Summary

Fourteen different sites were investigated with an impulse-response TEM system to evaluate different environments with varying conductivity, chargeability, magnetic response, sulfide content, rock type and texture. The configuration of the 2015 transient EM investigation consisted of:

- A square fixed-loop transmitter of 10m side length (fig.3a);
- Surface lines radiating from its center at 45 degrees;
- Receiver stations spaced every 5m;
- A square waveform powered by a 20A-50V transmitter;
- A base frequency ranging from 3 to 30 Hz;
- A Geonics EM38 with a 60 cercus loop configuration;
- A square fixed-loop transmitter of 50m side length (fig.3a);
- A square waveform powered by a 20A-50V transmitter;
- A base frequency ranging from 3 to 30 Hz;
- A Geonics three-component dEdt coil sensor (200 mT, 20 kHz);
- A GHD Nurdon/EM digital 24-bit EM receiver (120,000 Hz).

The exploration problem consists in finding new ore zones close to the surface that can be mined economically. Even though the ore consists of massive chalcopyrite-gold veins with quartz-carbonate + pyrrhotite-magnetite, geophysical work such as resistivity/IP, magnetic and MaxMin work was carried out (fig.6) to determine conductivity of different areas so we could develop a procedure to explore and map near-surface massive sulfides. Petrophysical measurements and microscopic observations suggest complex interrelations between the amount of one of the rock, fabric, texture, porosity, mineralogy and impurities, leading to a wide range of conductivity values that suggest chalcopyrite might be a semiconductor at this site.

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Methodology

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Results from the TDEM survey

This poster will be presented on: October 19, 2016 at 2:45 pm.

For more information: Frédéric Gaucher: fredericgaucher@laurentian.ca
Richard S. Smith: rssmith@laurentian.ca

Exploring for copper-gold deposits with time-domain electromagnetics in the Chapais-Chibougamau mining camp: case history of a challenging variable environment.

Frédéric Gaucher* and Richard S. Smith, Harquail School of Earth Sciences, Laurentian University of Sudbury, Ontario, Canada.

Petrophysical and microscopic observations

Measurements on core samples with MPP and SCHC hand-held instruments allowed us to establish a conductivity range for different chalcopyrite veins (fig. 6 and 7). From these observations, we concluded there is a direct relationship between conductivity and copper grades. Microscopic observations on polished thin sections lead to the interpretation that high conductivity could also be caused by pyrrhotite (fig. 8), while chalcopyrite rich sulfides had a relatively weaker conductivity caused by resistant silicates or molecular film of impurities surrounding and isolating the grains from each other (fig. 9).

Conclusion

The TDEM survey conducted on the Opemiska property demonstrated considerable conductivity variability, with high copper grades not guaranteeing a strong response. Our thin section work implies that the lower conductivity case was not present at the site but rather a conductive grain being surrounded by resistive material and not electrically connected. From an exploration perspective, prospecting for massive and disseminated chalcopyrite in the area should also be targeting weak conductive anomalies or other physical properties (OPM), since the Cu-Au are not always show a strong correlation with high bulk conductivity.