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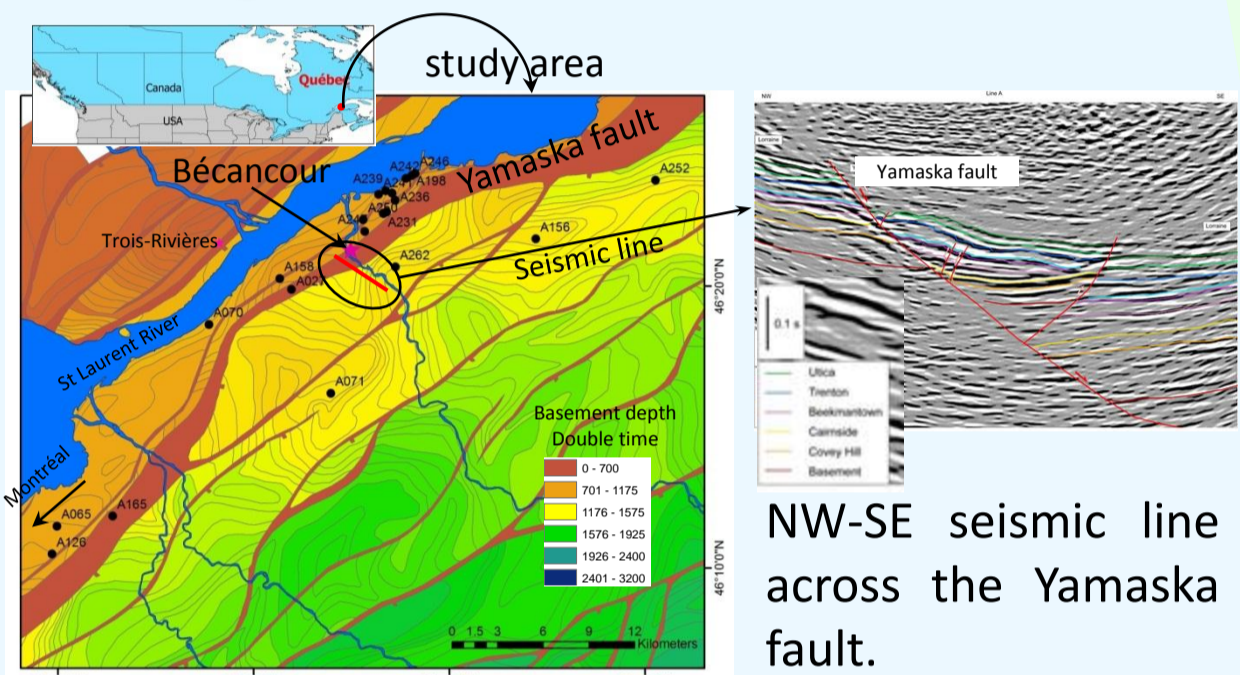
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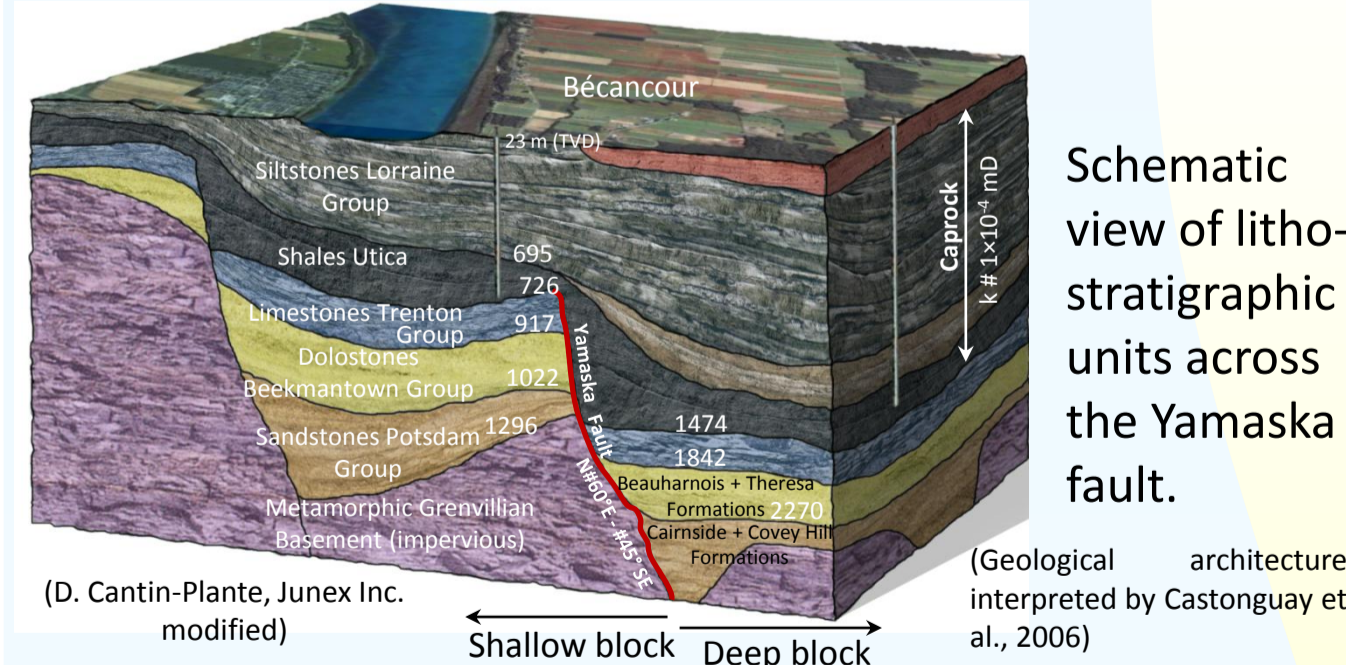
## Goal

Characterize hydrogeological and petrophysical properties of the deep saline aquifers to assess the feasibility of the CO<sub>2</sub> sequestration in the Bécancour region by analyzing existing hydrological, chemical and geophysical data.

## Geologic context

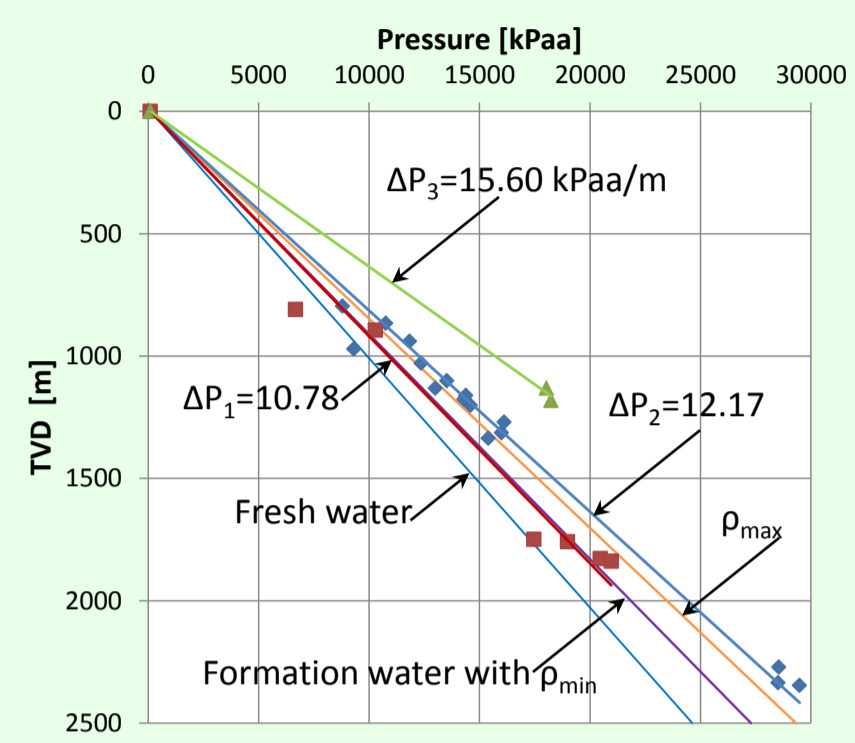


The Bécancour saline aquifers are located in the sedimentary successions of the St. Lawrence Platform which are separated into two distinct blocks by the Yamaska normal fault. Their thicknesses are increasing from the NW to SE across the Yamaska fault. The area is tectonically stable.

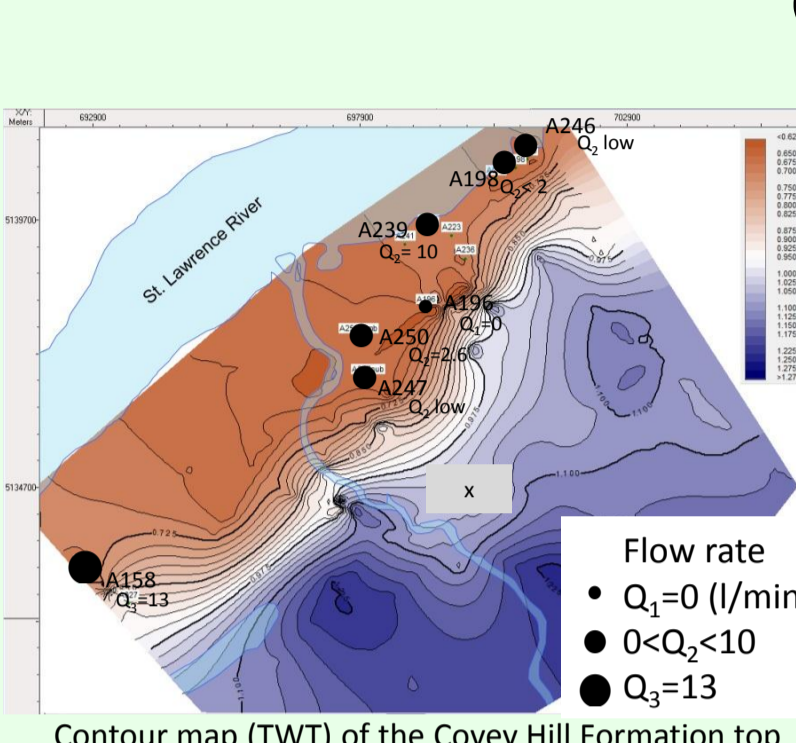


References:  
Konstantinovskaya E., Claprood M., Duchesne M., Giroux B., Malo M. & Lefebvre R. (2010). Le potentiel de stockage du CO<sub>2</sub> expérimental dans les aquifères salins profonds de Bécancour : Partie 1 : Analyse des diagraphties et des profils sismiques. Rapport INRS-CO<sub>2</sub>-2010-V2.1. 50 p.  
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## Hydrostatic pressures

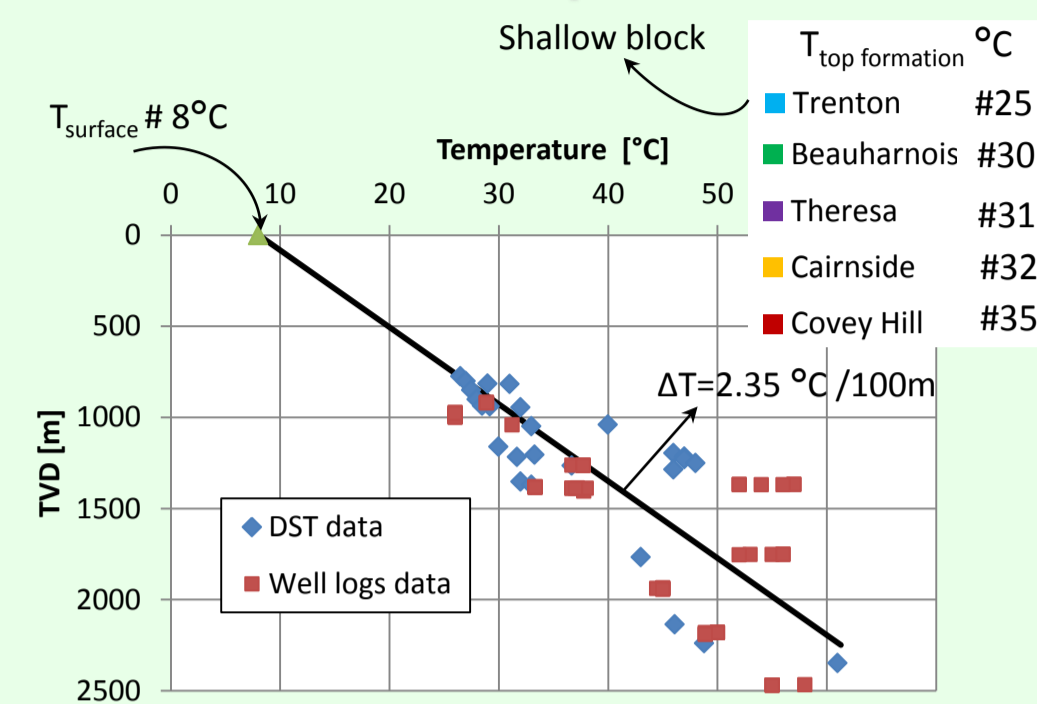


## Artesian rates

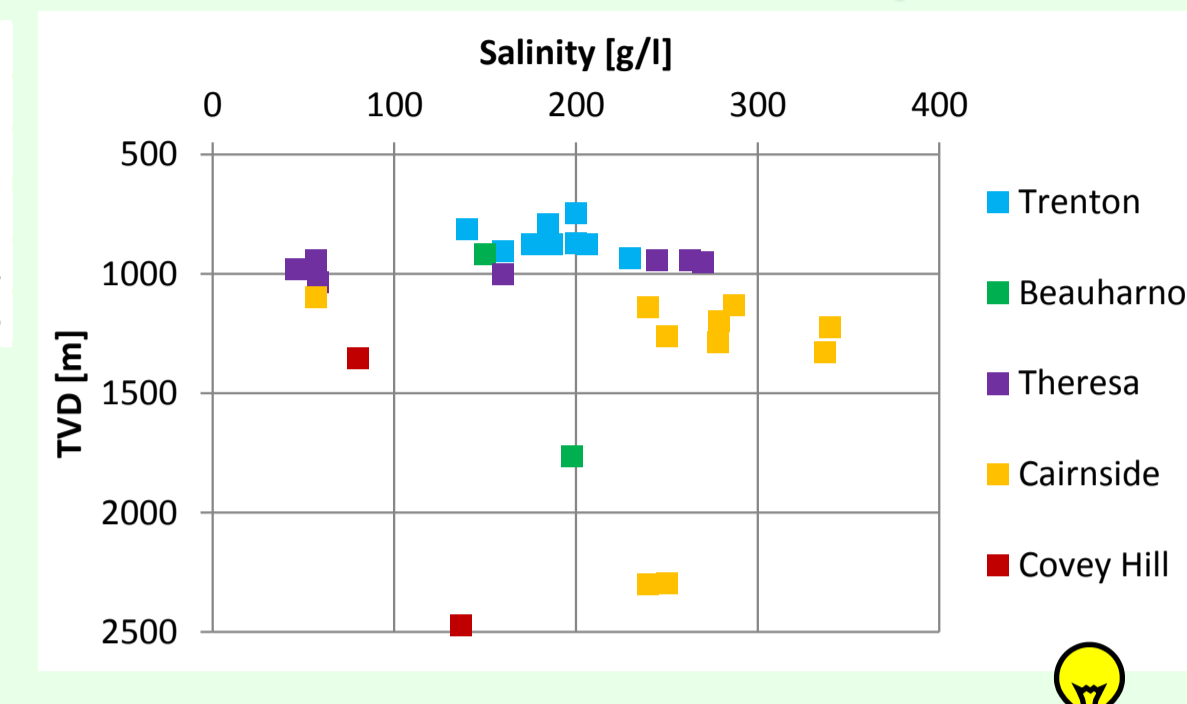


- Agreement between the  $\Delta p$  magnitudes and observed artesian rates (partially overpressurized site).
- The north-east part of the region is more suitable for CO<sub>2</sub> storage with regard to buoyancy of CO<sub>2</sub>.
- Non-homogeneity of the reservoir at the regional scale (presence of three local pressure gradients).
- Possible hydraulic connection between two reservoir blocks across the Yamaska fault.

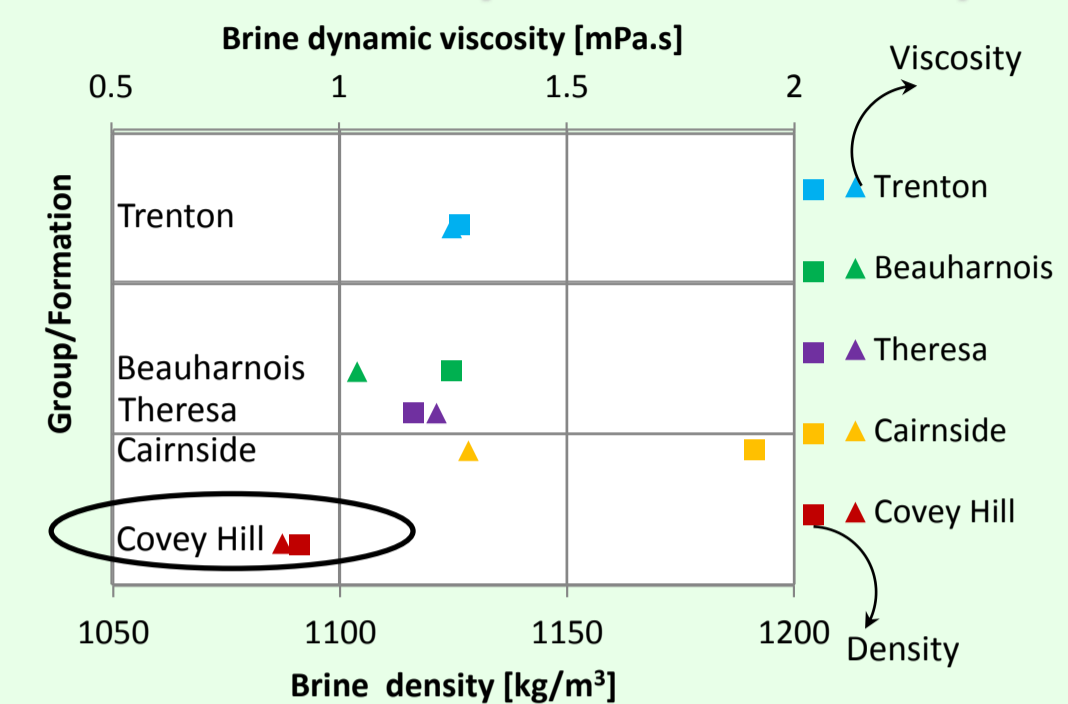
## Reservoir temperature



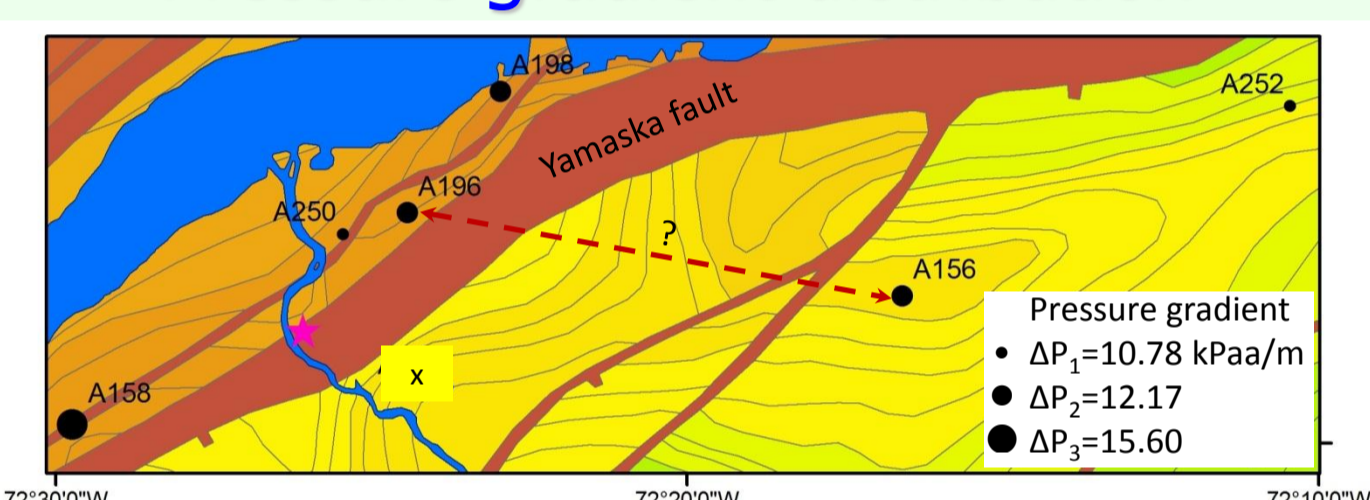
## Measured brine salinity



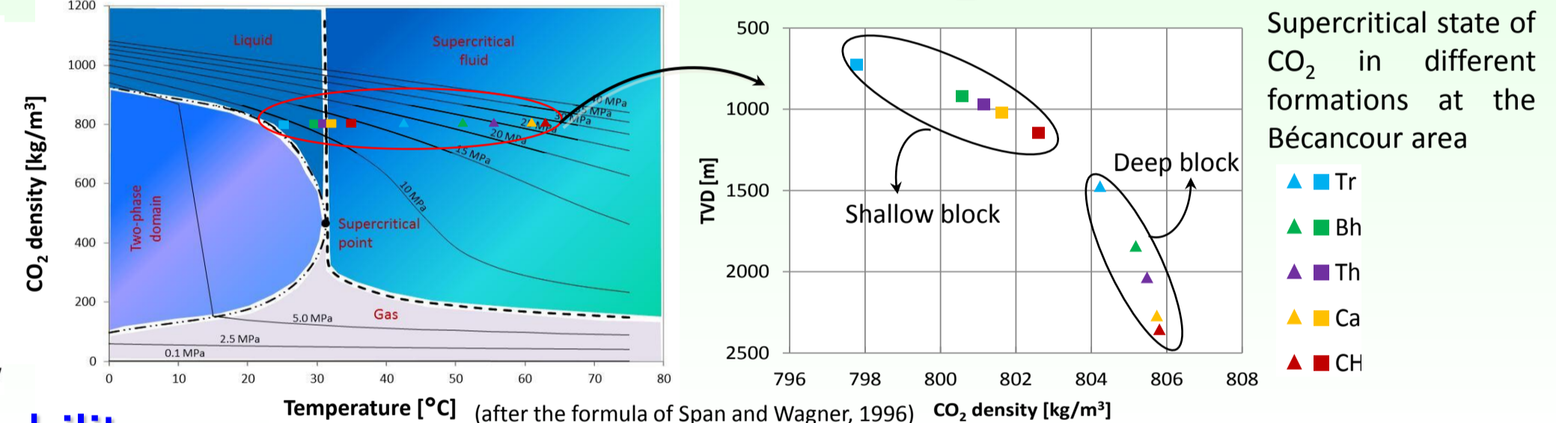
## Brine density and viscosity



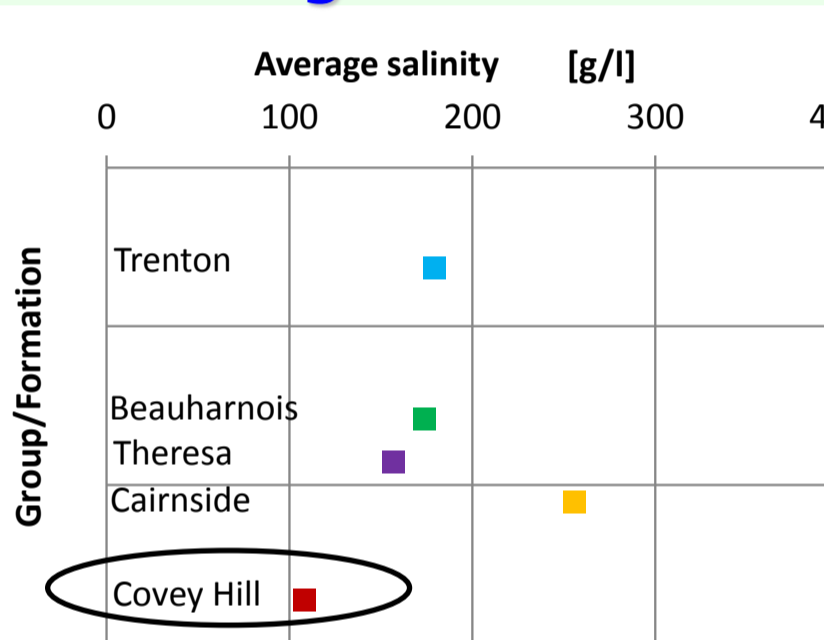
## Pressure gradient distribution



## Predicted supercritical CO<sub>2</sub> state

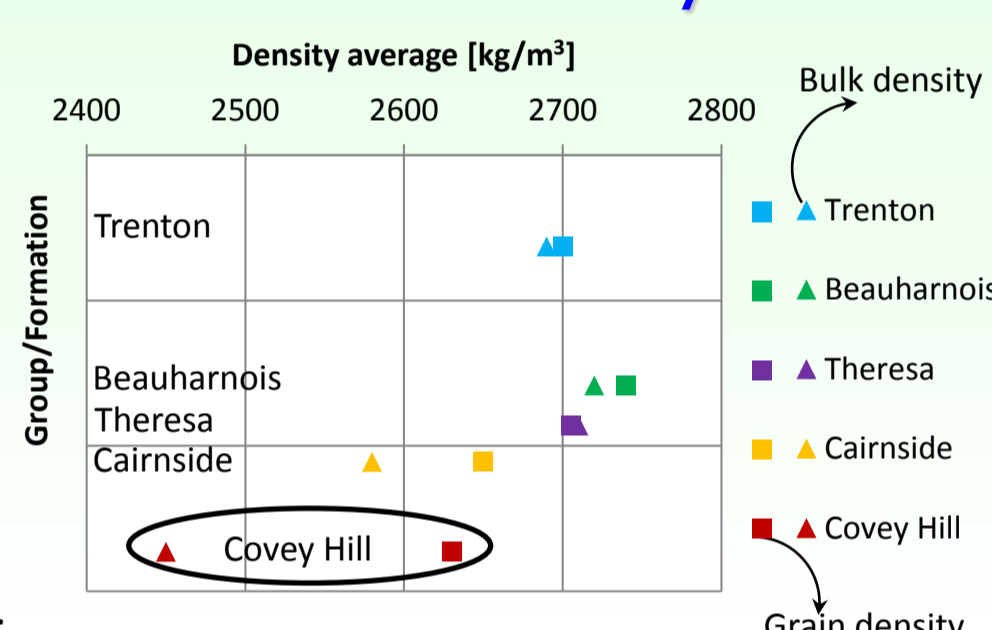


## Average brine salinity

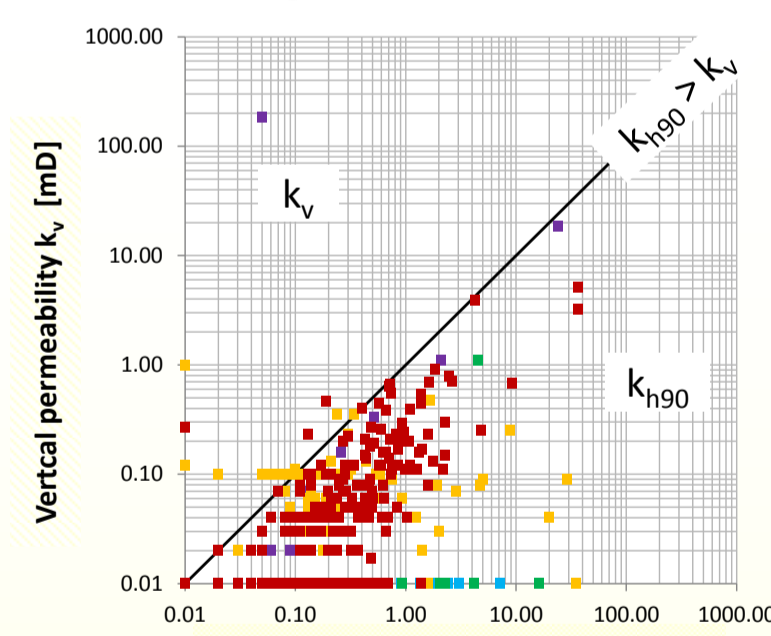


- Hydraulic discontinuity between the aquifers due to their salinity differences.
- More dissolution of supercritical CO<sub>2</sub> in the Covey Hill Fm. due to its low brine density.
- Covey Hill Formation is the best porous unit.

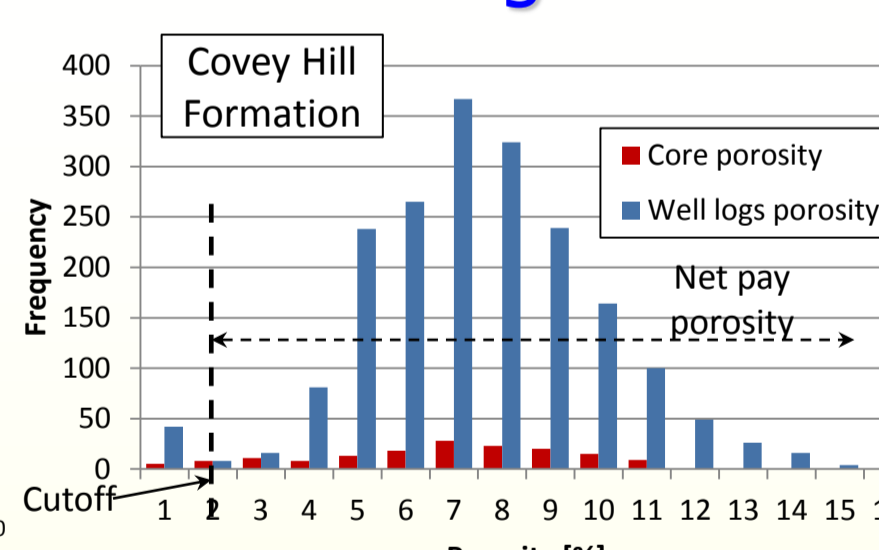
## Formation density



## Core permeabilities



## Porosity/permeability histogram



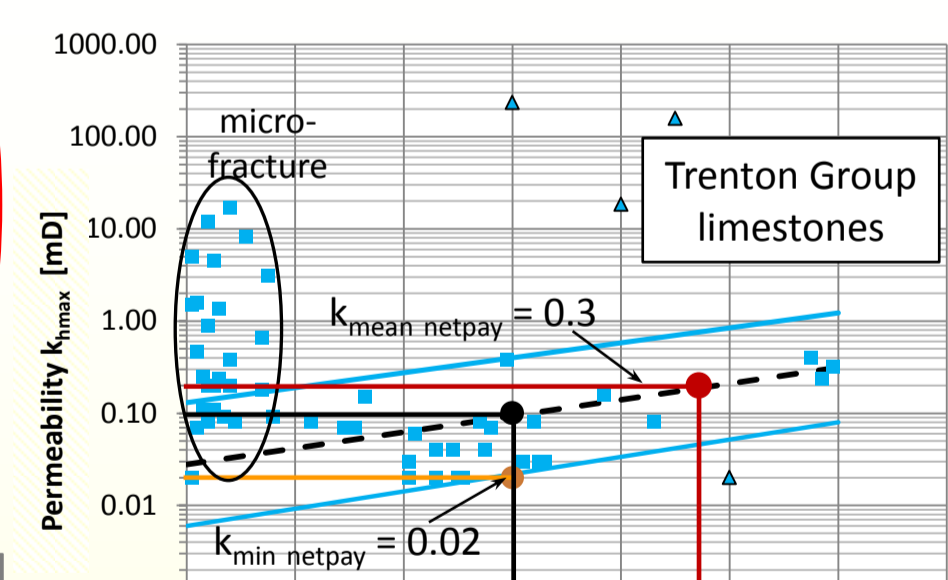
## Main parameters of the aquifers

Average parameters	Trenton	Beauharnois	Theresa	Cairnside	Covey Hill
Formation thickness of shallow block [m]	164	51	62	85	141
Formation thickness of deep block [m]	257.0	118.0	84.0	147.0	257.0
Net pay [m]	3.1	2.9	5.0	31.4	187.5
Net pay porosity [%]	9.4	5.5	4.8	3.7	6.0
Net pay permeability [mD]	0.2	0.23	0.15	0.13	0.28
Net pay fluid volume [m <sup>3</sup> /m <sup>2</sup> ]	0.442	0.409	0.278	1.213	11.597
Pressure gradient [kPaa/m]	12.17	12.17	12.17	12.17	12.17
Temperature gradient [°C/100m]	2.35	2.35	2.35	2.35	2.35
Salinity [g/l]	179.1	173.9	157.0	255.9	108.5
Brine density [kg/m <sup>3</sup> ]	1126	1125	1116	1191	1091
Brine viscosity [mPa.s <sup>-1</sup> ]	1.248	1.040	1.214	1.285	0.875

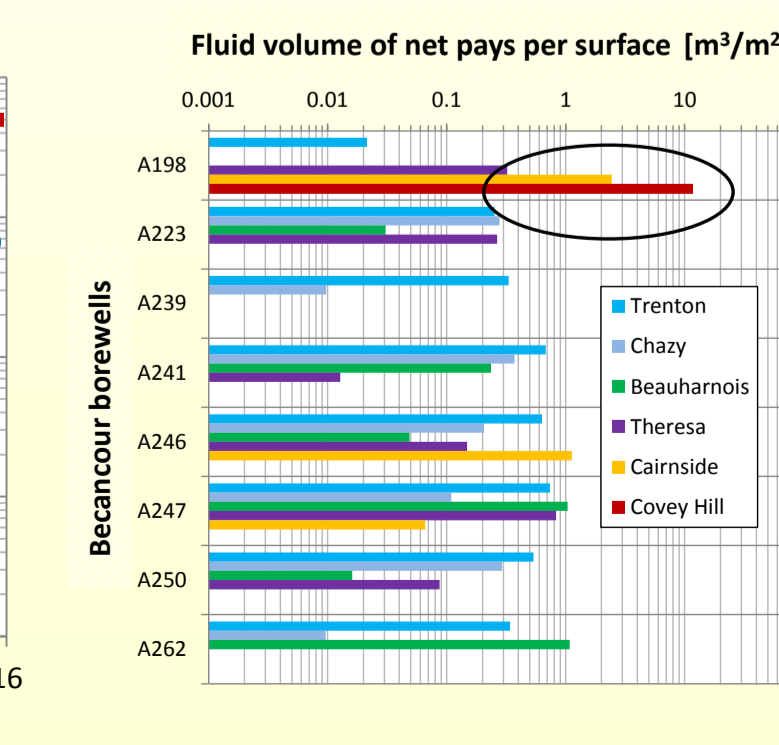
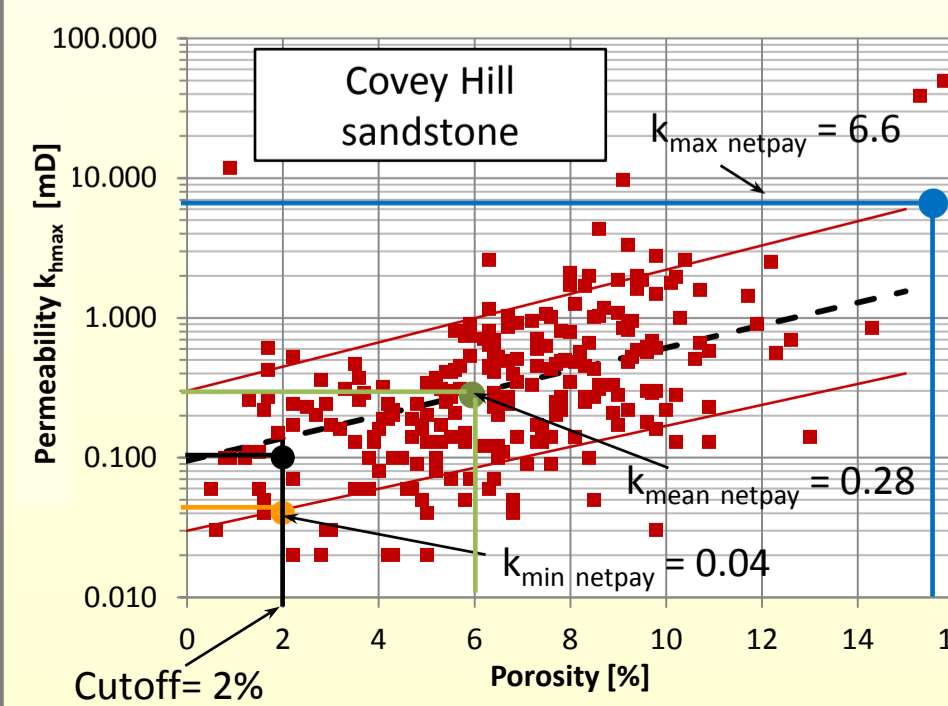
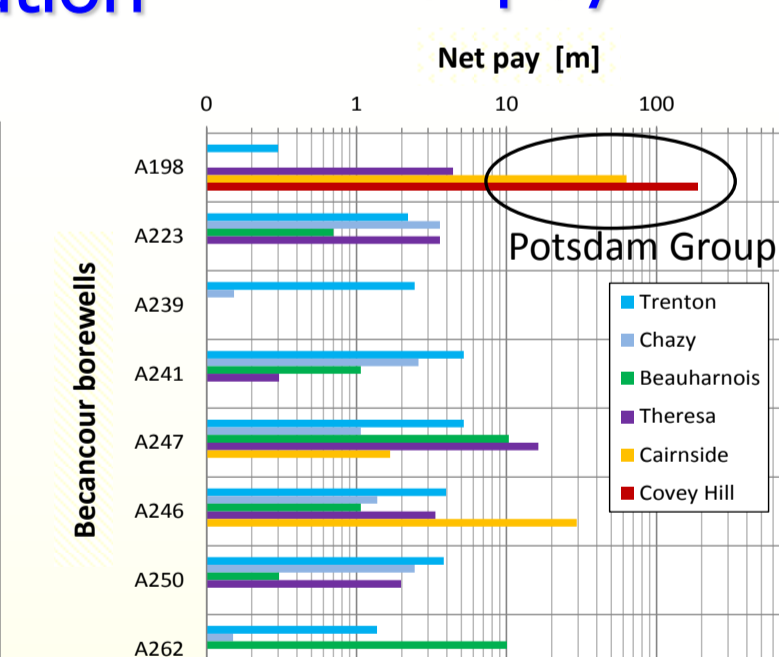
## Conclusion

- The hydrogeological and petrophysical properties of the Bécancour saline aquifers were identified (see Table).
- The lateral continuity is predominant in the aquifers due to permeability anisotropy ( $k_v$  much lower than  $k_h$ ).
- The Covey Hill sandstone reservoir (at >1 km of depth) is the best candidate for the CO<sub>2</sub> storage with  $P \geq 14$  MPa,  $T \geq 35$  °C,  $S=109$  g/l,  $k=0.3$  mD,  $n=6\%$  and net pay=188 m.
- The supercritical CO<sub>2</sub> state starts at 1145 m in the Covey Hill sandstone in the foot wall block of the Yamaska fault.

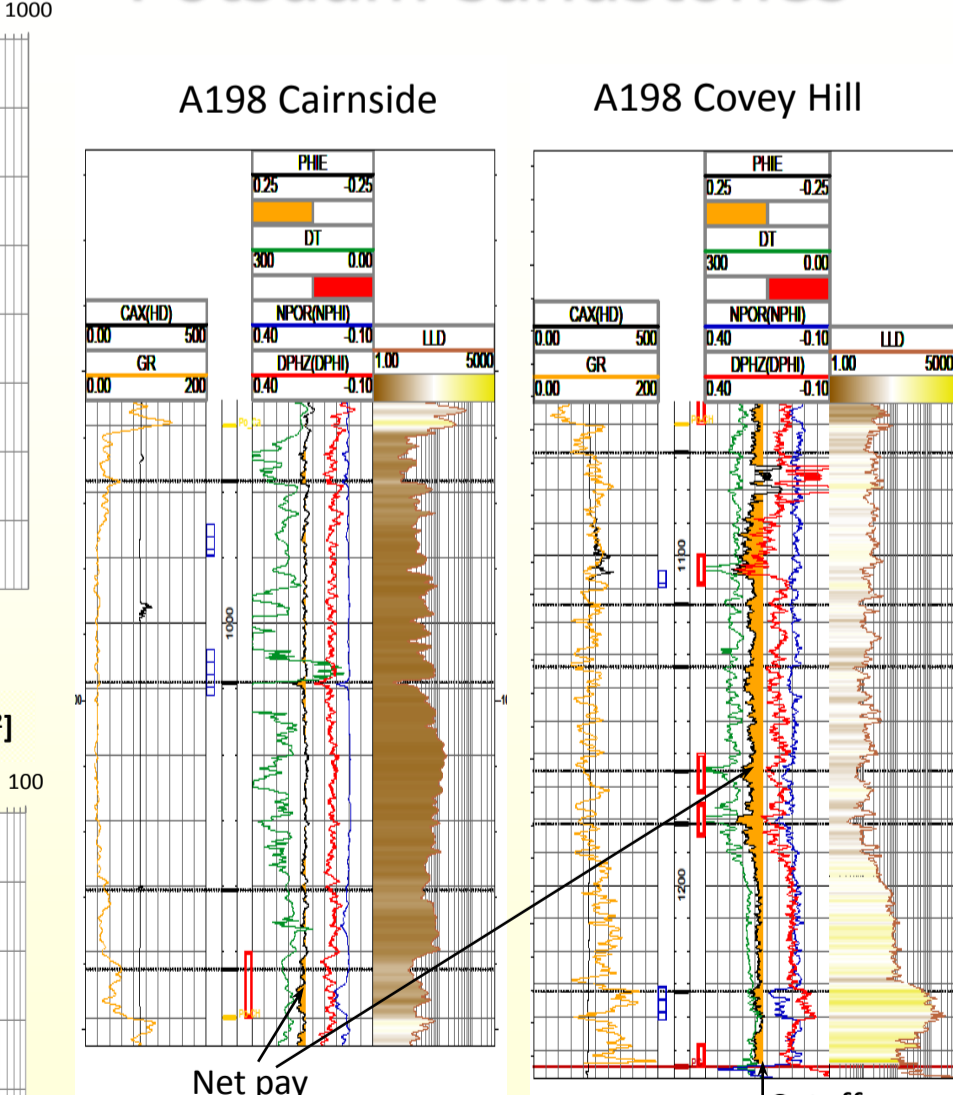
## Porosity cutoff determination



## Net pay



## Effective porosity in the Potsdam sandstones



- Net pays of the Potsdam Group are the greatest with respect to other stratigraphic units.
- Lithostratigraphic units are laterally continuous in the reservoir.

Acknowledgements:  
This research is financed by Ministère du Développement Durable, de l'Environnement et des Parcs du Québec.