

## **Depositional Settings and Early Diagenesis of Large Precambrian Iron Formations**

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Late Archean to Paleoproterozoic iron formations constitute uniquely large accumulations of iron-rich chemical sediments which owe their existence to a combination of several different circumstances. One is a favorable depositional setting. Sedimentological analyses of the stratigraphic units associated with large iron formations indicate they were mainly deposited along passive continental margins in deep shelf to slope settings. The sedimentary features of banded iron formations (BIFs) are consistent with deposition during highstands, but the features in granular iron formations (GIFs) require deposition in shallower water. Another factor is a prolific source of iron. Isley (1995) has argued persuasively that hydrothermal systems located on the open-ocean floor could have provided iron in sufficient quantities, and that the bathymetry and chemistry of the oceans at that time in earth history permitted plumes generated by these systems to travel long distances and deliver iron to totally unrelated environments. In addition, Beard et al. (1999) recently recognized isotopic fractionation of the iron in iron formations, suggesting microbes played an important role in fixing it. One final condition is the survival of iron-formation through diagenesis. Some have argued that the composition of today's iron formations is very different from their sedimentary precursors. While much of the silica found in both BIFs and GIFs was clearly introduced during early diagenesis, the textures and minerals shielded within early-cemented BIFs and GIFs indicate their original compositions were much as we find them today.