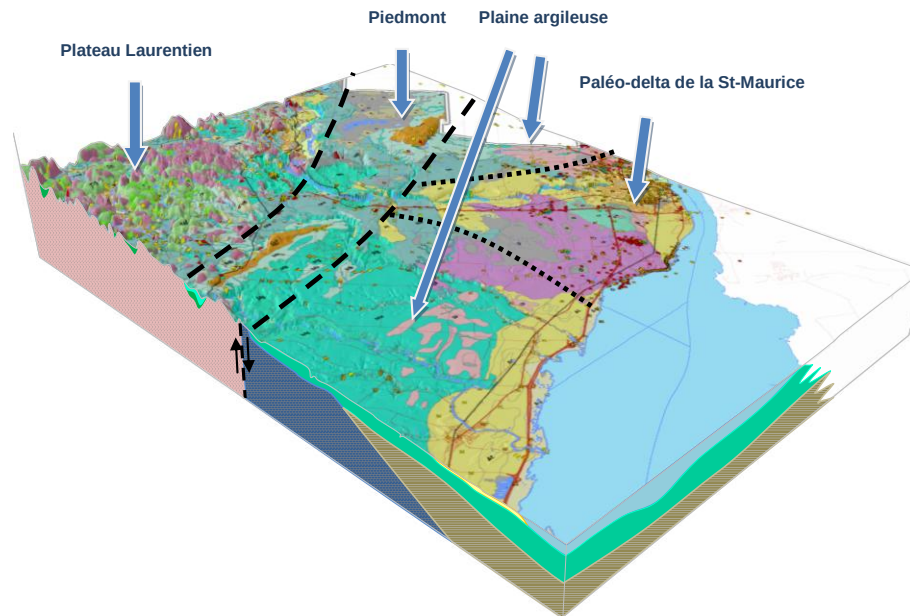


The impact of Quaternary sedimentation processes on hydrogeologic systems in the Mauricie region, Quebec, Canada

Développement durable,
Environnement
et Parcs

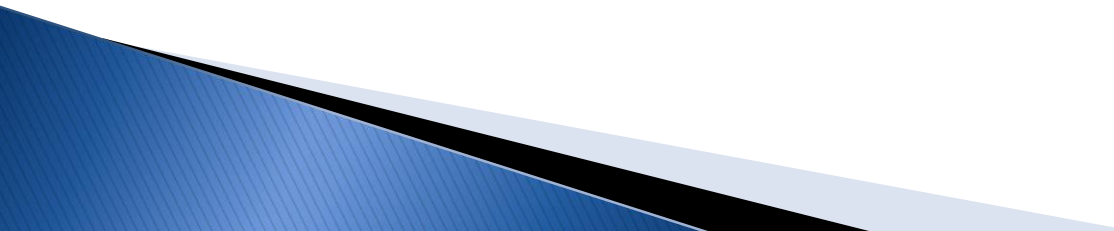
Québec



2012 GSA Annual meeting – Charlotte

By: Yves Leblanc, Guillaume Légaré, Michel Parent, André Pugin and Stéphane Campeau

Contents

1. Introduction
 2. Field works
 3. Hydrogeological conceptual model
 4. Conclusions
- 

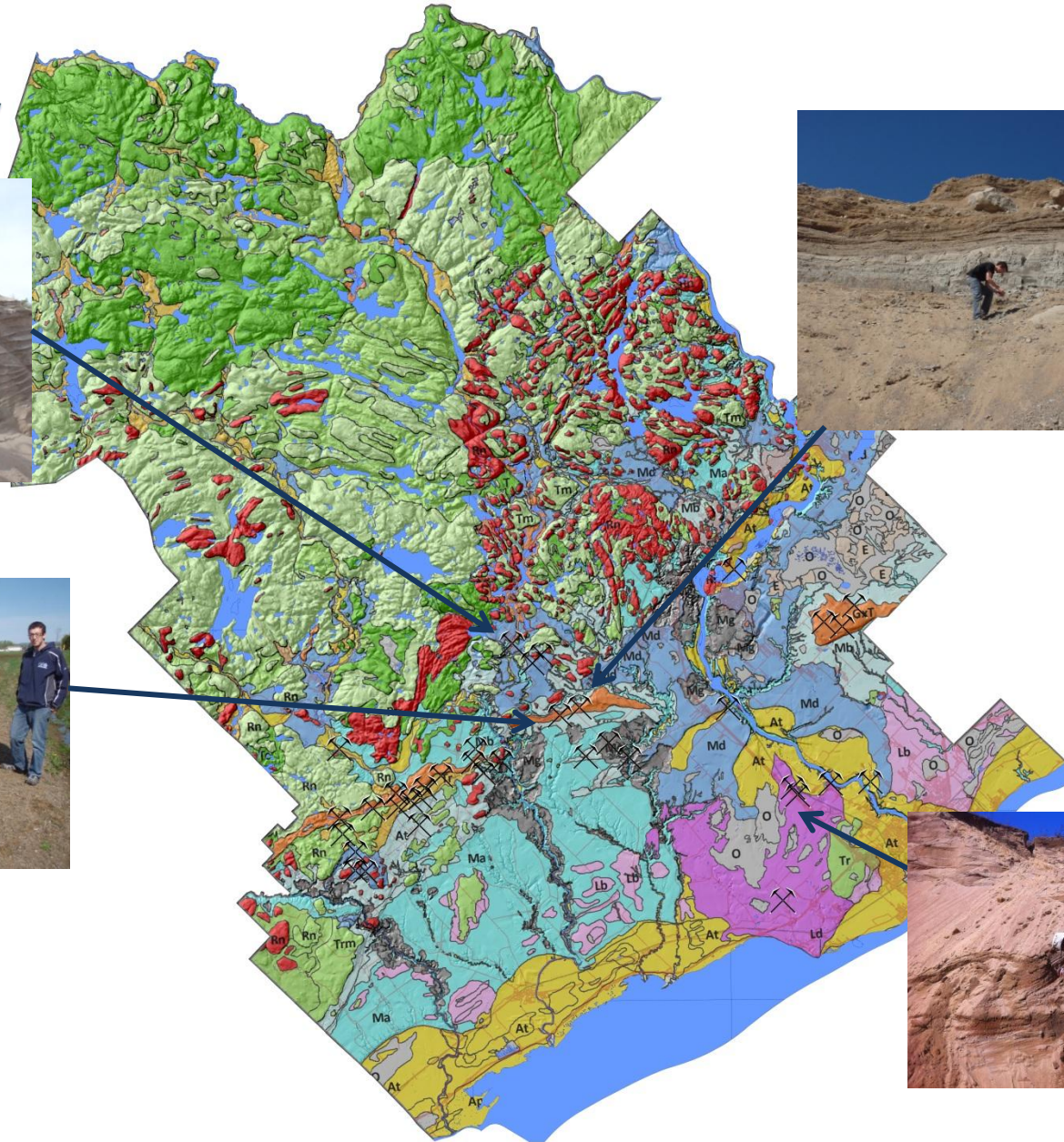
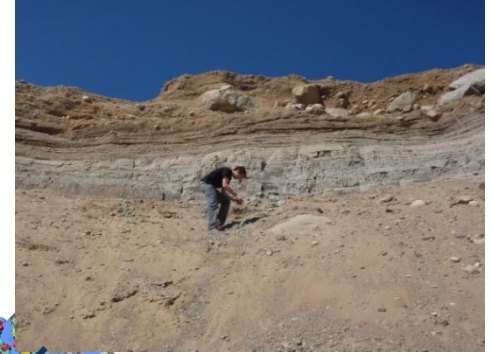
Introduction

- Regional Groundwater characterization of S-W Mauricie area
- $\pm 3500 \text{ km}^2$
- Funding $\pm 850 \text{ K\$}$ Prov. Gov.-GSC
- Objectives:
 - Increasing Knowledge
 - Geoscientific tool creation
 - Scientific contribution
 - Educational
 - Spreading of information



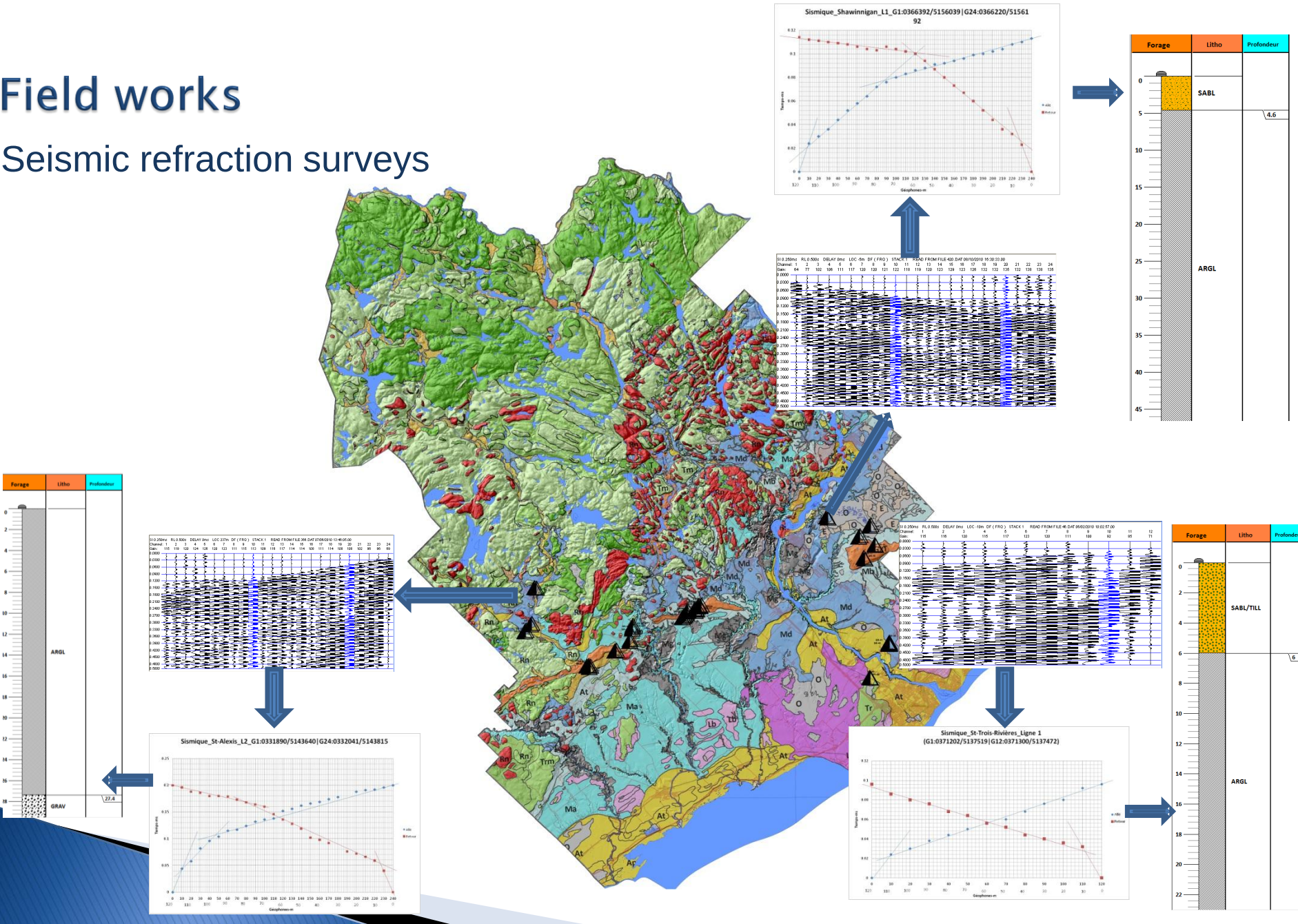
Field works

Quaternary survey

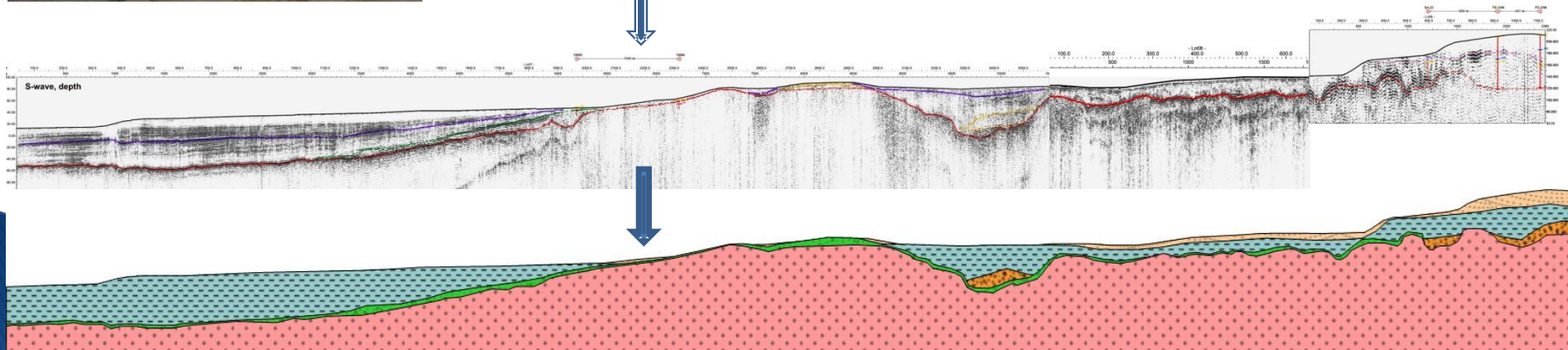
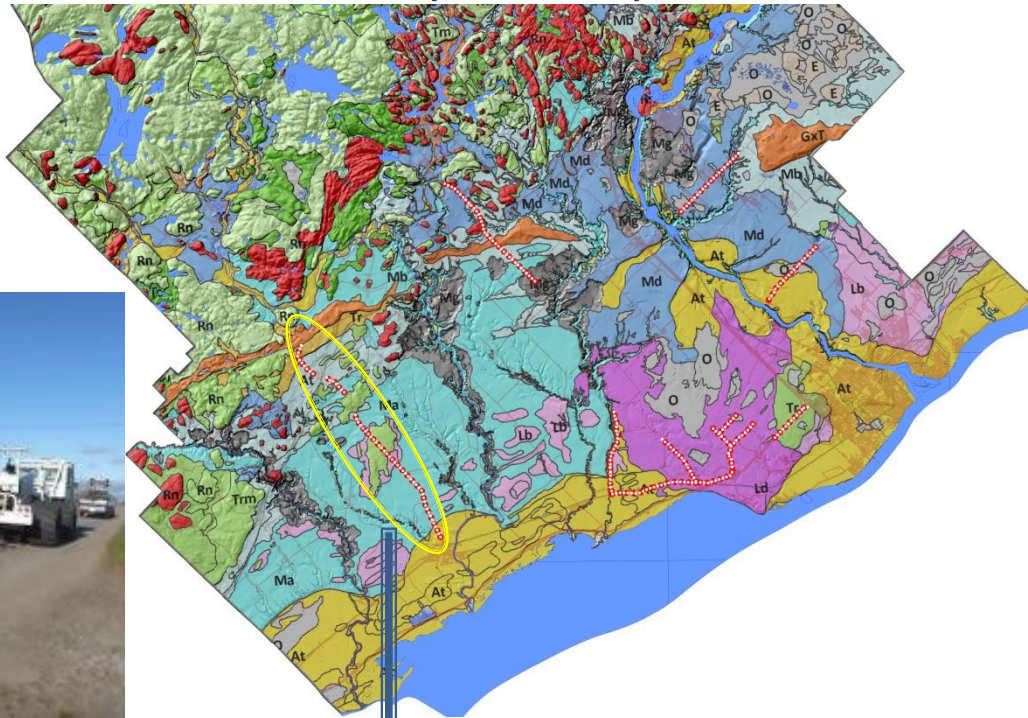


Field works

Seismic refraction surveys

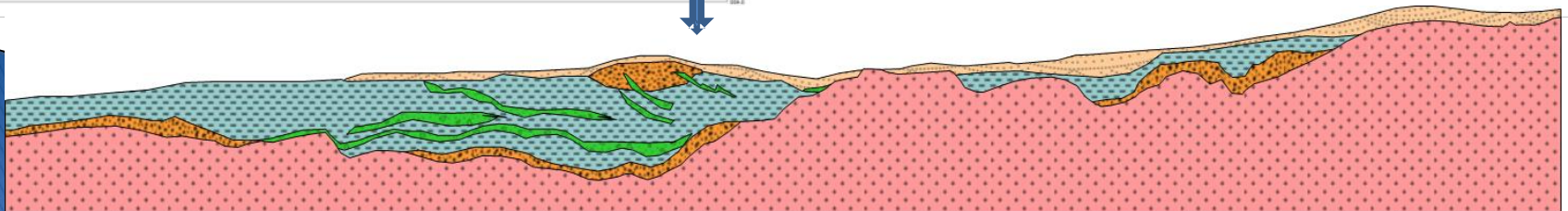
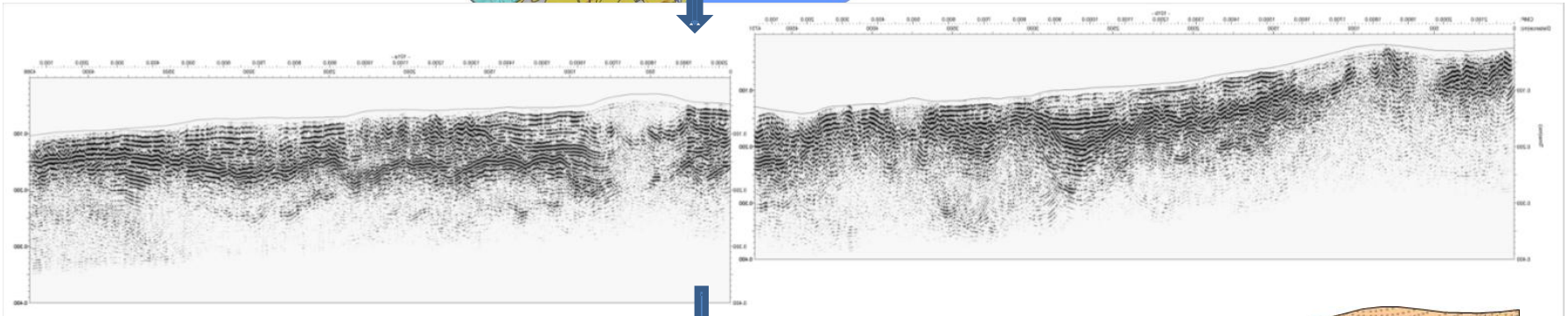
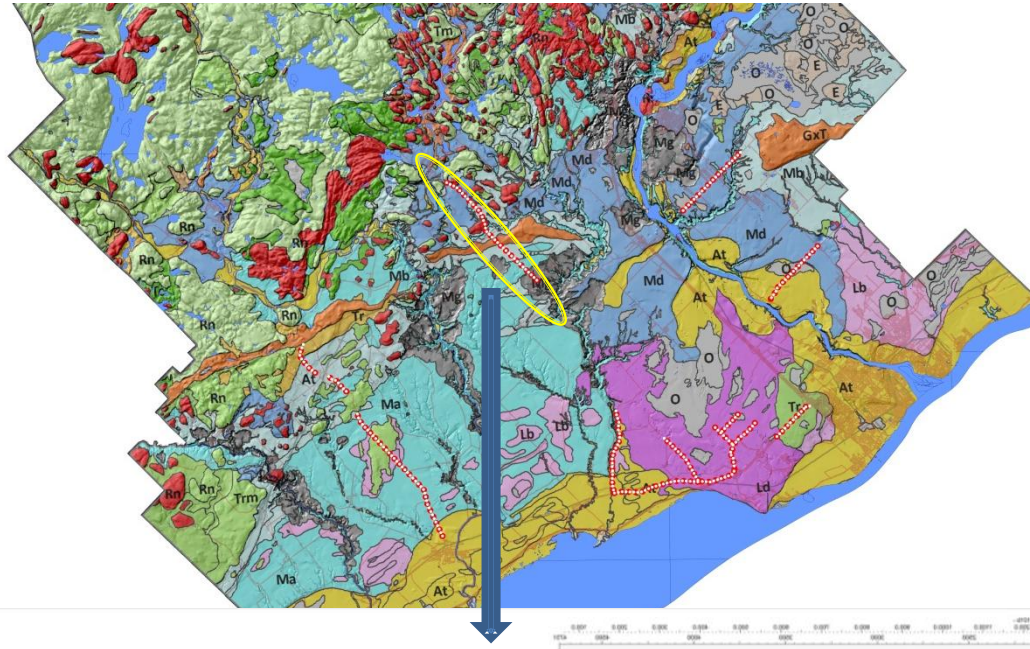


High-resolution seismic-reflexion (Minivibe)



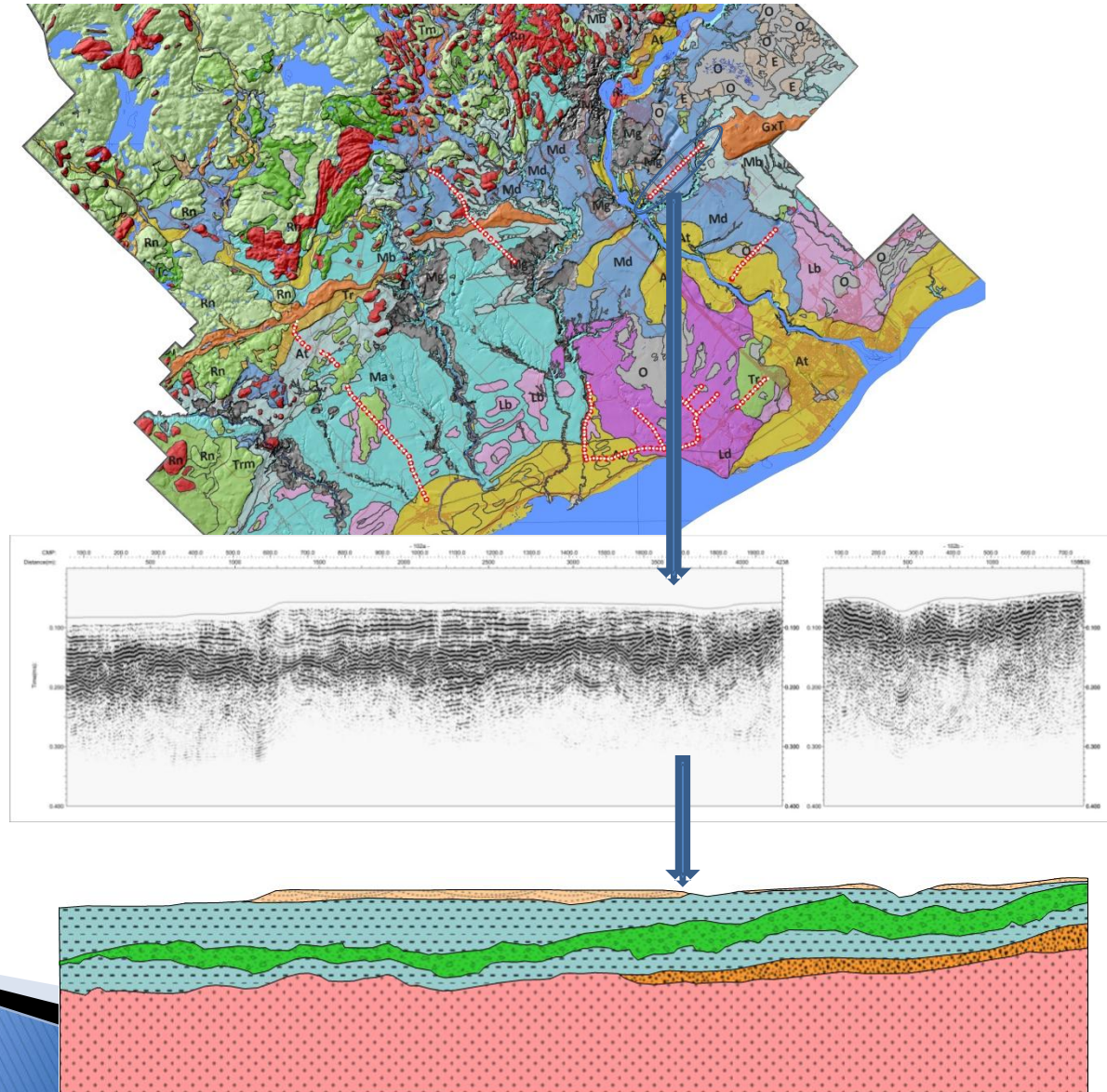
Field works

High-resolution seismic-reflexion (Minivibe)



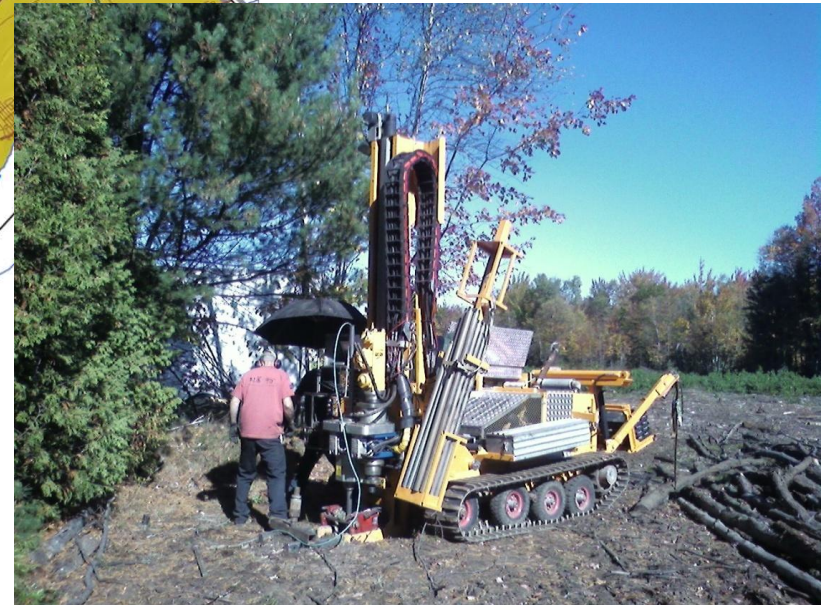
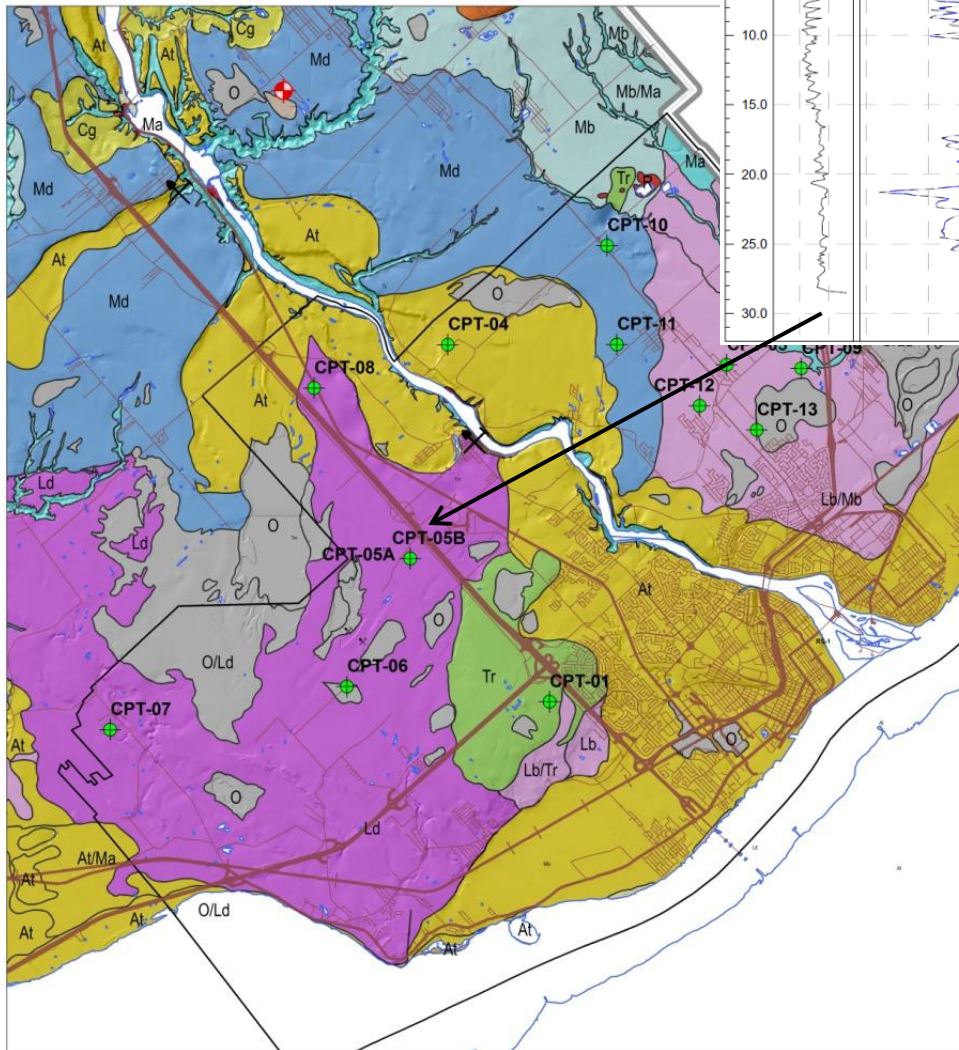
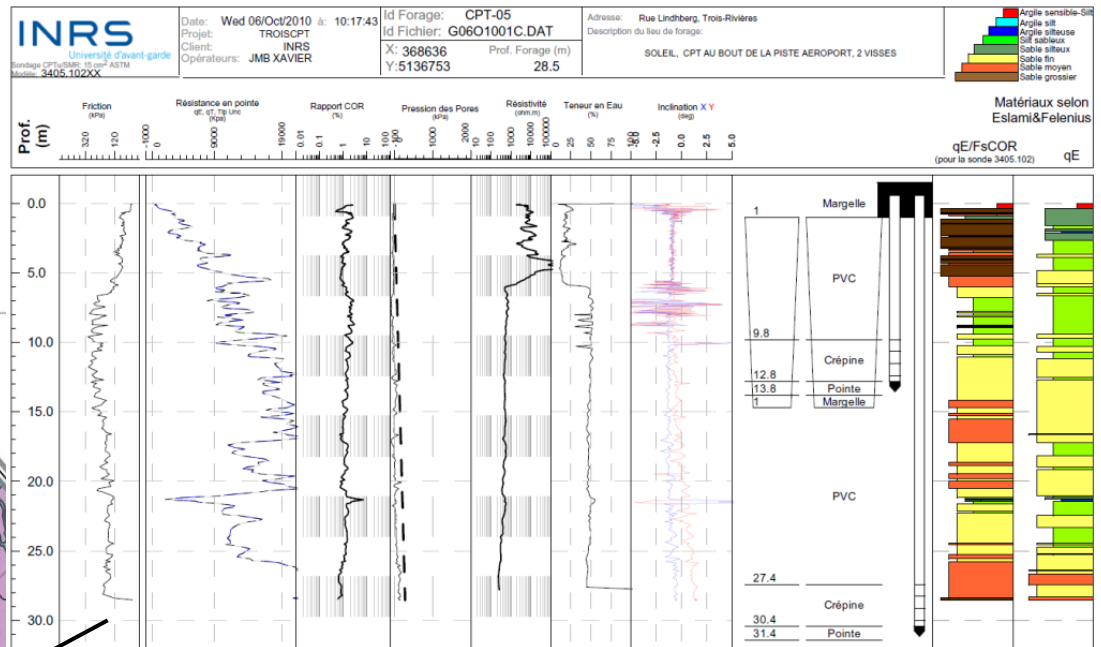
Field works

High-resolution seismic-reflexion (Minivibe)



Field Works

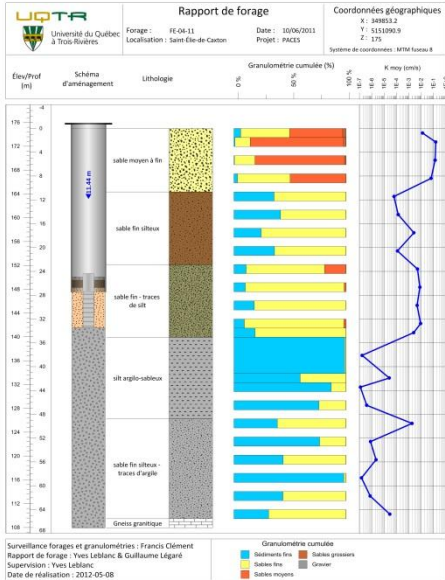
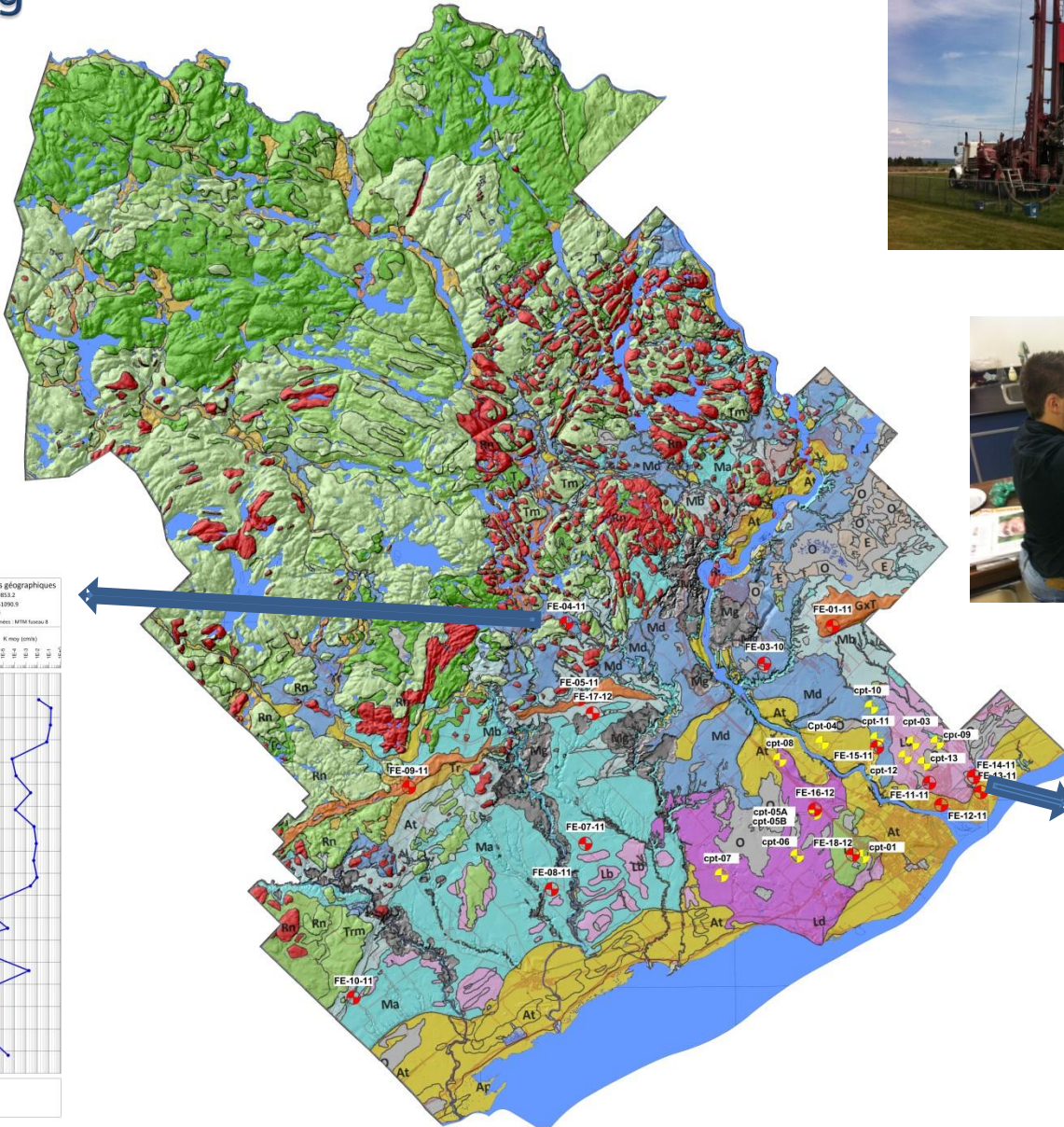
Cone penetration tests



Forage Roto-Sonic

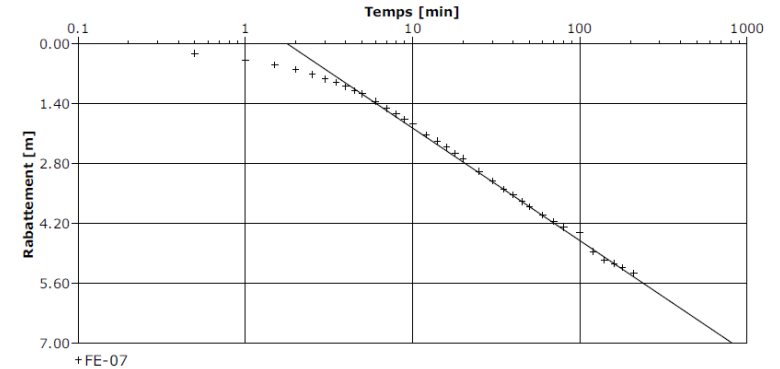
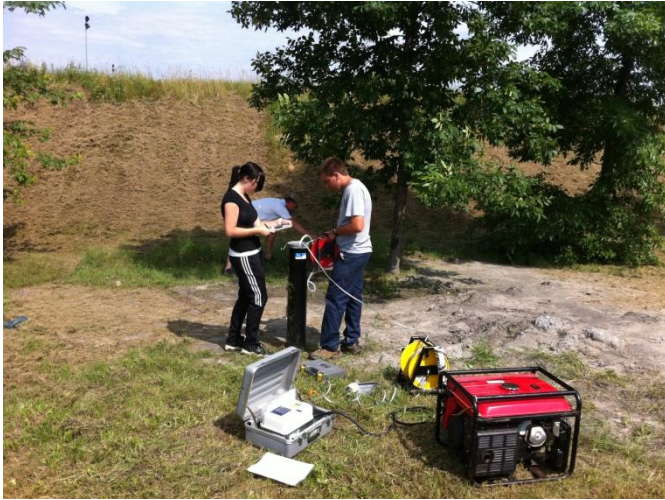
Field works

Borehole drilling



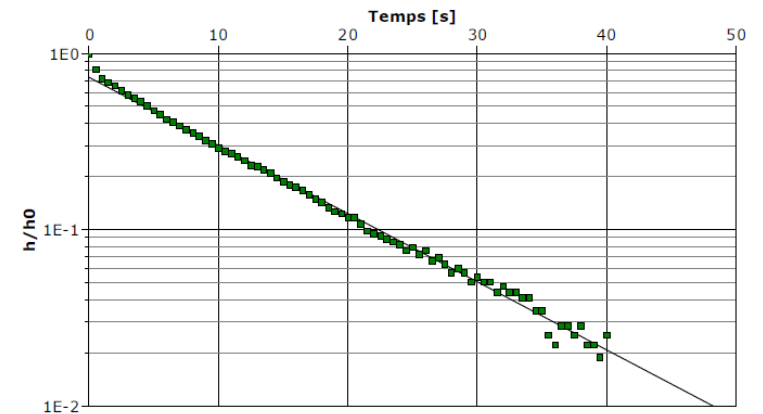
Field works

Pumping tests and permeability tests



Calcul après Cooper & Jacob

Forage d'observation	Transmissivity [m ² /d]	Conductivité hydraulique [m/d]	Storage coefficient	Distance radiale au pompage [m]	
FE-07	6.03×10^{-1}	4.02×10^{-1}	2.95×10^{-1}	0.07	



3350 km²

Bedrock

85 km

Faïlle de Saint-Cuthbert

Faïlle de
Saint-Prospér

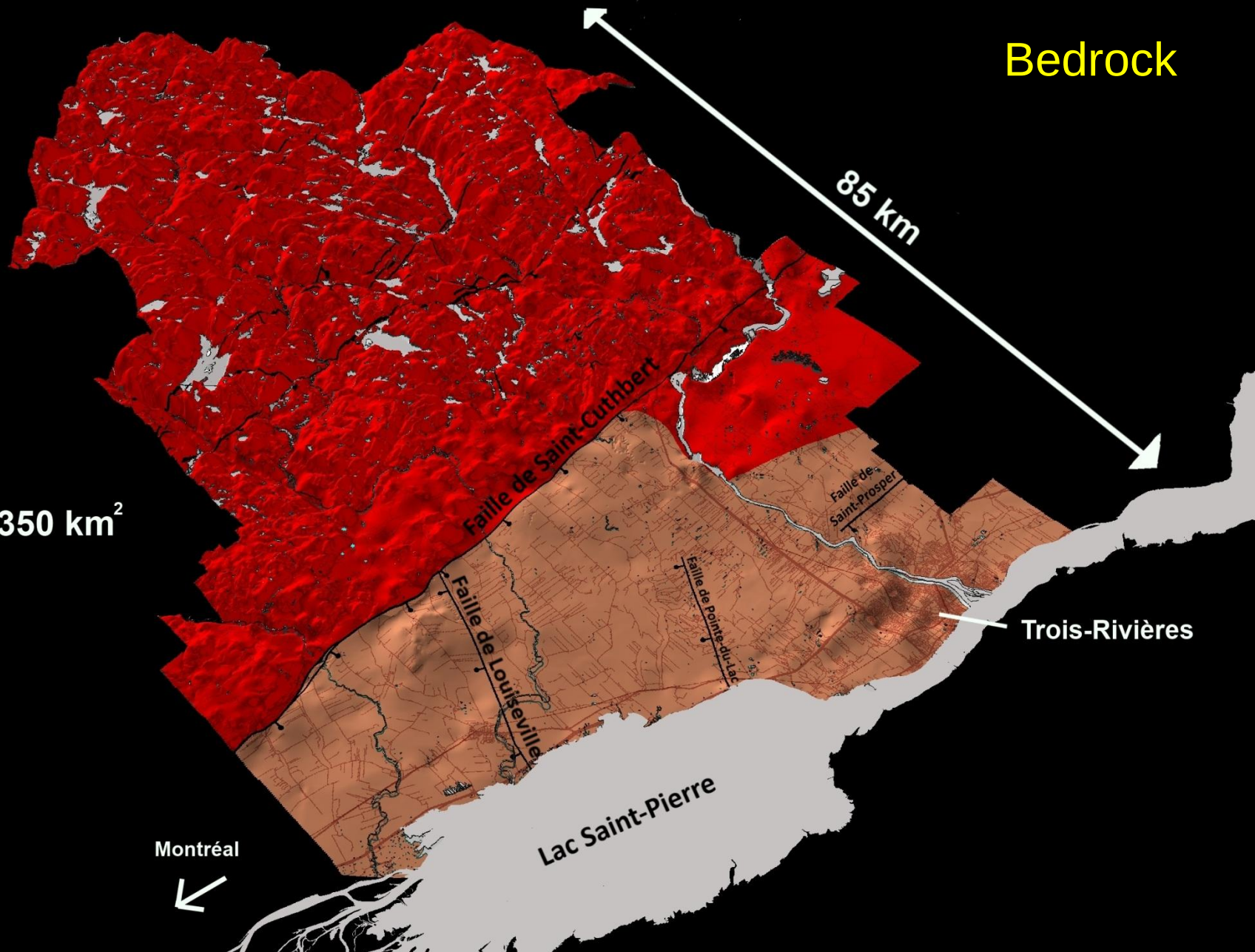
Faïlle de Louiseville

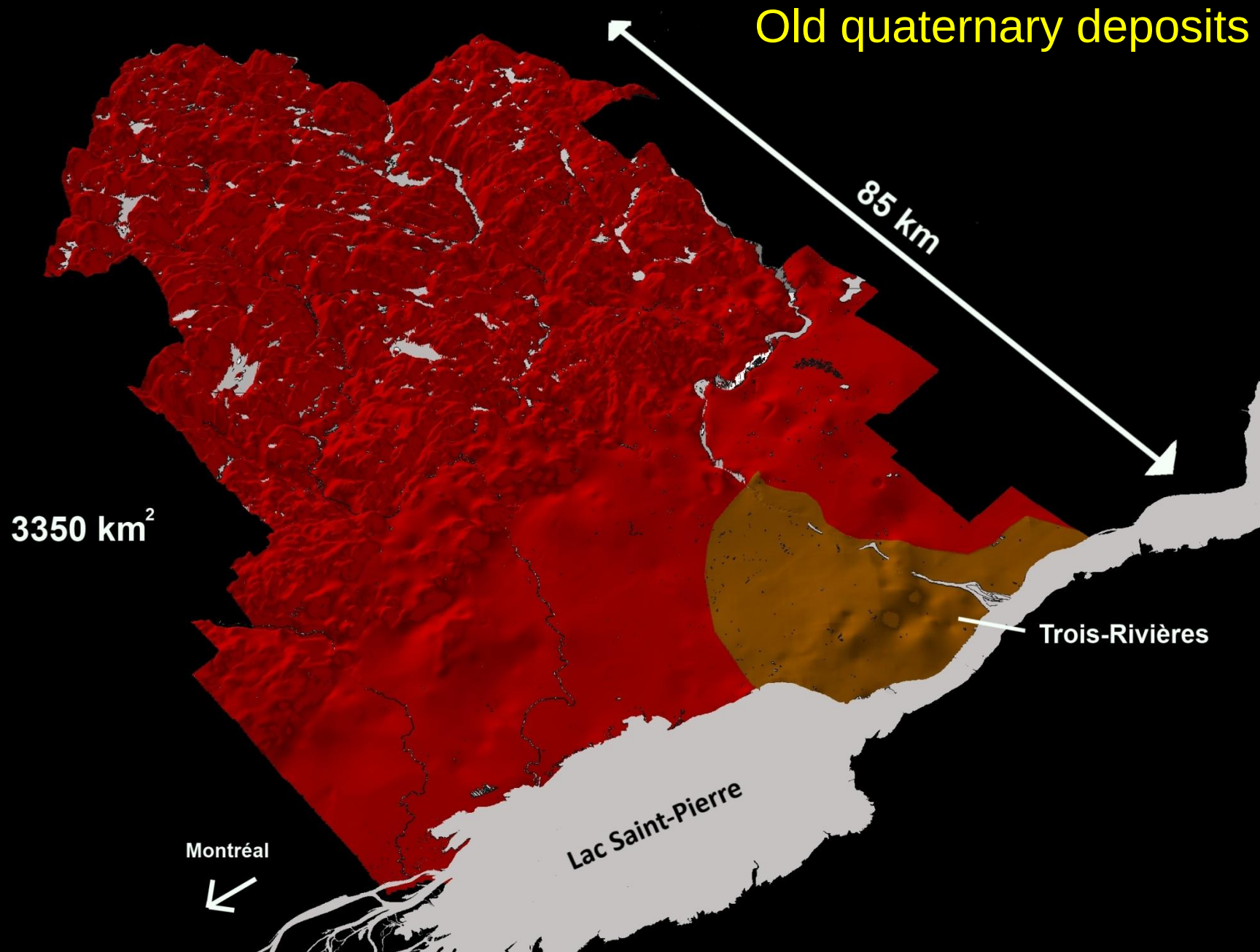
Faïlle de Pointe-du-Lac

Trois-Rivières

Lac Saint-Pierre

Montréal





Glacial till

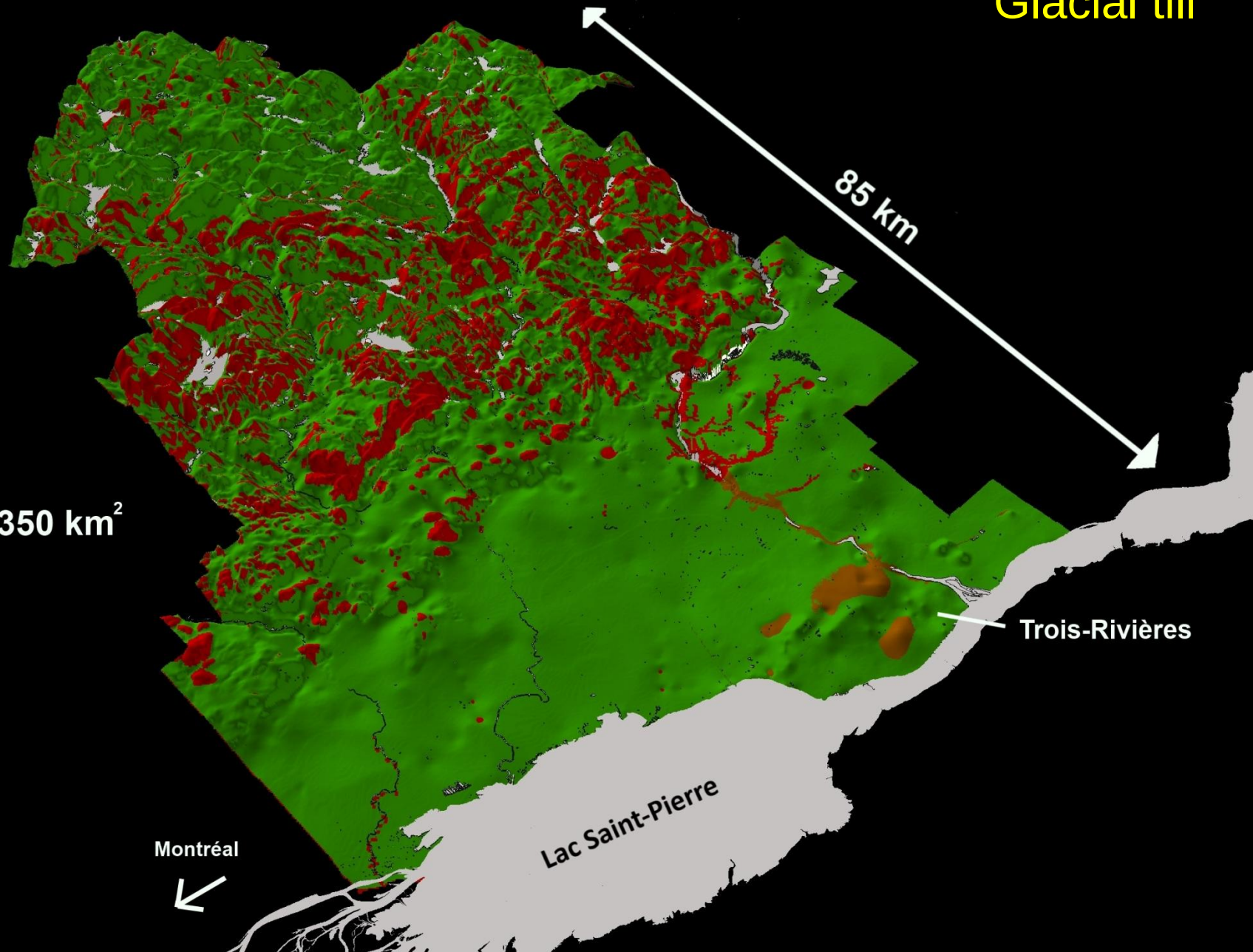
85 km

3350 km²

Trois-Rivières

Montréal

Lac Saint-Pierre



Fluvio-glacial

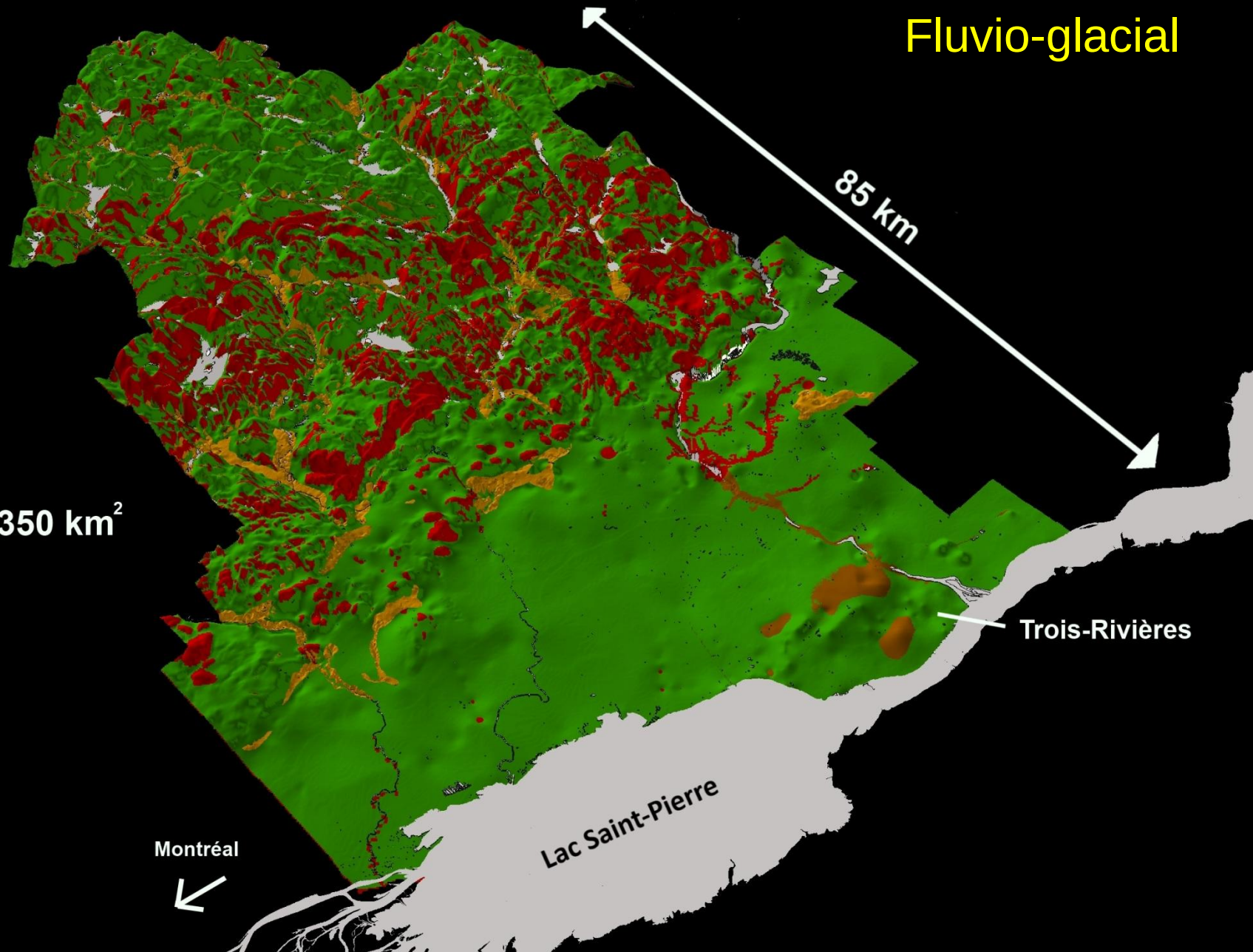
85 km

3350 km²

Trois-Rivières

Montréal

Lac Saint-Pierre



Marine fine sediments

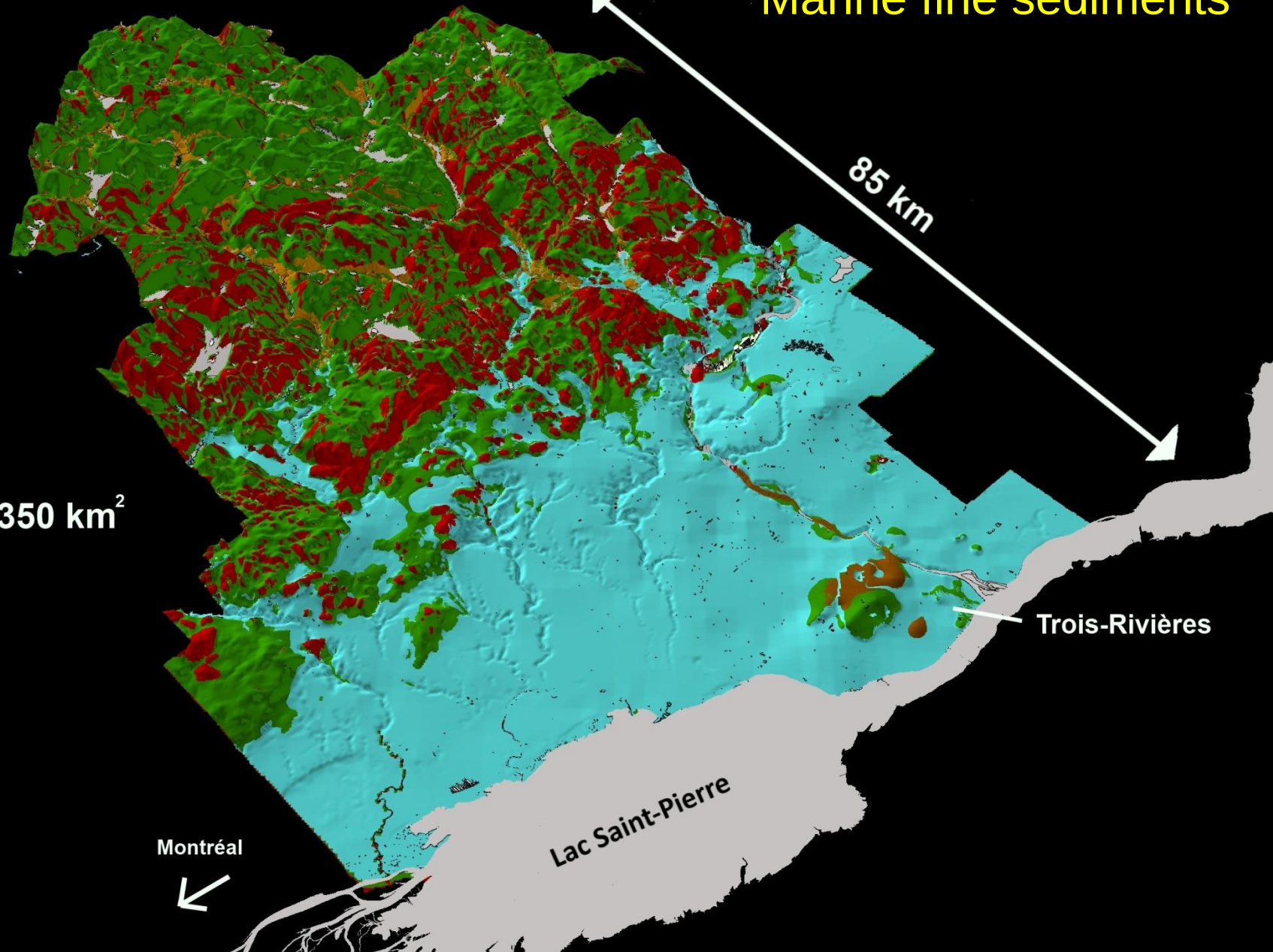
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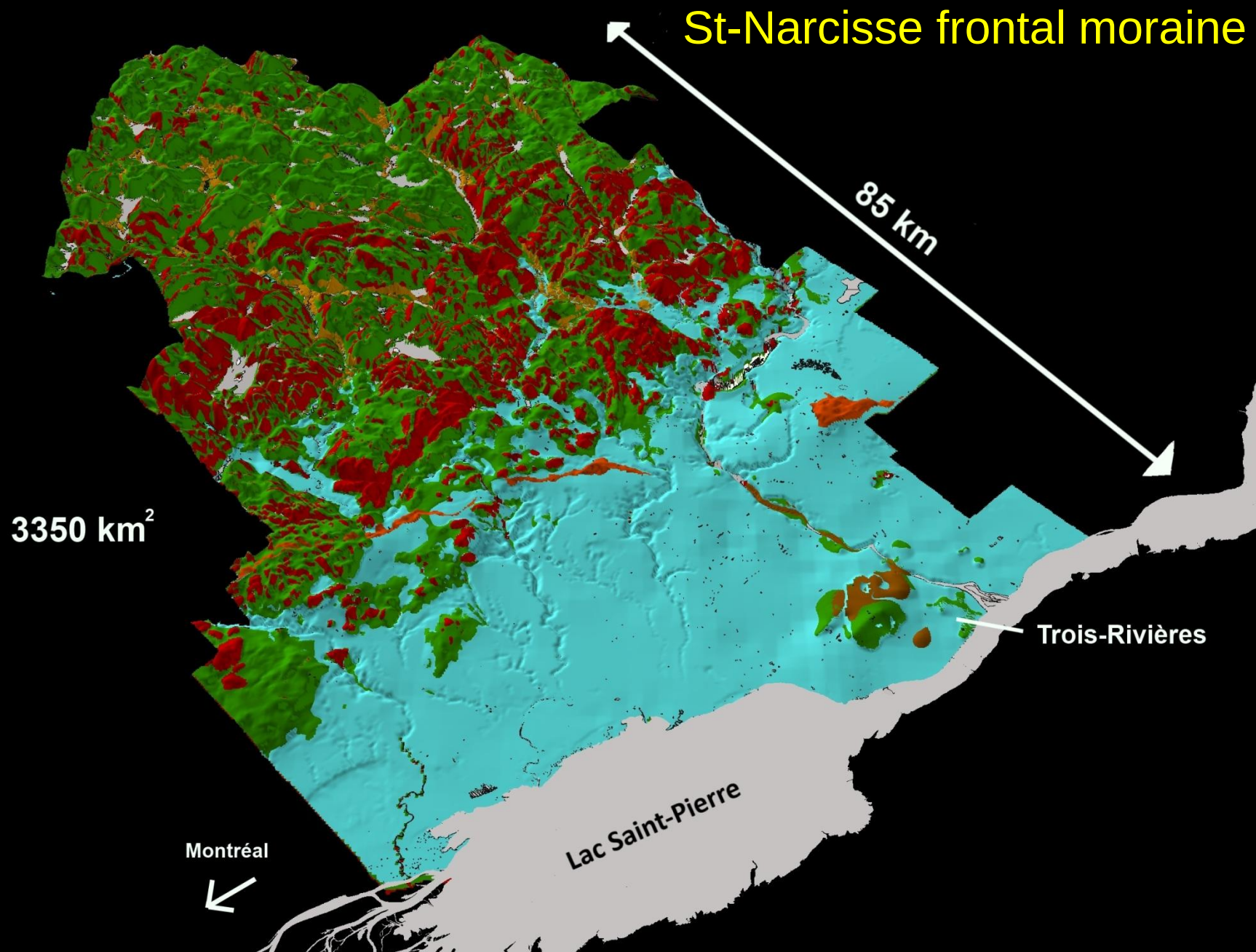
3350 km²

Trois-Rivières

Montréal

Lac Saint-Pierre





Deltaic and littoral sands

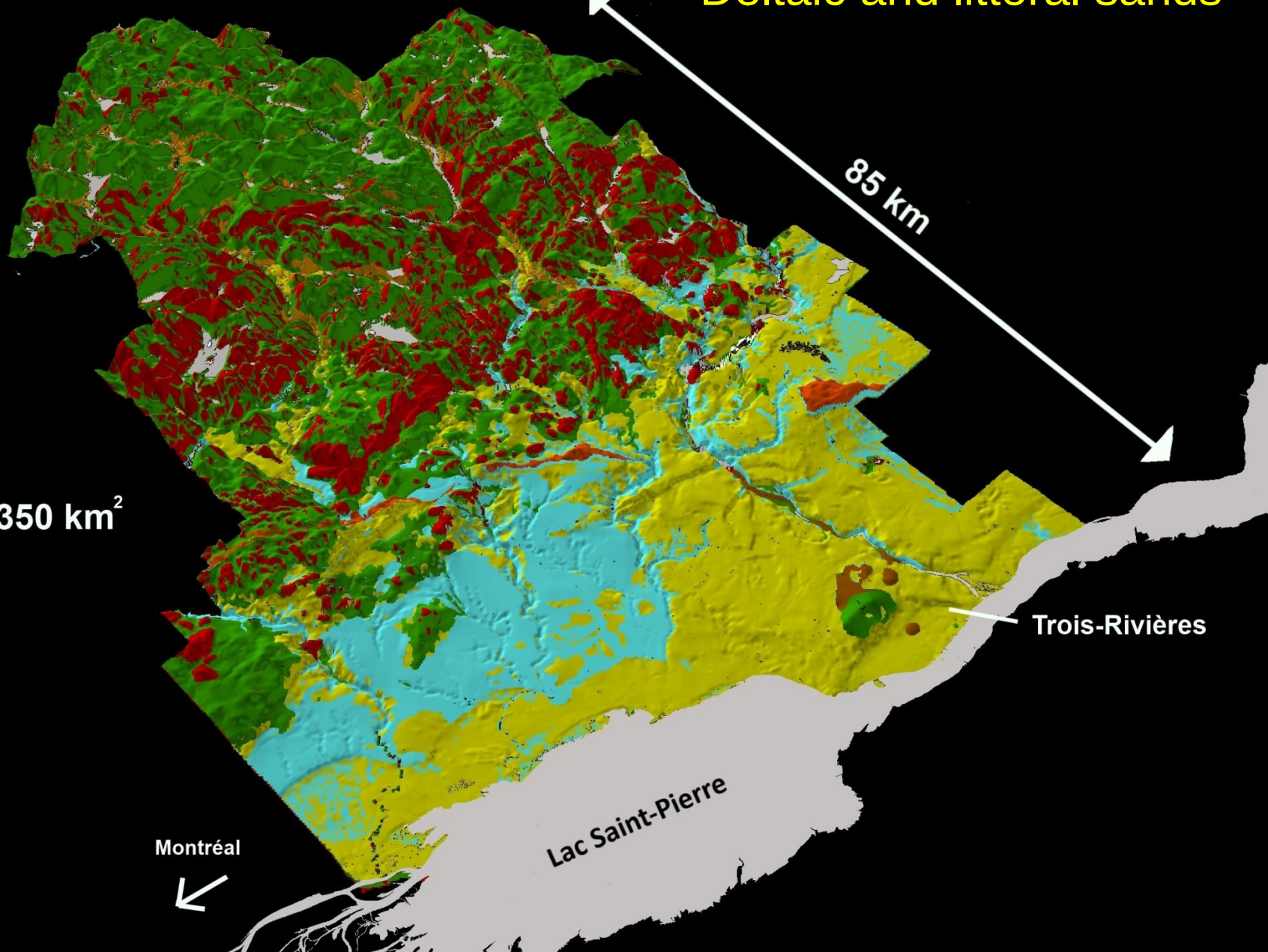
85 km

3350 km²

Trois-Rivières

Montréal

Lac Saint-Pierre



Organic

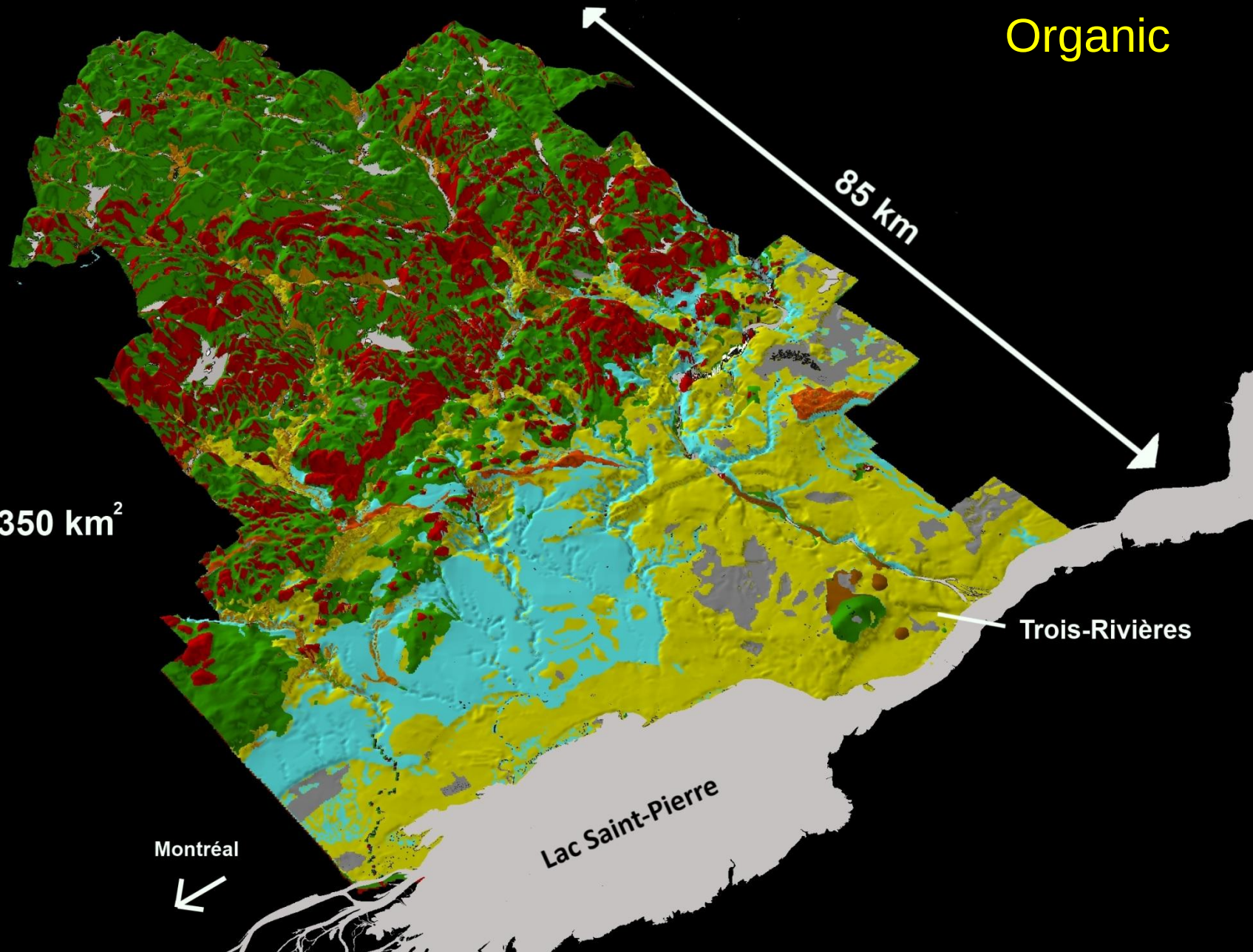
85 km

3350 km²

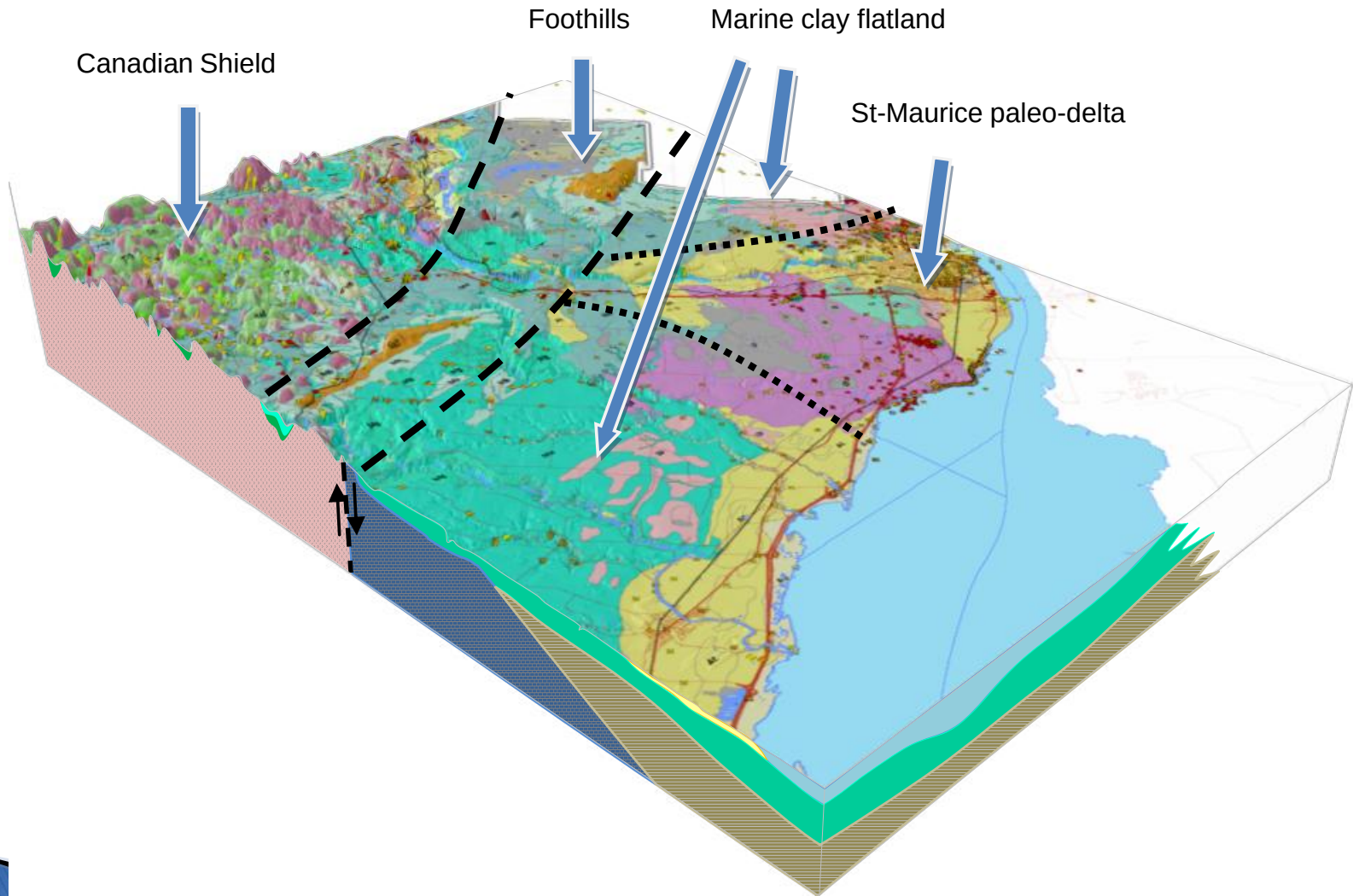
Trois-Rivières

Lac Saint-Pierre

Montréal



Hydrogeological conceptual model

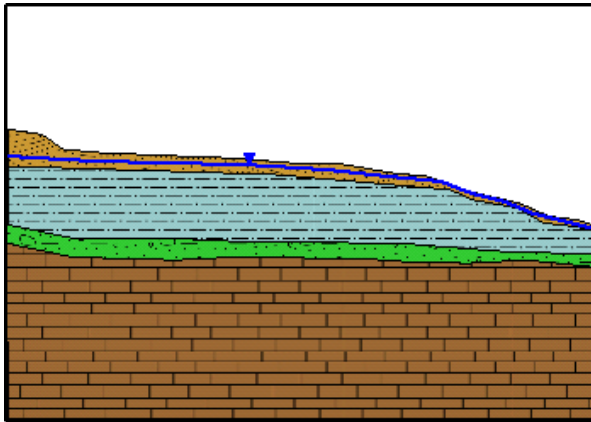


Hydrogeological conceptual model

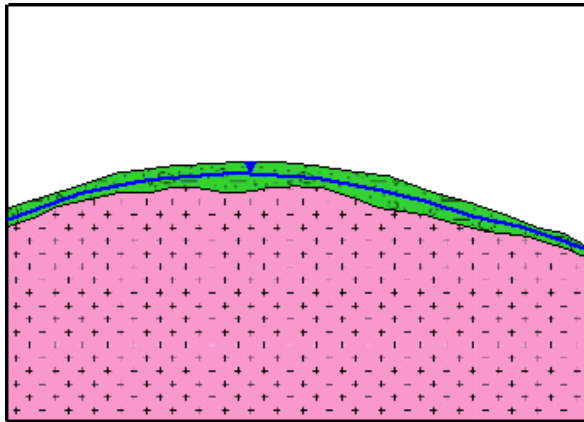
Factors controlling the distribution of productive aquifers

- Condition 1: Physiographic context

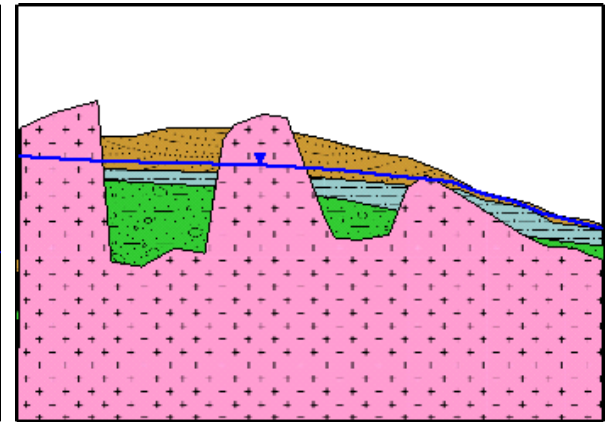
St-Lawrence lowlands



Canadian Shield



Foothills

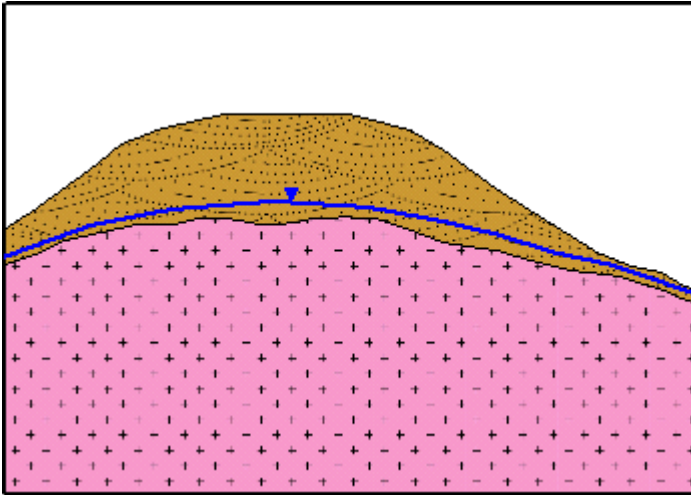


Hydrogeological conceptual model

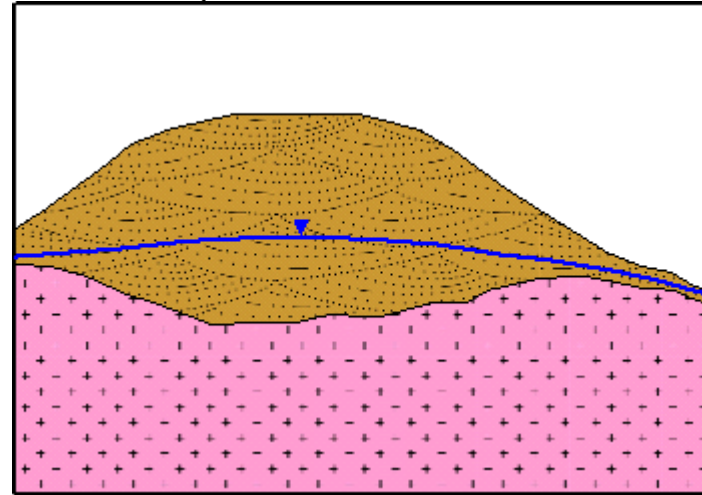
Factors controlling the distribution of productive aquifers

- Condition 2: Bedrock topography

Convex bedrock



Buried valley

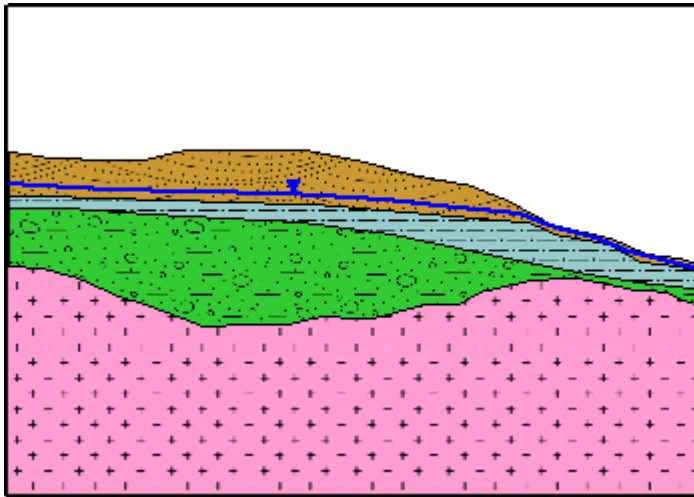


Hydrogeological conceptual model

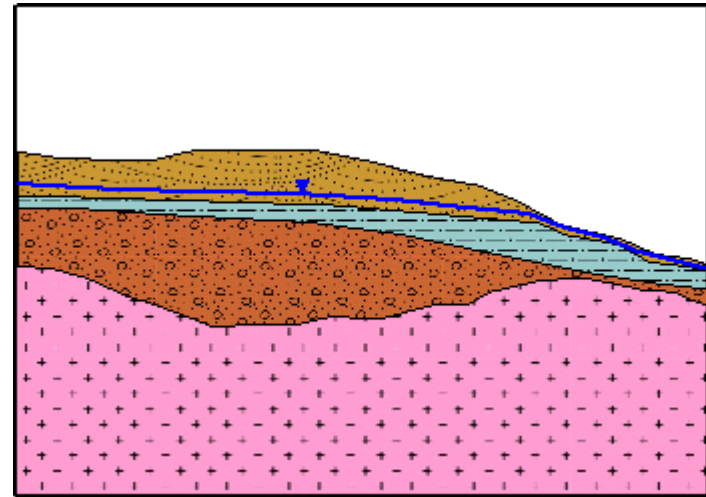
Factors controlling the distribution of productive aquifers

- Condition 3: Large sediment input provided by subglacial meltwater corridors

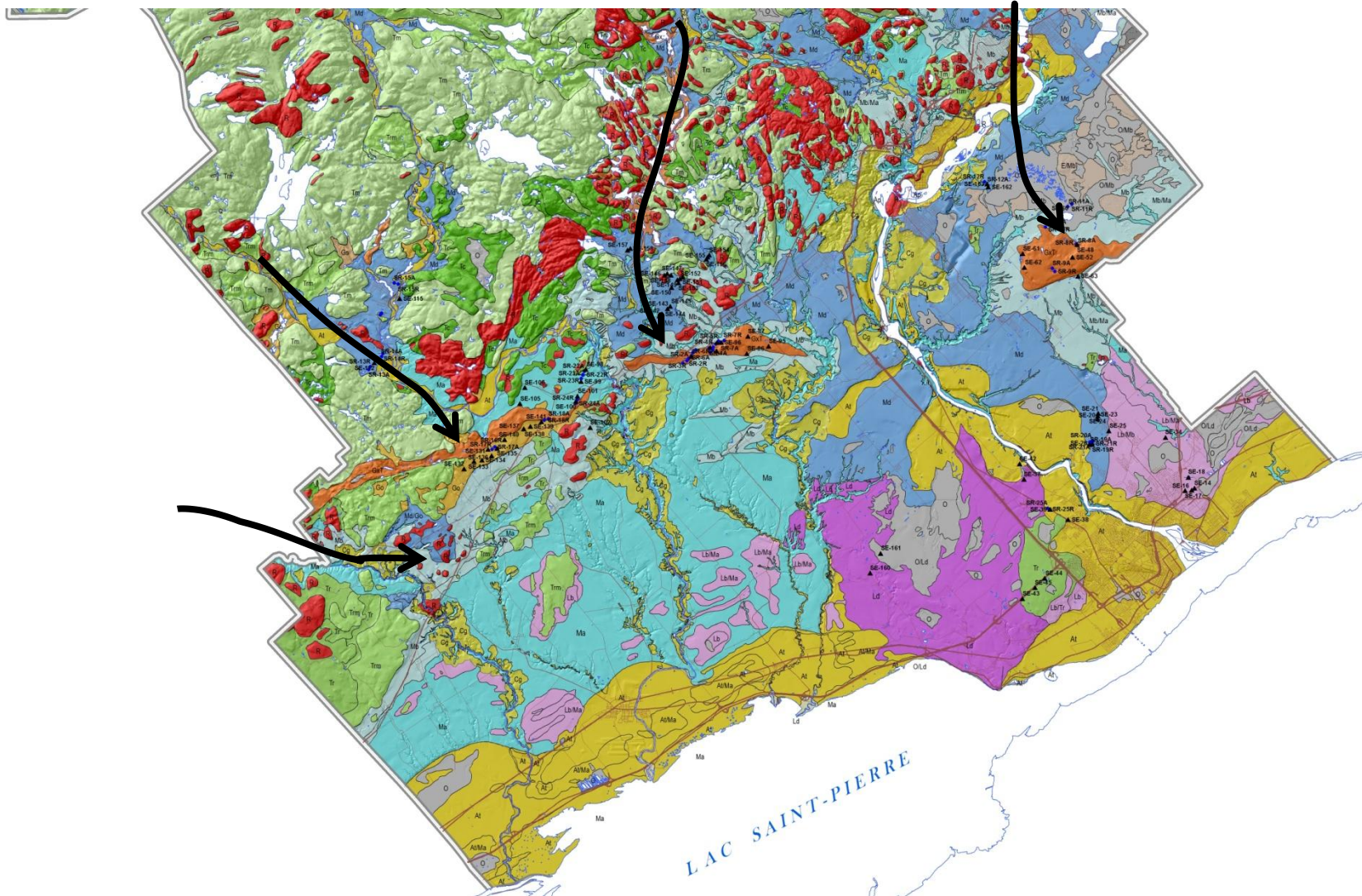
Fine sediments and/or glacial till



Coarse sediments



Factors controlling the distribution of productive aquifers



Conclusion

- Integration of a variety of investigation methods
 - Increased knowledge about regional groundwater
 - Development of an aquifer depositional model
-
- May help future groundwater investigation programs
 - May help for land planning



Thanks a lot!

Teamwork

- ▶ Yves Leblanc, UQTR: Hydrogeology
- ▶ Guillaume Légaré, UQTR: 3D Sedimentary model
- ▶ Michel Parent, GSC: Quaternary stratigraphic interpretation
- ▶ André Pugin, GSC: 3C high-resolution seismic profiling
- ▶ Stéphane Campeau, UQTR: Team coordination