Lithostratigraphy, Mineralogy, and Structural Controls of the Late Ediacaran Tizi N'ousatour Cu-Ag Deposit, Northwestern Anti-Atlas, Morocco

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The Imi N'Ozrou mining site, encompassed by various metallic indicators such as copper and silver, is situated in the Anti Atlas at the northwest boundary of the West African Craton. These metals are located in the volcano-sedimentary series of the late Ediacaran Ouarzazate Group deposited between 590 and 550 Ma. The volcanic facies at the site comprises porphyritic and aphyric rhyolites, vitroclastic porphyritic dacites and rhyodacites, as well as their pyroclastic equivalents. These formations are intersected by two systems of dikes, mainly oriented in the E-W and N-S directions. N-S dikes are the youngest and possibly Triassic, despite intersecting the lower Cambrian. The Precambrian terrains are overlain by a Paleozoic sedimentary series, topped by Neogene trachytes.

Three main fault systems have been identified, namely N-S, E-W, and NW-SE, which imply the occurrence of three deformation stages. Phase I is represented by N-S–striking strike-slip faults, carrying a suite of dacite and rhyodacite veins and developing at the basement. It corresponds to the post-collisional collapse that took place during the late Ediacaran, resulting in the formation of horsts and grabens. Phase II is marked by sub-meridian compression with dextral shear zones and medium E-W–striking reverse faults. This family is believed to be posterior to phase I. Phase III represents a compressional phase marked by the formation of dextral strike-slip faults, which is considered to have occurred after the previous two phases. The faults of this phase offset both the dikes of phase I and the faults of phase II. The E-W structures consist mainly of barite, calcite, quartz, Ag-Hg amalgam, argentite, polybasite, pearceite, pyrite, arsenopyrite, chalcopyrite, galena, malachite, azurite, oligist, and bornite associated with fractures and sub-parallel crushing zones in the E-W dolerite dike. The mineralized host rocks are characterized by stockwork mineralization and affected by hydrothermal metamorphism.