

Geophysical signatures of chemical alteration

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The search for mineral deposits below unmineralised cover, or at depth, requires knowledge of the signatures of chemical alteration, as well as how these signatures change at depth. Although not commonly considered in modelling observed geophysical responses, chemical alteration can have a large impact on the physical properties of rocks and hence a large impact on observed geophysical data. Understanding how chemical alteration influences physical properties is the key to understanding the geophysical signatures of chemical alteration.

Changes in density, magnetic susceptibility and seismic velocity due to chemical alteration have been studied. Studies were performed by examining available physical properties from mineralised regions, as well as through numerical simulations of chemical alteration. The changes in these physical properties allow an understanding of the signatures of chemical alteration in three key datasets for regional exploration: gravity, magnetics and seismic reflection. Interpretation of chemical alteration at both the mine and regional scale is possible with the knowledge of the changes in physical properties that can result from chemical alteration.

As property inversions of gravity and magnetic provide measures of density and magnetic susceptibility in the subsurface, the understanding of how these properties change with chemical alteration provides a powerful tool for deeper and cheaper exploration.