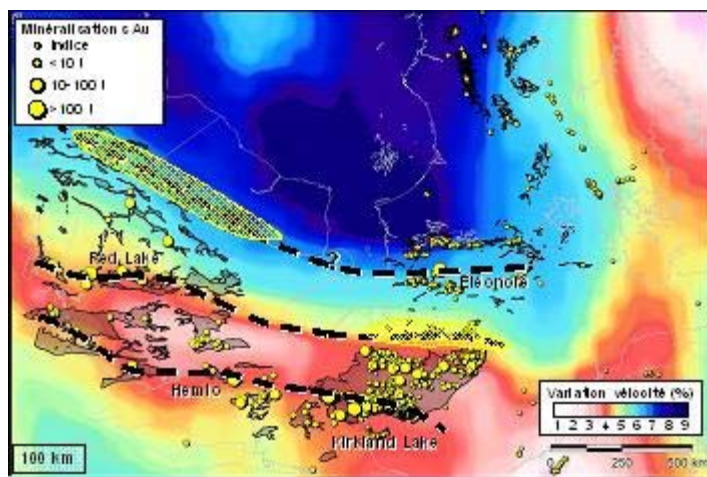


### Project 2006-3: Translithospheric structures: implications for diamonds and other economic materials

Size, orientation, shape and metamorphism of the Archean greenstone belts of the Superior Province vary from south to north. The Abitibi is the largest and the least metamorphosed of the greenstone belts (greenschist grade). The other greenstone belts in the centre and the north of the Superior Province are smaller, more elongated and more metamorphosed (amphibolite grade). Based on geophysical and geological evidence, project 2006-3 demonstrated that this organisation is a reflection of the primary architecture of the Archean lithospheric mantle. This project also aimed to analyse the implications for Au and base metal mineralisation in the Superior Province, more specifically the regional metallogeny of the greenstone belts.

Mantle heterogeneities were imaged using a tomographic model of surface waves that covers North America between depths of 30 to 250 km. This methodology was developed mostly for diamonds in earlier projects. The model of the crust at a depth of 100 km reveals two major E-W structures to the south and north of the Abitibi Subprovince that may be interpreted to be remnants of Archean subduction zones. These structures define a velocity zone up to 30% slower than the northern domain. The largest orogenic gold deposits of the Abitibi are found on the surface along these structures. The two subduction zones can be traced in the mantle for over 1000 km along a seismically defined plane, sloping shallowly to the north. The surface projection of the termination of this plane corresponds to the location of the Élénore deposit and to the limit of the Mesoproterozoic mantle.



Model of seismic velocity variation showing two major E-W discontinuities and one possible new discontinuity in the area of James Bay.

It is proposed that a portion of the Superior underwent a regional uplift. This would explain the reason for the fact that the roots of the greenstone belts are now exposed. Geological evidence suggests that a rise in the deep crust took place during retrograde metamorphism and during the pan-Superior gold episode associated with it.

<b>Summary: Project 2006-3</b>	
<b>Objectives</b>	<ul style="list-style-type: none"> <li>To determine the spatial correlation and the genetic link between crustal structures and the subcontinental lithospheric mantle.</li> <li>To identify the structures and domains favourable for mineralisation based on the 3D architecture of the crust.</li> <li>To determine spatial links between certain metallogenic provinces and the structure of the mantle and the crust.</li> </ul>
<b>Results</b>	<ul style="list-style-type: none"> <li>Recognition of three major E-W discontinuities in the lithospheric mantle;</li> <li>Trans-provincial correlation between the greenstone belts of Ontario and Quebec.</li> </ul>
<b>Innovations</b>	<ul style="list-style-type: none"> <li>Application of a seismic tomography model to establish basic controls on mineralisation.</li> </ul>