

# **Targeted Mineral Exploration in Large Igneous Provinces: Modelling the Gravity Signature of Associated Layered Intrusions**

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## **Abstract**

Interest in Large Igneous Provinces (LIPs) has increased recently as studies suggest a link between LIPs and layered mafic-ultramafic intrusions that host valuable Ni-Cu-PGE ore deposits. Furthermore, it has been proposed that layered intrusions within approximately 500 km of the plume centre are the most prospective mining targets. A sound methodology for assessing the distribution of layered intrusions in the vicinity of plume centre regions is still unavailable, however we believe that large gravity anomalies associated with the LIPs may be the key. The 1270 Ma Mackenzie LIP, which extends over an area of nearly 3 million sq. km and with a plume centre in the northwestern Canadian Shield, provides an excellent opportunity to test this hypothesis as it is associated with prominent gravity anomalies and the Ni-Cu-PGE mineralized Muskox layered intrusion, located beneath the Coppermine continental flood basalt. Our overarching goal is to produce a density model of the subsurface by inverting regional gravity data in the vicinity of the Mackenzie plume centre. As the area has already been studied extensively, it provides us the opportunity to calibrate our approach with previous results. Ultimately, our goal is to extend this method to approximately 10 other plume center regions from across the globe (with ages ranging from 180 to 2700 Ma) with the objective of identifying and modelling layered intrusions in the subsurface. If successful, our technique will provide insight into the nature and distribution of layered intrusions in plume center regions.