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LA-ICP-MS data files for optimized workflow analyses and reproducibility of hydrothermal magnetite as an indicator for porphyry copper deposits

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Front cover:
Subglacial till from near Mount Polley. **Photo by Travis Ferbey**.

Back cover:
Reflective light image of a hydrothermal magnetite grain with minor apatite inclusions from a bulk till sample collected near the Mount Polley Cu-Au deposit. Laser ablation spot is 55 μm, magnetite grain is set in epoxy. Photo by **Rebecca Morris**.

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Keywords: porphyry copper deposits, magnetite, indicator minerals, laser ablation inductively coupled mass spectrometry, optimized workflow exploration

Summary

This release provides major and trace element chemistry data from magnetite analyses in bulk subglacial till samples collected near the Mount Polley porphyry copper deposit. These samples were re-analyzed by laser ablation inductively coupled mass spectrometry (LA-ICP-MS) using revised and optimized workflows described in Morris et al. (2025).

Herein we provide supporting laser ablation inductively coupled plasma mass spectrometry (LA-ICP-MS) major, minor, and trace element data (Fe, Ti, Mg, Al, V, Cr, Mn, Co, Ni, Cu, Zn, Na, Si, P, S, K, Ca, and Ba) measured in magnetite grains (BCGS_GF2025-10.zip); see Morris et al. (2025) for analytical details. Re-analyzed samples are 12-PMA-094-A01 (Table 1), 12-PMA-098-A01 (Table 2), and 12-PMA-101-A02 (Table 3). Relative standard deviations on repeat analyses of external standards are also provided (Table 4), and comparison of sum normalization values to those run with an internal standard (Table 5). Table 6 provides a 'live' worked through example of plotting linear discriminant analysis 1 (LDA1) and 2 (LDA2), as per the equations and boundaries defined by Pisiak (2015) and Pisiak et al. (2017) and used in Morris et al. (2025). However, we note that LDA plots in Morris et al. (2025) were generated in ioGAS™ software. As described in Morris et al. (2025), four methods tested various analytical workflows and calibration standards.

Method 1 was performed by editing time-resolved spectra around obvious inclusions (notably apatite) encountered at depth during laser ablation. This method used BCR-2g and NIST 613 standards for calibration, and NIST 611 as an external standard. Method 2 was identical to Method 1 but instead used NIST 611 and NIST 613 standards for calibration, similar to Pisiak et al. (2017). External standards used were BCR-2g and BHVO-2g. Method 3 used only the first 10 seconds of ablation data, without consideration of inclusions. This method used BCR-2g and NIST 613 standards for calibration, and BHVO-2g as an external standard. Method 4 was performed by collecting the entire 40 seconds of ablation data, without considering inclusions. This method used BCR-2g and NIST 613 standards for calibration, and BHVO-2g as an external standard. A downhole fractionation correction factor was applied to Method 4 to account for potential fractionation effects over the entire time-resolved spectra (40 seconds).

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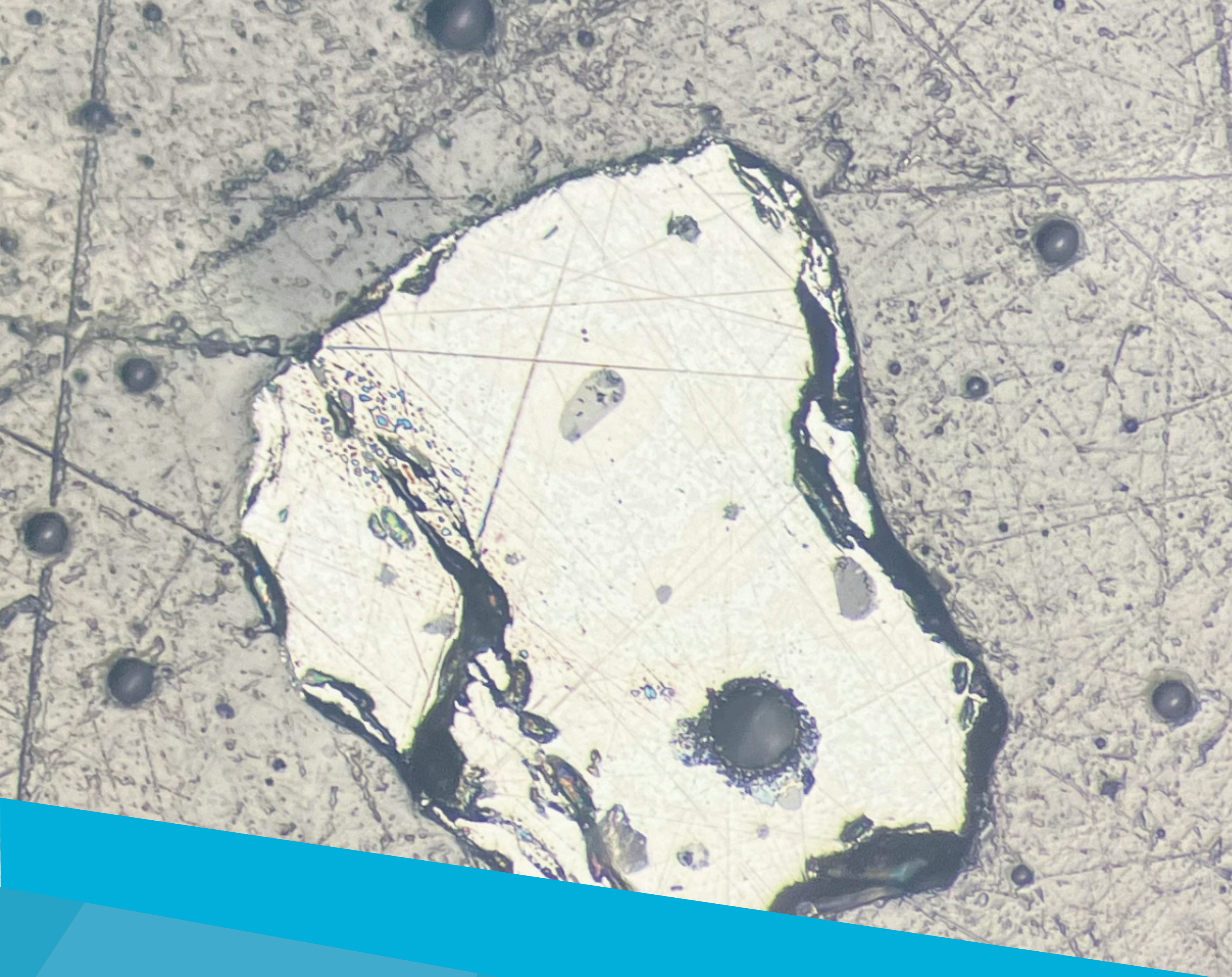

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