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Exploring Critical Raw Materials: Preliminary results from the study of the Ediacaran Imiter Aplite-Pegmatites Field, Anti-Atlas, Morocco

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The increasing demand for critical raw materials in green energy technologies, especially electric vehicle batteries, has refocused attention on rare element granitic pegmatites in mineral exploration. These pegmatites serve as crucial sources of commodities, and geochemical studies help refine exploration targeting.

In the northwestern sector of the West African Craton, pegmatites from the Imiter Field represent one of numerous occurrences, rarely investigated, exposed in several inliers within the Anti-Atlas belt, spanning a length of 600 km and striking in an ENE-WSW direction. The pegmatites of the Imiter Field, located south of the world-class Imiter silver deposit, may be part of the large metallogenic province associated with the Panafrican Orogeny. These pegmatitic dykes, hosted by the early Ediacaran basement, form swarms characterized by extensions of several hundreds of meters and thicknesses reaching up to 10 meters. They are oriented along two main directions: NE-SW and NW-SE. Petrographic analysis of the pegmatites and aplite indicates a composition dominated by quartz, plagioclase, K-feldspar, muscovite, biotite, allanite, and sphene. These rocks, classified as external pegmatites, are associated with the Bou Teglimt granitic pluton. The Imiter pegmatites exhibit distinctive characteristics, including significant extension, complex layering, internal zoning, and the prevalence of muscovite-rich pegmatite and aplite. Field observations and geological mapping suggest a connection to the Late Ediacaran Large Igneous Province, dating between 590 Ma and 540 Ma.

The Imiter Field stands as a crucial pegmatite area within the Saghro massif. It necessitates comprehensive studies focused on crystallochemistry, petrogenesis, and exploration techniques. These investigations aim to characterize metasomatic processes and the accompanying geochemical modifications resulting from the intrusion of aplite-pegmatites into metasediments within the Imiter Field.