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Mapping Lithium Resources in Underrepresented Regions for the Global Energy Transition

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Lithium, the third most abundant element in the universe, possesses a remarkably high electrochemical potential, making it a key component in modern energy storage technologies. This property has driven a surge in demand, leading to a sharp increase in lithium prices in October 2015 [1]. The ongoing global energy transition, marked by the growing reliance on batteries, has further fuelled this demand [2]. Countries with significant lithium reserves, such as Ukraine and other post-Soviet nations, hold strategic potential in supporting this transition while simultaneously advancing their own economic recovery.

Rare-element granite pegmatites, particularly those of the Li-Cs-Ta and Nb-Y-F types, are among the most promising resource targets for lithium due to their distinctive geochemical trace element composition [3]. Pegmatite deposits of these types are known to contain lithium ore resources amounting to several tens of millions of tonnes [4]. While global mapping databases, such as those provided by the U.S. Geological Survey [1], cover a significant portion of the world's lithium deposits, the territory of post-Soviet countries remains underrepresented. As part of the ANR TRANSFAIR project, we are working to address this gap by conducting an inventory of lithium deposits genetically linked to pegmatites, with a particular focus on Ukraine and its neighbouring post-Soviet countries [5].

In this context, our work aims to enhance the existing map of lithium deposits by incorporating data on occurrences along the Alpine mountain belts, the southern Urals, and the Kola Peninsula. We have evaluated the location, geological structure, geochemical specialization, lithium content, and known geological resources of selected deposits. The updated database will serve as a valuable tool for government agencies, private companies, and environmental organizations, enabling them to make informed decisions regarding lithium ore resources and their sustainable development.

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