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Exploration Targeting for Pegmatite-hosted Lithium Mineralization in Västernorrland Region, Sweden, by Multivariate Analysis of Till Geochemical Data

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With increasing demand for green energy elements, such as lithium (Li), it is appealing to develop methods for modeling the spatial distribution of relevant elements in a variety of sampling media (e.g., bedrock, soil) in order to outline exploration targets for such elements. This presentation describes multivariate statistical analyses of till geochemical data to identify and outline areas that probably host Li-bearing pegmatites in the Västernorrland region of Sweden. We employed K-means clustering and principal components analysis (PCA) to reveal spatial patterns in the data, from which geochemical anomalies linked to bedrock as well as to mineralization can be recognized. The K-means clustering and PCA results were tested against locations of known Li-bearing pegmatites. Multi-element anomalies revealed by K-means clustering correspond to multi-element anomalies disclosed by PCA, suggesting that principal components extracted by the latter are continuous equivalents of discrete clusters recognized by the former. The study shows that K-means clustering and PCA must be employed in tandem in analyzing regional-scale till geochemical data so as to reveal meaningful information regarding prospective targets areas for further exploration.