rich lamination in this sequence.

Therefore, MG unit is made by replacing siderite of clay lamination of SG unit with magnetite. Moreover, the SB unit might be preserved original sedimentary structure to form BIF sequence.

### Reference

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