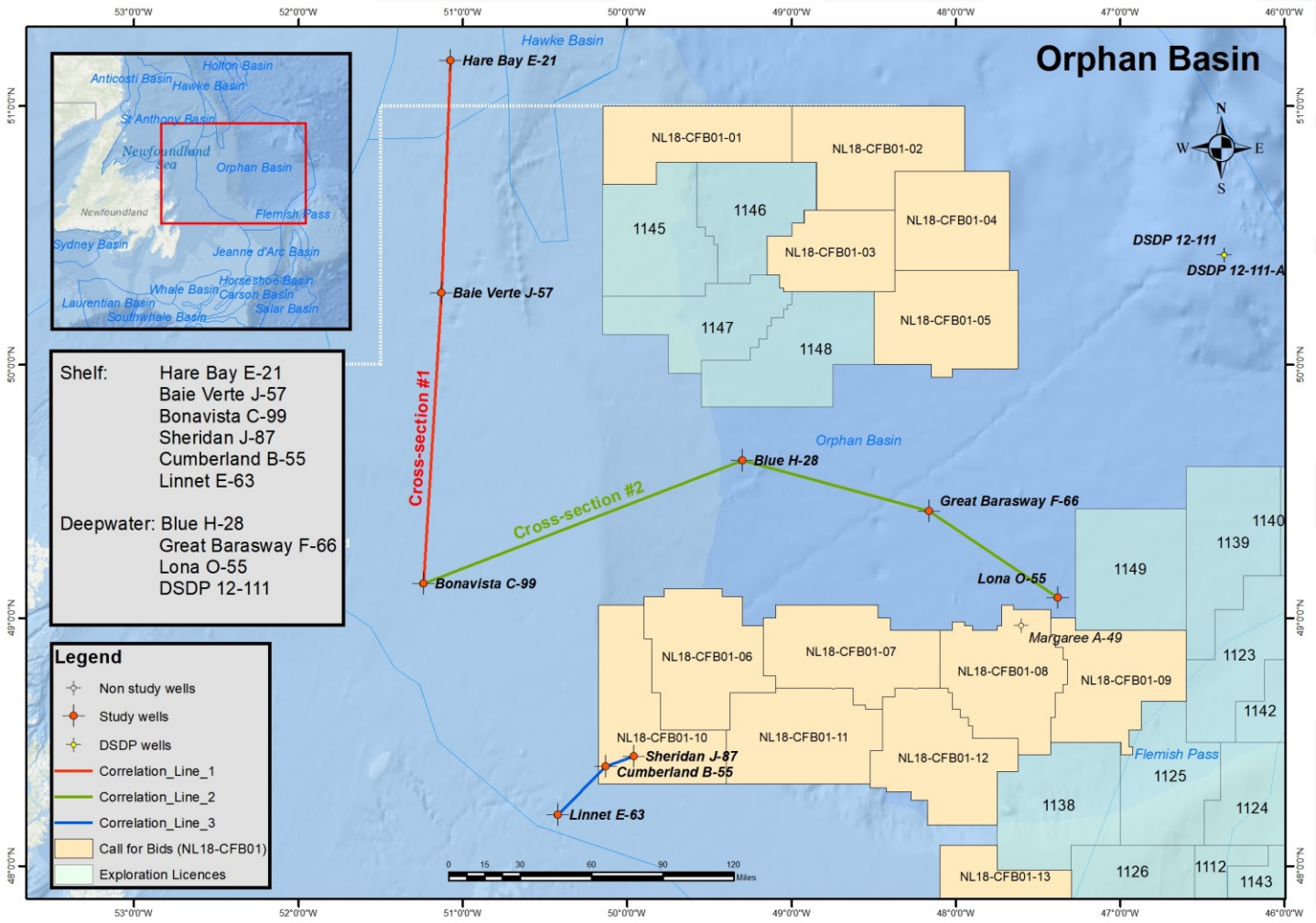
ORPHAN BASIN STUDY - INTEGRATED BIOSTRATIGRAPHY, SEQUENCE STRATIGRAPHY & PALEOENVIRONMENTS



Objectives & deliverables:	• To produce an **accurate and consistent stratigraphic framework** for the Orphan Basin, calibrated to Geological Timescale 2016, and based on **9 wells** (see list above). In addition, a reinterpretation of original data from DSDP Site 111 (located on the Orphan Knoll) is presented free of charge for comparison. • Based on **new data** (2,075 new analyses) combined with a 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. • Focus extended from the Jurassic-Cretaceous into the Cenozoic, in line with new play concepts for the Orphan Basin.
Price:	• Available through data licensing agreement – **price on application**. • Discount for *bona fide* license groups (e.g. 3 companies pay 240%, not 300%).
Completion:	March 2018. Final report available now.
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Introduction

The Orphan Basin is greatly under-explored, with little subsurface data beyond seismic. In November 2016 four new exploration licenses were awarded in the western Orphan Basin. In April 2018 the C-NLOPB issued Call for Bids NL18-CFB01, including 12 parcels in the Orphan Basin and immediate surrounds. Following these recent commitments there is a need to maximize the information gleaned from limited well penetrations. There remains great scope for improved understanding of the Newfoundland margin. 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, with unrivalled experience in the Orphan Basin following our involvement in the 2010-2013 exploration campaign. Comparison of our data with released biostratigraphy data showed great potential for improved understanding of other wells. 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 an example below from the Flemish Pass). 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			Nannos not considered since 1986!
1990	Ascoli			
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.

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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 nine of the ten wells drilled in the Orphan Basin; we were not able to include the deep-water well Margaree A-49 which is scheduled for release of biostratigraphic data in November 2018 (when released this data which was generated by PetroStrat should be readily comparable with this study). Stratigraphic focus is extended from the Jurassic-Cretaceous into the Cenozoic, in line with new play concepts for the Orphan Basin. 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.
- The 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 is 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:

- 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 palaeoenvironments, which will influence source/seal/reservoir distribution.
- Focus extended from the Jurassic-Cretaceous into the Cenozoic, in line with new play concepts in the Orphan Basin.
- Fully compatible with PetroStrat’s Flemish Basin non-exclusive study, and forthcoming studies in Southern Newfoundland.
- Exceptional value for money, when compared with proprietary rates.

Wellsite operations in the Orphan Basin.