Polygenetic lateritic iron ores on BIF's in Minas Gerais/Brazil

By J. WEGGEN, Bergisch Gladbach and I. VALETON, Hamburg*)

With 9 figures and 1 plate

Abstract

The aim of this paper was a mineralogical-geochemical investigation of the weathering processes in the BIF's (banded iron formation) of the Ferteco area, M.G. Brazil. A several hundred meter deep Proterozoic supergene alteration is overprinted by younger, mainly Cenozoic weathering processes. The later is characterized by surface related increase of gibbsite and goethite and by groundwater governed new formation of magnetite, traces of Mn-minerals and local elevated gold contents. The canga on top is interpreted as residual breccia.

Introduction

In the Iron Quadrangle, M.G., relics of Pre- to Lower Tertiary deep lateritic high grade iron ores on BIF's-Cau8 Formation, Middle Proterozoic - are related to the Gondwana or Postgondwana landsurfaces.

Polyphase processes of supergene alteration and erosion during Proterozoic-probably also early Phanerozoic -- and since Cretaceous time led to polygenetic weathering profiles up to 300-400 m in depth. They are partly locked by a final canga and/or partly truncated. Canga talus material covers the Lower Tertiary bauxites.

The history of research on BIF's and their weathering in the Iron quadrangle was influenced by DORR, 1964 and the ideas of THIENHAUS, 1964; EICHLER, 1967, 1968; WEGGEN, 1986.

In the last years, since 1982, MORRIS developed very differentiated genetic models for the history of BIF's of the Hamersley platform. They are only slightly modified by sedimentation and diagenesis, tectonism and metamorphism. Following MORRIS (1983, 1985, 1987) during Proterozoic time iron concentration took place by supergene processes. The first worldwide period of unconformities accompanied by reworking and deposition of ore pebbles happened at about 2000 Ma (Fig. 1). Therefore the first event of supergene iron
Fig. 1. Stratigraphic relationships of Proterozoic rocks of major iron provinces of Western Australia, Minas Gerais, Cape Province, and the Lake Superior area. The dot-pattern represents a tentative correlation of the first stratigraphic evidence of BIF-hosted supergene iron ores, related to unconformities. The probable earliest ore forming period for the Hamersley Platform is arrowed. The correlation is used to support the hypothesis that at about this period oxygen levels in the atmosphere reached concentrations that could drive deep electrochemical cells in BIF. These, for the first time, formed ore-bodies at sufficient depth to be preserved, despite deep erosion during subsequent periods of re-exposure. (After Morris, 1985).