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Geological and Metallogenic Characterisation of Manganocopper Mineralisation in the Tizi N'Isdid Deposits (Ounien Massif, High Atlas, Morocco)

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The Tizi-N-Isdid region, renowned for its significant mineral resources, particularly manganocopper, is located in the Ounien massif, on the border between the Anti-Atlas and the High Atlas, on the western edge of the Precambrian Ouzellarh promontory. The Tizi N'Isdid deposit is hosted by a detrital series and overlain by Adoudounian dolomitic bars. A precise lithostratigraphic description is provided, highlighting the presence of volcanic and volcano-sedimentary formations of the Ouarzazate group, as well as formations of the Taroudant azoic group. Mineralization occurs mainly in reddish-brown claystone, with braunite as the main manganese ore. The gangue is made up of elements of claystone, calcite, quartz in mosaic or fibroradial clusters and, secondarily, barite. The paleogeography of the site shows stratification of mineralization on a shallow subhorizontal platform, with minor variations in the thickness of basaltic flows and coarse conglomerates. Manganese mineralization extends over 6 km in a north-south direction, in the form of lenticular layers and discontinuities. Mineralization styles are examined in detail, showing a variety of morphologies ranging from massive mineralization to bands in claystones. Geochemical analyses suggest a Sedex-type hydrothermal origin for the mineralization, with braunite as the dominant mineralogical indicator. In conclusion, the geological study of the Tizi-N'Isdid deposit provides a detailed overview of its geology, the horizontal and vertical distribution of its mineralization and its genetic typology. This information makes a major contribution to the characterization and development of manganese and copper mineralization in the Ounien High Atlas region.