CONSOREM

Consortium de recherche en exploration minérale

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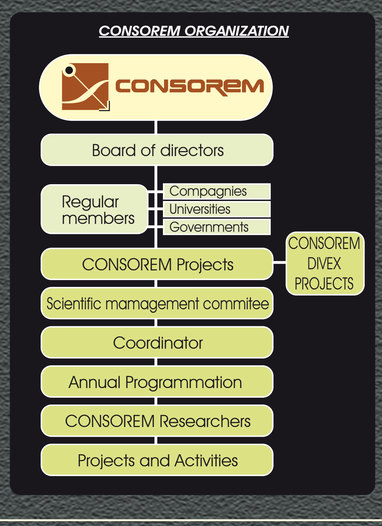


What is CONSOREM ?

- Public Private partnership in applied research for mineral exploration
- Synergy between companies, governements and universities
- A unique research structure under industry control

Objectives

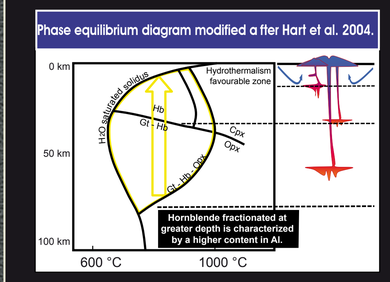
- development of technologies and knowledge applied to mineral exploration;
- development of mineral exploration models;
- convey the knowledge towards the industry;
- training of highly qualified personnel in mineral exploration

CONSOREM'S RESEARCH: DEVELOPING EXPLORATION TOOLS

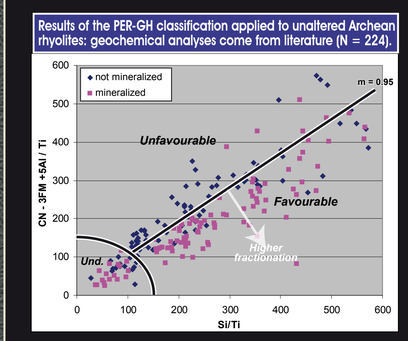
METHODOLOGICAL TOOLS

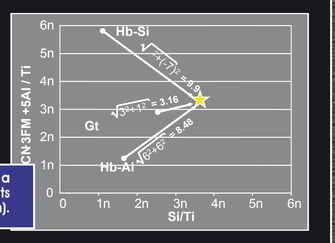
New methods developed or modified by CONSOREM. They are used in data treatments independently of the territory.
Examples are:

The PER-GH classification: a new tool to evaluate the fertility of felsic volcanic rocks

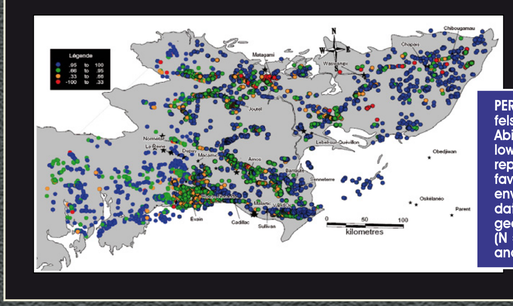


A new method has been developed to promote the utilisation of major elements in order to evaluate the fertility of felsic volcanic environments for VMS deposits. Based on theories about the petrogenesis of felsic volcanites and the 'Pearce Element Ratio' (PER), it is suggested that fractionation of REE into garnet and hornblende at depth is reflected onto the major elements signature. The **PER-GH index,** an acronym for Pearce Element Ratio - Garnet/Hornblende, is used to discriminate between non-fertile, fertile and highly fertile environments. Since hydrothermalism promotes the effects of fractionation on element mobility, alteration will accentuate the favourability.



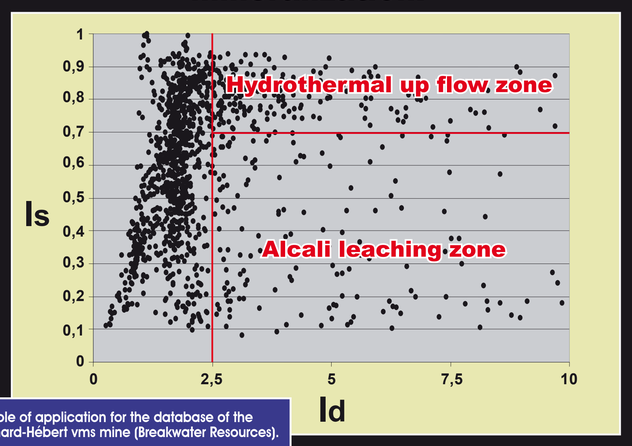


PER-GH diagram: the coordinates of a rhyolite sample are function of its differentiation history (fractionation).



PER-GH classification of felsic volcanites of the Abitibi sub-province: lower ratios (red dots) represent the more favourable environments. The database contains geochemical analyses (N = 24 579) from private and public sources.

Zonation and type of carbonates associated with gold and base metals mineralization.



Example of application for the database of the Bouchard-Hébert vms mine (Breakwater Resources).

Carbonatization is a common alteration that is associated with gold and base metals mineralization. An interpretative tool as been developed to characterize this type of alteration from the lithogeochemical analyses. Alteration intensity is characterized by the saturation index (Is : molar CaO/CaO+FeO+MgO) while the discrimination index (Id : molar CO2/CaO) enable the identification of the different carbonates species.

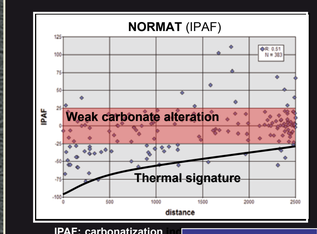
A diagram using these two indexes has been developed to identify the most promising samples from a database set in relation with the type of mineralization. Orogenic and vms-type carbonates are discriminated with a Is *vs* Id diagram in addition to the characterization of the carbonates associated with the leaching or the up flow zones from a vms-type mineralization.

DECISION TOOLS

Allow more easily the integration, comparison and analysis of data to evaluate the mineral potential of a specified region.
Examples are:

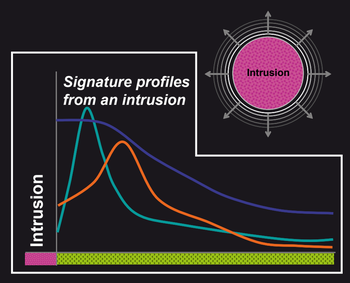
Spatial Signal Analysis Software

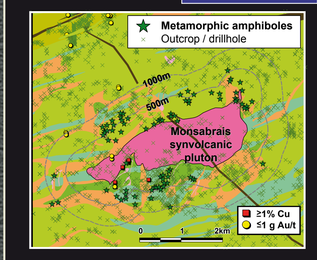
The **Spatial Signal Analysis Software (SSAS)** is used in the detection of geochemical, geophysical and mineralogical variations relative to a point, a line or surface, which represent geological items (faults, intrusion, etc.). It has first been developed to evaluate the role of intrusions in the mineralization process of different deposit types (Au and base-metals) in Abitibi, using private and public datasets.

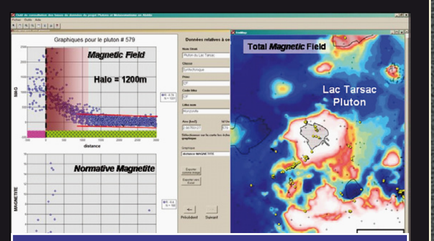


IPAF: carbonatization

Alteration signature around intrusions

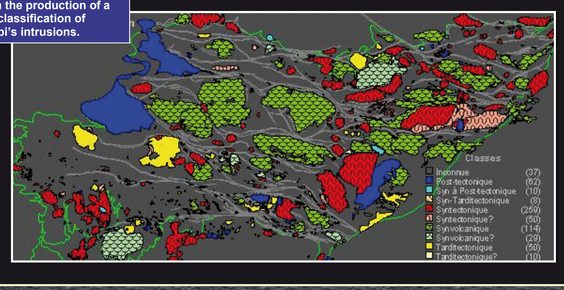




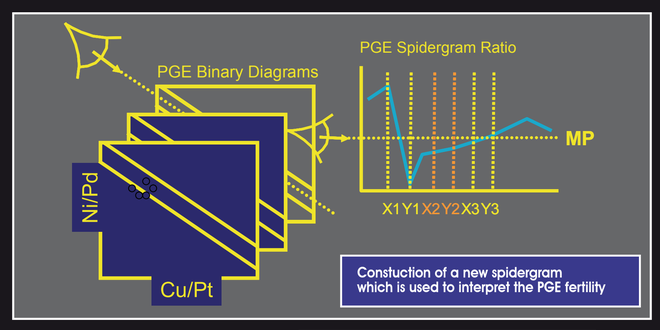


CONSOREM's Spatial Signal Analysis Software

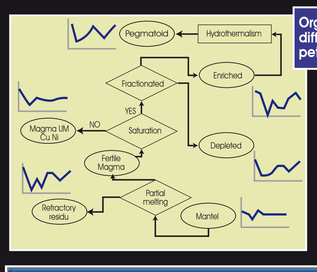
The application the SSAS led in the production of a new classification of Abitibi's intrusions.



Interpretation of PGE fertile environments

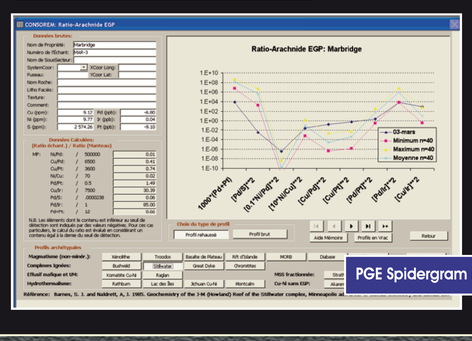


Constuction of a new spidergram which is used to interpret the PGE fertility



Organization chart summarizing the different spidergram profiles in relation with petrogenetic contexts

CONSOREM has developed a unique interpretation tool for PGE and Ni fertility. The new spidergram combines commonly used binary diagrams (Barnes et al. 1988) in order to interpret petrogenetic processes and discriminate fertile/depleted settings. CONSOREM's spidergram is used in conjunction with a database to compare profiles with a collection of data from different environments around the world.



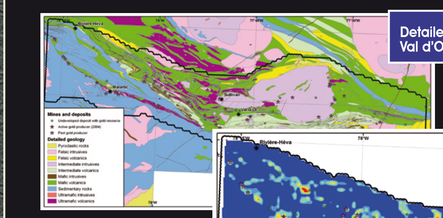
PGE Spidergram ratio software application

TARGETING TOOLS

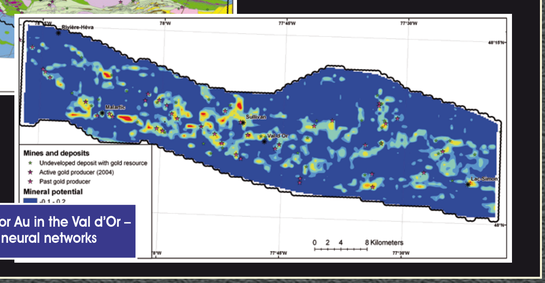
Result from the integration of different databases, and/or the acquisition of knowledge, which allow pre-competitive targeting on precise territories.
Examples are:

Mineral prospectivity mapping using artificial neural networks for Au in the Val d'Or – Malartic area

Artificial Neural Networks can powerfully integrate and process large numbers of geoscientific layers. CONSOREM has applied this relatively new GIS technique to produce a mining camp scale mineral potential model for **orogenic gold in the Val d'Or – Malartic area** using lithogical, structural, and geophysical layers as inputs, and the location of known gold occurrences as data to be modelled. This prospectivity map provides new targets for gold exploration.



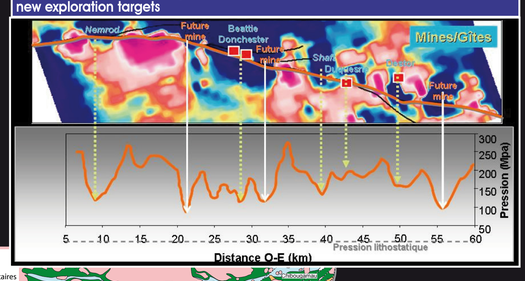
Detailed 1:50k geological map of the Val d'Or - Malartic area

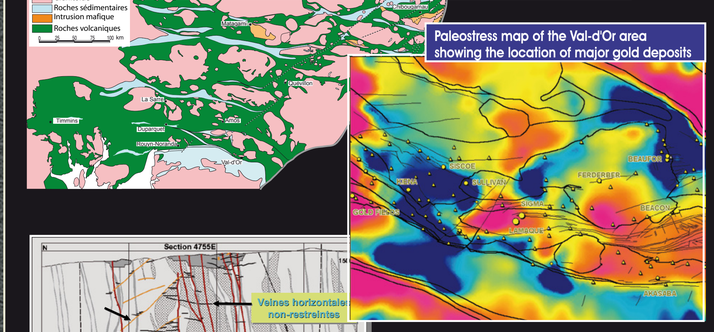


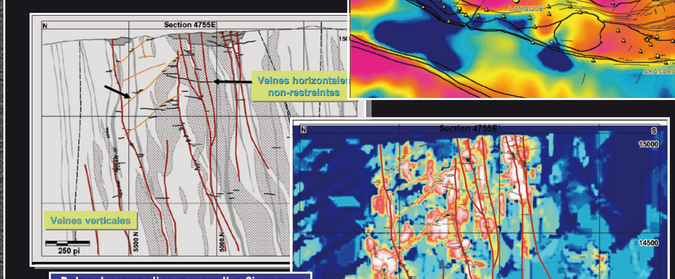
Mineral potential model for Au in the Val d'Or – Malartic areaby artificial neural networks

Paleostress mapping to target orogenic gold deposits

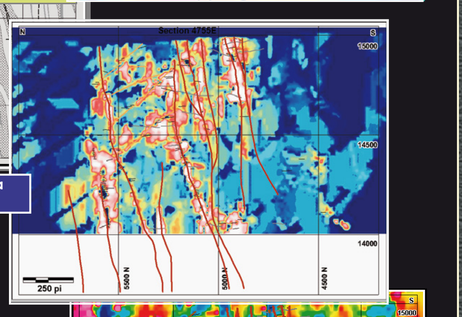
Paleostress map along the Destor-Porcupine Fault in the Abitibi Greenstone Belt with a longitudinal profile showing the location of new exploration targets







Paleostress section across the Sigma deposit in the Val-d'Or area



CONSOREM applies stress mapping techniques on several sites, along faults, across mines, and at the regional scale, in order to determine favorable parameters for orogenic gold deposits. Paleostress maps are constructed using the geomechanic modeler UDEC which simulates incremental displacements along discontinuities such as faults and lithologic contacts.