

# Metallogenic study and 3D modelling of the Porcupine-Destor Fault in the Duparquet area, Abitibi Subprovince (Phase 1/3)

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## Abstract

The Porcupine-Destor Fault (PDF) is one of the most important gold metallogenetic belts in the Abitibi Subprovince. Work accomplished in 2002 along the PDF completed the regional mapping from the 1990s. The purpose of this project was to give a plus value to the PDF by developing new tools for gold exploration based on a regional metallogenetic synthesis and 3D modelling.

Existing observations on gold mineralizations from the western and central PDF areas highlight distinct characteristics for each area. In the western area, there is a close spatial relationship between the occurrence of gold zones, carbonate alteration and the PDF. Mineralizations exhibit several characteristics typical of orogenic gold deposits, such as a Au/Ag ratio > 3, occurrence of quartz-carbonate veins, strong iron-carbonate alteration, and structural control. The central area differs from the western area in that several gold zones are located farther from the PDF. These zones are associated with E-W deformation zones or with porphyritic intrusions. Mineralization in the Duparquet Formation basin is generally associated with disseminations of fine pyrite, silicification and sericitization. The mineralization is mainly controlled by the rheology or the chemical composition of host rocks and contains metals characteristic of epithermal deposit (Ag, Zn, Pb, Hg, Sb). However, orogenic-type mineralizations also occur in the central area. Preliminary conclusions are that epithermal-type mineralization is pre- or syn-schistosity, whereas orogenic-type mineralization is synchronous or late.

The 3D common-earth model (gOcad®) that we propose deals with the PDF's central area, where data, mostly from drill-holes, are more abundant and readily available. Moreover, mineral exploration has been active for several years in this area. A compilation of multidisciplinary data from SIGEOM system, government reports and unpublished data from exploration companies began in June of 2002. The modelling has made it possible to build 3D lithological and structural surfaces, gold grade isosurfaces, and magnetic susceptibility grade isosurfaces. The result of an unconstrained geophysical inversion indicates that some lithological contacts need to be revised.

The Holloway and Holt-McDermott mines along the PDF in Ontario are examples which suggest that, for the western area, strongly sericitized structures must be explored to greater depths and that ENE trending structures have a high potential. In the central area, exploration work has been concentrated along the PDF and some subsidiary E-W faults north of the PDF. The E-W faults along the north-eastern portion of the Duparquet basin have hardly been explored despite the occurrence of important alteration zones. Moreover, apart from a few areas, little exploration work has been carried out at a depth greater than 500 m.

Upcoming work in the context of this study will investigate other gold occurrences along the PDF and the classification of the various types of gold mineralization. An isotopic study of quartz veins will also be undertaken. The modelling work will be aimed at finishing the 3D common-earth model (gOcad®), building constrained geophysical inversions and establishing an example of queries to define gold exploration targets.

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