

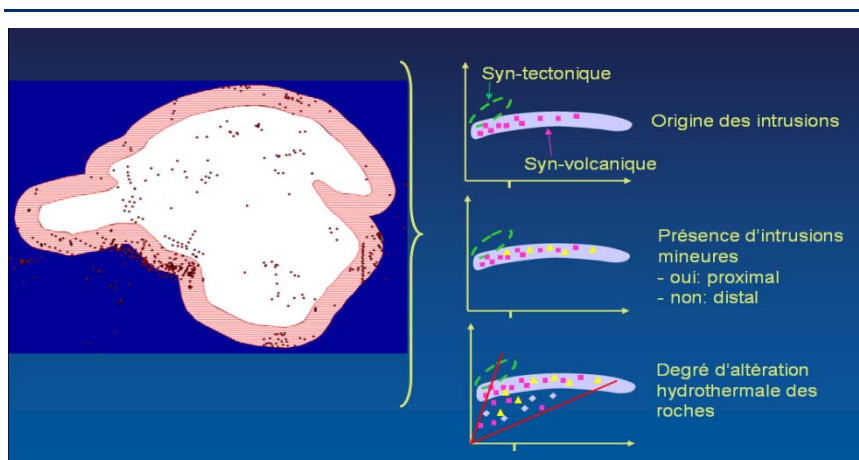
Project 2001-3: Typology of synvolcanic intrusions for mineral exploration in the Abitibi

Because of their known role as thermal drivers of hydrothermal systems, the identification of a synvolcanic intrusion can directly target areas of interest for VMS exploration. There are several well-known synvolcanic plutons in the Abitibi Subprovince (e.g.: the Flavrian Pluton in the Blake River Group). However, the Abitibi Subprovince consists of a large number of plutons of various ages and compositions that are poorly documented or undocumented, but which could be synvolcanic. This project for the characterisation of the Abitibi Subprovince intrusions has as objective the identification of the plutons of possible synvolcanic origin.

The project consists of three parts: 1) compilation of existing data on age, mineralogical composition and physical characteristics of the intrusions, 2) chemical characterisation and 3) geophysical characterisation.

Part 2 is the most innovative.

As a matter of fact, a method has been developed to interpret the origin of the intrusions by comparing the composition of the pluton to the composition of its immediate environment. The initial premise was that a contemporary pluton and its volcanic environment should show compositional affinities with each other. In addition, the presence of dikes comagmatic with the intrusion should be recognisable in the country rocks. When lithochemical sampling is adequate, the data could be used as a basis for comparison to verify the hypothesis.



Development of a simple and effective method for identifying synvolcanic intrusions.

Using private and public lithochemical databases and an Al versus Ti diagram, the method is based on the comparison of samples from the main intrusion and from the volcanics (lavas and minor intrusions). A 2 km buffer zone was designated around the main intrusion for selecting the volcanic rock samples to be compared to the intrusion. The intrusion is considered to be synvolcanic when there is agreement between the fractionation trends of the intrusion and country rock samples. The agreement between these samples and the ones from minor intrusions also allows us to estimate the degree of proximity of the effusive vent. Finally, the method also allows us to estimate the level of hydrothermal alteration experienced by the rocks, based on the distribution of the samples along the alteration lines. The database used in applying the method contains over 57000 samples. The database is a combination of data from the OGS database, the BAROQ database, Quebec theses compiled by Mathieu Piché and from Noranda Inc.

The geochemical method allowed us to evaluate more than a hundred intrusions. Of these, 37 intrusions were identified as syntectonic, 30 were identified as having the possibility of being synvolcanic, 11 were identified as new synvolcanic intrusions, 8 were already known to be synvolcanic intrusions but without VMS deposits and 12 were historically known intrusions with VMS deposits. For exploration, the 11 intrusions newly identified as synvolcanic represent prime targets for VMS-type mineralisation. The possibly synvolcanic intrusions are second-order targets requiring substantiation with new data. The spatial extent of the intrusions is not complete due to heterogeneous sample distribution. Finally, it should

be noted that the method developed could be easily used to characterise intrusions in case new data are generated or become available.

Summary: Project 2001-3	
Objectives	<ul style="list-style-type: none"> • To determine the state of knowledge about the intrusions in the Abitibi in general and the synvolcanic intrusions in particular. • To put intrusions into perspective with known base metal and gold mineralisations throughout the Abitibi. • To identify favourable exploration areas.
Results	<ul style="list-style-type: none"> • Data compilation and database creation; • Characterisation of synvolcanic intrusions and evaluation of poorly known intrusions; • Identification of new synvolcanic intrusions corresponding to prime VMS exploration targets in the Abitibi.
Tools and Innovations	<ul style="list-style-type: none"> • A new method for identifying synvolcanic intrusions.
Note	<ul style="list-style-type: none"> • Article published in the journal Applied Earth Science (Trans. Inst. Min. Metall. B): D. Gaboury, 2006. Geochemical approaches in the discrimination of synvolcanic intrusions as a guide for volcanogenic base metal exploration: an example from the Abitibi belt, Canada, vol. 115, p. 71-79. Link: Abstract of the article