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Links between supercontinent cycles, volcanism and mineral systems

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Increasing societal demand for critical minerals is pushing exploration into new frontiers, with general consensus that one of the most fruitful avenues is likely to be deposits that are buried beneath surface cover. Taking advantage of this novel exploration search-space necessitates a transformation in exploration methods, including development of new techniques and geological insights into the genesis of mineral deposits. In particular, discerning processes that are operating during mineralisation leads to an improved understanding of their setting within the plate-tectonic framework, greatly enhancing predictive power in under-explored regions. Here, we use global compilations of several classes of base-metal deposit to explore the geodynamic setting of these mineral systems. We will demonstrate quantitative links between deposit distribution, lithospheric structure and styles of volcanism. Analyses of this type not only provide new tools to identify prospective regions for future exploration, but also shed light on the often enigmatic geological processes that are responsible for mobilisation of metals and their concentration into ore bodies.