

PALEOPROTEROZOIC BANDED IRON FORMATION OF THE QUADRILÁTERO FERRÍFERO BRAZIL



Aerial view of Pico do Itabirito formed by a compacted hematite monolith surrounded by an open pit iron ore mine in BIF.

ONE OF THE MOST IMPORTANT RECORDS OF PALEOPROTEROZOIC BIF ON EARTH AND PLACE OF FERRUGINOUS CAVES.

The Banded Iron Formation (BIF) in the Quadrilátero Ferrífero is a Lake Superior-type iron deposit formed at the beginning of the Great Oxygenation Event. During the Cenozoic the wetter climate favored weathering that enriched iron minerals, which produced economically significant iron ore bodies.

Duricrust is formed by iron oxide and hydroxide (ferricrete) close to the top of weathering profiles in the BIF. These capstone deposits, named regionally as canga, are resistant to erosion and are host to small caves that are the first to have been described in detail in ferruginous rocks (Auler *et al.*, 2014; Simmons, 1963).

SITE 013

GEOLOGICAL PERIOD	Paleoproterozoic
LOCATION	State of Minas Gerais, Brazil. 20° 14' 25" S 043° 52' 01" W
MAIN GEOLOGICAL INTEREST	Stratigraphy and sedimentology Geomorphology and active geological processes



Outcrop of folded metamorphic BIF in Serra da Piedade Protected Area.

Geological Description

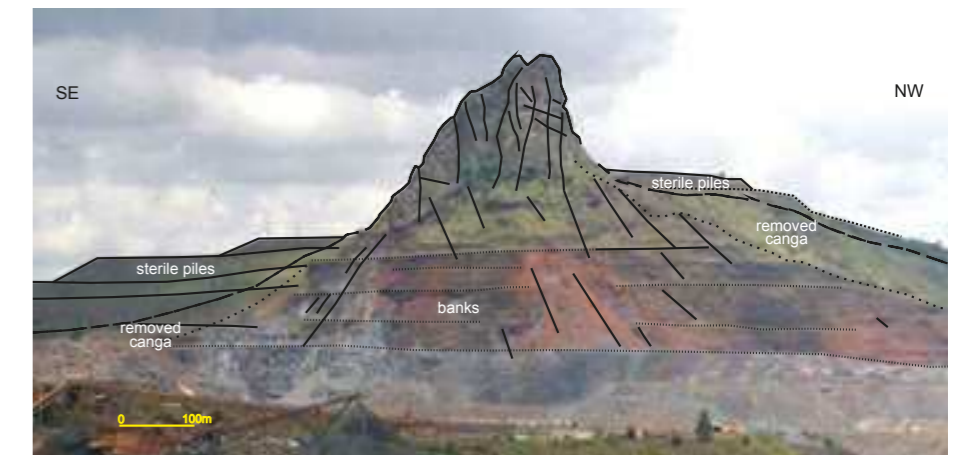
The most conspicuous Banded Iron Formation in Quadrilátero Ferrífero, together with marbles, dolomites and hematitic and dolomitic phyllites, constitute the Cauê Formation of the Supergroup Minas. These rocks are Paleoproterozoic in age, up to 350 m thick, 2.42-2.58 GA, and deposited in a shallow marine ocean (Spier *et al.*, 2003). They are capped by dolomitic BIF and dolomites of the Gandarela Formation, which exhibit biogenetic structures such as stromatolites and algal mats. These rocks have been deformed in two Proterozoic orogenies.

The Cenozoic climate favored weathering, which leached silicious and carbonate minerals of the the BIF and enriched iron minerals. This process has produced bodies of iron ore that have up to 75% FeO. These deposits are of global significance. Iron mines in the region produced more than 3.0 billion tons of

iron in the last 20 years. The weathering profile is the oldest and most continuous known (Spier *et al.*, 2006). The leaching at the tip of the BIF produced duricrust, which is formed by iron oxide and hydroxide (ferricrete). The Duricrust prevents erosion and is regionally called canga.

Scientific research and tradition

The BIF outcrops were landmarks for European and African populations in the region since the 18th century, and described by scientists in the 19th century. These deposits have been the subject of geochemical and tectonic investigations, as well as studies on the genesis of duricrusts and related cave formation.



Reconstitution of Pico do Itabirito, drawn on current photography. Designed based on 19th century paintings and on Rosiere *et al.* (2009)