

A Re-Evaluation of Vintage Andaman Offshore Seismic Datasets

Gary Scaife¹, Andy Billings², and Richard Spoor¹

Search and Discovery Article #10322 (2011)

Posted May 31, 2011

*Adapted from extended abstract presented at GEO-India, Greater Noida, New Delhi, India, January 12-14, 2011

¹Spectrum GEO, Ltd. (gary.scaife@spectrumasa.com)

²Hornet Geoconsulting, Ltd.

Abstract

This paper is based on the recent reprocessing and interpretation of approximately 10,600 line kilometres of reprocessed 2D offshore seismic data extending across an area of some 245,000 square kilometres of the Indian waters of the Andaman Sea, an area defined on the USGS worldwide basins map as part of the Andaman Sea Basin. The Andaman Sea lies to the southeast of the Bay of Bengal and forms part of an Island Arc System which extends 1200 km from Myanmar in the North to Indonesia in the South ([Figure 1](#) and [Figure 2](#)).

The seismic data used is from five different surveys of 1982 to 2001 vintage and was reprocessed by Spectrum Geo Ltd in 2009-2010 under an agreement with Directorate General of Hydrocarbons (DGH) India ([Figure 3](#)). The seismic dataset extends over the fore-arc basin, volcanic arc and back-arc basin areas of the Andaman Sea Basin, east of the emergent islands.

The Andaman Sea Basin has evolved through a complex tectonic history that began in the Cretaceous, associated with the oblique convergence between the Indian and west Burmese tectonic plates. The main tectonic elements that can be observed from west to east include; The Andaman Trench/Inner Slope, Outer High/Trench slope break, Fore-Arc Basin, Volcanic Arc, Back-Arc Basin and the Mergui Terrace. A simplified cross section through the north-central part of the project area is seen in [Figure 4](#).

The Indian part of the Andaman Sea Basin is considered frontier in nature with only 13 wells drilled in the project area east of the Andaman Islands, all targeting the shallow water part of the fore-arc basin and most of them close to the Andaman Islands. Of these wells, the first to be drilled (AN-01-1) discovered gas. The discovery proves the presence of working hydrocarbon systems with

generating hydrocarbon source systems, reservoir and seal horizons as well as migration and trapping mechanisms. However, the vast majority of the basin (especially the deep water) remains unexplored. The Andaman Sea Basin is located between, and on trend with, the well explored, mature hydrocarbon producing provinces of Myanmar to the north and Indonesia to the south. Both of these areas contain world class producing fields (for example, in Myanmar the multi-TCF gas fields of Yadana and Yetagun, and in Indonesia the NSO and Arun gas fields) features observed on the Spectrum reprocessed seismic appear to be analogous to these producing fields and indicate that these successful play fairways can be extrapolated into this frontier area.

Basins in the project area can be seen to contain well in excess of 6000 m of sediments ranging in age from Late Cretaceous to Recent. The sediments range from fluvio-deltaic through shallow marine to deep marine and include carbonate reefs as well as clastics. The primary source rocks in the basin are reported to be sediments of Cretaceous to Eocene age. Biogenic gas is reported to be sourced from Neogene sediments (and are possibly the source of the gas in the Miocene Limestone of Well AN-1-1). Interpretation of the reprocessed data has shown the Andaman Sea Basin contains all the elements for successful hydrocarbon exploration as it has identified potential source, reservoir and seal intervals as well as structural and stratigraphic trapping geometries ([Figure 5](#) shows an example of a limestone build up). Direct Hydrocarbon Indicators (DHI's) are observed which include gas clouds, bright and flat spots, seabed pock marks, vent mounds and also Bottom Simulating Reflectors (BSR's) indicating the presence of Gas Hydrates.

The exploration focus is now turning to this frontier area, with the recent award of further exploration licenses in the Andaman region. The reprocessed seismic data will provide explorationists with vital regional structural and stratigraphic insight to de-risk an area which is hoped to provide future high impact hydrocarbons.

Acknowledgement

The authors are pleased to thank DGH, India for permission to publish this paper.

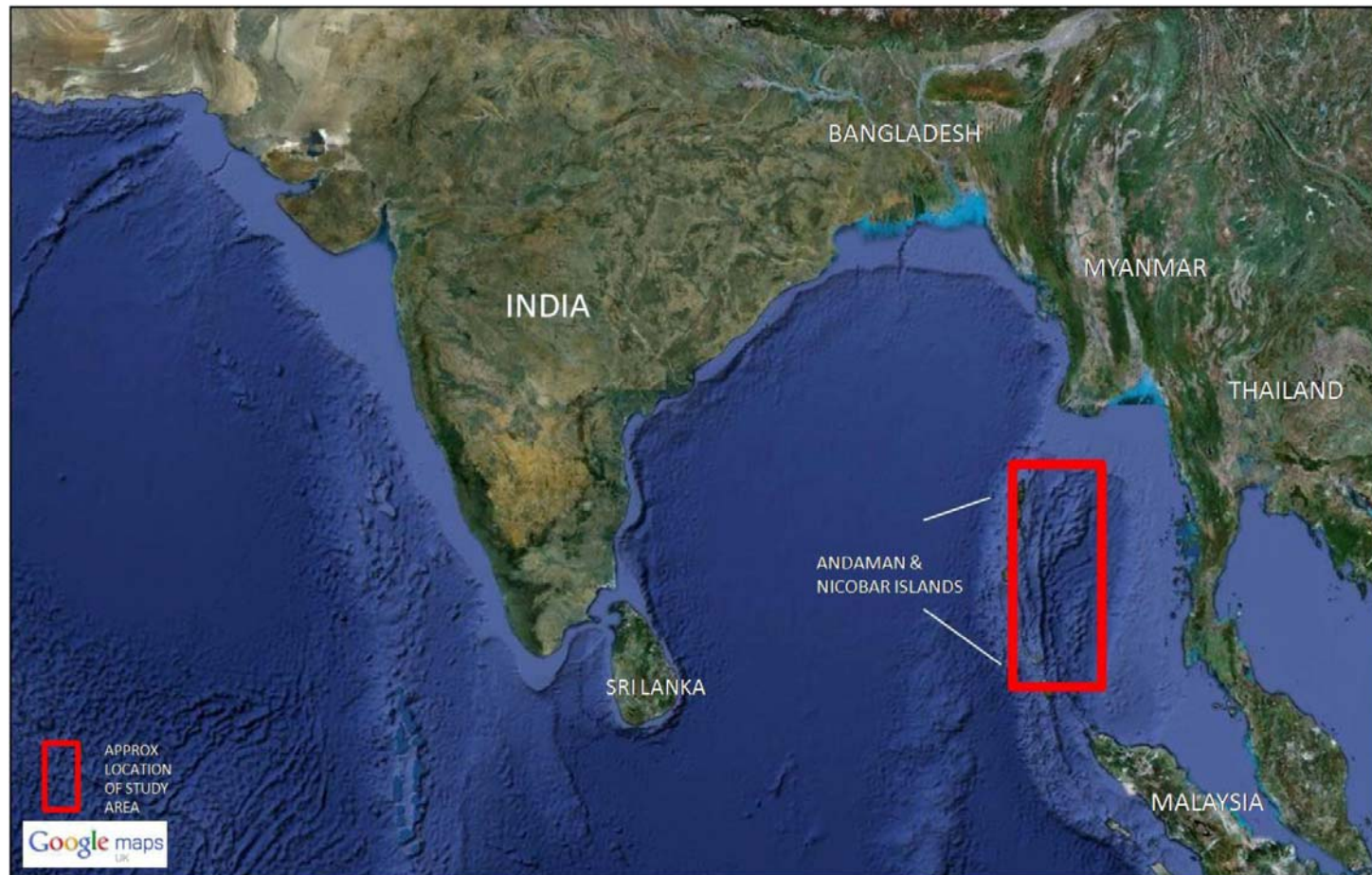


Figure 1. Andaman Islands regional location map (from Google Maps).

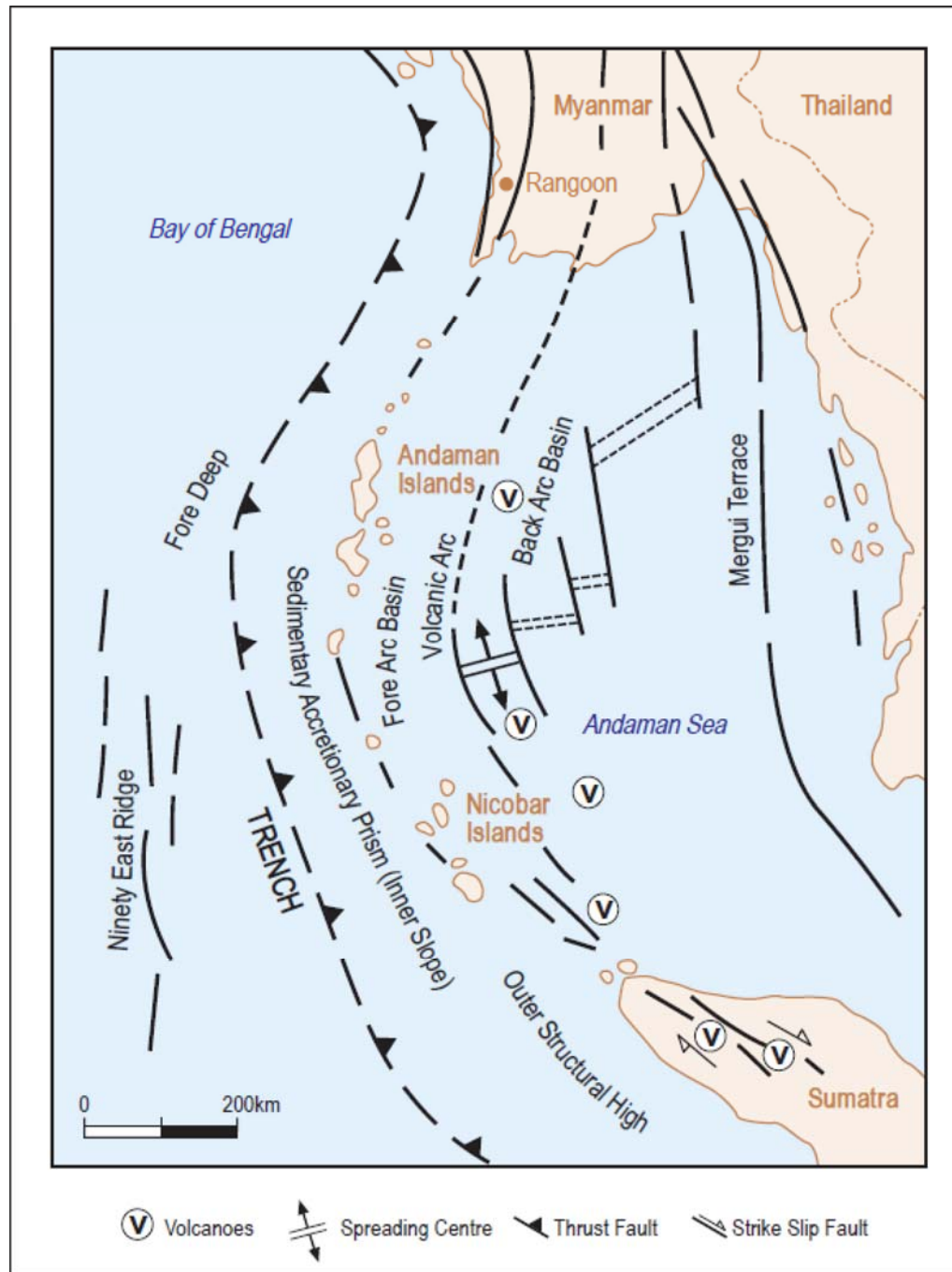


Figure 2. Simplified tectonic elements of the Andaman Region (modified from DGH).

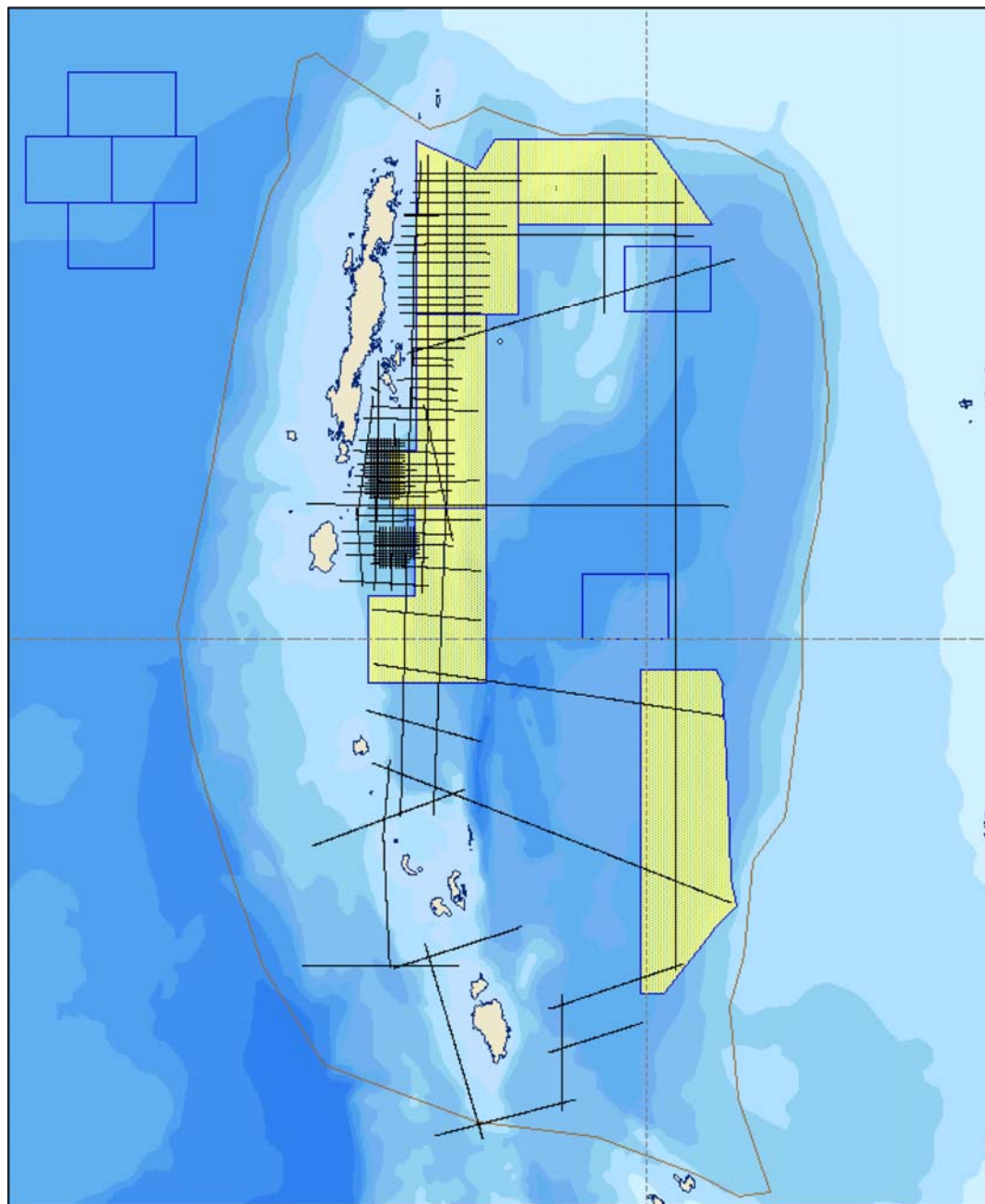


Figure 3. Location map of Spectrum's reprocessed seismic data.

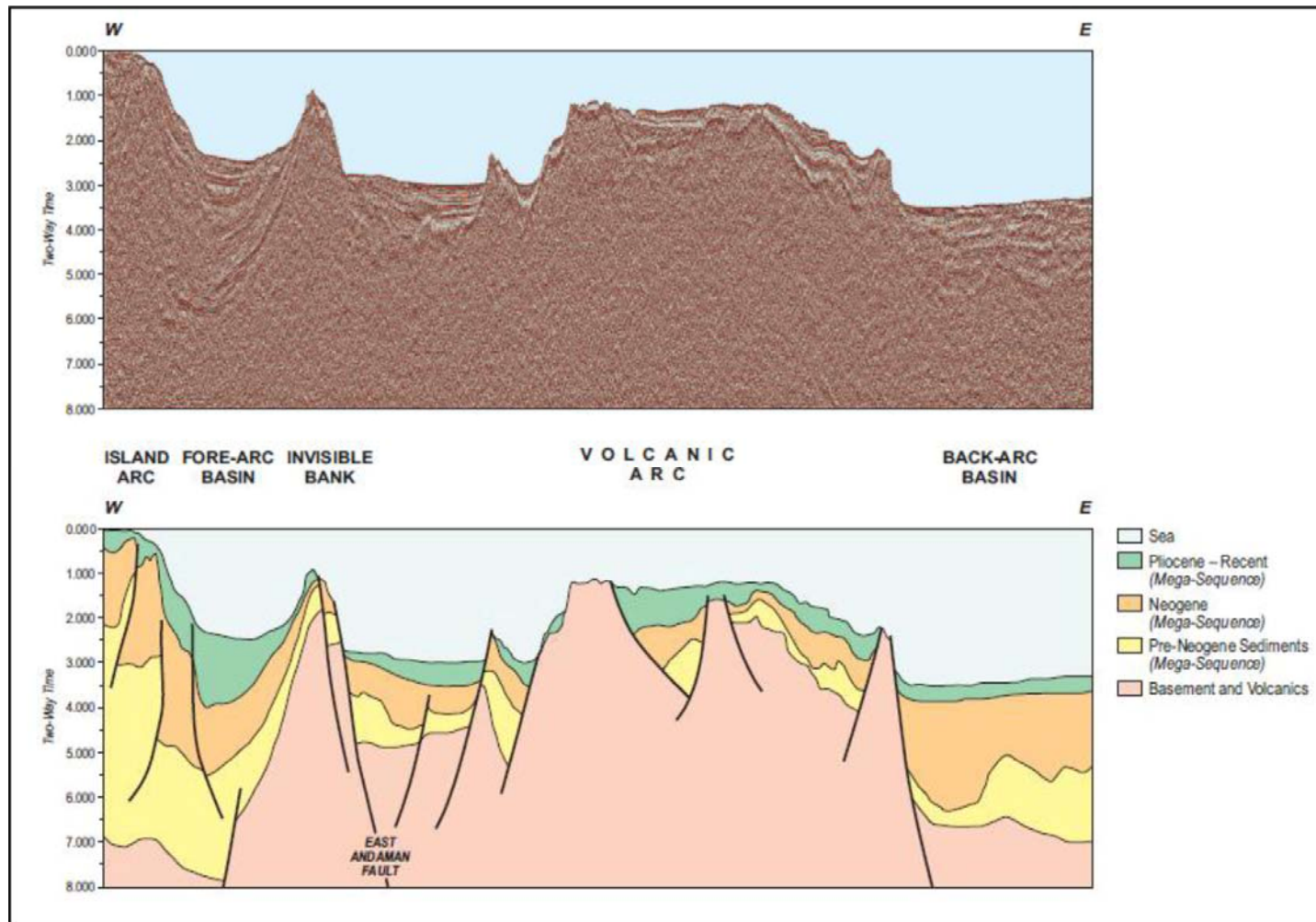


Figure 4. West to East geo-seismic cross section through the north-central part of the Andaman Basin.

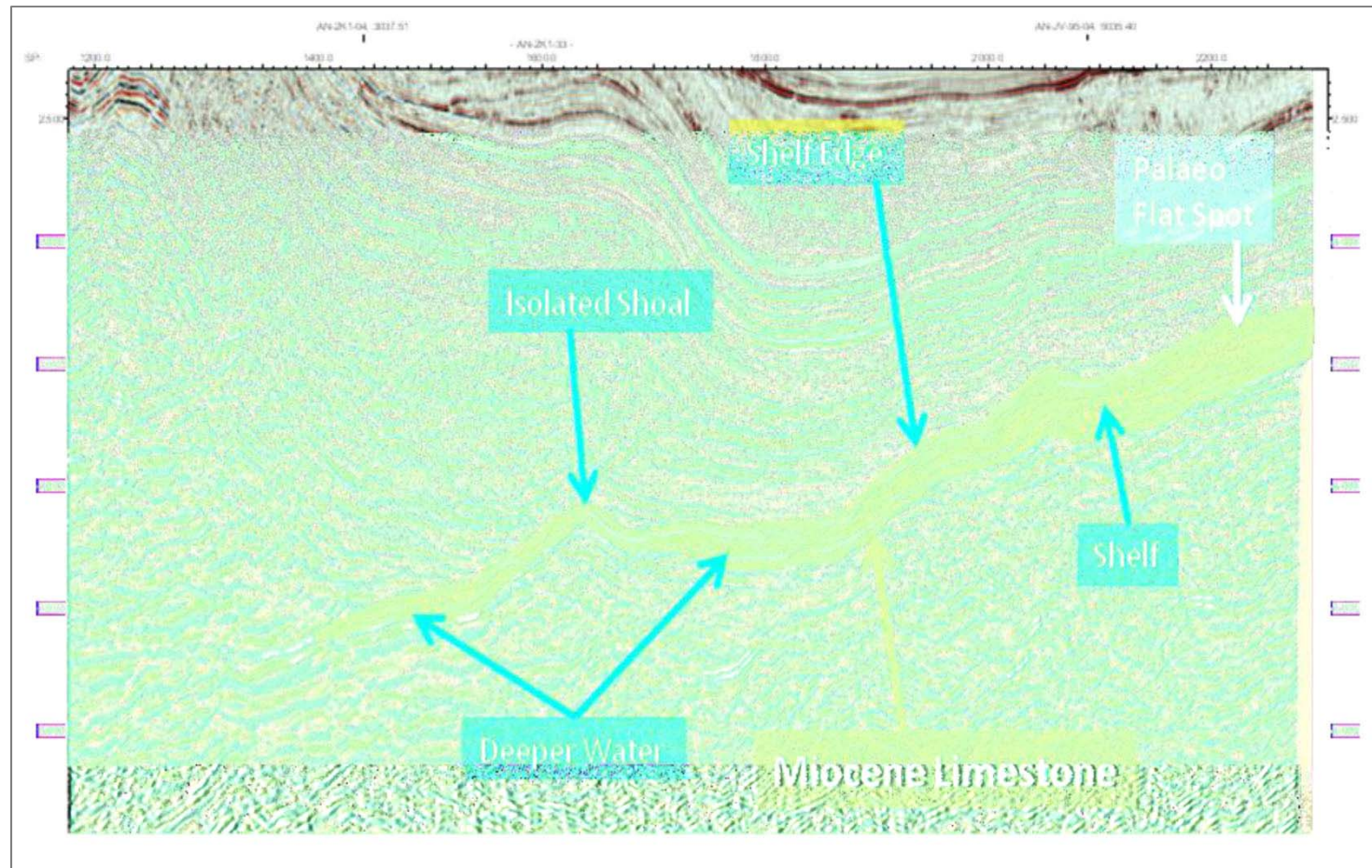


Figure 5. Example of limestone build-up. Note image is 28 km in length.