NSERC-CMIC FOOTPRINTS

Lesher CM, Hannington M, Galley A, and the Mineral Exploration Research Network , 2018, NSERC-CMIC Mineral Exploration Footprints Research Network: data integration for the next generation of mineral exploration models, Abstract, Society of Economic Geology, Keystone, USA

The Mineral Exploration Footprints Project was established to (1) enhance the ability of the mining industry to recognize the footprints of ore systems from high-grade cores to distal cryptic margins, (2) develop methods to integrate multiscale, multiparameter 3-D data that define ore system footprints, and (3) develop workflows that assist researchers and industry explorationists to more effectively interact and accomplish these goals. Multidisciplinary teams from 24 Canadian universities and 28 industry sponsors defined the hydrothermal-magmatic footprints of the Canadian Malartic disseminated Au deposit in Québec, the McArthur River and Millennium unconformity U deposits in Saskatchewan, and the Highland Valley porphyry Cu deposit in British Columbia. New and reprocessed QA/QC-controlled geologic, structural, lithogeochemical, mineral chemical, hyperspectral, petrophysical, geophysical, and multimedia surficial data were collected for each site along cross and long sections. All data were interrogated within self-consistent 3-D Common Earth Models, and cutting-edge data analytics were used determine spatial data clusters and to generate rules defining how the data interact to produce subtle footprints of the ore systems. Joint and constrained geophysical inversions were carried out to separate hydrothermal footprint signatures from background rock types, using not only petrophysical data but also proxies derived from other data sets. Method development focused on rock volumes with high-density data centered on cross and long sections through the research sites, allowing researchers to maximize recognition of relationships between disparate data types (e.g., potential field vs. point data), but the results were also applied to more sparsely populated rock volumes in order to recognize and understand the largest extent of the ore system footprints.

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