International Explorers & Prospectors Inc.
Exploration Research Program in the Abitibi Craton

Over the last 30 years, IEP **(https://internationalexplorersandprospectors.com)** has carried out numerous studies of volcanic stratigraphy and hydrothermal alteration in the southern Abitibi Greenstone Belt, mainly in the Ontario sector (see References section). These studies were funded by IEP and its predecessors PALL/EAC, by associated private syndicates/companies and joint-venture industry partners, and by collaborative provincial government programs such as Discover Abitibi. The objectives were:
(1) to define the most favourable stratigraphic intervals within this greenstone belt for ore deposition, based on specific primary features such as the chemical composition and age of the volcanic host rocks; and
(2) to quantify the chemical effects of hydrothermal alteration in order to define fluid pathways and potential sites of ore deposition.

Application of Lithogeochemistry

The Kidd-Munro and Blake River terrains of the Abitibi Greenstone Belt host synvolcanic, basemetal massive sulfide (VMS) deposits as well as gold veins emplaced during or after regional metamorphism. Stratigraphic sequences in these terrains generally have been disrupted by folding and faulting, and overprinted by later mineral assemblages. As such, volcanic units known to host mineral deposits can be difficult to follow laterally and at depth during exploration programmes. Lithogeochemical data can, however, provide a way around this problem by allowing chemical definition of key volcanic units, even where such units have been altered and metamorphosed. In this approach, immobile-element systematics are used to define the original chemical signatures of the volcanic units, while mass-change calculations are used to assess the strength and extent of hydrothermal alteration of the volcanic rocks. Such information is particularly needed in the early stages of exploration drilling where drill holes are necessarily widely spaced and targets are hard to hit.

In the late 1980s and early 1990s, this methodology was applied in a series of studies on VMS deposits of the Matagami and Noranda camps of Quebec by W.H. MacLean at McGill University, and colleagues T.J. Barrett, S. Cattalani and L. Hoy at the Mineral Exploration Research Institute
(Montreal). Since then, a similar approach has been applied by IEP to the Kidd-Munro and Blake River terrains of Ontario. IEP has also carried out geochronological studies (in conjunction with M. Hamilton and J. Ayer) which have helped to define the spatial extent of these terrains, and opened up new areas for exploration (see next section).

Application of Geochronology

To date IEP has funded 13 high precision U-Pb geochronology samples utilizing chemical abrasion to improve concordance of zircon analyzed subsequently by isotope dilution – thermal ionization mass spectrometry (ID-TIMS) at the Jack Satterly Geochronology Laboratory at the
University of Toronto. Seven of the samples were taken to better understand the stratigraphy of the Kamiskotia Volcanic complex (KVC), with 2 samples taken from the underlying Kamiskotia Gabbroic complex (KVC). The new results have considerably improved our understanding of the KVC stratigraphy, which consists of 2 major mafic and felsic volcanic stratigraphic units: a 2704 Ma lower Blake River unit overlain by a 2700 Ma upper Blake River unit; the latter is host to 5 VMS deposits over a strike length of 15 km. In addition, a new age of 2704 to 2702 Ma from the KGC indicates this large synvolcanic intrusion is correlative with the VMS-bearing Upper Blake River unit. New age data has also better defined the boundaries between the Kidd-Munro and Blake River assemblages northwest of the Kamiskotia area in Robb Township, and to the northeast in Reid Township. Finally, new ages have helped to define stratigraphy and intrusive relationships on IEP's gold properties in Matheson and Beschefer townships.

New Research Initiatives

Over the past 3 decades, IEP has undertaken numerous geophysical surveys in the Kamiskotia area, including electromagnetic (EM), magnetometer and gravity surveys. In 2021, IEP joined a
Metal Earth research consortium focused on obtaining audio magnetotelluric measurements to better define resistivity/conductivity trends in the uppermost 3 km of the crust, i.e., to depths well beyond the effective range of typical EM surveys.

This fall, in collaboration with Metal Earth, a new MSc project will begin which will incorporate IEP's large volumes of geophysical data into an integrated regional model in order to provide new prospectivity maps that will help guide exploration for VMS and magmatic Ni-Cu-PGE deposits in the Kamiskotia area.