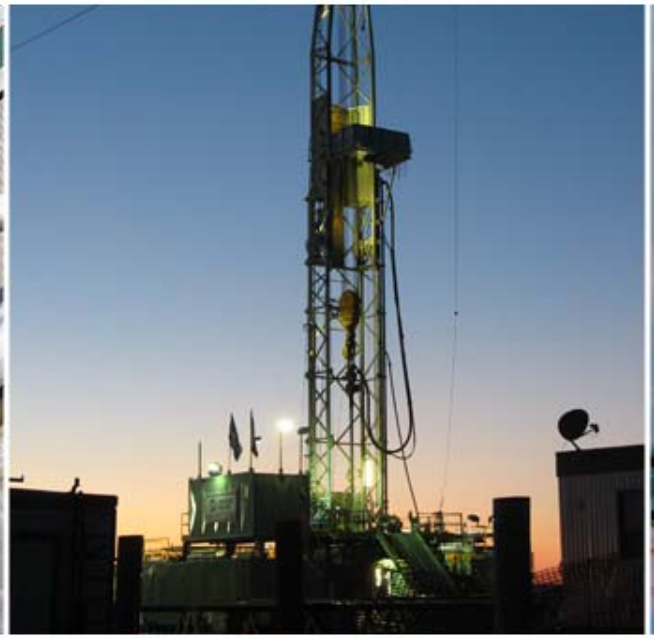
# Utica Shale: Do We Have the Right Map?



GASTEM | Geology & Geophysics Department
Christine St-Laurent, M.Sc., P.Geo.

# The Map (The Past)

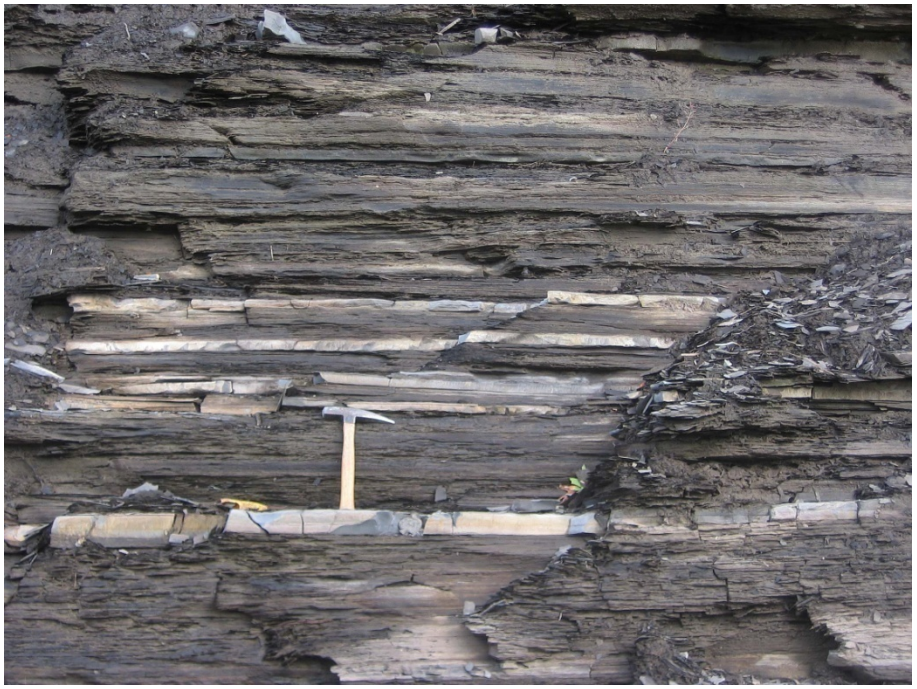
# The Origin (New York)

**The Utica Shale was first described by Emmons (1842) in New York State as a “black shale comprised between the Lorraine and the Trenton”**

Source: Nyahay et al., 2007

# The Origin (Quebec)

**In Quebec it is defined as a “dark brown calcareous shale associated with calcareous siltstone, with a smell of oil” (Globensky et al., 1993)**

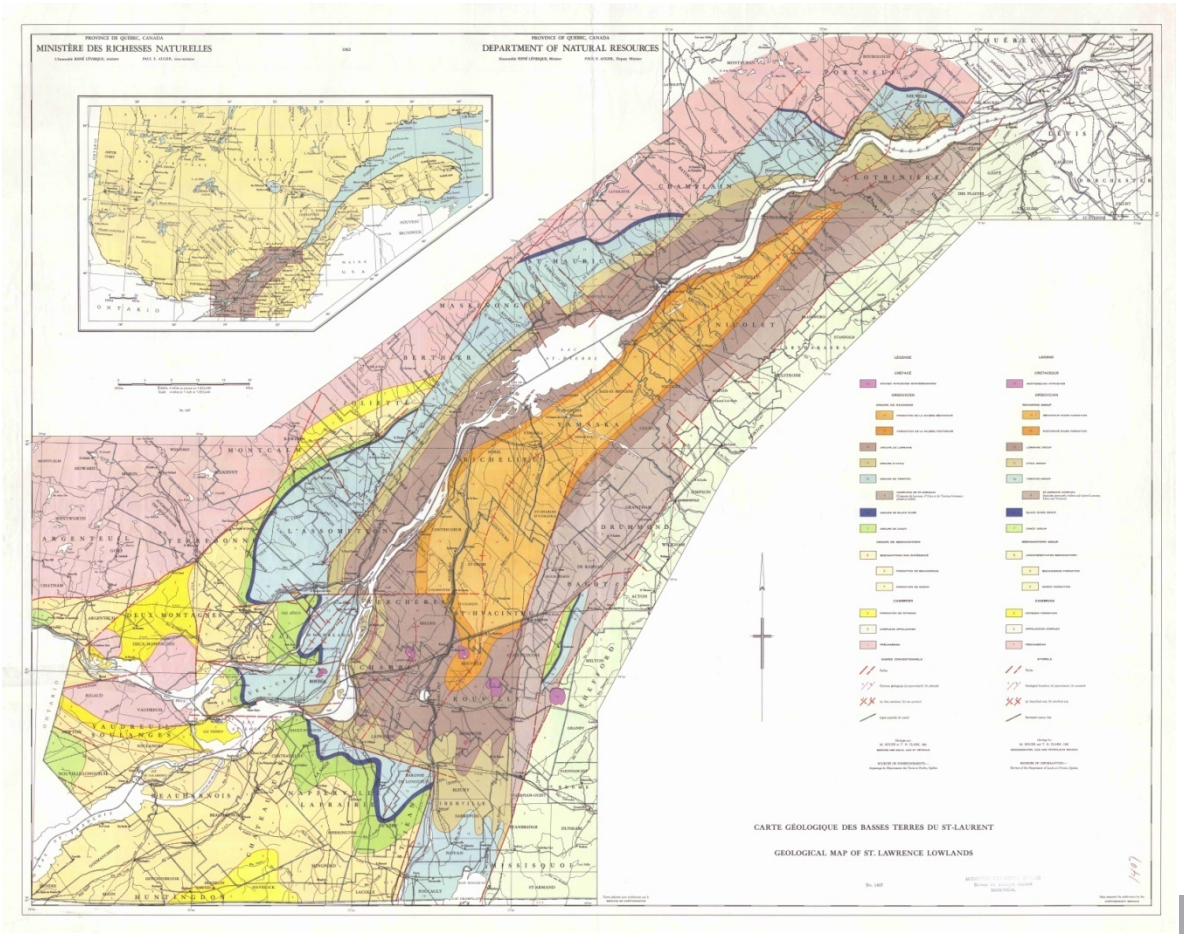


Source: R. Thériault

# Lowlands Geological Map in the Literature

- **This map is the result of compilation work from Houde and T.H. Clark, 1962**

- **It was the first comprehensive map of the Lowlands**

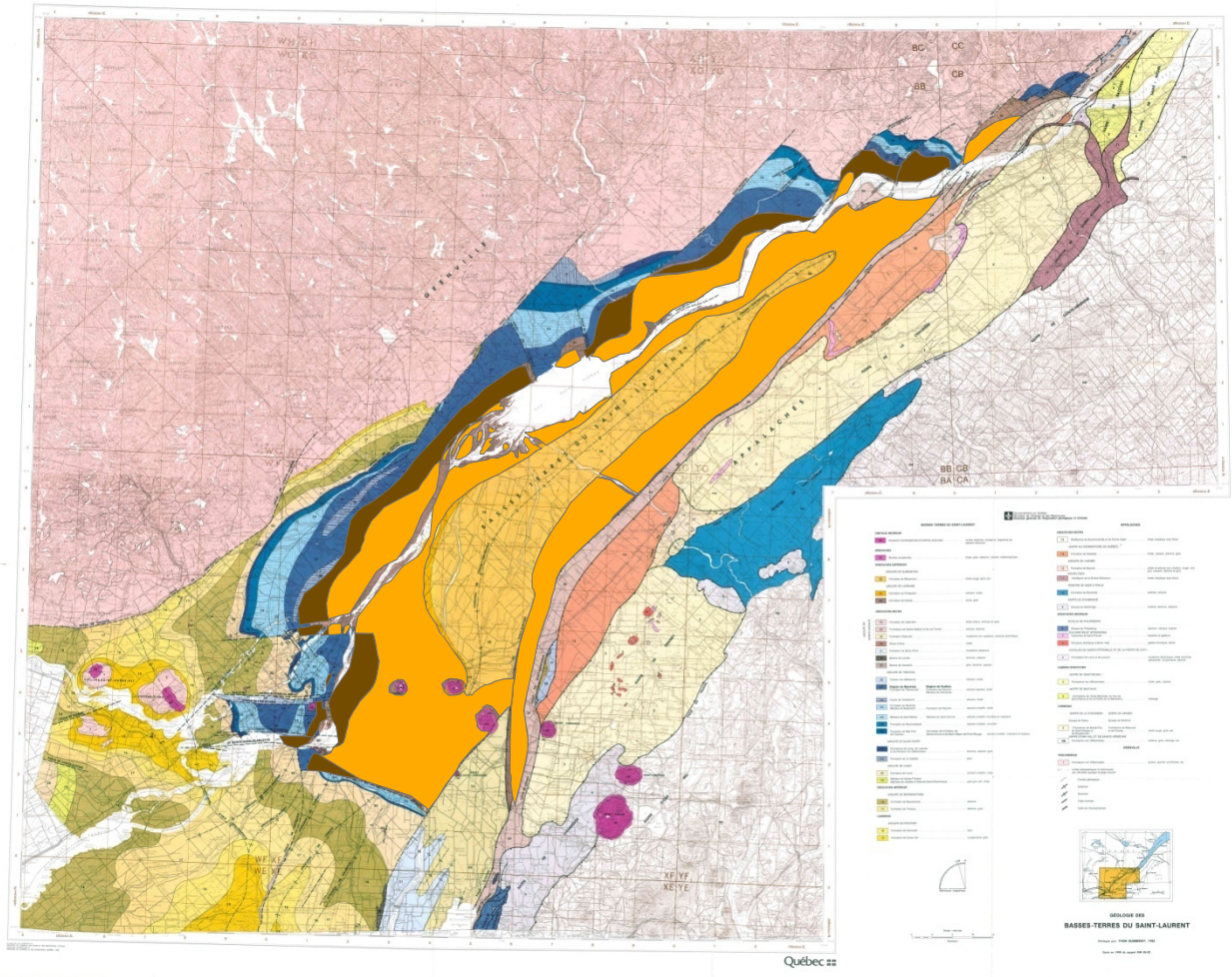


# Lowlands Geological Map in the Literature

- **The most recent map dates back to 1985 by Globensky**

- **This map is an update from Houde and Clark's map**

- **Since then, no other update of the Lowlands geological map has been done**



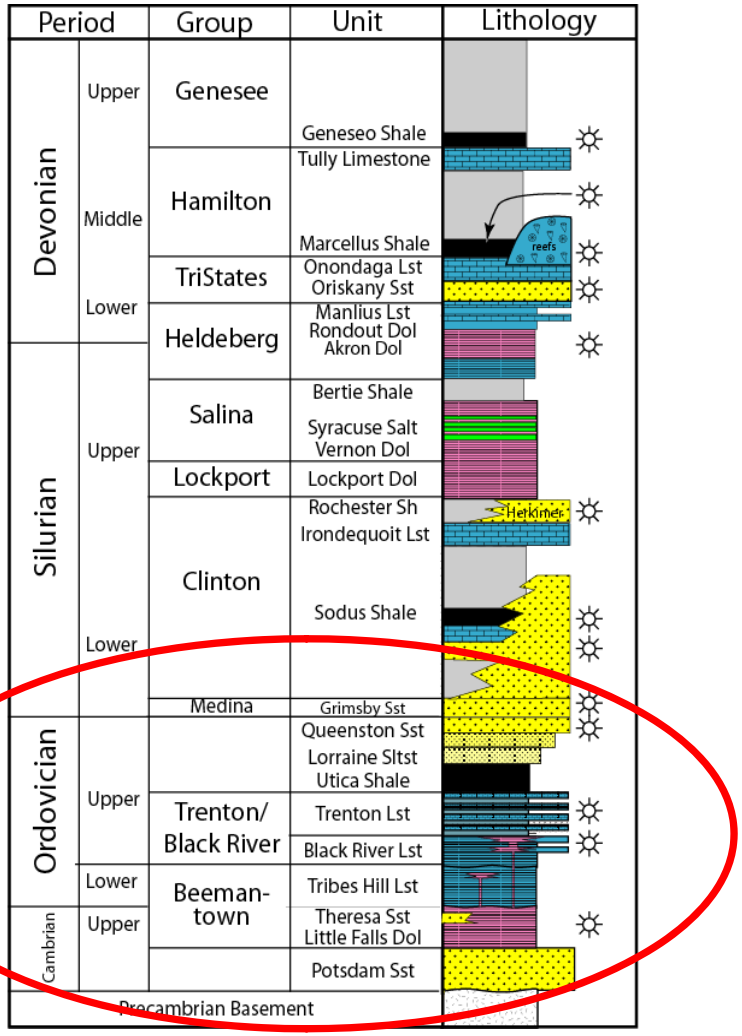
# No more update to the Lowlands map since. Why?

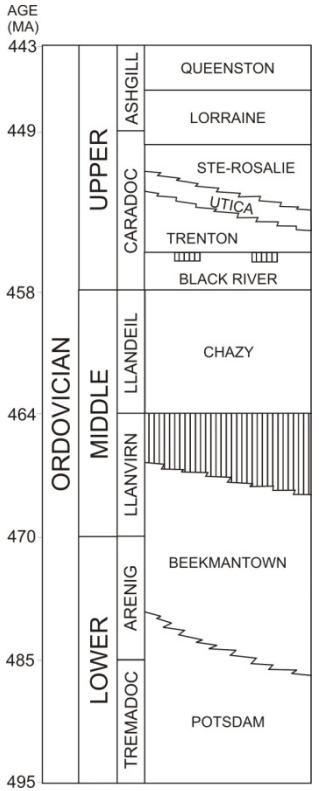
- The main reason for such a lack of recent mapping in the Lowlands is most probably that, until very recently, there was not any real viable economic target in the geological formations underlying the Lowlands.

- Misconceptions? Since the beginning, geoscientists tried to apply chronostratigraphy (instead of lithostratigraphy), as I am going to illustrate later.

# The Terminology (The Present)

# New York and Quebec Stratigraphy

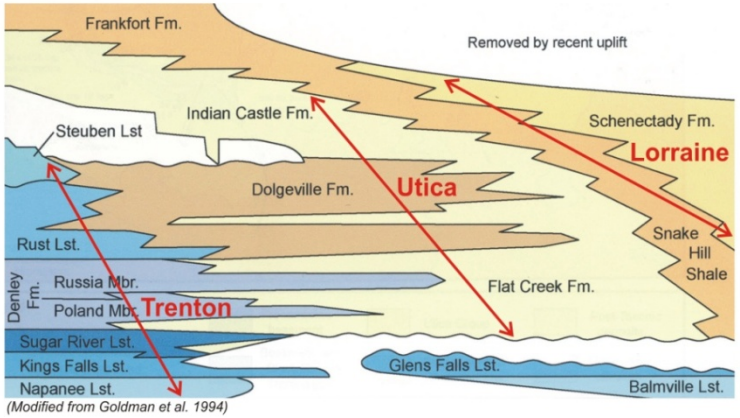


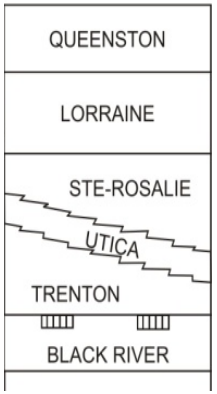

Modified from Lavoie et al., 2008

# How the terminology has been defined through space and time

- Geologists over time tried to find chronostratigraphic markers in the Utica as well in New York State and Quebec
- Unfortunately, as stated by Clark, 1972, except for the lowest part of the Trenton and the upper part of the Utica, the two units are essentially contemporaneous



(Modified from Goldman et al. 1994)



Modified from Lavoie et al., 2008

# Lorraine-Utica Boundary

Lavoie et al., 2008:

- “The limit between the Utica and the Lorraine is put at the first sandstone bed in an otherwise fine grained (mudstone and siltstone) dominated succession”
- “Such transition is definitely not easily recognized everywhere as the distal flysh of the Lorraine Group are not always marked by significant sandstone beds”

# Utica-Trenton Boundary

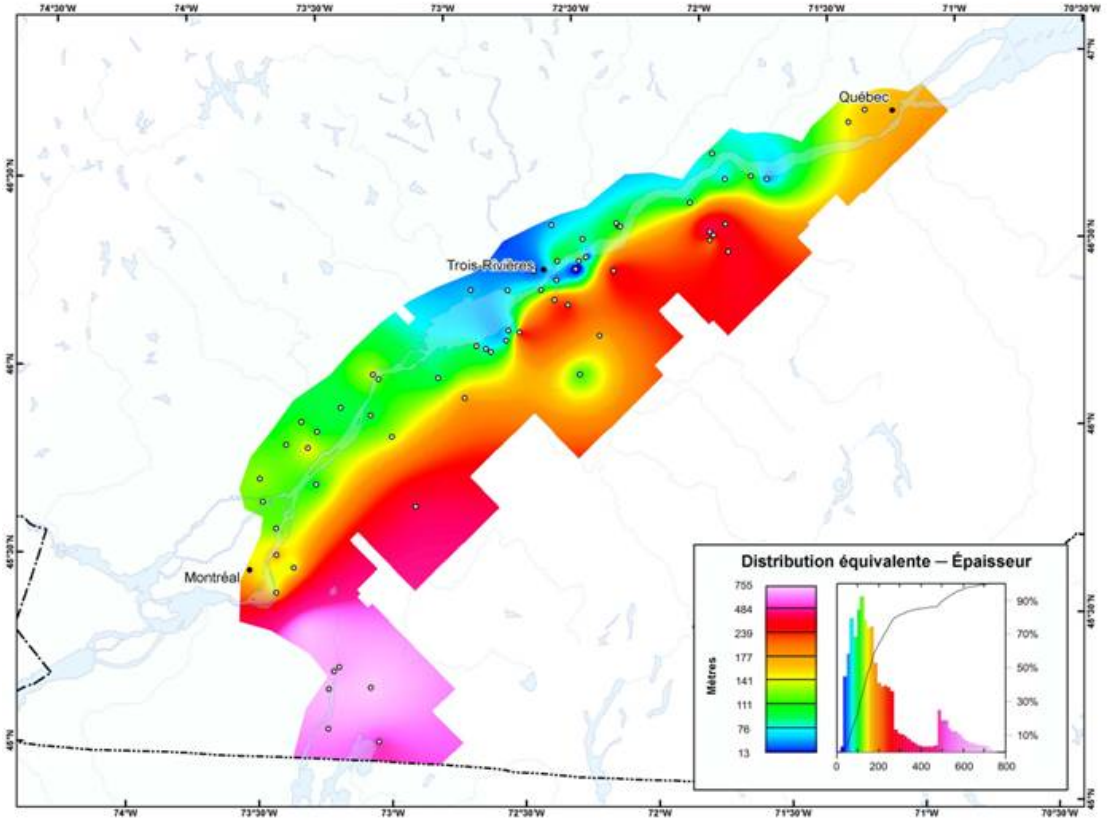
- Lavoie et al., 2008: “The limit between the two units corresponds to the interval where shale dominates the section”
- Globensky, 1987: “On outcrop, the transition is sudden in Montreal area and gradual in the Quebec City area”
- Near Montreal, the transition in some wells is more progressive, possibly because they were drilled further inside the basin.

# Stony Point and Iberville Formations: long lost relatives of the Utica and Lorraine?

- Stony Point:
  - Conformably overlies the Montreal fm
  - Calcareous mudstone
  - Oceanic depositional environment
- Iberville:
  - Gradual change from the top of the Stony Point to the Iberville
  - Non-calcareous flysh mudstone
  - More proximal depositional environment

# Stony Point and Iberville Formations: long lost relatives of the Utica and Lorraine?

Robert Thériault integrated the Stony Point data in his Utica thickness map, extending the Utica down to Vermont.

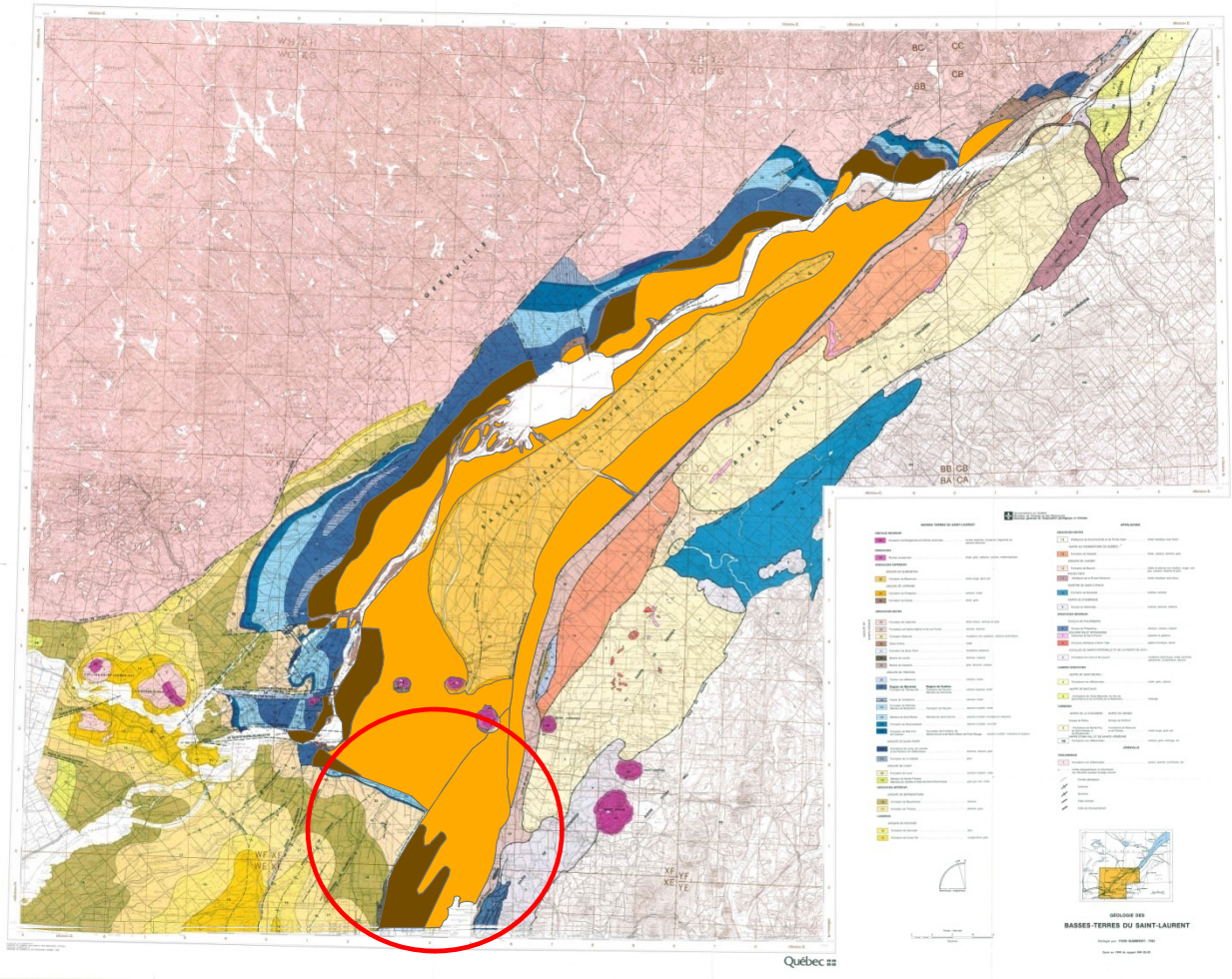



Source: R. Thériault, 2009

# What's Coming (The Future)

# A different map, just for fun

- **If the Stony Point and the Iberville are part of the Utica and the Lorraine, then this will modify the aspect of the Lowlands geological map**



# What' coming

It is now time to establish the basis of a rational stratigraphic framework for the Utica Shale in Quebec, a framework that accounts for:

1. The lateral and vertical variability of the shale as well as its diachronicity;
2. The contemporaneous tectonism that influenced the depositional setting of the terrigenous material and had an impact on the preservation of the organic matter.

# Collaboration is the key!

- More scientific work is needed (like Robert Theriault's);
- Industry must work with the government and academia to build solid basis for exploration;
- The Utica Fairway as we know it will stay the same, but it will evolve and be refined through time.

# Many Thanks to…

- Stephan Séjourné
- Richard Nyahay
- Robert Thériault

- T. H. Clark, for his formidable work over the years, his prose and sense of humour

# And Finally: Clark on the Utica

**« I would suggest that advice from experts be sought concerning the desirability of applying such production-boosting processes as acidizing, hydrafrac or sandfrac methods to selected zones. Until such additional tests have been carried out one can hardly say that the underlying rocks have been fairly tested. »**

**T.H. Clark, 1953**