Hydrothermal sequence of the Archean time: 3.5Ga Marble bar chert vs. 3.2 Ga Dixon Island Formation

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The 3.2 Ga Dixon Island Formation in the Cleaverville Group and the 3.5Ga Marble Bar Chert in the Pilbara terrane, Australia, is one of the best sequences that preserves an example of middle Archean hydrothermal stratigraphy and contains possible microbial material. Field observations and geochemical evidence suggest that the Dixon Island Formation and Marble Bar Chert preserved similar stratigraphy which identified as hydrothermal vents in the Archean ocean. 4 units are identified in these formations. 1) Basement volcaniclastics unit: thick Pillow Basalt in the Marble Bar Chert, rhyolite tuff in the Dixon Island Formation. 2) Hydrothermal unit: 50 m thick hydrothermal altered basement rock zone which contains many black chert veins. 3) Black Chert unit: organic carbon bearing black chert bed. Especially in the Dixon Island Formation, it contains abundant pseudomorph of silica after barite, halite and gypsum, and a distinctly continuous, stromatolite-like biomat layer, are preserved within the laminated black-chert bed. Total organic carbon in the black chert and black chert veins varies within 0.05 to 0.16% and the carbon isotope delta 13C values of these rocks are -32 to -27 per mil. 4) Varicolored Chert unit: it contains bedded chert, Fe rich bed and. BIF. These sequences are type sequence of low-temperature hydrothermal environments which contains key evidence of the early life and origin of oxygen produced system.