OCGC SEMINAR
Metal demand, mineral deposits and sustainability

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Earth and Atmospheric Sciences
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Thursday, October 18th, 2018, 11:30 AM
University of Ottawa
Advanced Research Complex, Room 233

Jeudi le 18 octobre 2018, 11h30
Université d'Ottawa
Advanced Research Complex, Pièce 233

Predicting future mineral and metal demand is challenging given changing energy markets, technology, new materials, and human needs. Regardless, most scenarios predict continued increases in demand for infrastructure metals, and rapidly expanding but volatile demand for the critical metals and minerals needed for modern technology and clean energy. Meeting increases in demand while striving to satisfy global sustainability goals will be difficult, particularly where reliance on economies of scale (and thus lower concentrations) results in less metal or mineral products per unit of rock with increase in energy and water use and waste products.

Three strategies are proposed to meet these challenges:

1. Develop exploration approaches and technologies that lead to discoveries with metal contents above current averages. While surface exploration will still be successful, quality discoveries at depth will require improved deposit models, better use of technology, new low-cost drilling technologies, and real-time integrated data. Understanding at the regional, camp and target scales must improve, including assessment of grade, rock and mineral variability of deposits, factors that determine effective mining, processing and environmental management.

2. Mining and processing technologies must enhance selectivity, producing more product from less rock (waste). Sensor-based ore sorting and other approaches to grade engineering, bulk underground mining, and *in situ* leaching offer potential improvements over current mining methods.

3. Exploit clusters of deposits with single operations to reduce mine footprints, minimize energy and water inputs, and deliver more product more effectively. These developments will require landscape-scale environmental, cultural and societal assessment to minimize cumulative impacts and allow for regional sustainable development in partnership with communities.

Earth scientists play critical roles in each strategy. Furthermore, new collaborative approaches among resource companies, communities, researchers and practitioners will be required for success, and to mitigate problems.

Dr. John F.H. Thompson divides his time between Cornell University, Ithaca, NY, where he is the Wold Professor of Environmental Balance for Human Sustainability, and Vancouver, where he consults on exploration, mining and sustainability. John has over 35 years in the mining industry (Rio Tinto, Teck) and related research (UBC MDRU), and has had many diverse leadership roles – Teck VP Innovation, Resources for Future Generations 2018, Genome BC, Society of Economic Geologists, Geoscience BC, Canada Mining Innovation Council, the World Economic Forum, and boards of exploration and technology companies.
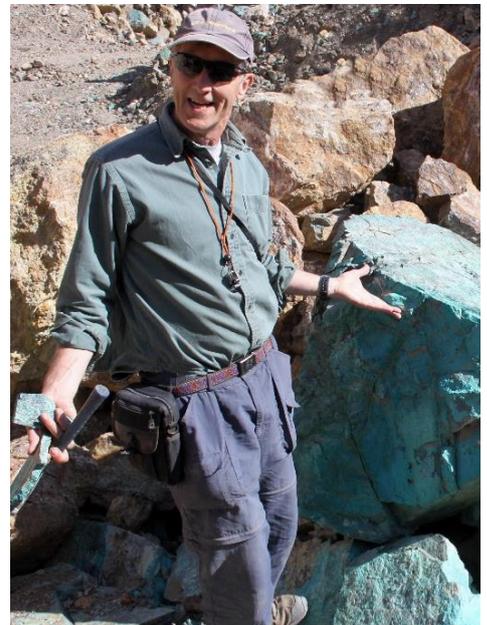
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