

Post-Collisional Delamination of a Late Ediacaran Large Igneous Province as a Metal Source for the Imiter Ag–Hg Deposit, Morocco

Fatiha Askkour², Moha Ikenne², **Mehdi Ousbih**¹

¹Moulay Ismail University, Meknes, Morocco, ²Ibn Zohr University, Agadir, Morocco

The Imiter silver district, a world-class Ag–Hg deposit located in the Anti-Atlas belt along the northwestern margin of the West African Craton, comprises multiple mineralized sectors (Imiter I, II, South, and Igoudrane). Mineralization occurs as sub-horizontal ore bodies, steep north-trending veins controlled by the Imiter fault, and low-angle south-dipping structures associated with crustal-scale deformation.

This study integrates field geology, electron probe microanalysis, and Pb isotopic data with published geochemical and geochronological datasets to constrain ore-forming processes, metal sources, and fluid evolution. Pb isotopes define three distinct mineralization stages: (i) Pb1 linked to Late Ediacaran magmatism, (ii) Pb2 related to Hercynian hydrothermal remobilization, and (iii) Pb3 reflecting Alpine overprinting.

The primary Ag–Hg mineralization (Pb1) is spatially associated with high Sr/Y intrusions (Bou Fliou, ~582 Ma; Igoudrane, ~538 Ma) and syntectonic dykes emplaced along the Imiter fault system. These relationships indicate a magmatic-hydrothermal origin, with dykes acting as key conduits for fluid flow and metal transport.

We propose that post-collisional lithospheric delamination triggered the generation of metal-rich magmas through interaction between delaminated lower crust, metasomatized mantle, and subducted slab components. This process sustained long-lived hydrothermal systems and controlled metal fertility within the district.

These results provide a refined genetic model for the Imiter deposit and highlight exploration vectors for Ag–Hg systems in Neoproterozoic magmatic provinces, emphasizing the role of crustal-scale structures and magmatic sources in ore localization.