

GEOTONIC ENVIRONMENT AND STRUCTURAL DISPOSITION OF EXTENSIVE BANDED IRON FORMATIONS

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Large iron-ore deposits with hundreds of million tons are worldwide composed of or derived from extensive banded iron formations (BIFs) of Archean and Proterozoic age. These thick successions of finely laminated protos (jaspilite, taconite, itabirite) are generally interpreted as sediments deposited under stable geotectonic conditions persisting over considerable periods, such as on continental shelves, in intracratonic basins or on submarine plateaus. The genesis of giant accumulations of iron and silica with subordinate carbonates and silicates occurring in more or less rhythmic sequences is mostly discussed with main reference to the source of corresponding ions and the mechanisms of deposition, often considering some chemical, lithostratigraphic and mineralogical similarities to define a generally valid genesis of banded iron formations. Comparative studies, however, show that BIF provinces differ considerably in the sequential succession and regional variability of ore and wall-rock assemblages and in their sedimentary and tectonometamorphic setting and history. The conditions of compaction and soft-sediment to hard-rock deformation can vary considerably, even over small distances, and thus produce contrasting parageneses, grain textures, grades of preferred orientation of mineral components and tectonically induced physical anisotropies. It will be demonstrated that extensive banded iron formations may form under quite contrasting geological conditions and that resulting economic deposits require a rather differentiating theory about the mechanism controlling the monotonous deposition of immense masses of iron over vast areas and long times.