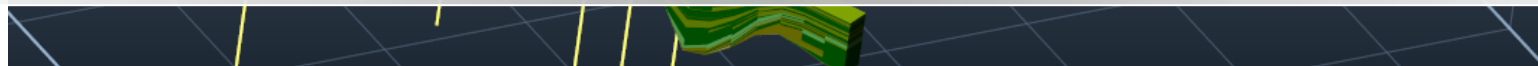


Exploration well failures and reservoir distribution along the Scotian Slope (Eastern Canada)

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Laurent Cuilhe¹, Adam MacDonald², Matt Luheshi³





Acknowledgement



Leptis E & P Ltd.



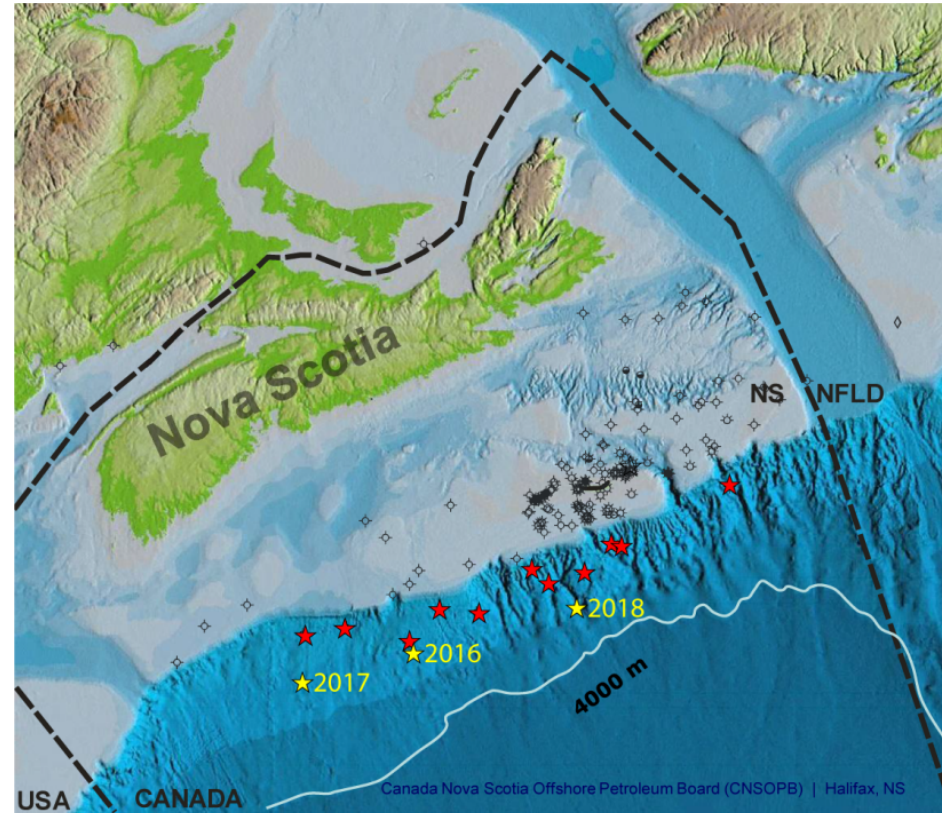
Contents

- Postmortem quick overview
- Central Slope case of study
- Shelburne subbasin case of study
- Sediment fairway and plays



Postmortem overview

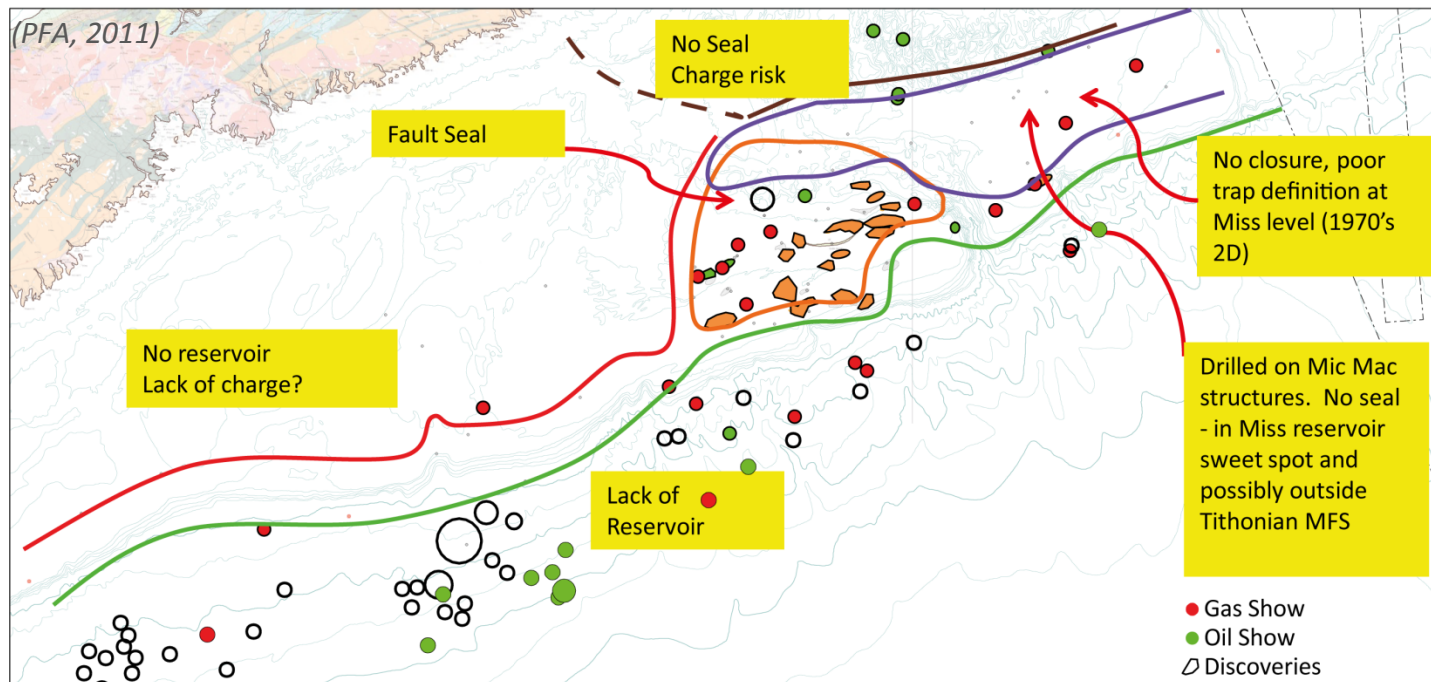
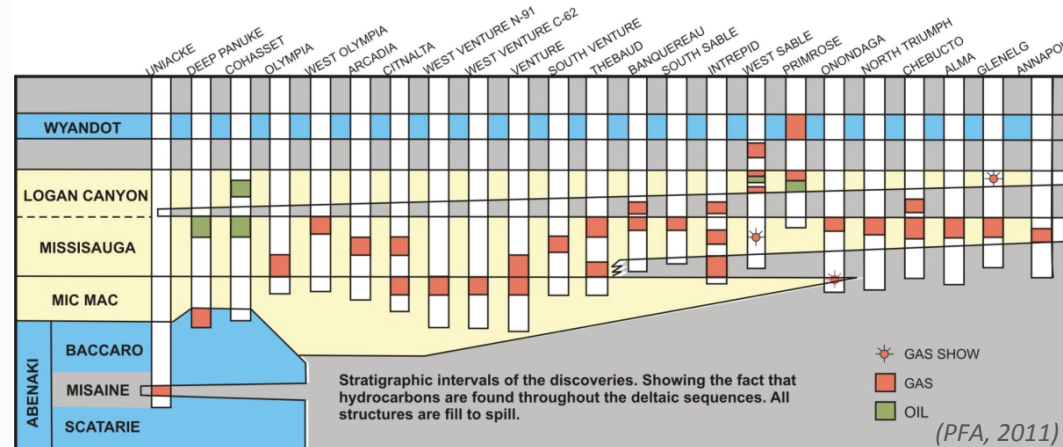
- Exploration since 1967
- Total 127 Exploration Wells; 25 discoveries
- Mostly located on shelf in Sable Subbasin
- 13 Deep Water Wells since 1983 (4 in mid 80s, 6 mid 2000s and 2 in 2016-2017, 1 ongoing 2018)
- 1 discovery in 2004 (Anapolis G24)
- Offshore NS still a frontier basin





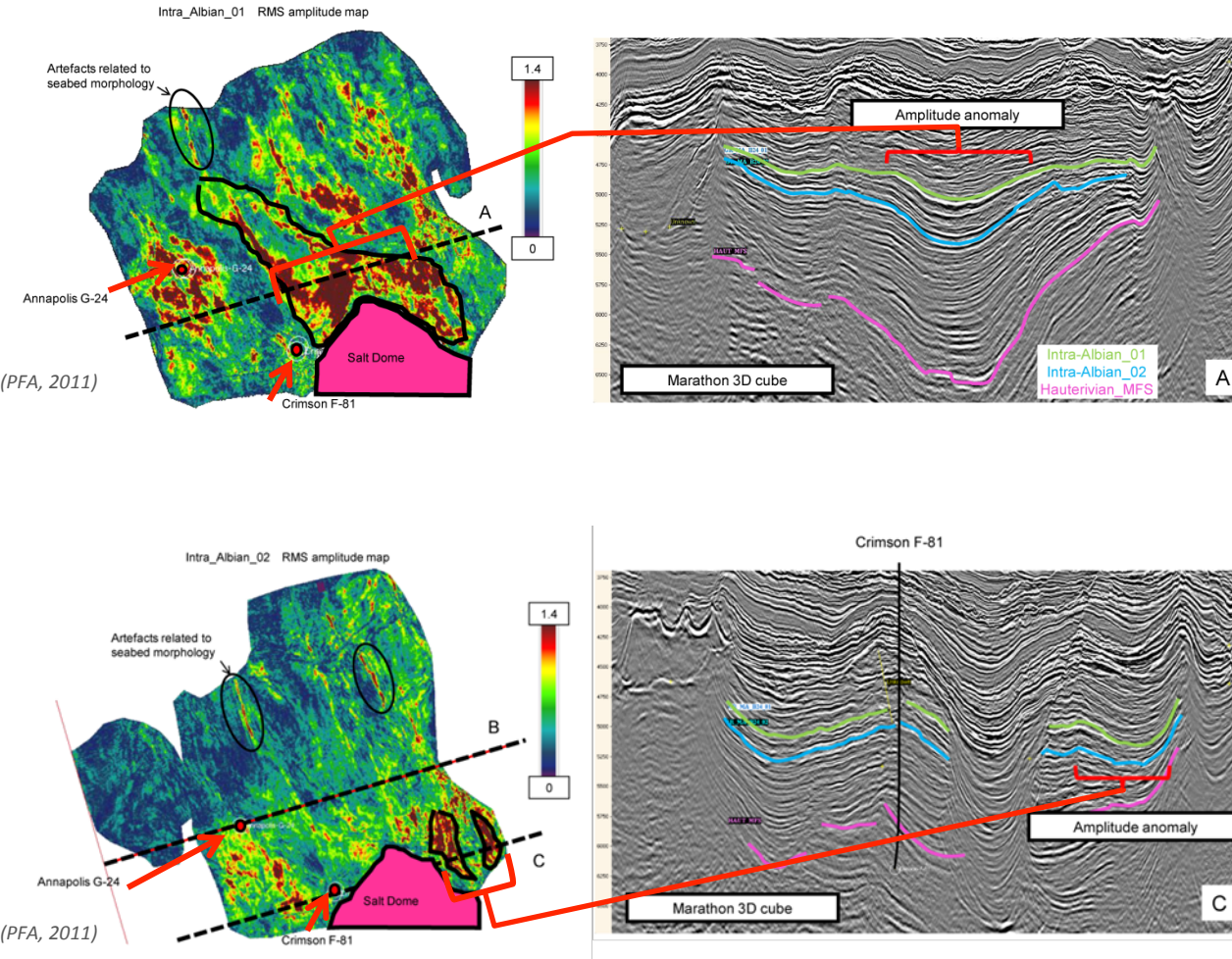
Postmortem overview

Post-mortem analyses have concluded that the issue in finding viable prospects is not the petroleum system but the difficulty to properly predict reservoirs location due to complex salt tectonic





Postmortem overview



- Annapolis and Crimson wells were not located at the best location to reach high amplitude reflectors
- Targets structural high, but not necessarily the proper one.
- Numerous artefacts in amplitude anomalies related to seabed morphology
- Stratigraphic trap should be tested if seismic quality allows



Key Points

- Wells did not targeted high amplitude reflectors
- Major difficulties in predicting reservoir presence and distribution
- Need additional tools to conventional exploration workflow
- Processing issues in 3D seismic volumes: impact of seafloor topography on seismic wave energy (energy preservation or amplification)

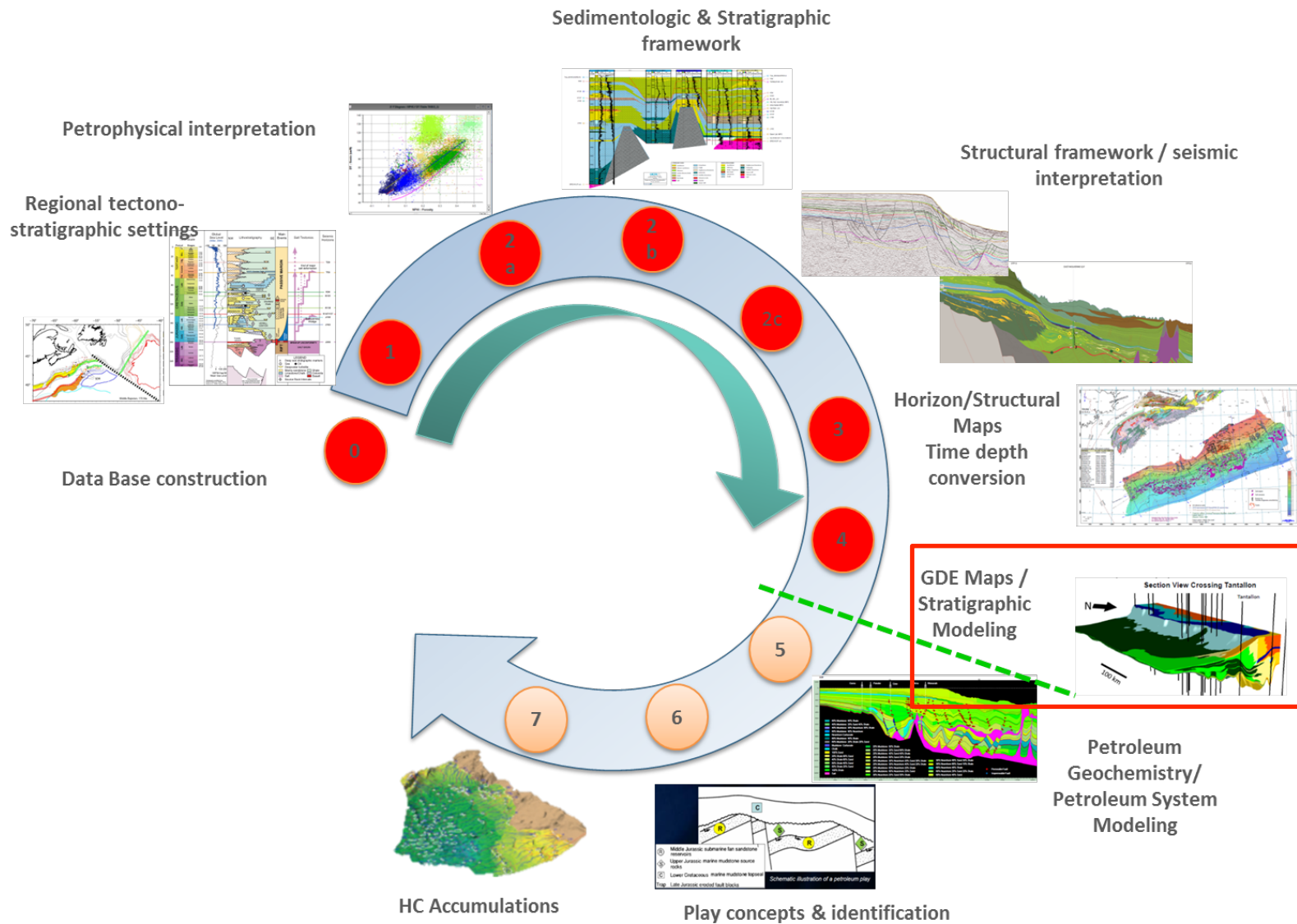


Central Slope case of study





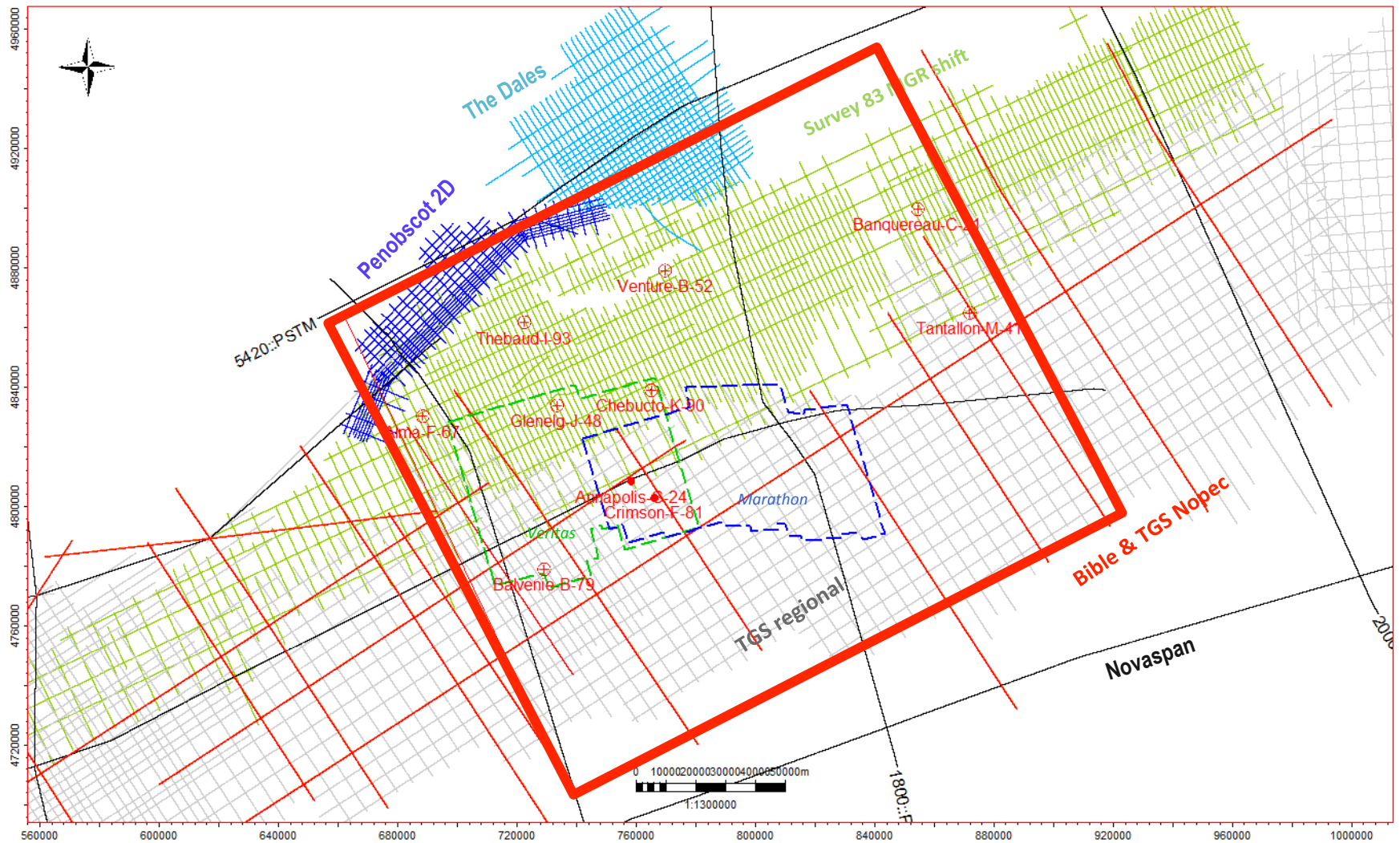
Followed Exploration workflow



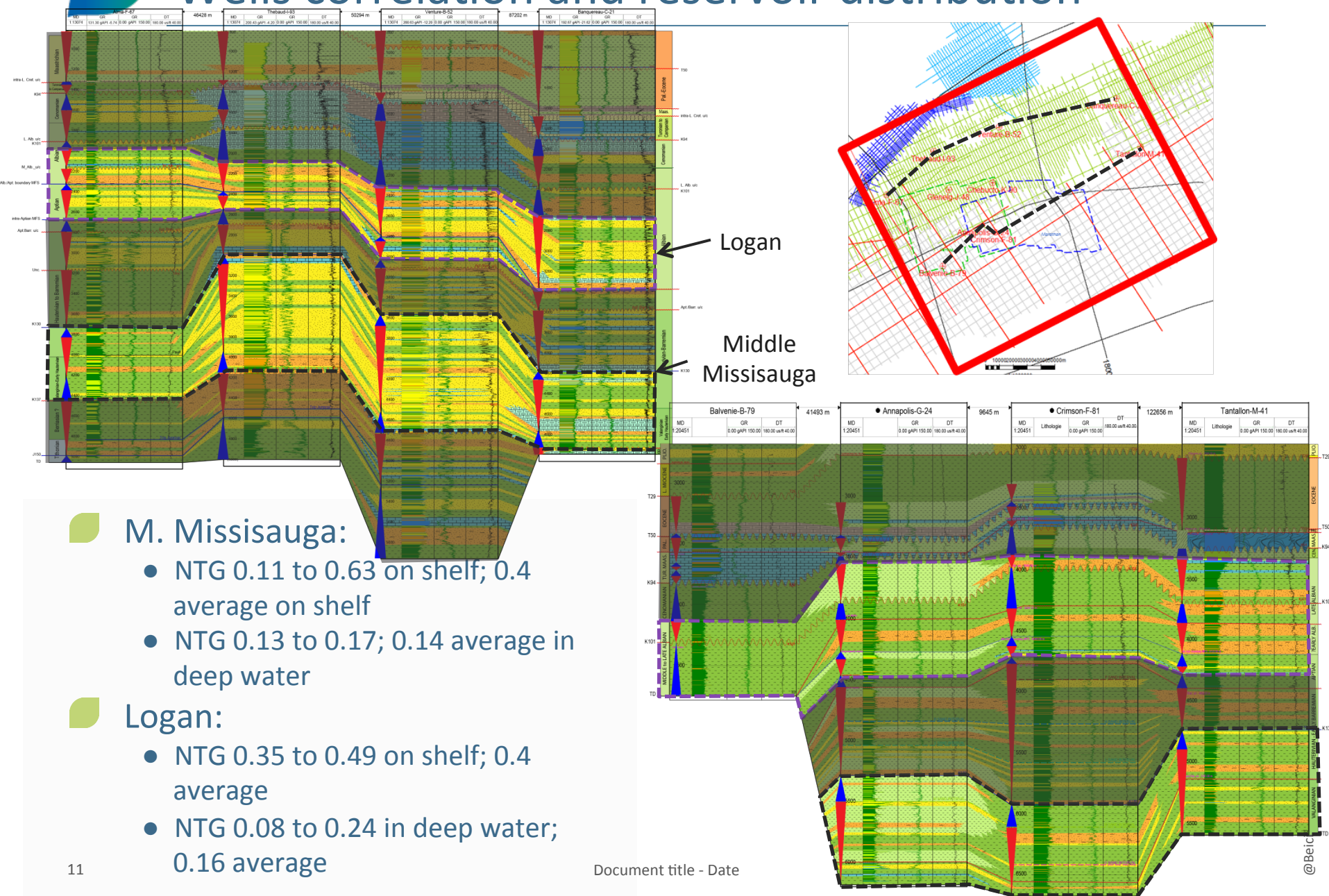


Central Slope case of study

Data set



Wells correlation and reservoir distribution



M. Mississauga:

- NTG 0.11 to 0.63 on shelf; 0.4 average on shelf
- NTG 0.13 to 0.17; 0.14 average in deep water

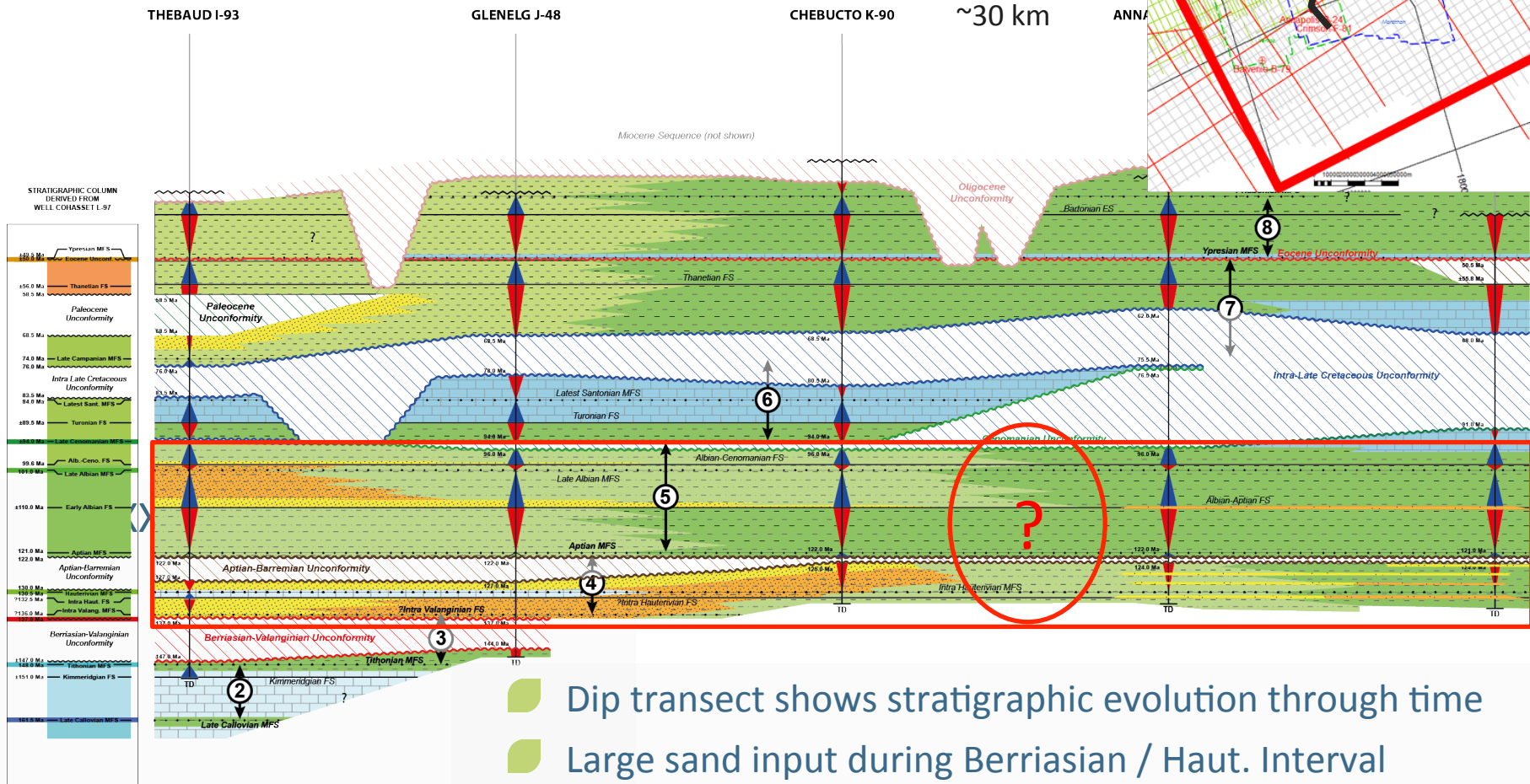
Logan:

- NTG 0.35 to 0.49 on shelf; 0.4 average
- NTG 0.08 to 0.24 in deep water; 0.16 average



Wells correlation and reservoir distribution

Chronostratigraphy, dip section shelf to deep water

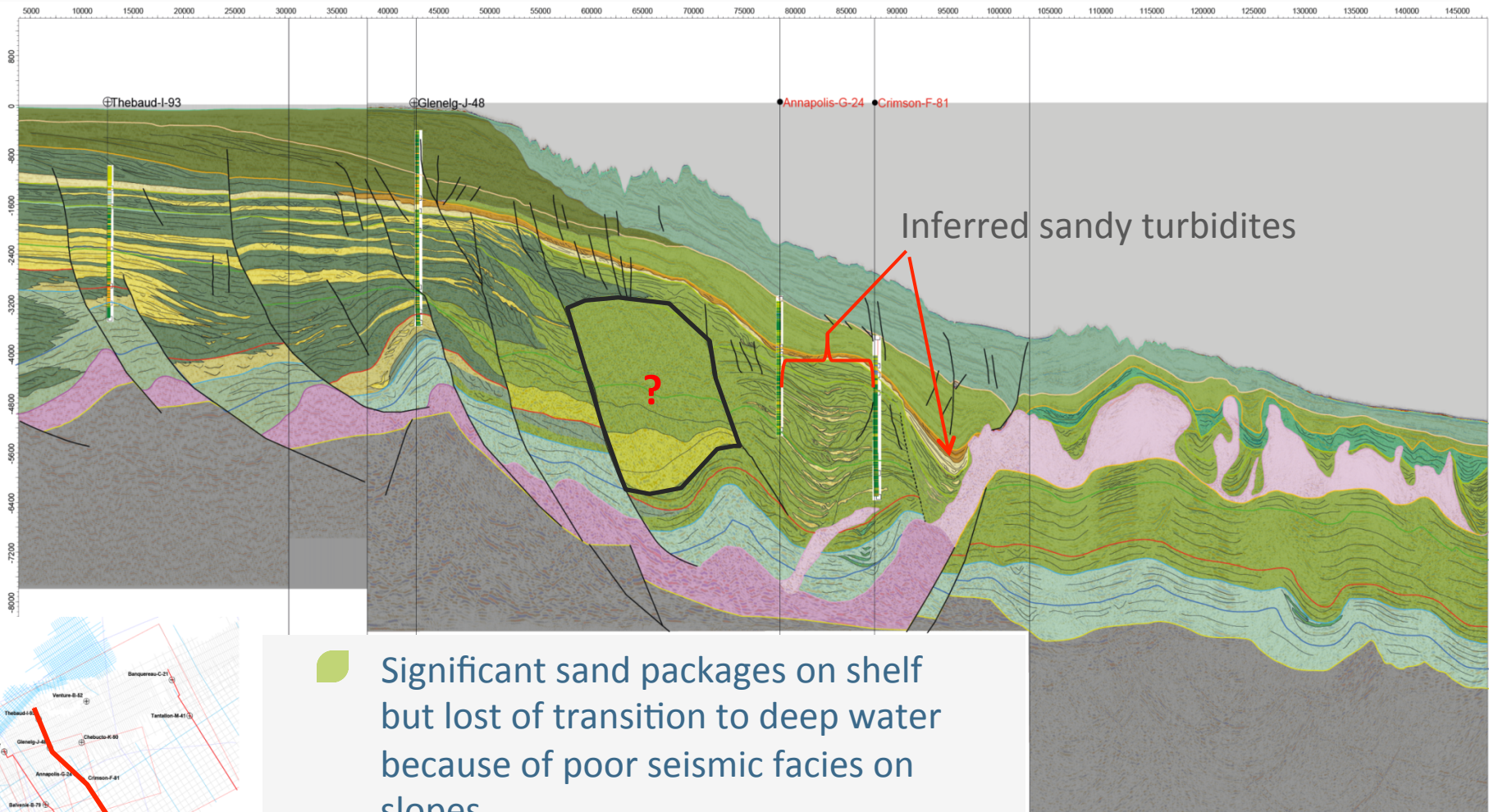


- Dip transect shows stratigraphic evolution through time
- Large sand input during Berriasian / Haut. Interval (Mississauga)
- Lack of sand in deep water wells
- Sand must be trapped between Chebucto and Annapolis



Seismic interpretation and lithofacies

Thebaud – Glenelg – Annapolis – Crimson transect



Significant sand packages on shelf but lost of transition to deep water because of poor seismic facies on slopes...

Sand facies in between Annapolis and Crimson



Geological model

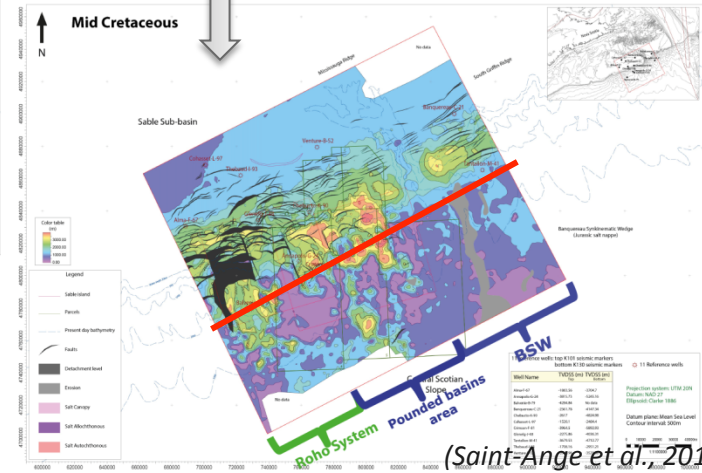
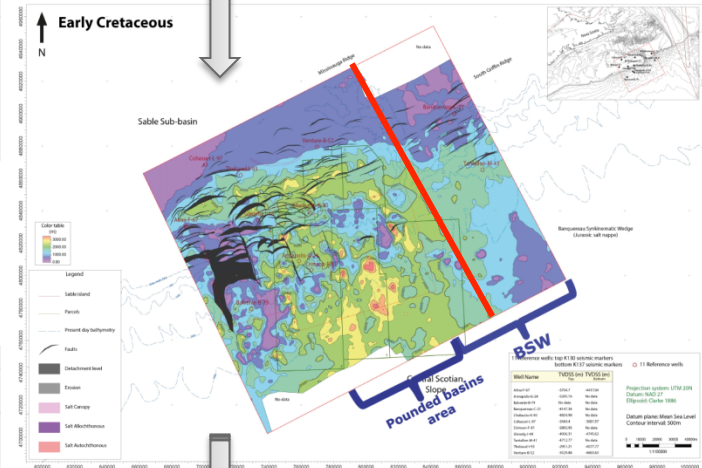
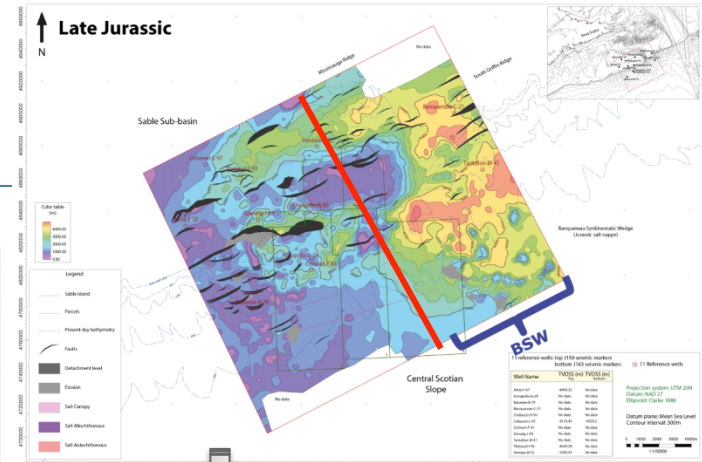
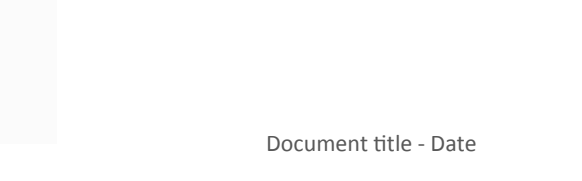
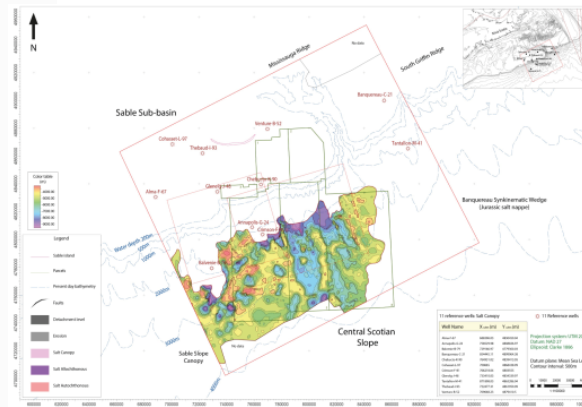
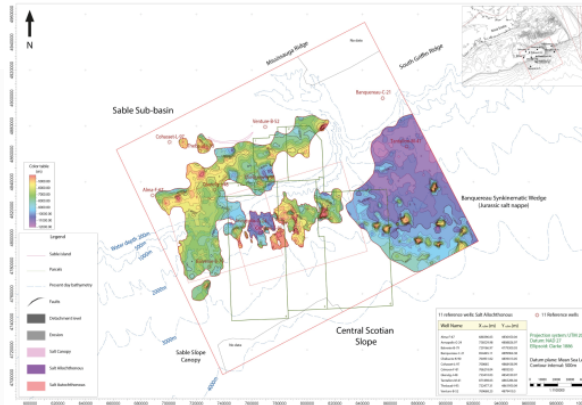
BSW formation during Jurassic

Salt Canopy mid Cretaceous

3 major depocenter Shifts = 3 type of salt controlled basin:

- BSW
- Pounded salt bassin
- BRS

⇒ 3 different salt related plays function of the timing of deformation





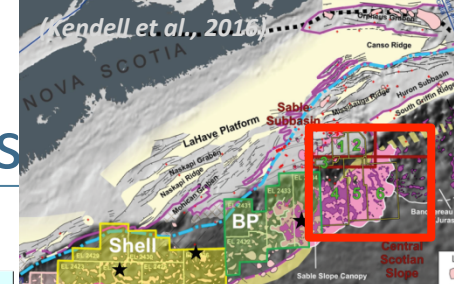
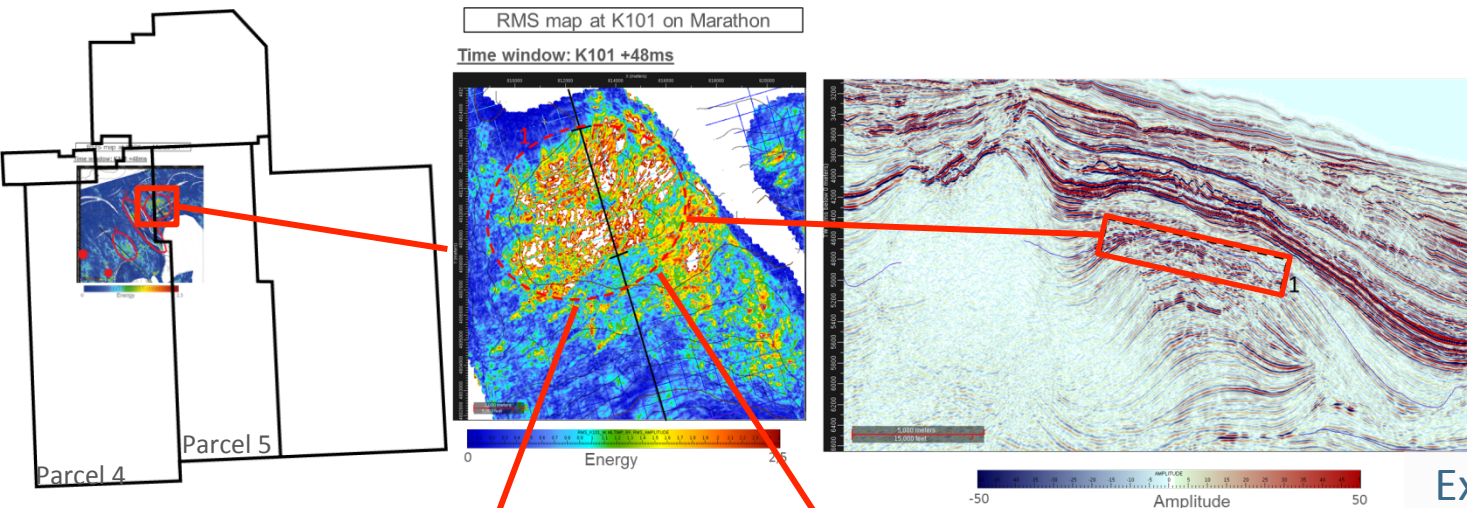
- Use of stratigraphic modelling (Dionisosflow™) ⇒ derisking reservoir presence or lack of



- @Beicip-Franlab

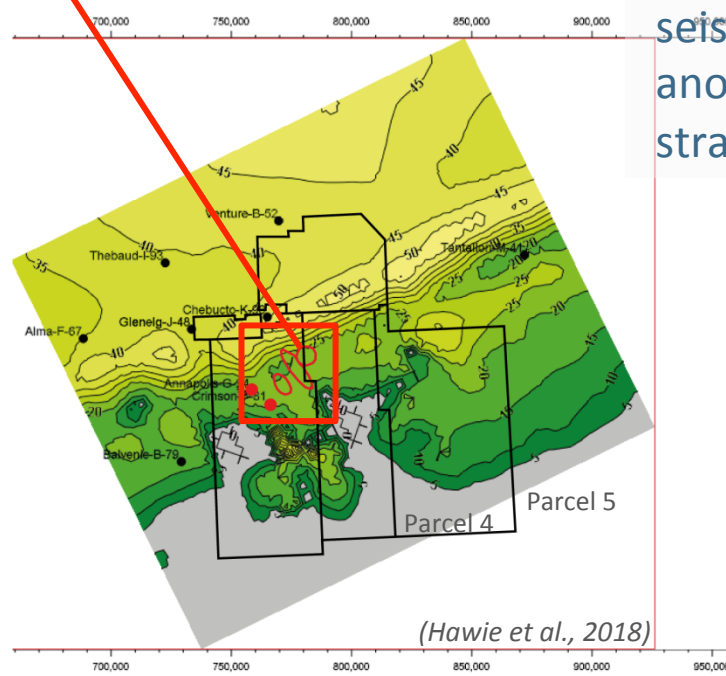
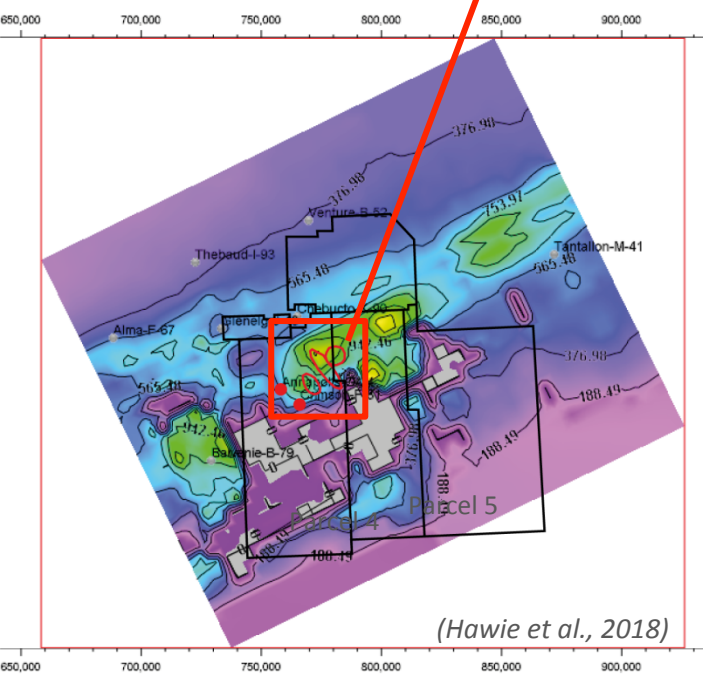


Derisking reservoir presence on prospects



K101 hz
Top of turtle back
structure

Example of cross
correlation between
seismic amplitude
anomaly and
stratigraphic modelling





Summary

- Significant sand trapping at the shelf edge and upper slope exist for the Cretaceous and haven't been tested. Strong potential remains on the shelf in Sable subbasin
- Significant reservoirs with good properties are present in deep water but the use of conventional seismic attribute analysis is not enough to find them
- Using stratigraphic modelling in an exploration workflow in support of 3D seismic data helps in derisking their existence and location
- Understanding the timing of salt deformation is essential for targeting the proper plays and subsequent prospects