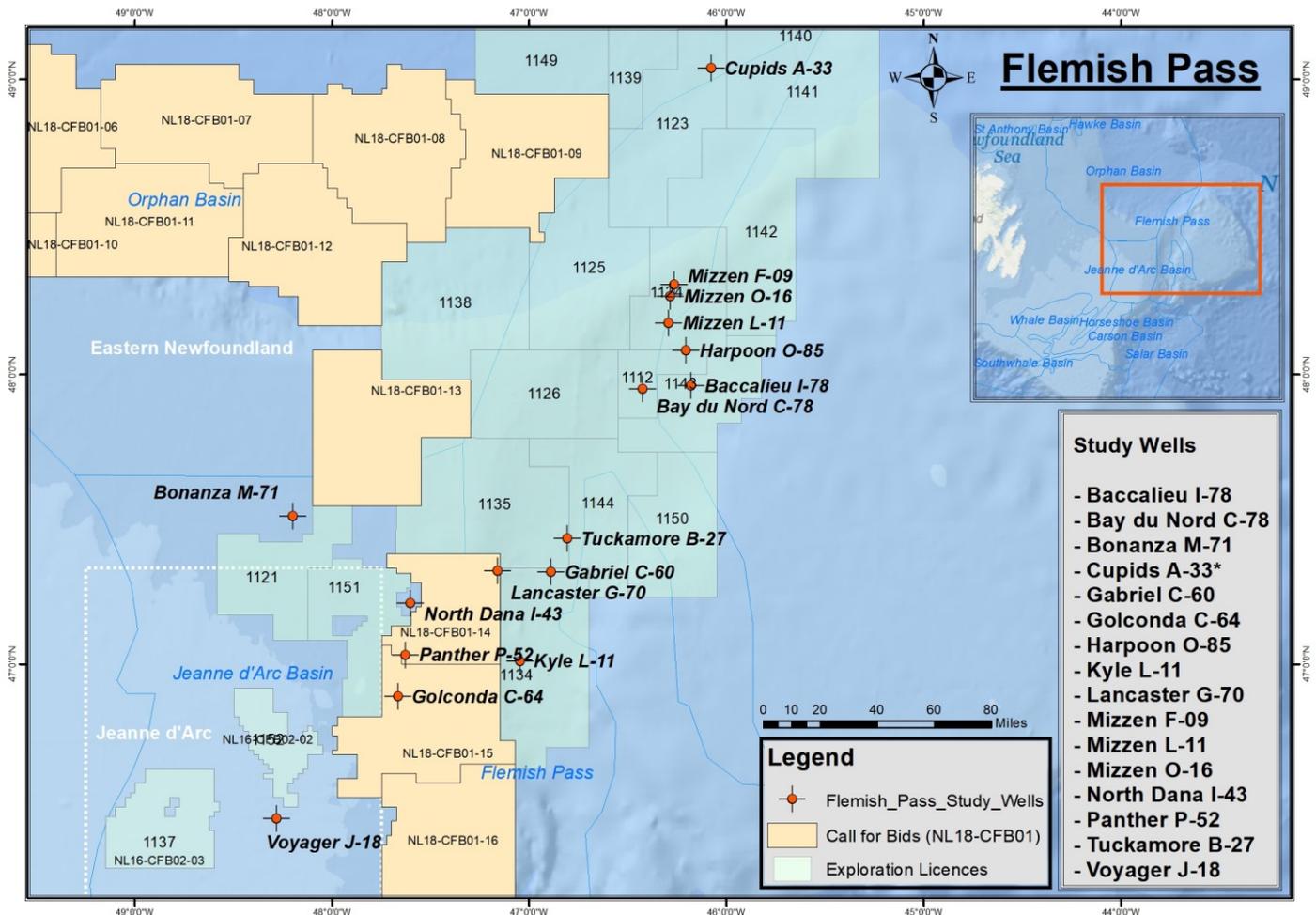


FLEMISH PASS STUDY - INTEGRATED BIOSTRATIGRAPHY, SEQUENCE STRATIGRAPHY & PALEOENVIRONMENTS



Objectives & deliverables:	<ul style="list-style-type: none"> To produce an accurate and consistent stratigraphic framework for the Flemish Pass, calibrated to Geological Timescale 2016, and based on 15 wells (see well list above). The addition of 1 key well in the Jeanne d'Arc Basin (Voyager J-18) enables tying the framework into the Jeanne d'Arc. Based on new data (>2,000 new analyses) combined with a thorough review of released biostratigraphic data. Identification of sequence boundaries and quantification of the magnitude of unconformities (enabling confident calibration of seismic). A review of paleoenvironments will facilitate understanding of source, seal, and reservoir distribution. Main focus in the Cretaceous and Jurassic; new analyses typically commence shortly above the base Tertiary unconformity. However, pre-existing data from the Cenozoic has been reviewed and updated Cenozoic interpretations will be presented.
Price:	<ul style="list-style-type: none"> Available through data licensing agreement – price on application. Discount for <i>bona fide</i> license groups (e.g. 3 companies pay 240%, not 300%).
Completion:	<ul style="list-style-type: none"> May 2018.
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Introduction

The Flemish Pass is a frontier exploration basin with substantial proven oil reserves. It has attracted major investment in Exploration Licenses following significant oil discoveries at Mizzen, Bay du Nord, Harpoon, etc. In April 2018 the C-NLOPB issued Call for Bids NL18-CFB01, including several parcels on the south-western flank of the Flemish Pass. There are various public domain accounts of the stratigraphy of the Flemish Pass, however, examination of the underlying biostratigraphic framework indicates substantial scope for improvement. There are often several fundamentally different age interpretations for key wells, some possibly influenced by lithostratigraphic assumptions. Following recent commitments there is a need to maximize the information gleaned from limited well penetrations, resolve the many ambiguities, and formulate a more robust stratigraphic framework. Biostratigraphy works extremely well in this area, but its interpretative value has not been maximized. A thorough stratigraphic review that utilizes all biostratigraphic disciplines is overdue. A review of paleoenvironments is also warranted, with particular scope for improved understanding in the Jurassic. PetroStrat is conducting several multi-client (or non-exclusive) studies in Eastern Newfoundland. We aim to produce a consistent and up-to-date sequence chronostratigraphic framework for the entire Grand Banks area.

Background

PetroStrat (established 2001) is the world's largest biostratigraphic consultancy. We gained substantial experience offshore Newfoundland following intensive multidisciplinary studies in the Laurentian Basin (2009-2010) and Orphan Basin (2010-2013). Comparison of our data with released biostratigraphy data from the Flemish Pass showed potential for improving resolution, and better ties to geological timescales. Our non-exclusive study involves a complete update of the stratigraphy, based on a combination of new data and review of released well data. Released biostratigraphic data available from the C-NLOPB is incomplete, and interpretations vary greatly among different contractors (see the example of Baccalieu I-78 below). In addition, the importance of nannopalaeontology has been played down in this area, with some contractors making do without this key discipline. Therefore, in our experience, released interpretations are often inaccurate or even misleading. There is a strong case for rationalization, and production of a consistent and up-to-date stratigraphic framework, based on full integration of all biostratigraphic disciplines, and calibrated to the latest standard Geological Timescale (GTS 2016).

e.g. BACCALIEU I-78 (Flemish Pass, drilled 1985)

Released Biostratigraphy		Biostratigraphic disciplines used		
Date	Report by	Palynology	Microfossils (Forams)	Nannofossils
1986	ESSO			
1987	Bujak Davies Group			
1990	Ascoli			Nannos not considered since 1986!
1990	Chevron			
1991	BP			
2002	Service Company A			
2005	Service Company B			



- STATUS** Multiple conflicting interpretations, with many discrepancies, even on a fundamental level.
e.g. 1 - Age at first returns varies from Pliocene to Early Cretaceous!
e.g. 2 - Large variations in top Jurassic.
e.g. 3 - Substantial variation in age at TD with little discussion of certainty (is there really Kimmeridgian?).
- CONCLUSION** Requires full integration of all 3 biostratigraphic disciplines.
Requires new nannofossil analyses (this science has advanced massively since 1986).
Requires application of updated biozonations and age calibrations (GTS 2016).
- RESULTS** The ESSO (1986) nannofossil slides were available for re-analysis, and very rich in nannofossils.
This new data (fully quantitative) permits improved resolution and interpretational certainty.

Project

This study commenced with a compilation of released biostratigraphy data and a review of released biostratigraphy slides, conducting re-analysis where necessary. Following “gap analysis” we accessed samples from the C-NLOPB and ran >2,000 new analyses (micropalaeontology, nannopalaeontology & palynology, as required) to verify, test, and improve interpretations.

This study includes fifteen wells, fourteen in the Flemish Pass plus one key well in the Jeanne d’Arc Basin (Voyager J-18) to enable tying the stratigraphic framework into the Jeanne d’Arc region. New analyses focus between the base Tertiary unconformity (or shortly above) and TD, however, pre-existing data from the Cenozoic has been reviewed and updated Cenozoic interpretations are presented. Another objective of this project is characterizing environments of deposition, via detailed integration of quantitative biodata.

Deliverables

- Summary logs and correlation panels incorporate chronostratigraphy, biozones, bioevents, and candidate sequence stratigraphic surfaces (identified via integration of biostratigraphic and log criteria), all calibrated to GTS 2016.
- Accompanying report text discusses degrees of interpretational certainty/uncertainty, explains major revisions relative to earlier interpretations, and outlines the paleoenvironmental history of each well location.
- All new data will be presented graphically and available digitally as .csv files, StrataBugs .sbg/.dex files, or as an ODM report.

Benefits

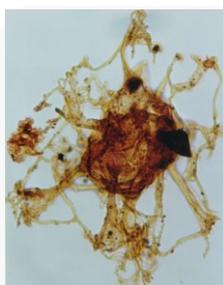
The benefits of licensing this study will be:

- Reduced uncertainty, and increased confidence in regional correlations. Reliable data enables confident calibration of seismic, following identification of sequence boundaries based on integration of biostratigraphic and log criteria, and quantification of the magnitude of unconformities.
- Greater understanding of the sediment supply, basin fill, and depositional setting in terms of the evolution of paleoenvironments, which will influence source/seal/reservoir distribution.
- Fully compatible with PetroStrat’s Orphan Basin non-exclusive study, and forthcoming studies in Southern Newfoundland.
- Exceptional value for money, when compared with proprietary rates.

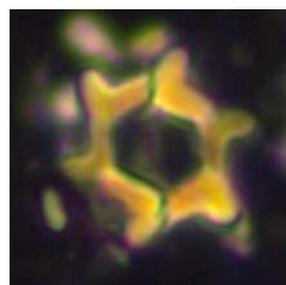
A thorough stratigraphic review that utilizes all biostratigraphic disciplines is overdue. Proper application and integration of all three biostratigraphic disciplines will improve resolution and resolve many ambiguities.



MICROPALAEONTOLOGY



PALYNOLOGY



NANNOPALAEONTOLOGY