

Geology and geochemistry of the banded iron formations (bifs) and their host rocks, central eastern desert, egypt

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The present work presents detailed geological and geochemical data on two selected Neoproterozoic BIF occurrences of the Central Eastern Desert (CED) of Egypt namely Abu Marwat and Um Nar occurrences. The BIFs occur in a wide range of different metamorphosed volcano-sedimentary host rocks with commonly sharp contacts with the host metavolcanics and schists. Banding and lamination defined by layers of magnetite and hematite alternating with quartz-rich layers on macro, meso- or micro-scales. Rhythmic banding is either streaky or continuous. These rocks have undergone several episodes of deformation and metamorphism.

The BIF of Abu Marwat form three main groups separated by relatively thick layers of metavolcanics. It is composed essentially of magnetite, hematite and microcrystalline quartz, in addition to ankerite in the carbonate-bearing bands. Um Nar banded iron formation is hosted by a metamorphosed volcanic/pyroclastic and schist sequences. The iron formations and associated rocks form an isoclinal fold which closes westward and is overturned toward the north. Although the BIF is regionally metamorphosed, the relict banding is usually still evident. It is composed of magnetite and minor hematite, together with silicate bands mainly of quartz, and epidote.

Geochemically, the host metavolcanics and metapyroclastics and schists are calc-alkaline and of island arc affinity. The Abu Marwat BIF shows high Cr and Ni contents, and high REE- enriched pattern relative to Um Nar BIF. All the BIFs show relatively low Fe/Al and Fe/Mg ratios, but very high Fe/Si ratios, high Al₂O₃ contents. The REE data of Um Nar, and Abu Marwat, normalized to the North American Shale Composite (NASC) values are characterized by mild to strong HREE enrichment with prominent positive Dy anomaly. It is suggested that the deposition occurred in an island arc setting, probably intra-arc basins through the precipitation of Fe silicate gels.