

2004-1: Fertility of small Archean greenstone belts – Phase II

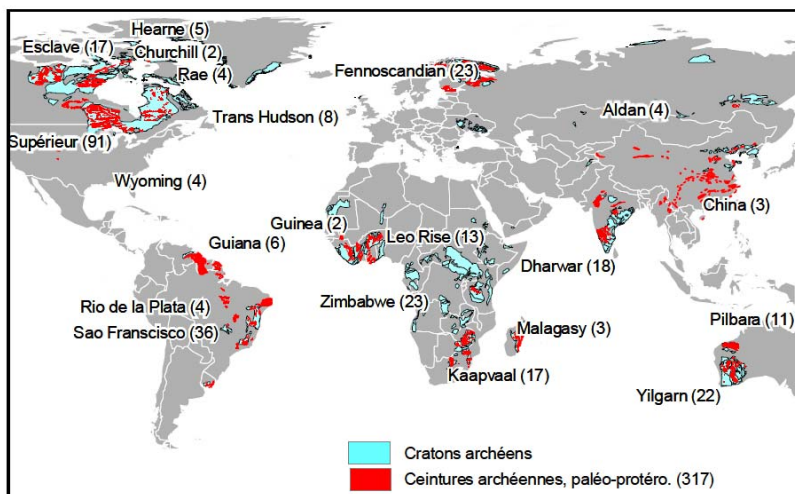
The current project is the continuation of project 2003-1. It focuses on analysing the world-wide greenstone belt database. The database was completed and ultimately included more than 330 Archean to Paleoproterozoic belts. The information was obtained mostly from the literature (over 500 references), and government and university databases. Documentation about the belts was adapted and generalised to be able to compare well-documented belts with less well-known ones. The database includes key elements of lithostratigraphy, structure, metamorphism and any existing mineralisation.

There are between 400 to 450 greenstone belts around the world. Therefore, the sample size of this study is considered to be statistically representative. Greenstone belts occur in a wide range of sizes: 95% of the distribution (lognormal) is between 70 and 30,000 km². The representatives at the lower end of this range are called septa, while greenstone belts exceeding 30,000 km² in size are called large belts. In addition, the central portion of the distribution referred to as "small belts" is divided into three sub-classes.

The comparison of several parameters based on current knowledge of mineralisation

allows us to state that the size of a belt does not affect in any way its mineral potential. Several small belts are host to hydrothermal alteration systems rivaling large belts. Moreover, the metal load of small belts is not affected negatively by a lack of large volumes of rock.

Multivariate analysis of the lithological assemblages shows that the three main components that can explain a significant portion of the variance are the felsic, ultramafic and sedimentary rocks (silicoclastic and chemical). The classification of belts using this method allows the recognition of the main geotectonic environments (oceanic arc, continental margin arc, continental rift); divisions that are usually made using lithogeochemical approaches. The presence of these three rock types appears to "augment" gold potential. There is no simple relationship between the abundance of ultramafic rocks and gold content: their "presence" alone is sufficient. It seems that beyond the presence of a particular lithological characteristic, the mineralised belts are those which contain the greatest variety of rock types.



Map of Archean and Paleoproterozoic greenstone belts compiled in database.

Summary: Project 2004-1

Objectives	<ul style="list-style-type: none">• To analyse and compare the features of small greenstone belts from around the world to extract fertility criteria.• To apply the analytical results in Northern Quebec to enhance the potential and to define, if possible to prioritise, exploration targets.• To develop a list of fertility criteria.
Results	<ul style="list-style-type: none">• Completion of the database for the greenstone belts of the world, listing the major lithological, structural, metamorphic and geochronological characteristics along with elements relating to the mineralisation.• Multivariate analysis of the parameters to establish fertility criteria.• Comparative tests of the Quebec greenstone belts with those in the database.
Tools and Innovations	<ul style="list-style-type: none">• Creation of a user friendly and searchable tool for a world-wide database on greenstone belts that can be used for comparison with greenstone belts in Quebec.