

Labrador Shelf Seismic Attributes Study

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Summary

Gas discoveries in several basins along the Labrador Shelf guide the investigation of Canada's northeastern continental margin in the search for further hydrocarbon reservoirs. Published examples of exploration data along this relatively undrilled shelf show the concentration of recent or re-processed older 2D seismic grids around the 5 gas discovery areas drilled during 1973 to 1980. Recent seismic sections are commonly pre-stack time migrated to image the complex extensional structures stretching the shelf and the slope. In this paper, additional analysis of several types of pre-stack seismic attributes are presented. They help qualify and characterize lithology or fluid types imaged on Labrador seismic sections.

Introduction

The area's five gas discovery wells are located in the Mesozoic Hopedale Basin along the southern Labrador Shelf. The largest discovery at North Bjarni location was drilled in 1973 and has estimated recoverable resources of 2.2 tcf (P50) reserovired in the Late Cretaceous Bjarni sandstone. The Hopedale study area is located between 54 and 60 degrees North latitude extending from 50 km to 250 km offshore. Structures are mapped in 200m to 2500m water depth, with drilled targets depths averaging 2800m. The modern seismic grid extends from shelf to deep water (Figure 1). The correlation of the 20 existing deeper wells with 35,000 km of recent 2D seismic data recorded by GSI in 2003 to 2007 provide a multitude of interesting targets for attribute investigation.

Reservoir identification based on structure and seismic reflection contrast alone can be complicated by the complex rifted nature of this margin and intrinsic limitation of stacked data. Labrador Sea subcrop maps from the GSC show a variety of rock types including Precambrian metamorphic rocks, basalts (both Cretaceous and Tertiary), Paleozoic carbonates (gas bearing at Gudrid and Hopedale), and Tertiary clastics (also gas bearing).

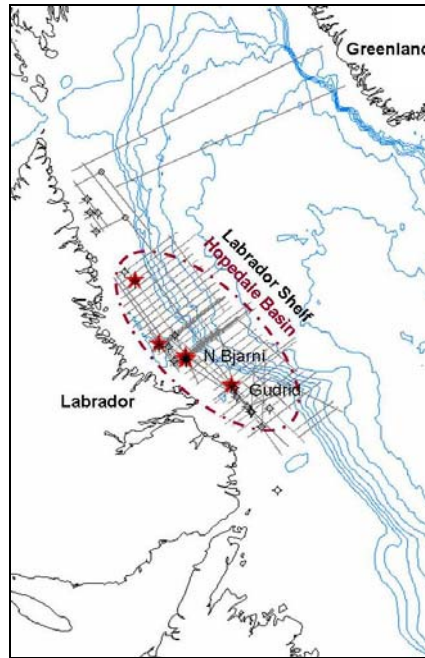


Figure1: Map of some of the 2003-2007 GSI seismic data in the study area with bathymetry and wells.

Our study objective was to investigate several anomalous targets (either high amplitude or otherwise out of the ordinary features) for identifying reservoir potential and rock or fluid type. The goal was to show how those attributes might assist the early stages of exploration planning or delineation drilling.

Several areas of the 2D data were compared with information from the discovery wells and further investigated using pre-stack analysis techniques. Interactive switching from post stack interpretation to “investigation” with pre-stack tracking and comparison of character around known geologic formations gives additional insight into the nature of undrilled features.

Examples

Pre-Stack analysis, including AVO and Rock Property analysis, are used to investigate the petroleum geology of various leads and prospects. Examples are reviewed along several markers and at several potential drilling locations. The results highlight the differences and similarities between several known discoveries, and undrilled locations.

Conclusions

Pre-stack attribute investigation and analysis, including AVO and Rock Property analysis, in conjunction with available petrophysical and well information, adds a valuable dimension to the pre-drill interpretation and character recognition of events in the less explored, Hopedale Basin, Labrador Sea.

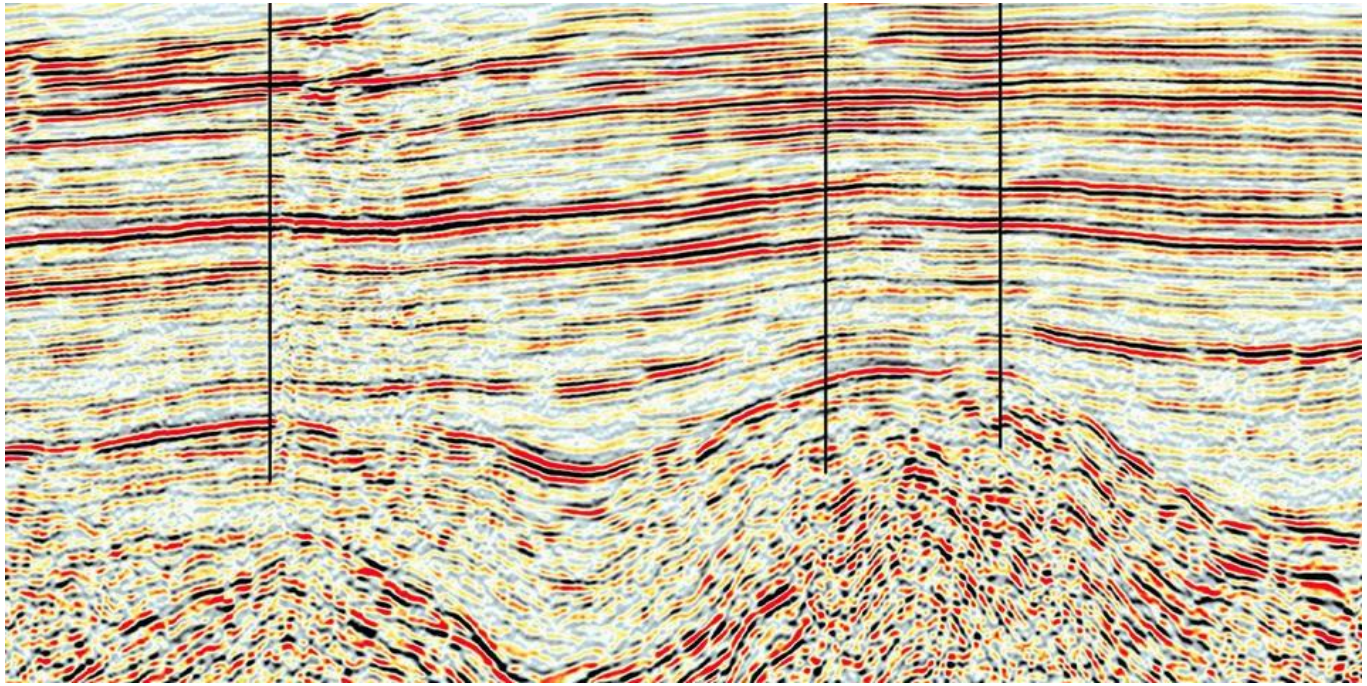


Figure2: Example of 2D Pre-Stack Migrated data, Labrador Shelf, at one of the discovery wells. (Seismic data courtesy GSI).

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