Vectoring towards mineralization using hyperspectral imaging at the Canadian Malartic gold deposit, Quebec, Canada

P Lypaczewski[a], N Gillard[b], S Perrouty[c], B Rivard[a], and RL Linnen[c]

[a] *Earth and Atmospheric Sciences, University of Alberta, AB, Canada*
[b] *Department of Earth and Planetary Sciences, McGill University, Montréal, QC, Canada*
[c] *Department of Earth Sciences, Western University, London, ON, Canada*

The Canadian Malartic low-grade disseminated gold deposit is hosted by a lithologically variable sequence of Archean metapelites and metasandstones, which are challenging to characterize by conventional core logging. We made use of a hyperspectral imaging system (Specim SisuROCK™) to acquire shortwave infrared (SWIR) and thermal infrared (TIR) reflectance spectra over 150m of continuous drill core from the ore zone, as well as core from intervals of weakly altered, distal equivalents. The presence of quartz was determined from the TIR imagery, while the presence and mineral chemistry of white mica, biotite and chlorite was assessed with SWIR data. The drill core imagery enabled a correlation of estimated mineral compositions with downhole Au grades. Mineralized intervals are characterized by the presence of phengitic white mica (>2206nm, <3.3 Al^{VI} apfu) and Mg-rich biotite/chlorite (Mg# > 70), whereas less altered, distal samples contain more muscovitic white mica (<2202nm, >3.5Al^{VI} apfu) and biotite/chlorite of an intermediate composition (Mg# 50-60). The SWIR analysis also included over 800 point measurements collected with a portable field spectrometer (Terraspec®) from outcrops in a 8 x 12 km region surrounding the deposit. This high density data allowed us to isolate the effect of metamorphism from that of hydrothermal alteration on mineral chemistry. These surface measurements revealed a multi-km hydrothermal alteration halo around the deposit that may be of value for vectoring towards mineralization in similar environments.

Corresponding author: lypaczew@ualberta.ca