

# An Active Petroleum System in the New Ireland Basin: Papua New Guinea's New Frontier Miocene Carbonate Play

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## Introduction

The New Ireland Basin (NIB) is a 900 km x 180 km frontier basin in NE Papua New Guinea, bounded by the New Ireland and Manus Islands to the south and the Manus-Kilnailau submarine trench to the north (Fig. 1). The petroleum potential of the NIB was considered favourable following international marine seismic surveys in the mid-1980's, with Miocene carbonate buildups as potential plays.

In 2017, Searcher Seismic and BGP carried out a long offset, deep tow 2D multiclient seismic survey (SS2017) across the NIB. The seismic lines reveal substantial sediment thicknesses (up to 8 km) and structures throughout the basin (Fig. 2). High-resolution images of possible Miocene carbonate buildups and ramp deposits (Fig. 3) are a significant breakthrough. The existence of these favourable reservoir lithologies, combined with the discovery of active thermogenic HC seeps<sup>1</sup> offshore New Ireland (Fig. 1; red star), indicate that detailed exploration of this frontier basin is warranted.

## Basin Architecture

A ~70 km long NE-SW seismic line across the basin indicates sediment accumulations of at least 8 km in some areas (Fig. 2), with preliminary seismic interpretations based on Exon and others<sup>2</sup>:

**SB-A:** Pleistocene to Recent hemipelagic oozes

**A-B:** Pliocene volcanoclastic turbidites, interbedded with marls/chalk

**B-C:** L Miocene/E Pliocene chalk interbedded with volcanic turbidites

**C-D:** Early to Late Miocene carbonate shelf (Lelet Lst equivalent)

**D-E:** E Miocene outer shelf and slope sediments, largely volcanoclastic with possible carbonate banks (Lossuk River Bedsequivalent)

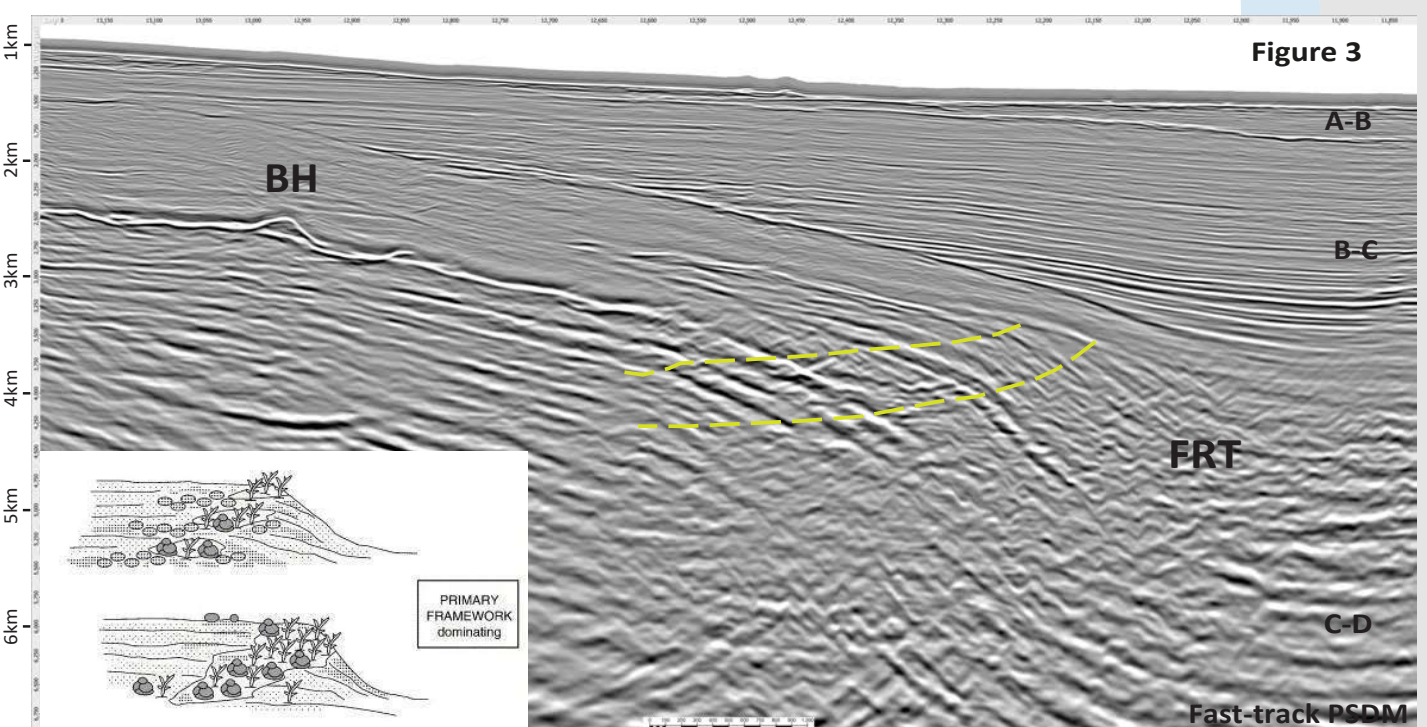
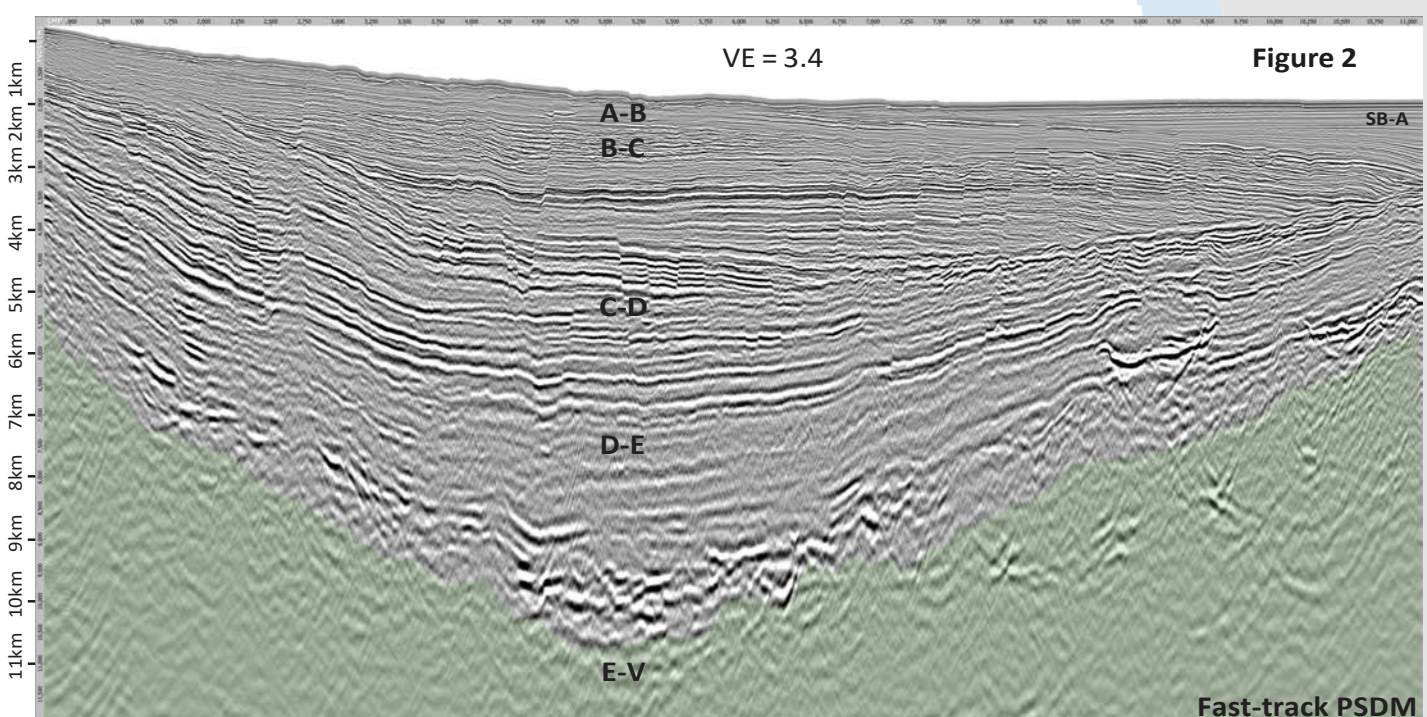
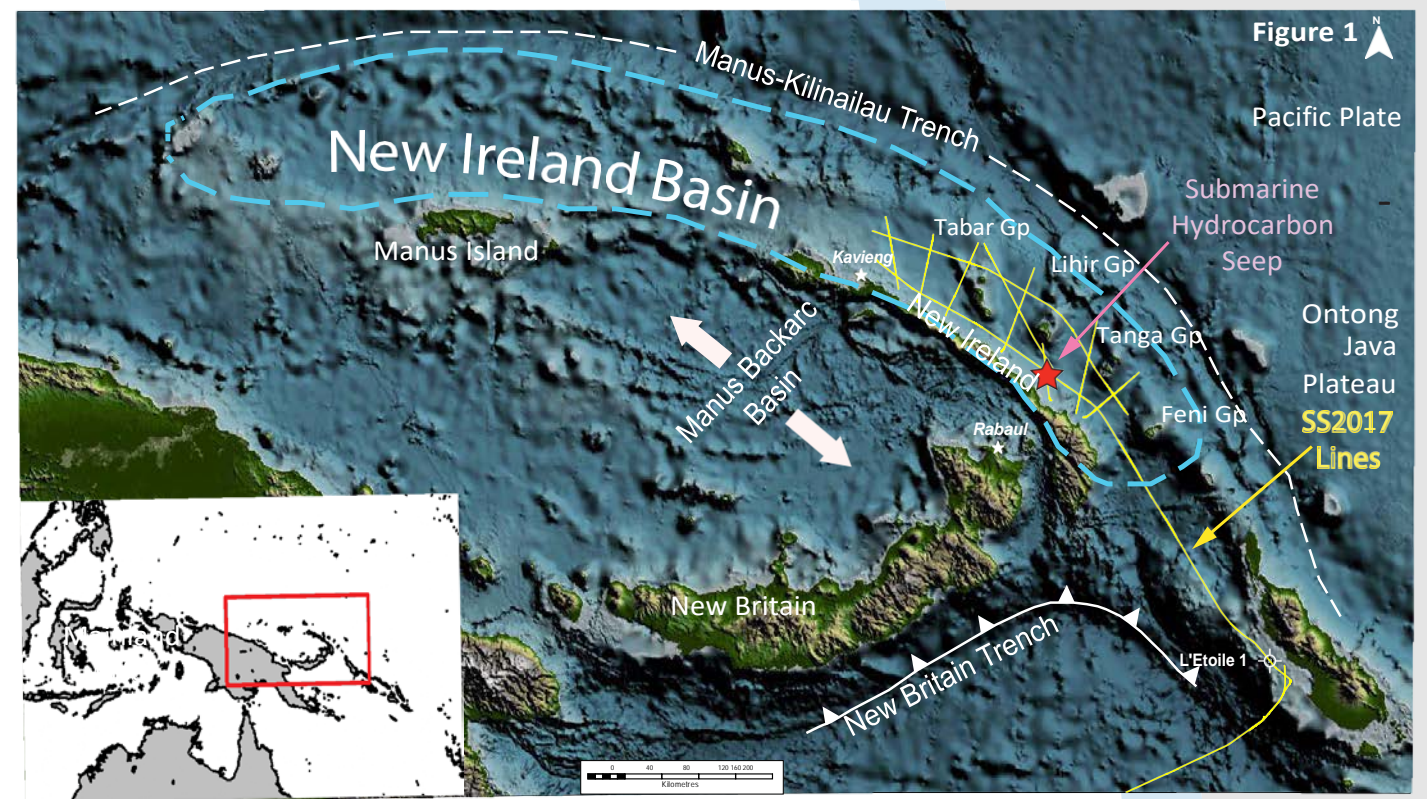
**E-V:** Eocene to E Miocene volcanics (Jaulu Volcanics equivalent).

Normal faults, flower structures and igneous sills transect the section.

## Miocene Carbonate Platform Sediments

A second seismic line (Fig. 3) off the New Ireland coast reveals sedimentary deposits with characteristics similar to carbonate ramp deposits in modern reef environments. Features include carbonate buildups or bioherms (**BH**) and chaotically layered prograding slope sediments representing potential fore-reef talus deposits (**FRT**). Miocene framework reefs would be expected near the apex of the change of slope (yellow lines) of the ramp deposits (c.f. inset model<sup>3</sup>). The carbonate platform was drowned and subsequently buried by Pliocene-Pleistocene chinks and volcanic turbidites (A-B & B-C units).

These offshore units are correlative with massive exposures on New Ireland (up to 1 km thick) of Miocene foraminiferal-algal biomicrite sediments (Lelet Limestone; Fig. 4) deposited in a backreef setting<sup>2</sup>. The Lelet formation includes coal-bearing subunits (Matakan Unit; Fig. 5), formed in reducing lagoonal environment.<sup>4</sup> A potential modern analogue for these Miocene deposits is the island of Bora Bora (Fig. 6).



## References

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