

# Following the footprints of Mineral Wealth

## Laurentian leads national geo-science research that could change exploration

By Sherry Drysdale

**Imagine an enemy submarine, lying submerged beneath the waves, on a foggy moonless night, somewhere off the rocky coastline.**

How far from land is it? At what depth?  
What are its dimensions, its weight and properties?  
And how can we get this information from a distance?

**T**hese questions give us a sense of the challenge geoscientists are taking on in one of the most significant research projects in the field today.

The research is national in scope, global in its potential impact. It will bring together geoscience researchers from 24 universities across Canada, and will also leverage the skills and expertise of 27 partners in the mining and mineral-exploration industries.

The project is being led by Dr. C. Michael Leshner, Professor in Economic Geology and Research Chair in Mineral Exploration at Laurentian University, in conjunction with co-leader Dr. Mark Hannington, Goldcorp Chair in Economic Geology at the University of Ottawa.

Dr. Leshner says the submarine analogy is apt in describing mineral exploration. "In fact, some of the methods that Inco used to find the Thompson Nickel Belt in the late 1940s were based on military technologies developed to detect submarines during the Second World War," he says. "Submarines and ore deposits are both difficult to find even when on the surface, accounting for the continued discovery of near-surface deposits like Voisey's Bay."

Geoscientists have long relied on an array of techniques and instrumentation to read the signals given off by valuable ore deposits lying beneath the surface; subtle chemical and physical signs may indicate mineral riches.

"Just as a motionless submarine may physically disturb only a very thin layer of water around its hull but may thermally disturb a thicker layer, ore deposits physically, chemically, and thermally disturb the rocks around them to varying degrees as they form and are modified by later geological processes, with each modification having a different sized footprint," Dr. Leshner explains.

What's new and exciting about the Footprints project is its objective of integrating these distinct signals to produce a much more useful 'map' for mineral exploration – a closer read of what lies beneath the surface.

"The major goal is to combine the barely detectable signatures of all of the available geophysical and geochemical techniques in ways that maximize the combined signal," says Dr. Leshner. "The various attributes of ore deposits are often layered but rarely combined and integrated, so this project focuses on integrating the signals. To do this, we have assembled a pan-Canadian research team with expertise in each of the methods – geological, mineralogical, geochemical, petrophysical, and geophysical – that tell us

something about the ore deposits. We've designed the project to maximize researcher interactions and to give us more of a 'high-definition' picture," he says.

An unprecedented aspect of the research is the degree of collaboration among partners in the mining and mineral exploration industries, who clearly see the potential value in the science.

Dr. Francois Robert is VP and Chief Geologist, Global Exploration with Barrick Gold and, along with the research team one of the chief architects of the project. "It has come about through extraordinary collaboration and a shared strategic vision," says Dr. Robert. "This really sets a new standard for our industry."



Mining and mineral exploration companies and service providers across the country will be contributing to the multi-year Footprints project through the Canada Mining Innovation Council (CMIC). The industry sponsors, through CMIC, will contribute nearly \$3M in cash to propel the research and \$3.9M in cash-equivalent in-kind support.

Also new and exciting in the Footprints project is the unprecedented size of the matching research grant awarded by the Natural Sciences and Engineering Research Council: \$5.1M, the largest grant ever awarded under the NSERC's Collaborative Research and Development Program.

As the official NSERC grant-holder, Dr. Leshner will be working with more than two dozen academics who've signed on to be part of the history-making Footprints research project. It will be a lot of work, and it will be spread over the next several years. Ultimately, the results of the research could change the way that mineral exploration is conducted across Canada, and around the world. ◀