

# SEG 2022 Conference: Minerals For Our Future

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## **An Integrated Perspective on Lithium Mineral Systems**

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Economic concentrations of lithium occur within a range of geological settings and are found within mineral and brine deposits, posing unique challenges and opportunities to geologists in exploring for this critical metal. Whilst over 65% of known lithium resources reside within brines, this is likely an underestimate, as exploration and discovery of unconventional lithium brine resources, such as granite- and basin-hosted brines, is in a phase of rapid growth. This evolution has been driven by surging demand for lithium in batteries, alongside innovations both within direct lithium extraction technologies and geological understanding of the lithium mineral system. Considering these developments, relatively low-grade, high-volume and deep-seated, high-grade resources are being evaluated, and lithium brines are being explored for in new environments, such as oilfields and paleo-salar systems. Furthermore, lithium recovery from brines may be possible in conjunction with production of geothermal energy, potentially offsetting the carbon footprints and economic costs of both.

In order to conduct effective lithium exploration, an overarching understanding of the interlinkage of mineral and brine-hosted lithium systems is essential. By approaching lithium exploration as a mineral systems problem, whereby the key sources, pathways, concentration mechanisms and sinks are considered in detail, it is possible to generate new insights that vector to ore. The presentation will deliver an overview of the lithium mineral system; key examples of applied lithium exploration that focus primarily on lithium brine systems, but leverage fundamental understanding of hard rock geology and lithium sources, will be covered. These case-studies utilise a range of datasets from global- to deposit-scale, and will be utilised to summarise the methodology, data and insights required to generate novel exploration targets.