

Project 2011-08: Paleoenvironmental re-evaluation of the Selbaie volcanic complex and its metallogenic potential

This project aims to re-evaluate the zinc, copper and silver potential in the region of the old Selbaie mines (Production from 1981 to 2004 in 3 areas, for a total of 56.9 Mt @ 0.87 % Cu, 1.85 % Zn, 39 g/t Ag and 0.55 g/t Au), in the northeast of the Abitibi Subprovince. Since the discovery of polymetallic mineralisation in 1974 only one regional mapping campaign has been carried out in this more than 700 km² sector (Lacroix, 1994) and all scientific publications are about the geology of the mine and its surroundings. The geological map of the Selbaie camp was completely reworked based on recent and public geological and geophysical information from SIGÉOM, new unpublished borehole data (lithological and geophysical descriptions) from member and non-member companies of CONSOREM, and especially from innovative processing techniques that allowed the characterisation of synvolcanic structures and hydrothermal alteration in this large volcano-plutonic complex (attached Figure). It is a comprehensive study that treats synvolcanic structures, rocks and alterations geochemistry and magnetic and gravimetric signatures on a regional scale.

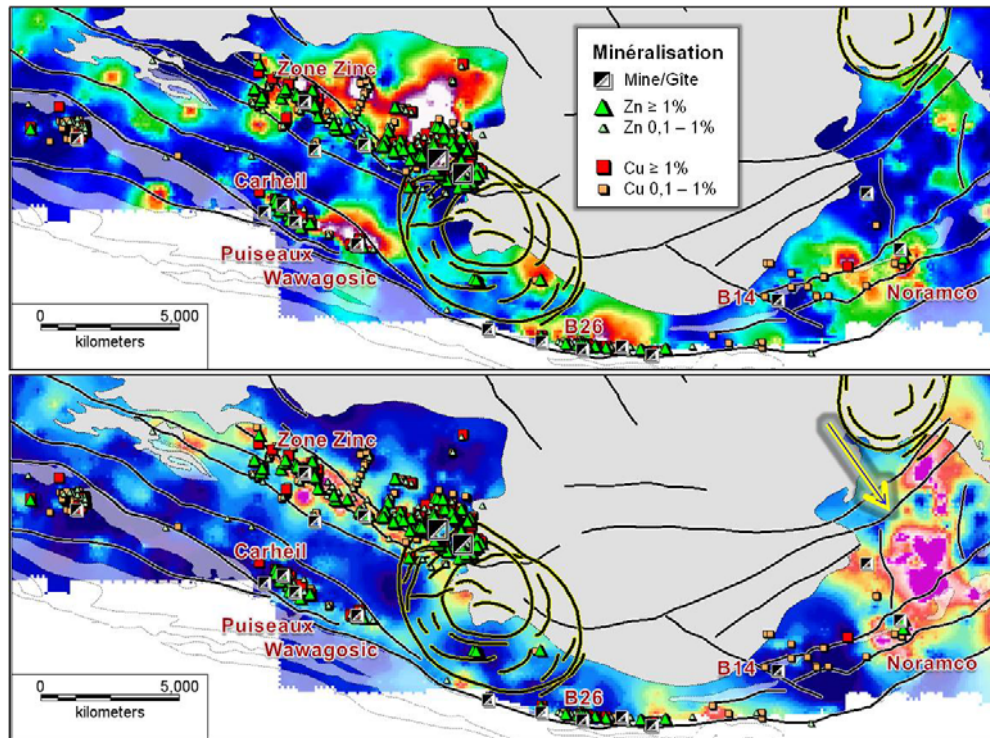
The main results include the following: 1) the Brouillan intrusive Complex and the intermediate and felsic volcanics are comagmatic and calc-alkaline. 2) The mafic phase of the complex is largely comagmatic with the surrounding Enjalran-Bapst tholeiitic basalts. This implies that the feeder intrusions and the basalts are younger than the Brouillan Complex. 3) The litho-geochemical signature of the horizon carrying the 8 Mt sterile VMS at Selbaie (WAT unit) was identified using geochemistry farther south, at the boundary between Brouillan and Enjalran. 4) Two families of synvolcanic faults were differentiated, one NNW-SSE affecting the northern part of the complex and the other broadly E-W intersecting the NNW-SSE faults. The second family of faults is associated with the more felsic phases of the intrusive complex and probably the Selbaie mineralisation. The structures deduced from geophysical features are interpreted as faults that were originally grabens. Some circular features could represent small calderas (attached Figure). 5) The hydrothermal alteration was characterised using Lithomodeleur, Norm SV350 (Project 2011-04). It is typically volcanogenic and is concentrated along structures bordering some volcanic basins (Figure next page).



New geological map of the Selbaie mining camp showing synvolcanic faults and structures of the inferred calderas. The Brouillan intrusive complex at the centre is surrounded by Brouillan andesites (pale green) and felsic volcanics (pale yellow). The eye is surrounded by the Enjalran-Bapst Group (basalts).

5) The hydrothermal alteration was characterised using Lithomodeleur, Norm SV350 (Project 2011-04). It is typically volcanogenic and is concentrated along structures bordering some volcanic basins (Figure next page).

The synvolcanic faults interpreted above are considered to be important exploration targets, especially those that are located near the Brouillan intrusive complex (heat source). Several of the faults or fault segments have been very little explored and remain areas of high potential.



Geochemical alteration identified using norm SV350 (Project 2011-04) typically volcanogenic in normative phyllosilicates (figure above) and in normative carbonates (figure below).

Project 2011-08 : Summary	
Objectives	<ul style="list-style-type: none"> • To compile new geological information from member and non-member companies of CONSOREM. • To produce a new map in light of the new geological and geophysical information. • To identify synvolcanic structures. • To better understand the complexity and chronology of the intrusive phases of the Brouillan plutonic complex. • To propose a volcanic evolution model based on the new geological, geochemical and geophysical understanding, and to propose areas of interest for exploration.
Results	<ul style="list-style-type: none"> • Selbaie is a multiphase volcano-plutonic complex consisting of nested calderas that were probably built over a period of at least 10 Ma (2730-2720 Ma). • Several narrow volcanic basins bordered by altered and/or mineralised synvolcanic structures similar in orientation to the NW-SE and E-W Matagami structures (south and west flanks). • Exploration should focus along these synvolcanic structures that favour hydrothermal circulation and along the border of the Brouillan intrusive Complex (heat source).
Innovations	<ul style="list-style-type: none"> • New interpretation of synvolcanic structures using a multidisciplinary approach.