Goldschmidt 2022 Abstract
https://doi.org/10.46427/gold2022.11151

2D GRAVITY AND MAGNETIC MODELLING OF THE MACKENZIE LARGE IGNEOUS PROVINCE PLUME CENTER REGION, NORTHWEST TERRITORRIES, CANADA.

KAITLYN E. DE MORÉE VAN LIERDE, RICHARD E. ERNST AND CHRISTOPHER ROGERS

Carleton University

Presenting Author: kdemoree@gmail.com

The proposed plume center of the 1270Ma Mackenzie large igneous province (LIP) is defined by the focus of the Mackenzie radiating dyke swarm and is located off the coast of Victoria Island in NWT, Canada. It has been proposed that the intracratonic Amundsen Basin, which partially surrounds the Mackenzie plume center, may have formed because of decay of an unidentified mantle plume [1][2][3] which we suggest is the Mackenzie plume.

This study conducts 2D gravity and magnetic modelling of the circumferential gravitational low of the Amundsen Basin, along with radial gravitational highs partially circumscribing the plume center. The radial gravitational highs are interpreted as being feeder dykes of the Mackenzie LIP [4][5]. This modelling will help understand the setting of the Muskox intrusion, the Mackenzie plumbing system, and its other layered intrusions. The intrusions' geological context is key in understanding the different magma paths, batches, mineralization, and geochemical evolution of the Mackenzie LIP. The proximity of the Muskox mineralized intrusion to one of the radial gravitational highs suggests possible greenfield exploration targets along other radial gravitational highs.

We propose the thermal decay of the Mackenzie plume possibly caused the Amundsen Basin subsidence through three mechanisms. First, the thermal decay of the plume which occurred over ~200 Ma or more [6][7]. Second, the lateral redistribution of large amounts of magma through the Mackenzie dyke swarm from the plume centre [6][8][9]. Third, crustal loading due to the emplacement of massive mafic/ultramafic intrusions and eclogitized ultramafic underplating [10]

[1] LeCheminant & Heaman (1989), *Earth and Planetary Science Letters* 96, 38-48.

[2] Rainbird, Jefferson & Young (1996), *GSA Bulletin* 108, 454-470.

[3] Thompson, Rainbird & Krapez (2015), *Precambrian Research* 263, 246-259.

[4] Blanchard (2015), *Masters, Carleton University.*

[5] Blanchard, Ernst & Samson (2017), *Canadian Journal of Earth Sciences* 54, 290-310.

[6] Ernst, Davies, Jowitt & Campbell (2018), *Earth and Planetary Science Letters* 502, 244-252.

[7] Liu, Pearson, Wang, Mather, Kjarsgaard, Schaeffer, Irvine, Kopylova & Armstrong (2021), *Nature* 592, 732-736.

[8] Campbell (2001), *Mantle plumes: their identifiaction through time* 352, 5-21.

[9] Fahrig (1987), *Mafic Dyke Swarms* 34, 331-348.

[10] Ernst (2014), *Large Igneous Provinces*