

Lithium prospectivity of hydrothermally altered rhyolitic lacustrine sediments of the Taupo Volcanic Zone, New Zealand

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Recently GNS Science published a prospectivity model for lithium potential in New Zealand. It combined mineral system models of orogenic granitoid and pegmatite-hosted lithium and hydrothermally altered lacustrine volcanic sediment-hosted lithium into a single lithium model to cover the entire country.

We present here a more detailed look at lithium potential sourced from felsic extrusive volcanic rocks deposited in lacustrine settings, building on the modelling work by GNS Science. The fluid, ligand, and ore source are linked to a high degree of magma fractionation and emplacement within a continental setting, as well as with geothermal activity. Extensional faults of Cenozoic age facilitate the movement of heat and fluids, and in caldera settings there are marginal faults permitting low-temperature hydrothermal fluids to transport lithium from a degassing magma at depth, and lithium from the side wall. These fluids will alter the host rocks, resulting in altered clays formed from lacustrine rhyolitic sediments. Actual enrichment of lithium is controlled by availability of a source, fluid-rock reactions during transport, pressure-temperature conditions, and proximity to structures that permit the flow of hydrothermal fluids. The deposits themselves can be detected using surface samples and pathfinder elements associated with strongly fractionated magmas, such as B, Mg, K, and Rb.

A detailed model was set up over the Taupo Volcanic Zone in order to generate a detailed Fuzzy Logic prospectivity model for lithium. The outcome of this prospectivity modelling is presented here along with the types and distribution of exploration targets generated for volcanic lacustrine sediment-hosted hydrothermal lithium.