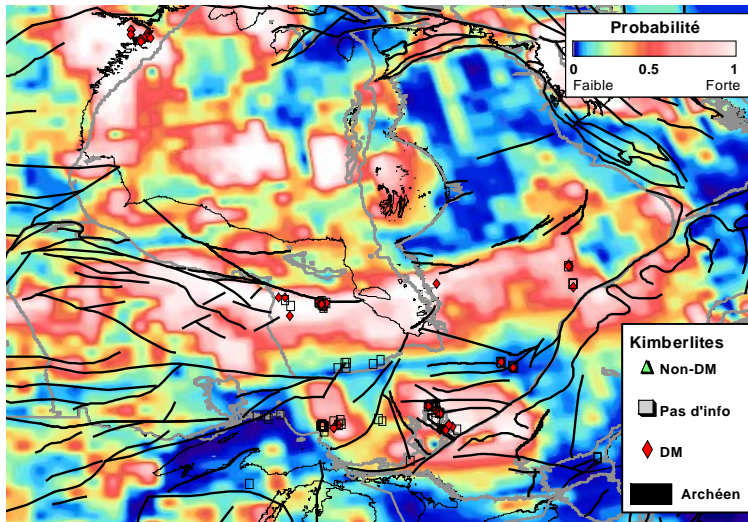


Project 2004-4: Structure of cratons and kimberlite fields – Phase II

Project **2004-4** on the structure of cratons and kimberlite fields is in its second phase. This project helped to define and clarify the geometry of Archean cratons at depth. In addition, deep structures in the mantle that have surface expressions were recognised from the variation of the seismic velocity gradient. Correspondence between mantle discontinuities defined by the velocity gradients at 170 km of depth and kimberlitic magmas can be used as a regional exploration tool.



Probability map for diamond-bearing kimberlites in Quebec and Ontario. The map was created using the neural network method.

The neural network method was applied based on new information. This approach gave positive results and suggested areas of higher favourability sectors for finding kimberlites. Among others, the Attawapiskat - Wemindji - Otish structure was confirmed by the method. In addition, a zone located under the Grenville Province turned out to be a favourable area and a large favourable arc can be drawn between the Lac de Gras area (Northwest Territories) and the Otish Mountains.

Summary: Project 2004-4	
Objectives	<ul style="list-style-type: none"> To obtain tools and methods that will target regional structures that are conducive for kimberlite emplacement.
Results	<ul style="list-style-type: none"> Refining the 3D representation of Archean cratons; Identification of deep structures in the mantle having surface expressions from variations of the seismic velocity gradient; Discovery of a connection between mantle discontinuities defined by velocity gradients at 170 km depth and kimberlitic magmas; Successful application of the neural network method for mineral prospectivity of kimberlite fields: <ul style="list-style-type: none"> Identification of the Attawapiskat – Wemindji – Otish structure; Discovery of potential in areas located under the Grenville Province; Discovery of a large arc of favourability between the Lac de Gras area (Northwest Territories) and the Otish Mountains.
Tools and Innovations	<ul style="list-style-type: none"> Regional exploration tool by the use of 3D seismic tomography; Regional exploration tool used to identify areas favourable for diamond-bearing kimberlites using the neural network approach applied to seismic tomography, gravimetry and magnetism.
Special Collaboration	<ul style="list-style-type: none"> Francine Fallara, URSTM/UQAC