

Lower Carboniferous Source Rock Characterization – Cape Rouge Formation, Conche Newfoundland

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Presentation Summary

- (1) Motivation, Aims and Research Objectives
- (2) Stratigraphy of the Anguille Group (NL) and equivalents (NB, UK)
- (3) Lithofacies and Geochemistry Summary of organic-rich facies
- (5) Offshore Potential?

Thank you to:

Peep



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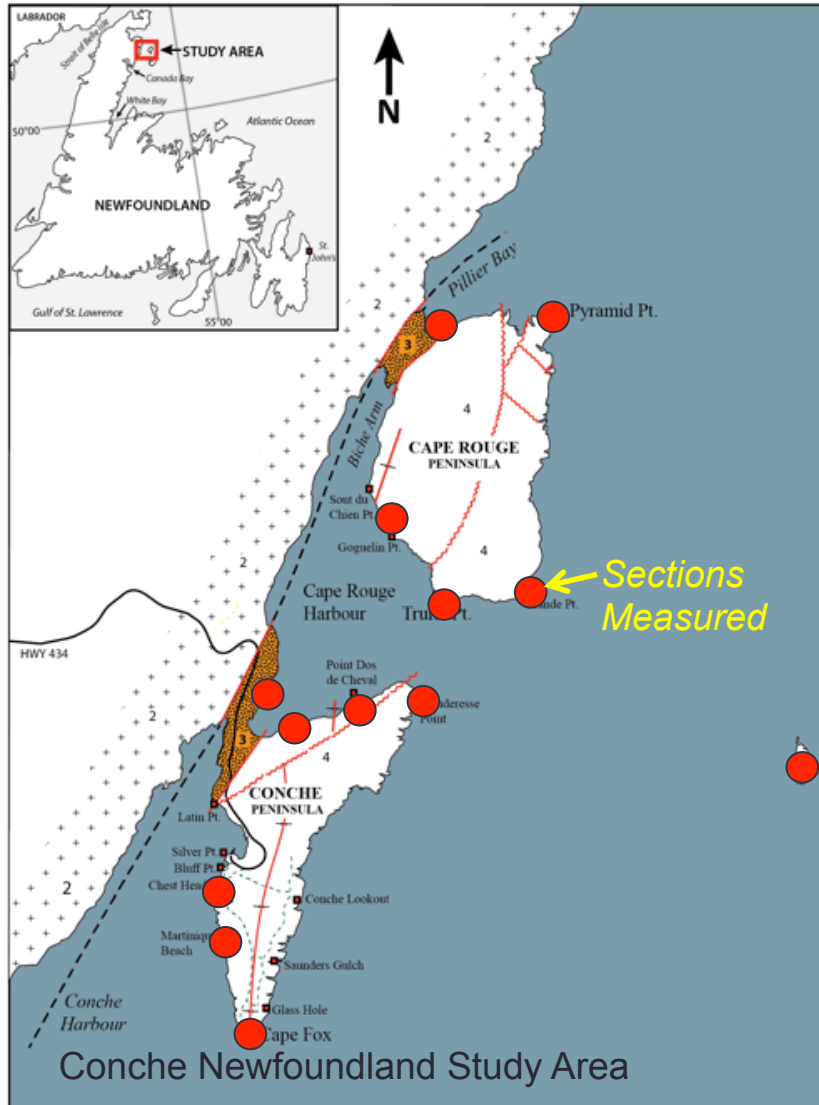
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Aims

- (1) Develop a better understanding of the source rock prospectivity of the Lower Carboniferous Anguille Group (Cape Rouge/Crouse Harbour Formations) in the Conche Region, Northern Newfoundland.**
- (2) Provide a better understanding of the sedimentological and diagenetic factors controlling the quantity and quality of source rocks**
 - Through the comparison of equivalent historically proven commercial oil shale successions.
 - Albert formation, New Brunswick
 - Strathclyde Group, Midland Valley of Scotland
- (3) Identify processes responsible for source rock destruction**

Results will aid in accessing the risk of future exploration offshore (White Bay Sub-basin, St. Anthony Basin).

Research Objectives



(1) Geological Survey of Conche Study

(2) Identified promising source rock successions

Key stratal surfaces & local architectures

(3) High resolution lithofacies characterization and geochemistry for high TOC intervals

(4) Identify the physical, biological & chemical processes that account for the variability in strata

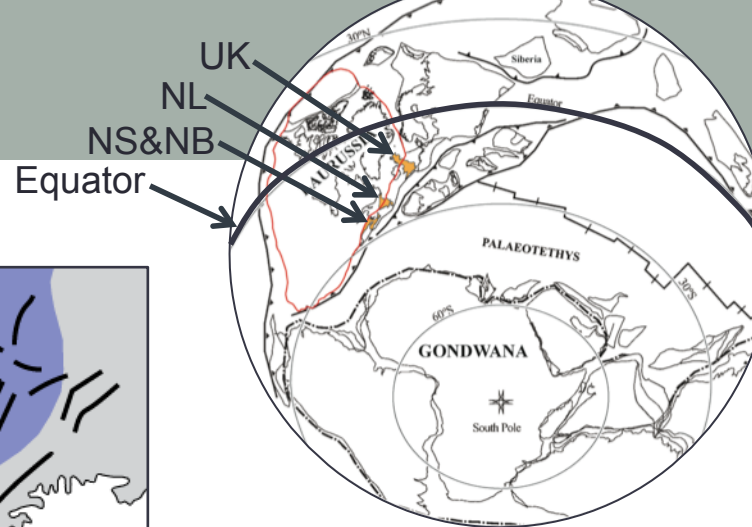
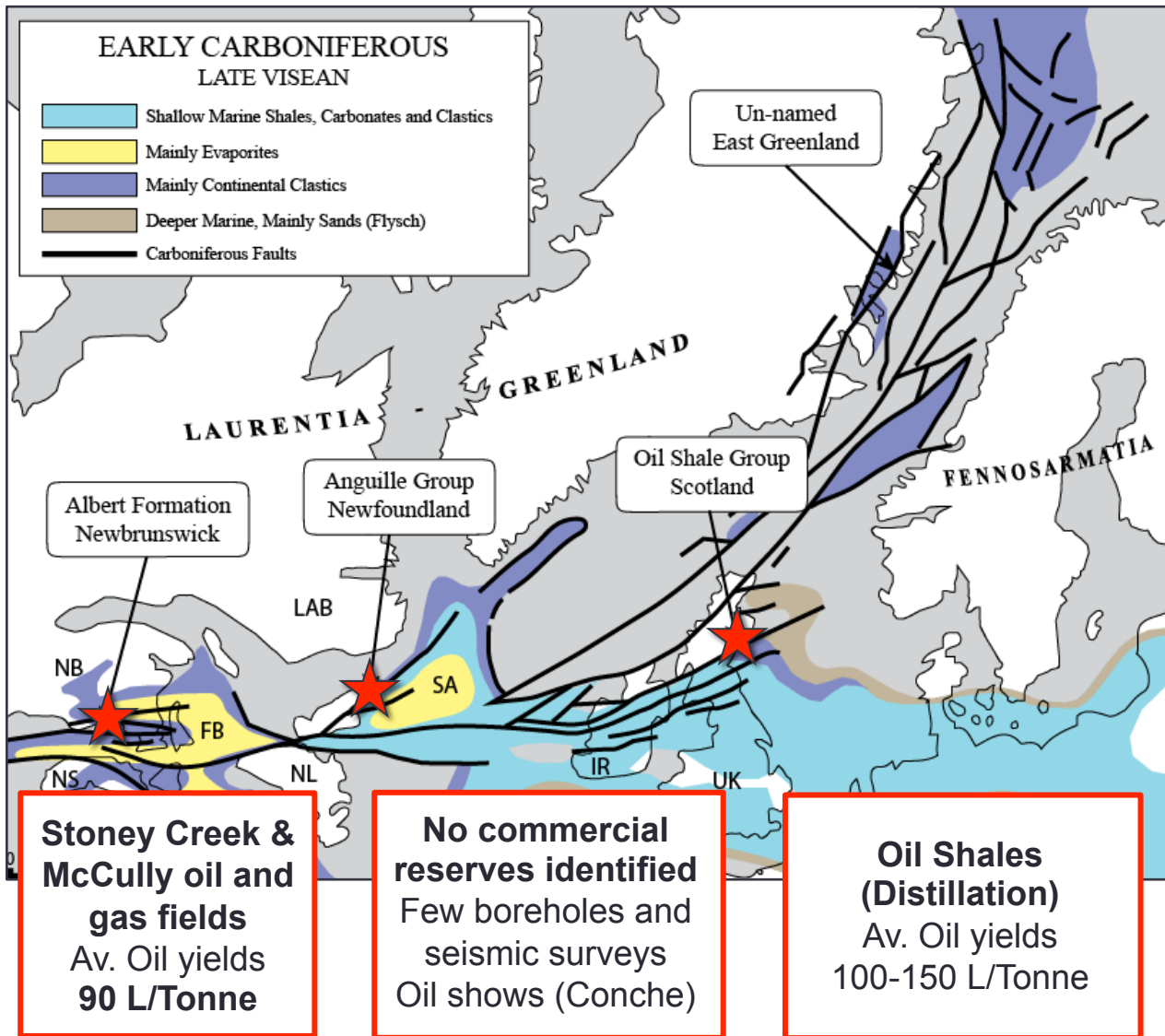
TOC, XRD, SEM

(5) Lake-Basin Type Model

(6) Compare with historically proven analogues of similar age and composition (Scotland, New Brunswick).

Early Carboniferous

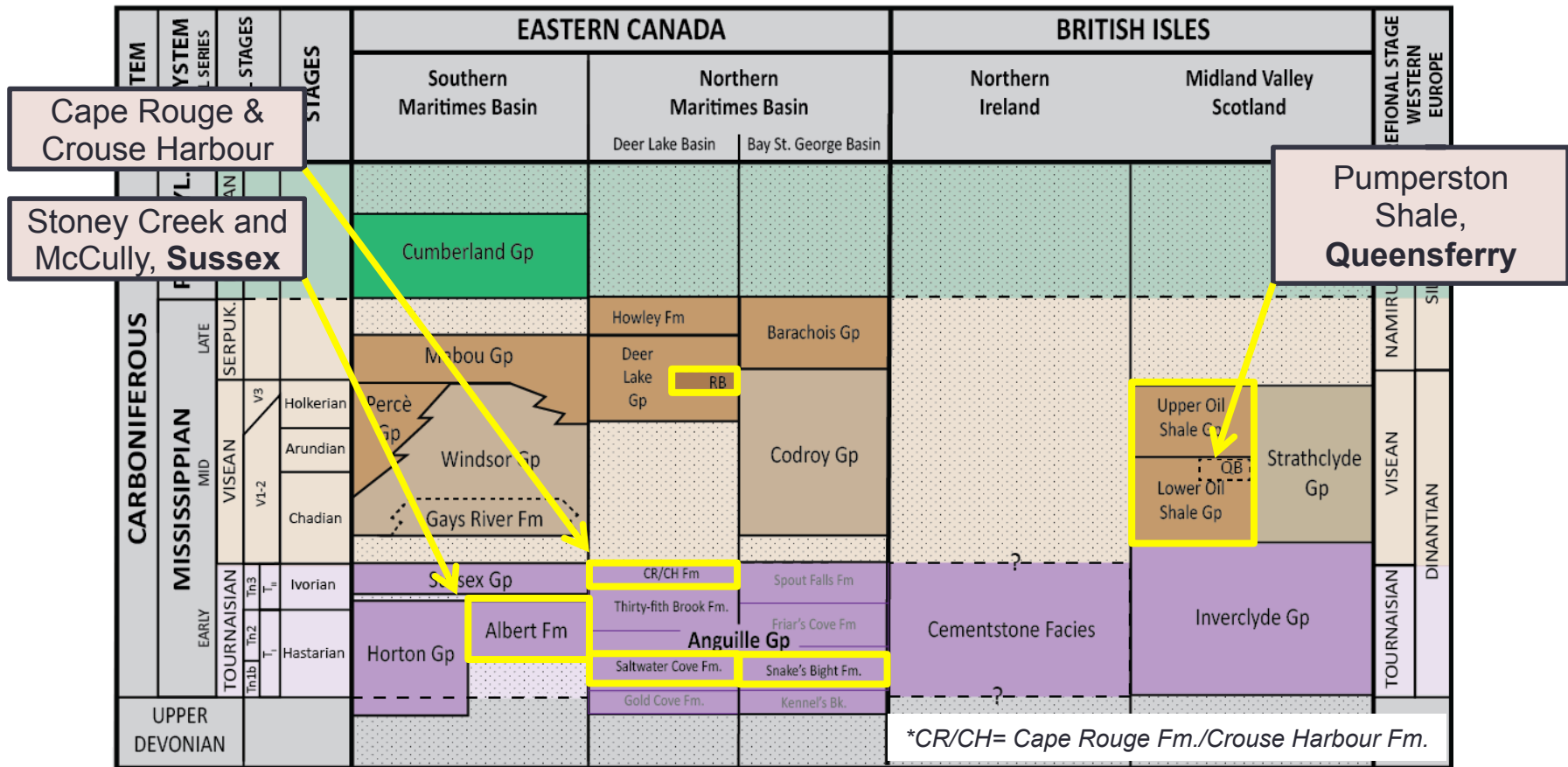
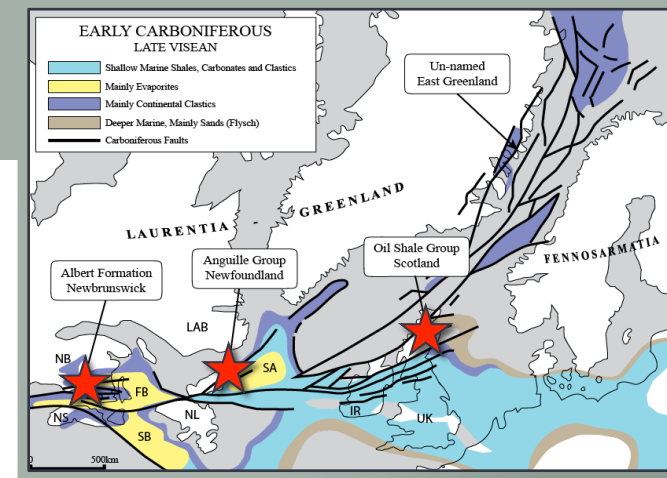
Figure: Paleogeographical reconstruction and major fault lineaments of the proto-North Atlantic rift system during the Carboniferous (modified from Ziegler, 1988).



- **Lacustrine strata of the Lower Carboniferous are widespread across Atlantic Canada and NW Europe**
 - Albert Formation, NB
 - Oil Shale Group, Scotland
 - Anguille Group, NL
- **Deposited along the Proto-North Atlantic rift system**
- **Microflora suggest low latitudes (~ 10-30°S)**

Regional Stratigraphy

- Miospore assemblages of the Cape Rouge/Crouse Harbour Formation are late Tournaisian
- Equivalent to Middle-upper Horton Group in other parts of the Maritimes Basin. Oil Shales from NS and NB are slightly older.
- Queensferry beds dated using ammonoids (Asbian) and are broadly similar age to the Anguille Group.



Mudstone Characterization

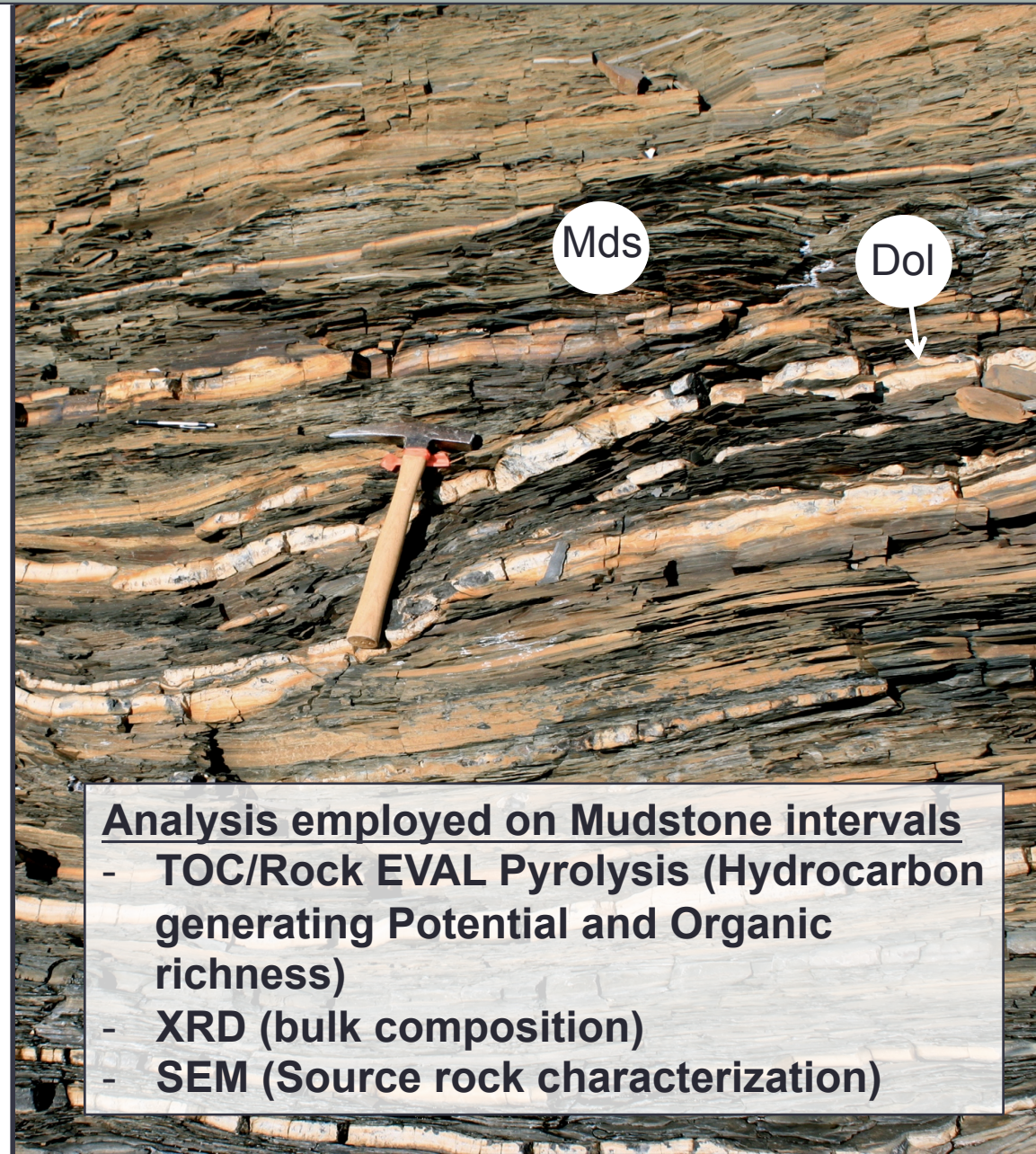
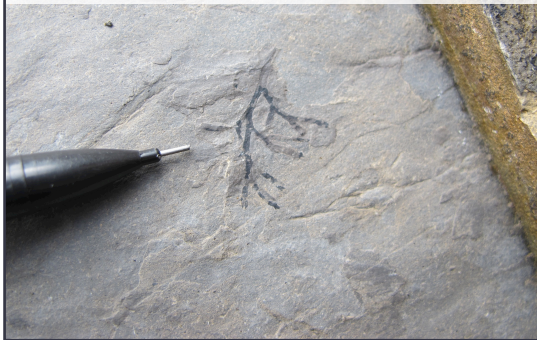
Soft Sediment Deformation



Bituminous hydrocarbon



Carbonized Plant Material



Analysis employed on Mudstone intervals

- TOC/Rock EVAL Pyrolysis (Hydrocarbon generating Potential and Organic richness)
- XRD (bulk composition)
- SEM (Source rock characterization)

Offshore Potential?

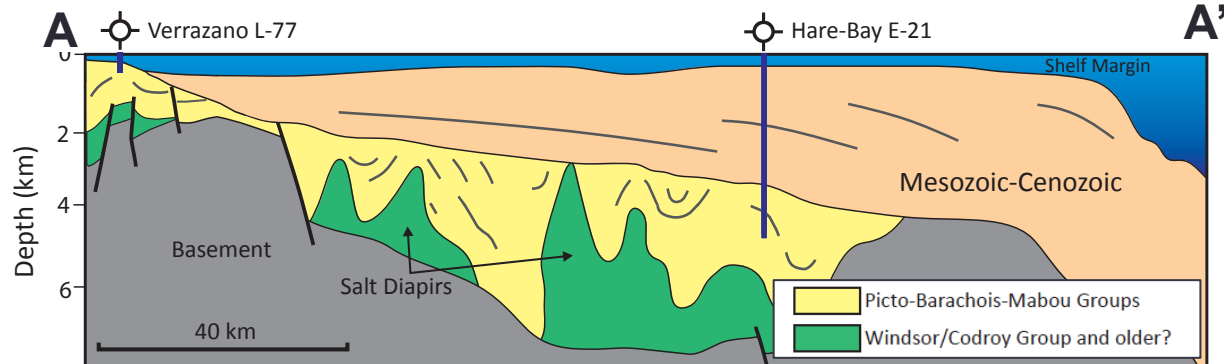
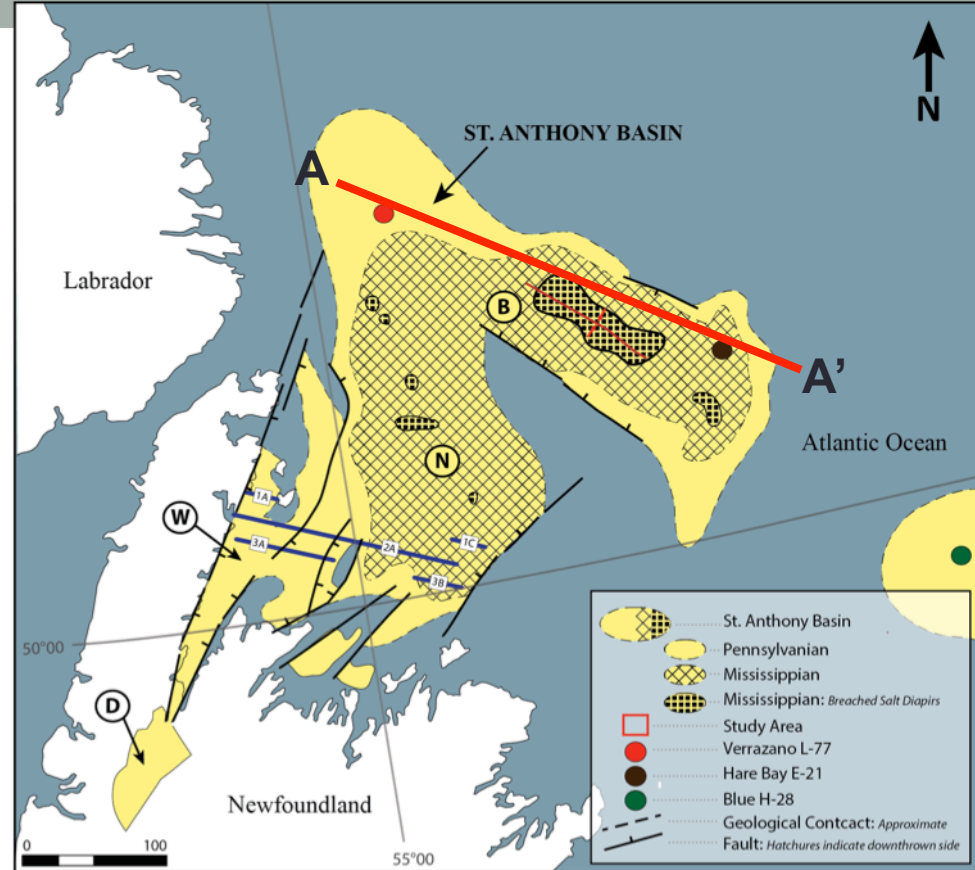
Two wells drilled in St. Anthony Basin verifying carboniferous strata offshore (Verrazano L-77, Hare Bay E-21).

- Verrazano L-77: Incomplete test of the Lower Carboniferous, TD 460m (Visean-early Namurian age).
- Vro 1.4-1.7% (overmature)
- Hare Bay E-21 tested Upper Carboniferous play, porosity values up to 15% (Ave 10%).

Five seismic lines shot in the late 60's (Tenneco)

Asymmetrical sub-basin

Potential for structural & stratigraphic plays



Hydrocarbon Potential Summary (preliminary)

(1) TOC values poor to fair (some excellent)

(2) dominantly Type III Kerogen

(2) Thermal Maturity in Oil Window

(3) In stratigraphic continuity with Alluvial/Fluvial/Deltaic reservoir facies

(4) Both source and reservoir are likely to occur offshore

Ongoing work:

- Lake-type models
- Dolomite deposition
- Identify processes responsible for source rock destruction in Nfld through comparison with Oil shales in Scotland and New Brunswick

