Characterization of deep saline aquifers for CO₂ storage in the Bécancour region (Québec)

Goal

Charakterize hydrogeological and petrophysical properties of the deep saline aquifers to assess the feasibility of the CO₂ sequestration in the Bécancour region by analyzing existing hydrogeological, 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 different blocks by the Yamaska normal fault. Their thicknesses are increasing from the NW to SE across the Yamaska fault. The area is tectonically stable.

Hydrostatic pressures

Artesian rates

Reservoir temperature

Measured brine salinity

Brine density and viscosity

Formation density

Effective porosity in the Potsdam sandstones

Core permeabilities

Porosity/permeability histogram

Main parameters of the aquifers

Porosity cutoff determination

Net pay

Net volume of net pay per surface [m²]

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 (kx much lower than ky).
• The Covey Hill sandstone reservoir (at 12 km of depth) is the best candidate for the CO₂ storage with Pz=14 MPa, Ts=35°C, S=109 g/l, k=0.3 mD, n=6% and net pay=188 m.
• The supercritical CO₂ state starts at 1145 m in the Covey Hill sandstone in the foot wall block of the Yamaska fault.

References


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Legend

• Tvd [m]
• Pressure [kPaa]
• Temperature [°C]
• Salinity average [g/l]
• Formation thickness of deep block [m]
• Formation thickness of shallow block [m]
• Average parameters

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