

## Refinement of geochemical classifications using photo textural metrics

MCLEAN TROTT<sup>1</sup> AND MATTHEW LEYBOURNE<sup>2</sup>

<sup>1</sup>Queen's University

<sup>2</sup>Queen's University

Presenting Author: [mclean.trott@gmail.com](mailto:mclean.trott@gmail.com)

Multi-element geochemistry has increased in importance in the mineral exploration sector in recent years. Work such as Halley's generic litho-geochemistry workflow [1] using laboratory geochemistry, and Gazley's example of classification [2] using portable XRF (X-Ray Fluorescence) analysis handily illustrate the utility of approaching geological problems using large, low cost datasets and a mineralogical/petrogenetic perspective on interpretation. However, a persistent weakness of any geochemical approach, particularly in terms of lithological classification, is the inherent "textural blindness" of geochemistry. In other words, the inability of geochemistry to distinguish between texturally distinct rocks if chemical compositions are not, in turn, sufficiently distinct. This can be particularly troublesome in geological settings containing intrusive and extrusive rocks with similar origins and therefore composition, and qualified geologists to manually log these rocks and identify key textures are in short supply. The enclosed case study addresses this problem using photo analysis and automated extraction of textural metrics which numerically describe rock textures and may inform geochemical classification such that rocks with distinct textures, but similar compositions may be robustly separated. The approach was applied to an Andean porphyry-epithermal dataset wherein historic drillholes were systematically re-analyzed using portable XRF and spatially coincident photographs. This enabled a large amount of data collection to be rapidly carried out by unskilled labour and facilitate robust reclassification of said drillholes, ultimately saving time and money, and providing valuable inputs to targeting efforts on the project.

1. Halley, S., *Mapping Magmatic and Hydrothermal Processes from Routine Exploration Geochemical Analyses*. Economic Geology, 2020. **115**(3): p. 489-503.
2. Gazley, M.F., *Examination of the Macraes Gold Mine portable X-ray fluorescence dataset*, in *NZ Branch AusIMM Conference 2018*. 2018, NZ Branch AusIMM: Tauranga, New Zealand.