

Andaman–Nicobar Basin

An assessment of the applicability of conventional gravity surveys as a tool for the analysis of subsurface geological structures

Introduction

This brief summary of the Andaman-Nicobar basin will introduce the potential capabilities of observing subsurface geologic structures in the region using gravity and magnetic surveys. The summary will draw on:

- previous regional studies
- public domain satellite gravity data
- comparison of satellite and airborne gravity data
- 2D forward modelling using data found from literature reviews

Regional Geology and Satellite Gravity Data

Located in the southeastern part of the Bay of Bengal, the Andaman-Nicobar basin forms part of the Island Arc in the East of the Indian Ocean associated with the convergence of the Indian and Burmese plates. The Island Arc System in the region has led to the formation of distinct forearc and backarc basins to the East of the Islands as shown in Figure 1, where the majority of exploration would be focused.

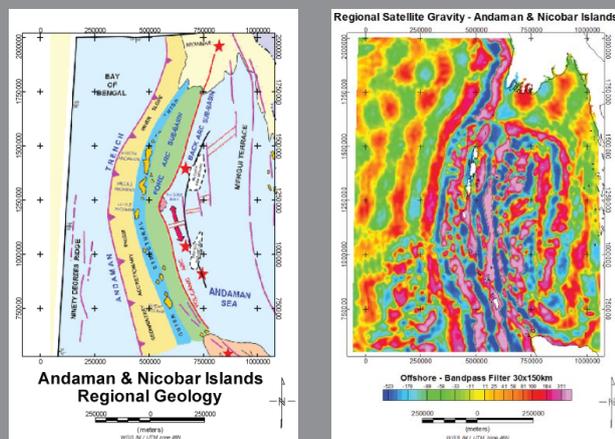


Figure 1
Regional overview of the structural geology around the Andaman-Nicobar Basin alongside filtered satellite gravity data

Using public domain Sandwell satellite gravity data, a regional gravity map (Figure 1) was generated which can be compared to current knowledge of the geological structure of the region. Large scale structures are visible with public domain gravity data, such as the spreading centre and trench to the west as seen in Figure 1.

Airborne Gravity

For airborne acquisition, Bridgeporth utilises GT-Technologies GT2-A gravimeter. This high resolution gravimeter is deployable in a wide variety of environments and has a recoverable wavelength resolution of approximately 1.5km, suitable for imaging structures from a regional to prospect scale.

Figure 2 shows a comparison between filtered Sandwell gravity data and filtered GT2-A airborne acquired gravity data. In this case, the imaging of the N-S trending basin – visible on the Sandwell data – shows significant uplift on the airborne data.

The flight line spacing for the airborne survey in this case was 1x2km. Aeromagnetic, gamma-ray spectrometry, LIDAR and hyperspectral imaging can also be acquired on the same platform.

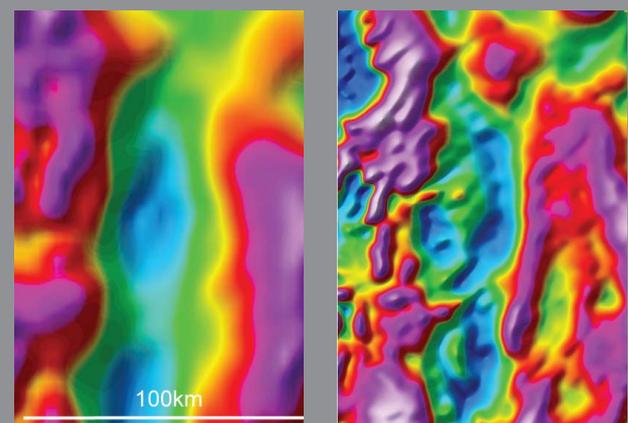


Figure 2
Comparison of Sandwell gravity data (left) to Bridgeporth acquired GT2-A airborne gravity data over same area.

Stratigraphy

Stratigraphy is available based on well and outcrop data (Figure 3) with the majority of reservoirs as Miocene limestones and sandstones and sources found in Palaeocene-Miocene shales.

Cretaceous-Recent sediments comprise of a variety of sandstones and shales with intermittent limestone packages.

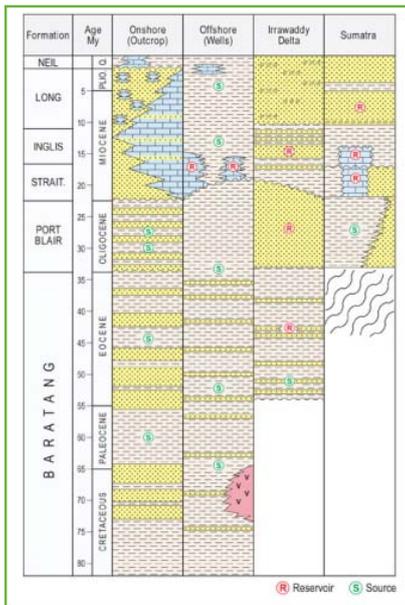


Figure 3 Summary of onshore and offshore stratigraphy in the Andaman-Nicobar Basin showing potential source and reservoir intervals

2D Modelling

Geoseismic cross sections across the region were modelled to observe the gravity response. Density and velocity values were estimated based on literature reviews. Figure 4 shows the gravity response to the model, which indicates that positive anomalies are associated with basement highs and negative anomalies are associated with thicker sedimentary packages.

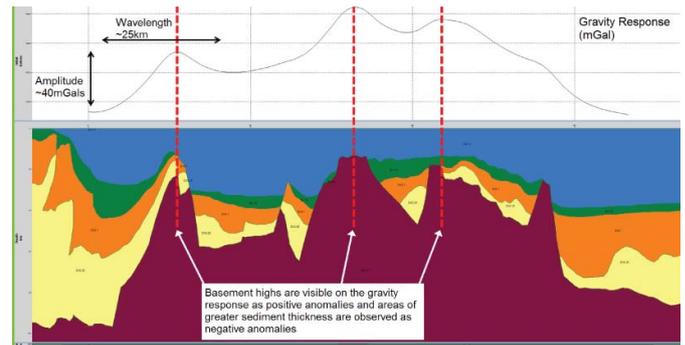


Figure 4 2D model profile showing the gravity response to subsurface structures

Conclusions

Bridgeporth holds considerable expertise in acquisition, processing and interpretation as well as providing a number of other services. The Andaman-Nicobar Basin remains vastly under-explored and gravity and magnetics would provide an excellent aid to an on-going exploration programme

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