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Banded Iron Formations (BIFs) and Associated Sediments Do Not Reflect the Physical and Chemical Properties of Early Precambrian Seas

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ABSTRACT

Ring-in-ring structures in Australian Early Precambrian banded iron formation (BIF) were identified as bubbling mud wavelets, which lithified during temporary exposure, contradicting the alleged BIF deep ocean origin. Least altered BIFs consist of alternating chert laminae with, and without iron oxides (or carbonates). They were precipitated during on-and-off periods of ferrous iron oxidation controlled by microbial oxygenic photosynthetic activity during solar illumination, which stopped during darkness as characterizing the Polar Regions, thus forming genuine annual varves. This polar environment is further corroborated by the magnetite-hematite-magnetite microcrystal layers in the iron-rich laminae reflecting mid-spring-summer-autumn changes in solar radiation, and by diamictite at the end of the sequence deposited from melting glaciers when the continental plate shifted to lower latitudes. BIF sequences in various countries comprise evaporates. They attest to intensive evaporation of the warm hydrothermal solution in restricted shallow lakes under the freezing dry climate up to silica (geyserite) precipitation referred to chert. The existence of oceans, mid-ocean-ridges and island arcs during the Early Precambrian results from the misinterpreted oceanic origin of BIFs and the Phanerozoic occurrences of the associated mafic-ultramafic basalt flows (Greenstone Belt).

KEYWORDS

Early Precambrian; BIF; Non-Marine; Polar Regions; Physical and Chemical Control

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