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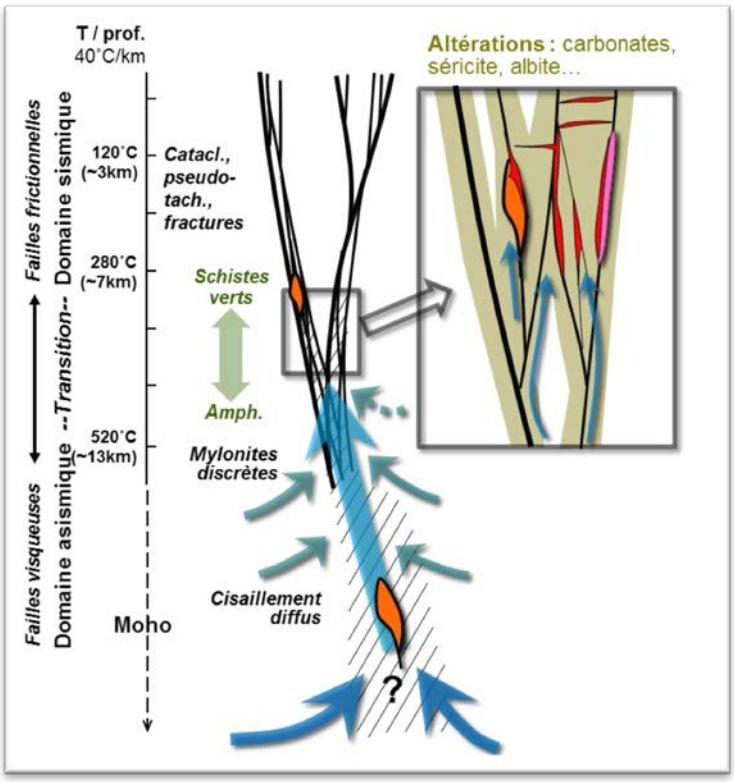
PROJECT INTEGRATION AND SYNTHESIS - OROGENIC GOLD IN ABITIBI

By Silvanus Rafini

DETAILS

Over the past 15 years, the CONSOREM has devoted more than 30 projects either directly or indirectly to orogenic gold in the Abitibi, thus representing one CONSOREM's major topics of study. These projects are distinguished by the various approaches, the methodologies, and types of data that have been used. The deliverables are many and of a varied nature: development of several tools for exploration, novel analytical methods (geochemistry of alteration, geochemistry of the secondary environment, geophysics of faulting), regional metallogenic re-evaluation, and the proposal of new exploration strategies, thematic and/or regional documentation, testing the performance of existing methods, as well as the generation of targets and prospectivity maps.

A quick summary of the current state of knowledge regarding the formation of orogenic deposits highlights the fact that CONSOREM projects address all steps, except for the early stages of metal enrichment in hydrothermal fluids in the lower crustal or mantle levels. The current project proposed to synthesize and integrate the results from these multiple research projects and to draw sum up the contribution of CONSOREM to orogenic gold exploration in Abitibi. This can be built around two main aspects: 1) conceptual contribution to the understanding of the genetic model and refinement of exploration strategies; 2) cartographic contributions with the production of multiple prospectivity maps and having various targets and scales. This distinction represents the project backbone, which is therefore focused on the two conceptual and cartographic components.



The conceptual integration is to develop an overview of the most significant contributions both for the practical aspects of exploration (tools, methods of analysis, interpretation of data) and for exploration models. These projects were initially selected based on the significance of the obtained results, and then gathered together for integration. The most significant results from the selected projects could be grouped into five general themes:

1. Alteration geochemistry: Several tools related to this theme were developed including an original diagram for the classification of alteration based on three dominant endmembers (K gain, Na gain, CO_2 gain), quantification tools of alteration such as mass balance through the modelling of precursors and the low-grade standard (CONSONORM), alteration diagrams for sedimentary rocks (correcting for hydraulic fractionation and multiple sources). All these tools are integrated into the LithoModeleur software.

2. The secondary environment: Several projects including three that have a direct impact on Au exploration in the Abitibi. These projects include the optimization of usage (protocols for sampling and the treatment of surveys, enhancing anomalies) involving several different media such as till surveys (fine fraction, heavy minerals, gold grains) and soils (humus horizon, B, or C). Finally, the performance of the different methods was compared statistically to regional surveys depending on their respective abilities to detect the known deposits. These results constitute a guide to good practices for the gold exploration in secondary environments.

3. The relationship between intrusions and gold in the Abitibi: Two projects were selected. The relationship between gold and the alkaline affinities is well known for the Abitibi, however the identification of these alkaline affinities is complex due to the inadequacies shown when using conventional diagrams for classification (Pierce, Middlemost). A multi-component diagram was therefore proposed to provide a robust recognition of this type of intrusion. In addition, an empirical diagram of gold fertility is proposed, using ratios of immobile elements.

4. Regional metallogenic re-evaluations: Eight multidisciplinary projects of geological, structural, and metallogenic reinterpretation of almost all the volcano-sedimentary basins of the Abitibi, with compilation and processing of new data. The deliverables are a revision of the metallogenic potential, targets, and exploration strategies.

5. Hydrothermal fields of the Abitibi: Four projects were selected. More conceptual, this integration focuses on the identification of hydrothermal cells along first order faults, following several approaches: i) modelling segments of seismic rupture and the associated hydrothermalism; (ii) identification of "deposit fields" through compilation of styles of mineralized bodies along the Cadillac Fault; (iii) identification of hydrothermal fields by the geochemical compilation of major deposits. These results converge toward the existence of at least five separate hydrothermal cells along the Cadillac Fault, inducing a typical spatial cyclicity (20–40 km) for the presence of gold.

The cartographic integration consists of a spatial overlay of different prospectivity maps generated by the different approaches that were adopted during the successive projects. Eight layers are retained, including the reinterpreted geological maps, MEGATEM targeting along the faults using a novel method of proven to be effective in detecting gold bodies, the map of modelled low paleopressions, and a renewed version of the map of deformation corridors. The weighting of the layers is derived from calculations of the contrasts (the weight of evidence method). Their "vertical" accumulation led to the production of an integrated map of gold favourability in the Abitibi. Several sectors are discussed in detail as well as variable-sized zones having a high potential.

SUMMARY SHEET

Objectives	Integrate and synthesize the results of the CONSOREM projects focused on orogenic gold in Abitibi. Identify the salient contributions of these projects.
Results	•The balance of the contribution of the CONSOREM to the exploration of these cottages in Abitibi is substantial: generation of tools/methods, refinement of exploration models, production of multidisciplinary prospectivity maps. •Conceptual Integration: landmark contributions focused around themes. •Cartographic integration: creation of a map of integrated gold prospectivity from the Abitibi compiling all the approaches adopted in the various CONSOREM projects.