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Geostructural Framework of the Alma Inlier (Western Anti-Atlas, Morocco) Revealed by Combined Remote Sensing and Airborne Geophysical Methods

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The Western Anti-Atlas of Morocco, with a particular focus on the Alma Inlier, represents a geologically prospective yet underexplored area for copper mineralization. Despite its metallogenic potential, the structural and hydrothermal controls on mineral deposition remain poorly constrained. This study adopts an integrated approach combining remote sensing and airborne geophysical data to investigate the structural architecture and fluid flow pathways associated with mineralization processes. The analysis begins with the extraction and interpretation of surface lineaments from remote sensing imagery, allowing for a first-order structural framework to be established. These results are then enhanced through the interpretation of airborne magnetic, which provide additional insights into subsurface features such as faults, lithological boundaries, and deep-seated lineaments. The integration of these datasets offers a comprehensive understanding of the structural controls that governed hydrothermal fluid circulation. By identifying potential zones where structural traps could have facilitated the concentration of mineralizing fluids, this study delineates high-priority targets for copper exploration. The proposed methodology, applied to the structurally complex Alma Inlier, contributes not only to refining the region’s geodynamic evolution but also to guiding future drilling campaigns with greater accuracy and efficiency across the broader Anti-Atlas copper province.