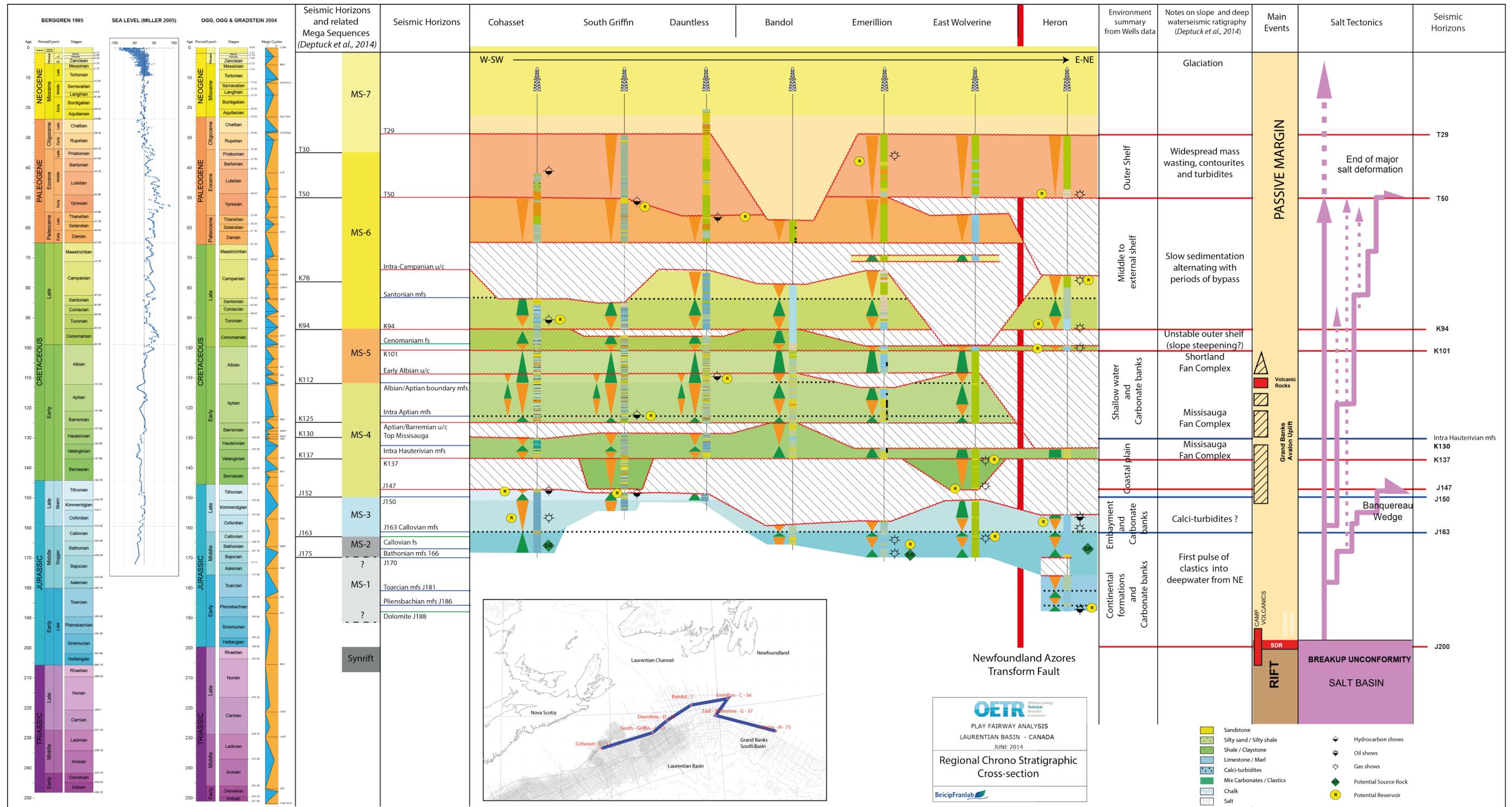


# STRATIGRAPHY

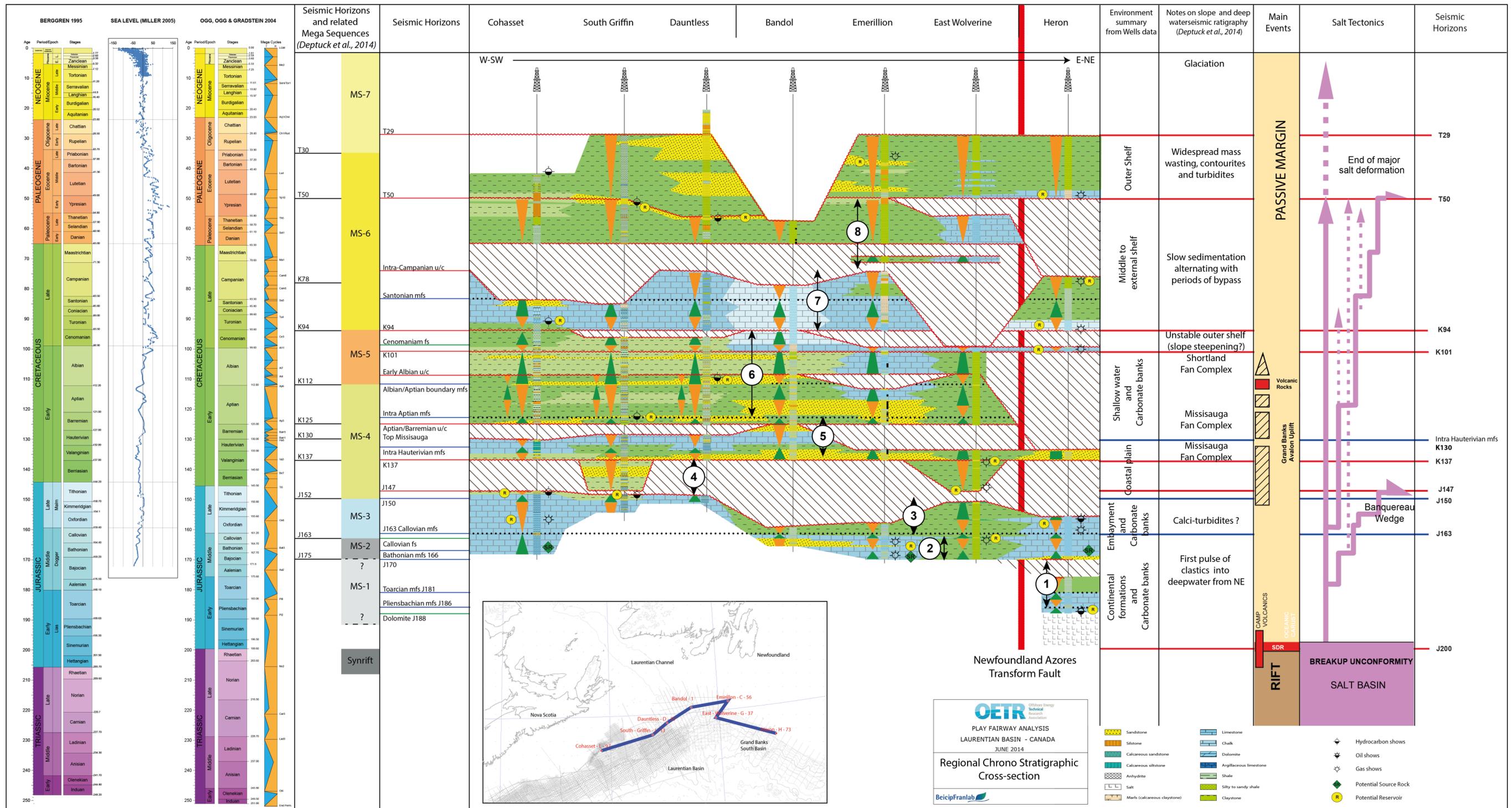
Laurentian sub-basin study - CANADA - June 2014



Regional Chronostratigraphic cross-section

# STRATIGRAPHY

Laurentian sub-basin study - CANADA - June 2014



## Lithologic cross-section in time showing the sedimentary facies and sequences across the margin.

Sequences have been regrouped into 8 sequences to harmonize with the 2011 PFA.

- 1- Pliensbachian to Bajocian:** Overall it is a transgressive formation consisting primarily of dolomite deposited under slightly restricted marine conditions topped by Limestone
- 2- Bajocian to Callovian:** Transgressive sequence with non-marine siliciclastics grading into Callovian shallow-marine oolitic carbonates. Marine shale deposited in late Callovian related to the Callovian MFS which drowned carbonate platforms.
- 3- Callovian to Tithonian:** Carbonate sedimentation restarts at the Callovian-Oxfordian boundary with reef platforms development during the Oxfordian. Offshore, marine shale accumulates (East-Wolverine). Reef development slows down with the Tithonian transgression and is finally drowned with the Tithonian MFS.
- 4- Tithonian to Valanginian:** This interval contains mostly prodeltaic and open-marine shales. During the Valanginian times, shale grades locally into sandstones related to deltaic progradations. Most of this interval is missing on the shelf and upper slopes due to the impact of the Berriasian-Valanginian unconformity (K137).

**5- Valanginian – Aptian sequence:** Following the drowning, reef platforms stop developing until the intra Hauterivian MFS. During the beginning of the regression patchy carbonate platforms develop away from siliciclastic inputs. Most of the sedimentation is dominated by shallow-marine siliciclastics input. The Aptian-Barremian unconformity is recognized across the Laurentian Basin.

**6- Aptian – Cenomanian:** Overall shallow water sedimentation predominantly shaly with locally sand progradation during the early Aptian regression. This section is absent from the well in South Whale Basin. The Cenomanian lies unconformably on the Hauterivian.

**7- Turonian – Campanian:** Drastic reduction of siliciclastic influx coincident with detrital carbonate in shallower water and a sharp increase in chalk/marl sedimentation under deep open-marine conditions. The top chalk is diachronous on the shelf. Carbonate and chalk formations are significantly eroded by the intra Campanian u/c. The Maastrichtian is preserved in the E-NE part of the basin.

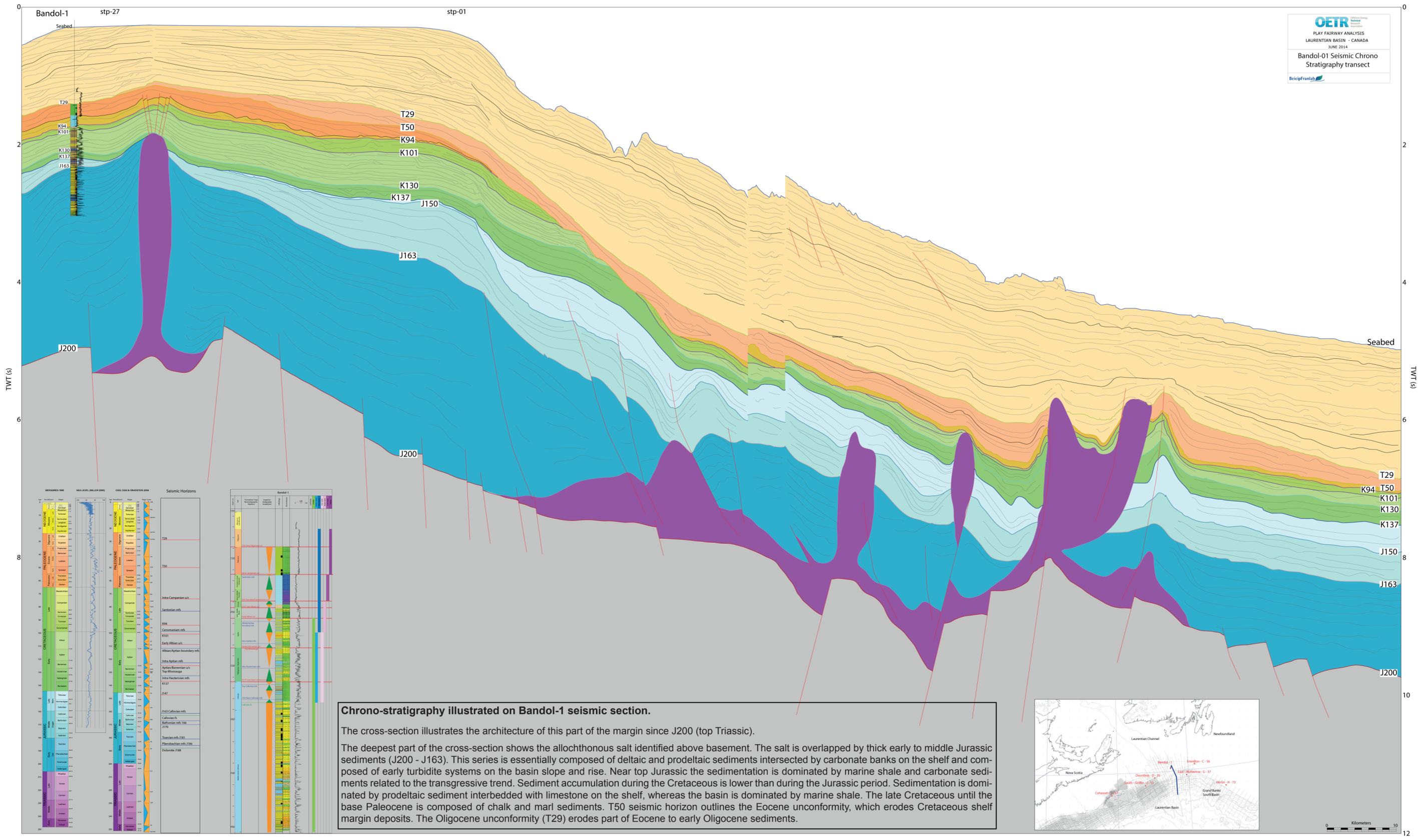
**8- Campanian – Ypresian:** Gradual transition from chalk to marine shale related to a regressive phase. Mix siliciclastic and carbonate turbidites are found offshore. Near the top Ypresian, sandstones are related to prograding clinofolds. The sequence is cut by the Ypresian u/c (T50). Above the unconformity the sequence is draped by laterally persistent Ypresian chalk.

A 3D topographic map of a mountain range. The terrain is color-coded by elevation, with green representing lower elevations and blue representing higher elevations. The map shows a prominent mountain range with a central peak and surrounding ridges. The text "CHAPTER 4-5 SEISMIC STRATIGRAPHY" is overlaid on the map in a blue, sans-serif font.

CHAPTER 4-5  
SEISMIC STRATIGRAPHY

# STRATIGRAPHY - SEISMIC STRATIGRAPHY

Laurentian sub-basin study - CANADA - June 2014

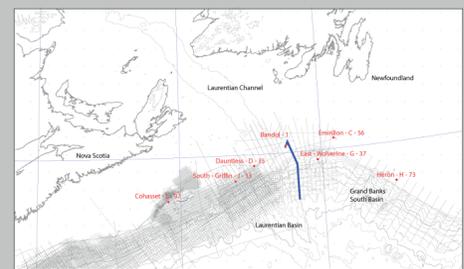


**OETR**  
 PLAY FAIRWAY ANALYSIS  
 LAURENTIAN BASIN - CANADA  
 JUNE 2014  
 Bandol-01 Seismic Chrono  
 Stratigraphy transect  
 Beiciparlab

**Chrono-stratigraphy illustrated on Bandol-1 seismic section.**

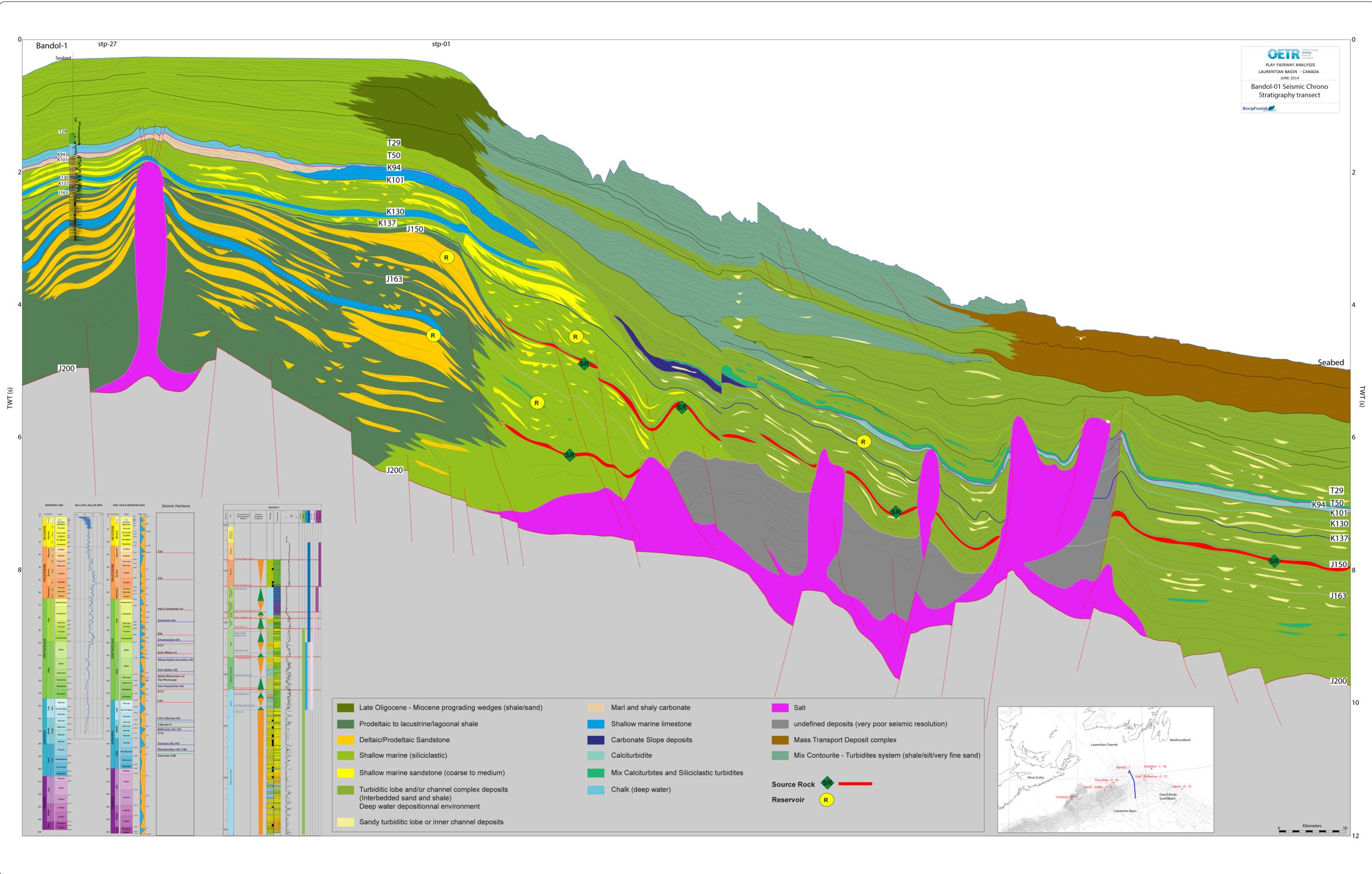
The cross-section illustrates the architecture of this part of the margin since J200 (top Triassic).

The deepest part of the cross-section shows the allochthonous salt identified above basement. The salt is overlapped by thick early to middle Jurassic sediments (J200 - J163). This series is essentially composed of deltaic and prodeltaic sediments intersected by carbonate banks on the shelf and composed of early turbidite systems on the basin slope and rise. Near top Jurassic the sedimentation is dominated by marine shale and carbonate sediments related to the transgressive trend. Sediment accumulation during the Cretaceous is lower than during the Jurassic period. Sedimentation is dominated by prodeltaic sediment interbedded with limestone on the shelf, whereas the basin is dominated by marine shale. The late Cretaceous until the base Paleocene is composed of chalk and marl sediments. T50 seismic horizon outlines the Eocene unconformity, which erodes Cretaceous shelf margin deposits. The Oligocene unconformity (T29) erodes part of Eocene to early Oligocene sediments.



# STRATIGRAPHY - SEISMIC STRATIGRAPHY

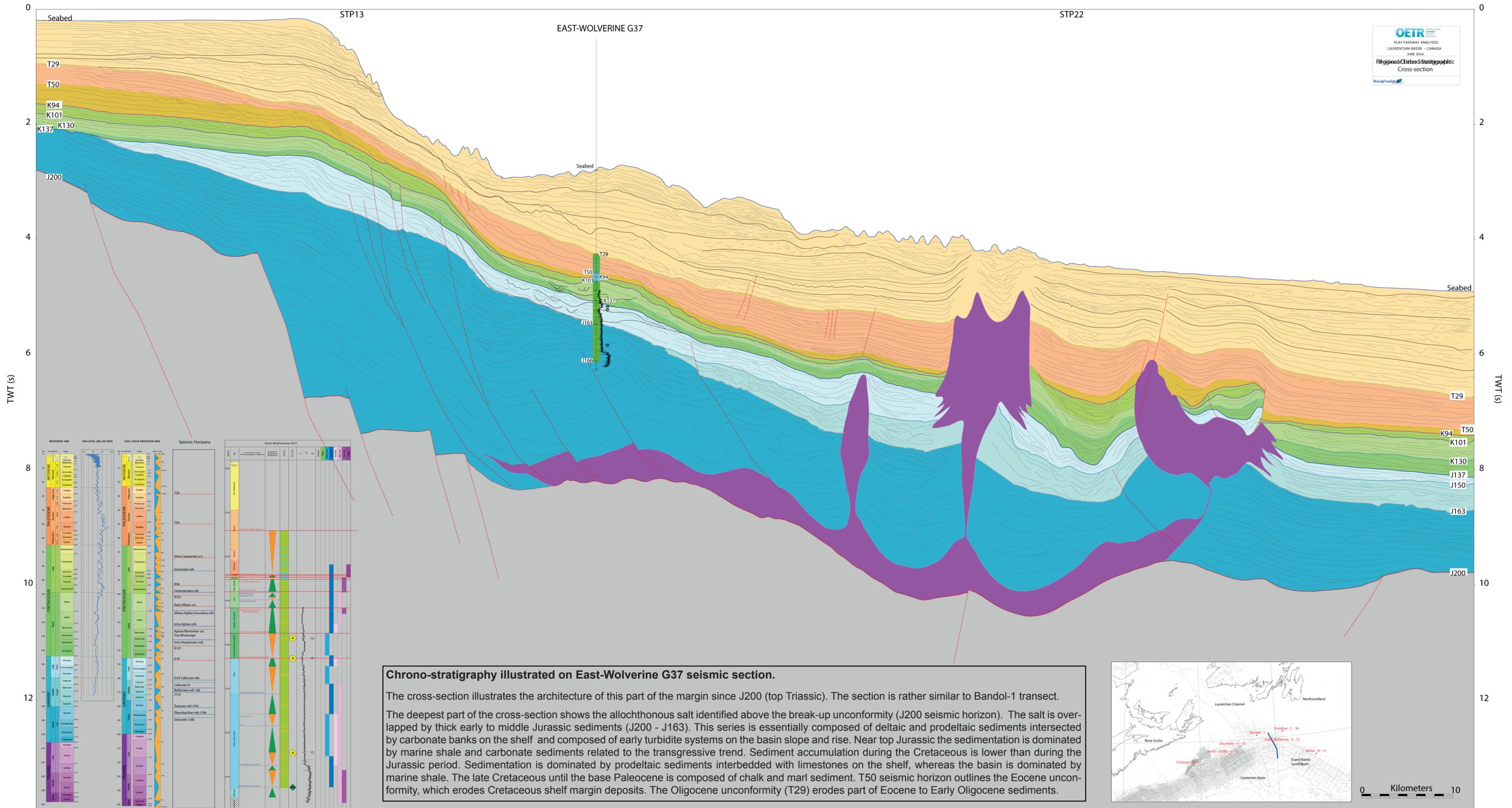
Laurentian sub-basin study - CANADA - June 2014



Architectural cross-section 1: Bandol-1 Seismic lithostratigraphy (lines stp-27 and stp-01)

# STRATIGRAPHY - SEISMIC STRATIGRAPHY

Laurentian sub-basin study - CANADA - June 2014



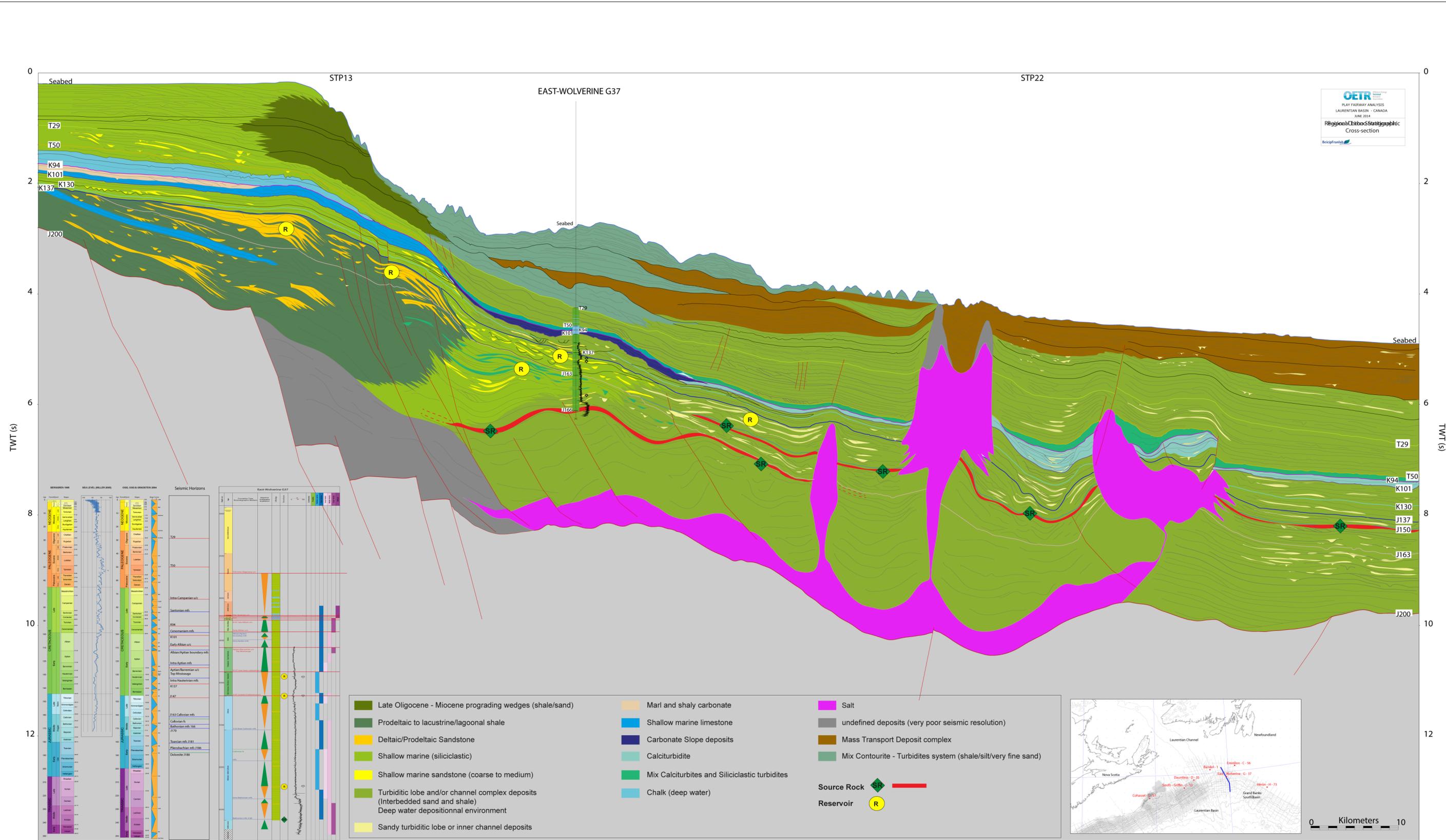
**Chrono-stratigraphy illustrated on East-Wolverine G37 seismic section.**

The cross-section illustrates the architecture of this part of the margin since J200 (top Triassic). The section is rather similar to Bandol-1 transect.

The deepest part of the cross-section shows the allochthonous salt identified above the break-up unconformity (J200 seismic horizon). The salt is overlapped by thick early to middle Jurassic sediments (J200 - J163). This series is essentially composed of deltaic and prodeltaic sediments intersected by carbonate banks on the shelf and composed of early turbidite systems on the basin slope and rise. Near top Jurassic the sedimentation is dominated by marine shale and carbonate sediments related to the transgressive trend. Sediment accumulation during the Cretaceous is lower than during the Jurassic period. Sedimentation is dominated by prodeltaic sediments interbedded with limestones on the shelf, whereas the basin is dominated by marine shale. The late Cretaceous until the base Paleocene is composed of chalk and marl sediment. T50 seismic horizon outlines the Eocene unconformity, which erodes Cretaceous shelf margin deposits. The Oligocene unconformity (T29) erodes part of Eocene to Early Oligocene sediments.

# STRATIGRAPHY - SEISMIC STRATIGRAPHY

Laurentian sub-basin study - CANADA - June 2014



Architectural cross-section 2: East-Wolverine G37 - Seismic lithostratigraphy (lines stp-13 and stp-22)