



GEOLOGY DEPARTMENT SEG Student Chapter Seminar



Guest Speaker:

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“The Muketei Metallotect in the Ring of Fire - An Emerging Base-metal Camp”

Abstract:

The “Ring of Fire” (ROF), also known as the McFaulds Lake greenstone belt, is an arcuate Archean greenstone belt >200km long located largely under the cover of the James Bay Lowlands in Northern Ontario. Since the initial mineral discovery in 2002, exploration companies have discovered nine deposits of magmatic Ni-Cu-PGE, chromite, and VMS Cu-Zn with estimated resources and/or reserves, and over 50 polymetallic occurrences. Work by the OGS and GSC over the past six years has led to the identification of seven distinct assemblages within the ROF (Metsaranta et al., 2015), of which the Muketei assemblage is by far the most well-endowed as it hosts all known chromite and Ni-Cu-PGE deposits, and a large proportion of the known VMS occurrences.

The Muketei assemblage is a magmatic-volcanic succession interpreted to have been deposited during extensional rifting of older evolved crust, ca. 2735 Ma. Tabular sill-like ultramafic bodies emplaced at or near the contact between basement tonalite and an older supracrustal sequence are interpreted to reflect komatiitic magmatism derived from high degree partial melting of the mantle. Feeder systems to these ultramafic sills are locally well defined and have the potential to host significant high-grade Ni-Cu-PGE mineralization as at the Eagle's Nest deposit. World class chromite resources occur stratigraphically above Ni-Cu-PGE mineralization as thick accumulations of semi-continuous strata within two main sill complexes. A regionally extensive sequence of ferrogabbro sills and lesser large layered intrusions occur higher up in the stratigraphy and are known to host Ti-V-Fe-P mineralization in cumulate horizons. The relationship between the ultramafic sills and regionally extensive ferrogabbro sills remains unknown, but we speculate the two are genetically related, either as co-products of high-degree partial melting in the upper mantle, or as end-member fractional crystallization products of mantle melts at higher levels in the crust. The latter has the potential to impact exploration targeting within the Muketei assemblage as the presence of thick ferrogabbro intrusions may provide a vector towards smaller ultramafic intrusions with potential for Ni-Cu-PGE and chromite mineralization.

The Muketei volcanic sequence, located generally above the ferrogabbro sills, is a folded, bi-modal volcanic succession up to ~10km in mapped thickness and hosts the McFaulds #1 and #3 Cu-Zn VMS deposits in the south, and the 5.01 Zn-Cu VMS occurrence in the north. Age determinations for the volcanic sequence (Metsaranta et al., 2015) indicate that it is contemporaneous with ultramafic and mafic magmatism at depth, suggesting the heat source which generated the felsic volcanic melts, and possibly the hydrothermal systems, may be linked to their emplacement.

The Muketei assemblage is unique in the ROF with its extraordinary mineral endowment and the contemporaneous nature of its magmatic and hydrothermal mineral deposits. In this respect we recognize it as a mineral Metallotect of which we are only just beginning to understand and appreciate its characteristics and spatial extent. Questions remain as to why the Muketei is so unique relative to its sister assemblages in the ROF and to other greenstone belts in the Superior Province and beyond.

About the Presenter:

Ryan Weston, Noront Resources' Vice-President Exploration, is a Professional Geologist with over 15 years' exploration experience nationally and abroad. He has explored for VMS deposits in the Mexican Cretaceous belt, komatiite-hosted Nickel sulfides in Australia's outback and porphyry and epithermal mineralization in the Peruvian Andes.

Since 2012 Ryan has been focussed on exploration and development within Ontario's highly prospective Ring of Fire district which hosts world class chromite resources, a significant magmatic Ni-Cu-PGE deposit (Eagle's Nest) and numerous VMS occurrences, all discovered within span of less than 10 years. Ryan is an ardent believer in the continued prospectivity of the belt and believes there are more high-quality deposits yet to be found. Ryan received his MSc in geology from Laurentian University in 2002 and is a recent MBA graduate from the Smith School of Business at Queen's University.

Thursday, MARCH 23, 2017 AT: 5:00 pm IN: CB 3031

Pizza will be provided!