

# Petroleum Geology and Exploration History of the Mergui Basin, THAILAND



**EPPM (P1) PROJECT**

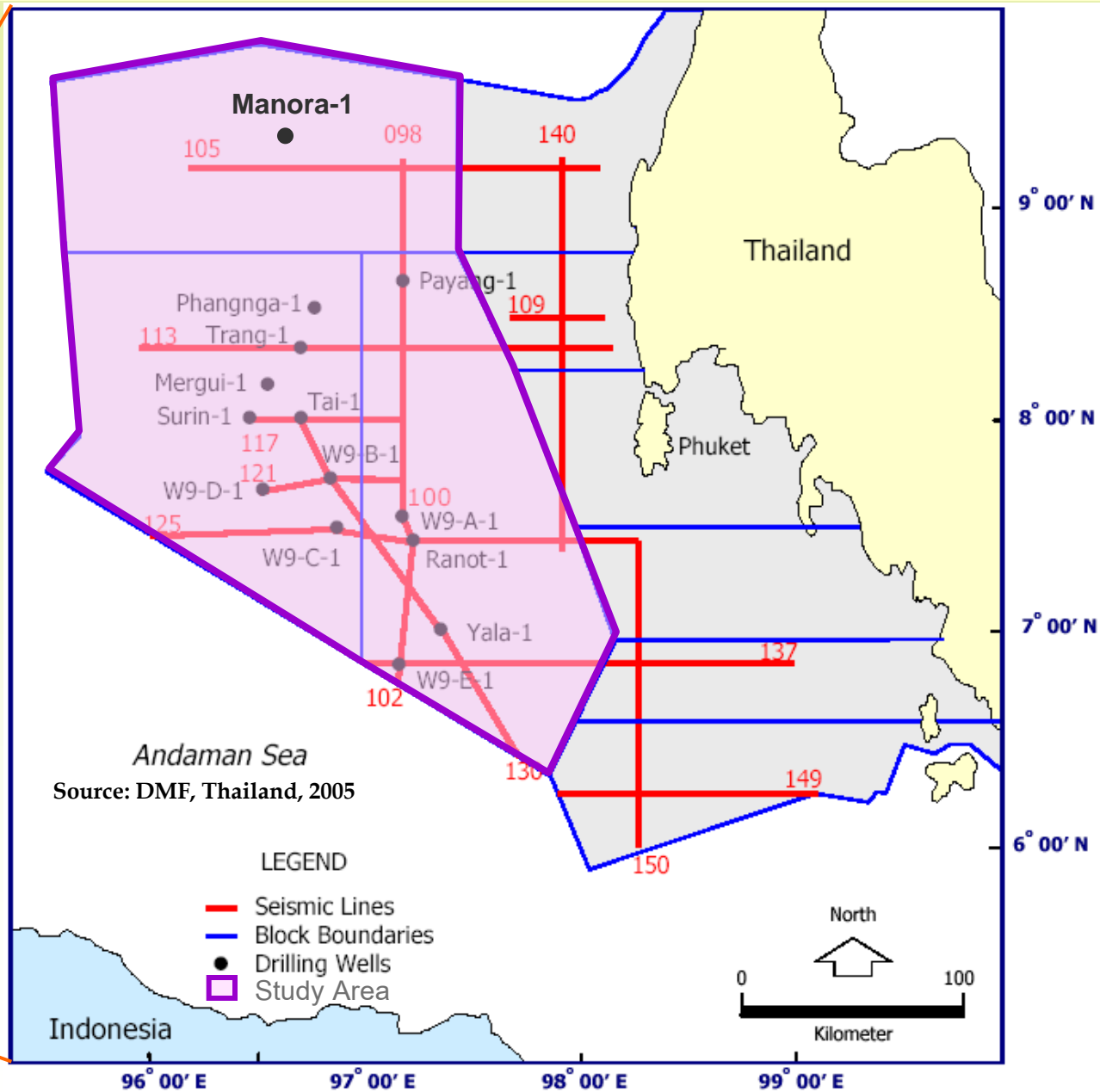
**KRABI, THAILAND**

**12<sup>th</sup> May 2009**

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# Location



# Exploration History

## Seismic Surveys in the Andaman Sea

Operator	Block	Duration	2D (km)
Amoco	W2	1974	452.00
DMR	Andaman Sea	28 Apr-23 May 1995	3,298.00
ESSO	W9	1974-1975	11,785.00
Kerr-McGee	W7/38	19 Apr - 10 May 1998	3,875.50
		9-19 Feb 1999	1,332.30
Oceanic	W7	1974	2,097.00
Pan Ocean	W3,W4	1970, 1972	1,390.00
Placid Oil	W8	1985	834.00
Union Oil	W8	1973	7,163.00
Unocal	W8/38, W9/38	29 Nov 1996-11 Feb 1997	11,737.00
Weeks	W1	1973	910.00
Shell			
<b>Total</b>			<b>44,873.80</b>
Magnetic Survey in the Andaman Sea			
Kerr-McGee	W7/38	1998	3,820.40

## Seismic Data

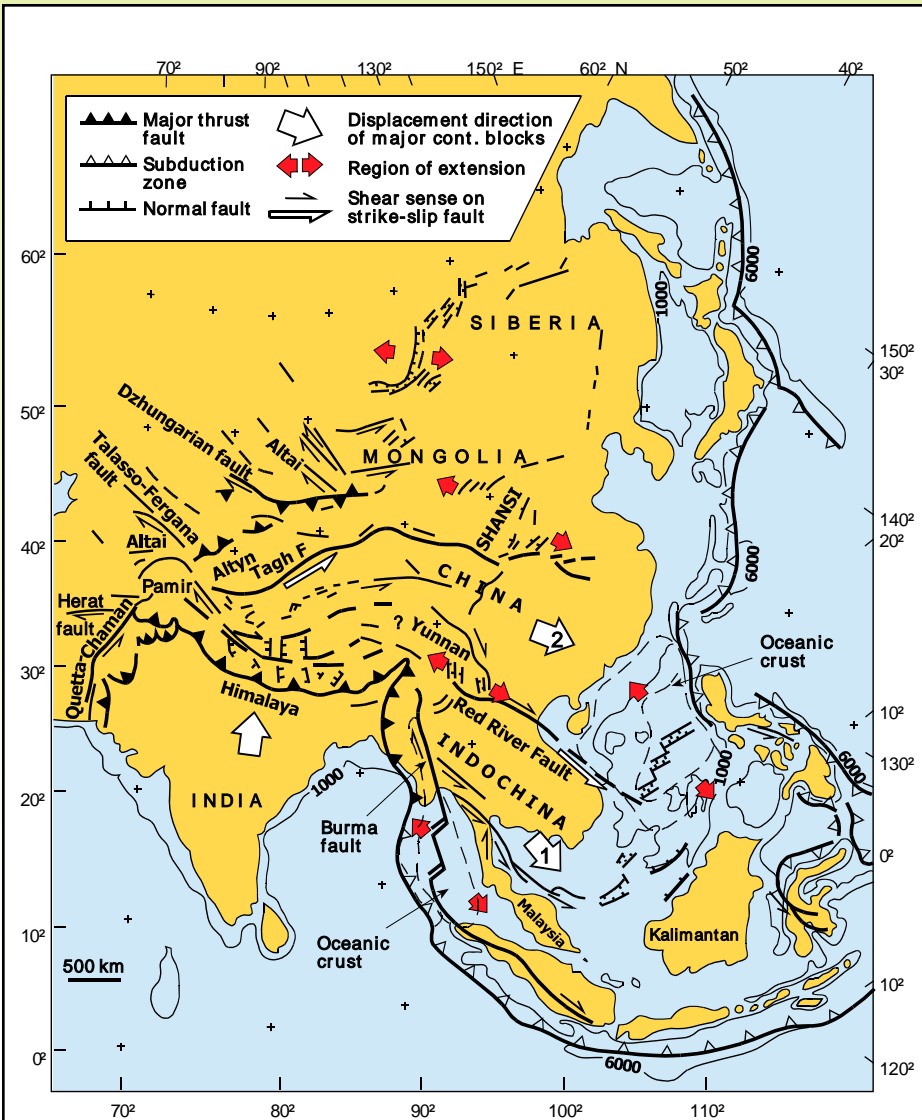
There are over 1,000 2D seismic lines, with total length approximately 45,000 km were acquired covering the main concession blocks.



# Exploration History

OPERATOR	WELL NAME	BLOCK	SPUDED DATE	RELEASED DATE	RESULT
ESSO	W9-A-1	W9	15-Dec-75	01-Mar-76	DRY
ESSO	<b>W9-B-1</b>	W9	04-Mar-76	22-Mar-76	GAS&OIL SHOWS
ESSO	W9-C-1	W9	01-Jun-76	01-Sep-76	DRY
ESSO	W9-D-1	W9	03-Aug-76	02-Sep-76	DRY
ESSO	W9-E-1	W9	05-Sep-76	13-Nov-76	DRY
UNOCAL	<b>TRANG-1</b>	W8	11-Mar-76	28-May-76	GAS&OIL SHOWS
UNOCAL	TAI-1	W8	28-May-76	28-Jun-76	DRY
UNOCAL	PHANGHA-1	W8	30-Jun-76	13-Jul-76	DRY
UNOCAL	<b>MERGUI-1</b>	W8	16-Jul-76	02-Sep-76	OIL SHOWS
UNOCAL	PAYANG-1	W8	04-Sep-76	17-Sep-76	DRY
UNOCAL	SURIN-1	W8	20-Sep-76	02-Oct-76	DRY
UNOCAL	THALANG-1	W9/38	11-Oct-97	29-Oct-97	DRY
UNOCAL	KANTANG-1	W8/38	25-Oct-97	05-Nov-97	DRY
UNOCAL	KRA BURI-1	W9/38	06-Nov-97	23-Nov-97	DRY
UNOCAL	SI KAO-1	W8/38	05-Nov-97	03-Dec-97	DRY
UNOCAL	KATHU-1	W8/38	06-Dec-97	10-Dec-97	DRY
PLACID	<b>YALA-1</b>	W8	20-Sep-76	20-Oct-76	GAS SHOWS
PLACID	RANOT-1	W8	28-Jan-87	18-Feb-87	DRY
KERR-McGEE	MANORA-1	W7/38	22-Feb-00	13-Mar-00	DRY

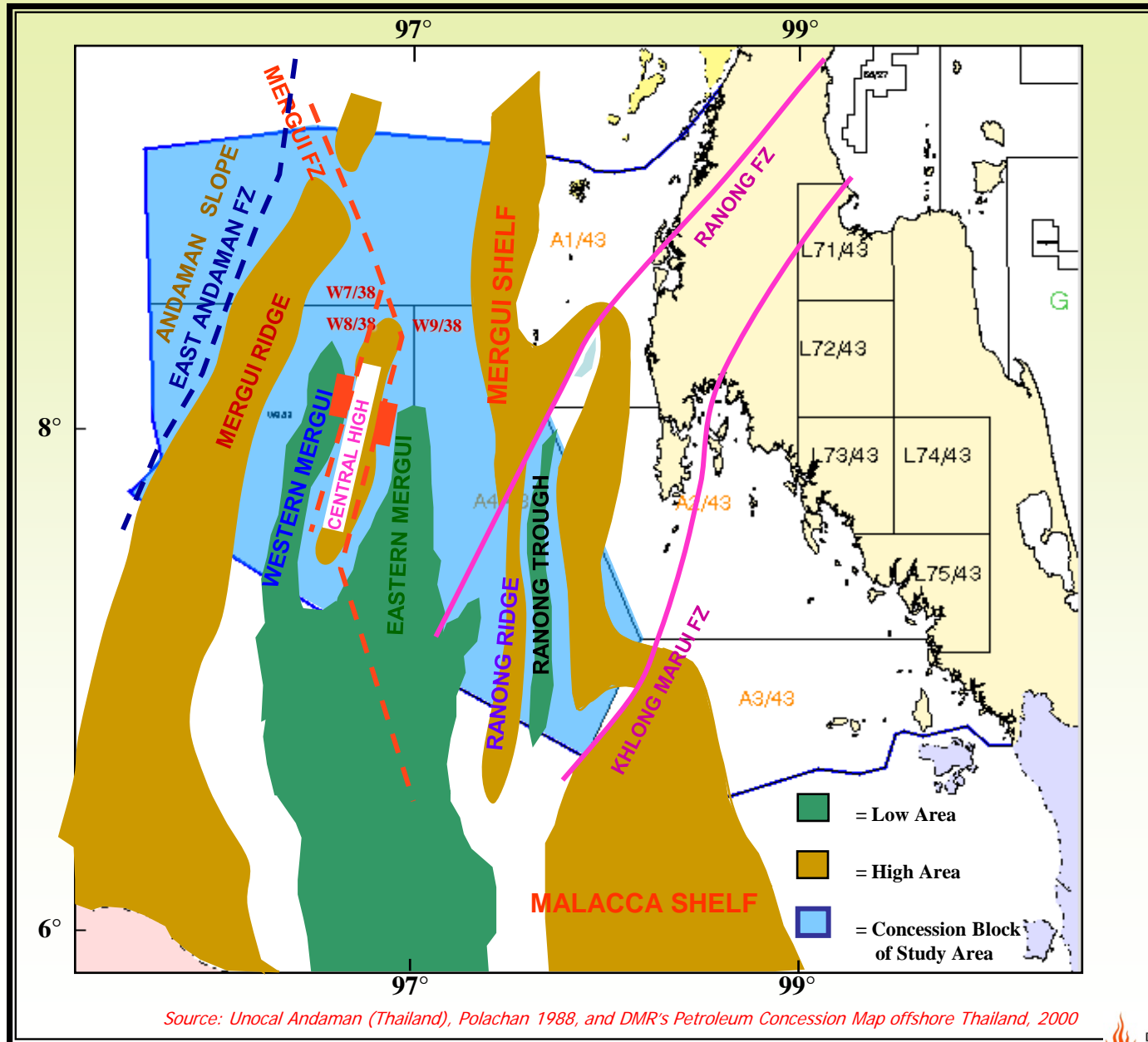
# Regional Framework



Tectonic map of central-east Asia illustrating 'Extrusion' model and its relationship with Cenozoic structures in the region. Numbers in white arrows indicate the relative order in which certain continental blocks were extruded toward the southeast. After Tapponnier *et al.* (1982).

**Figure 2.13** Tectonic map of central-east Asia illustrating 'Extrusion' model and its relationship with Cenozoic structures in the region. Numbers in white arrows indicate the relative order in which certain continental blocks were extruded toward the southeast. After Tapponnier *et al.* (1982).

# Physiographic map of the Mergui Basin

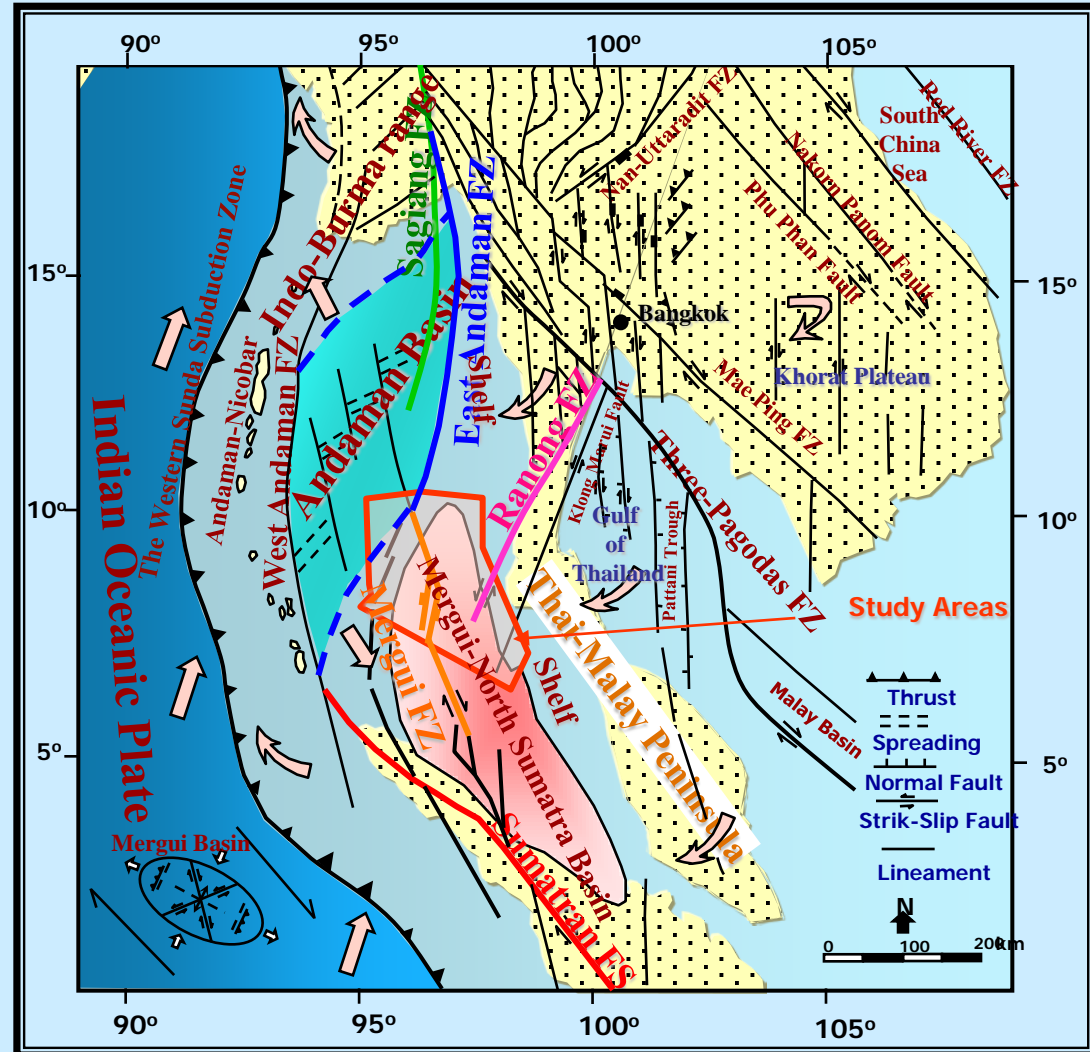


Source: Unocal Andaman (Thailand), Polachan 1988, and DMR's Petroleum Concession Map offshore Thailand, 2000

# Plate motions and Simplified Structural Framework of Cenozoic basins in the Gulf of Thailand and the Andaman Sea

## Legend

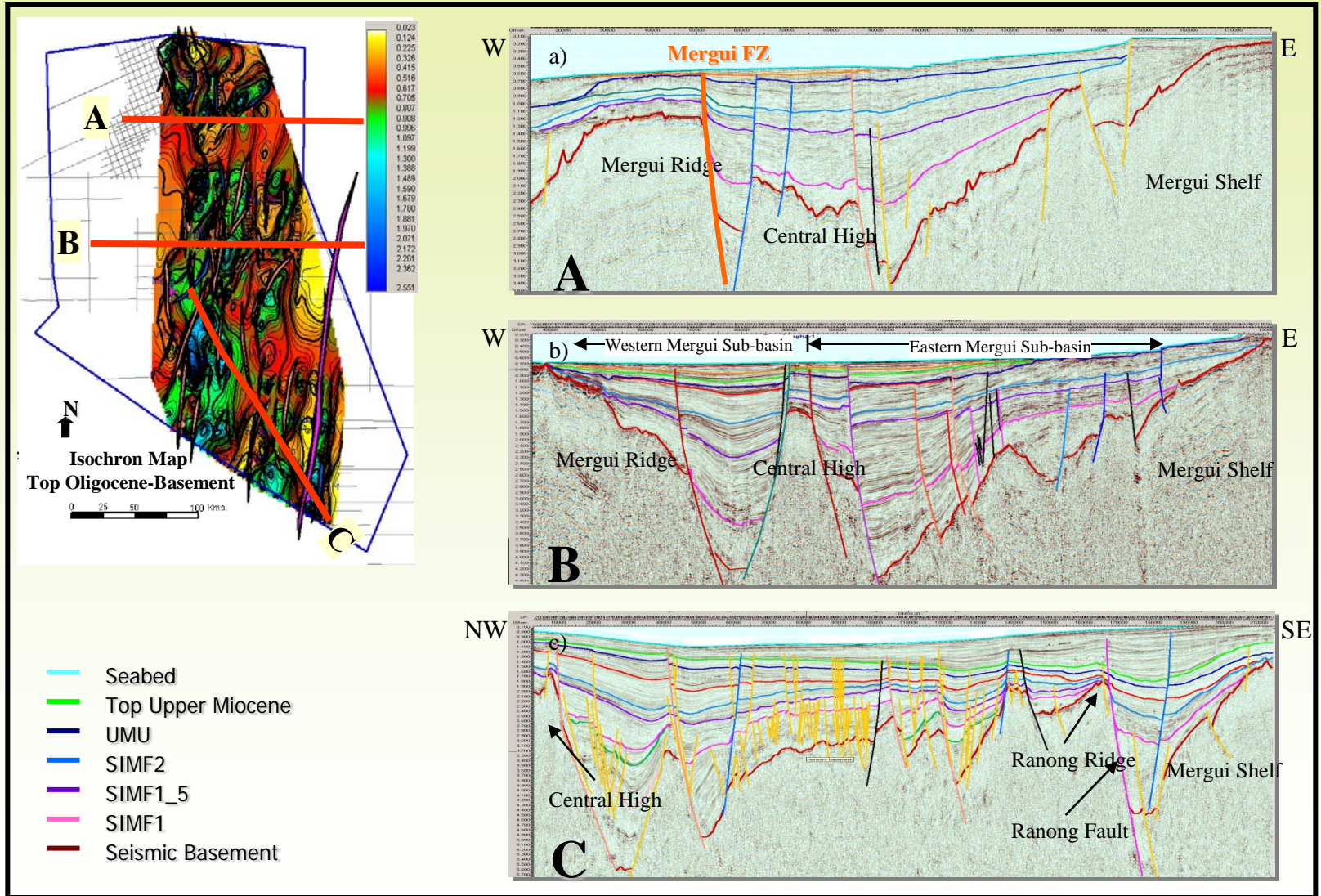
- East Andaman FZ
- Sagiang FZ
- Sumatran FS
- Ranong FZ
- Mergui FZ
- Andaman Basin
- Mergui - North Sumatra Basin
- Study Area
- Indian Oceanic Plate
- Sunda Continent
- Offshore area
- ➔ Plate Motion



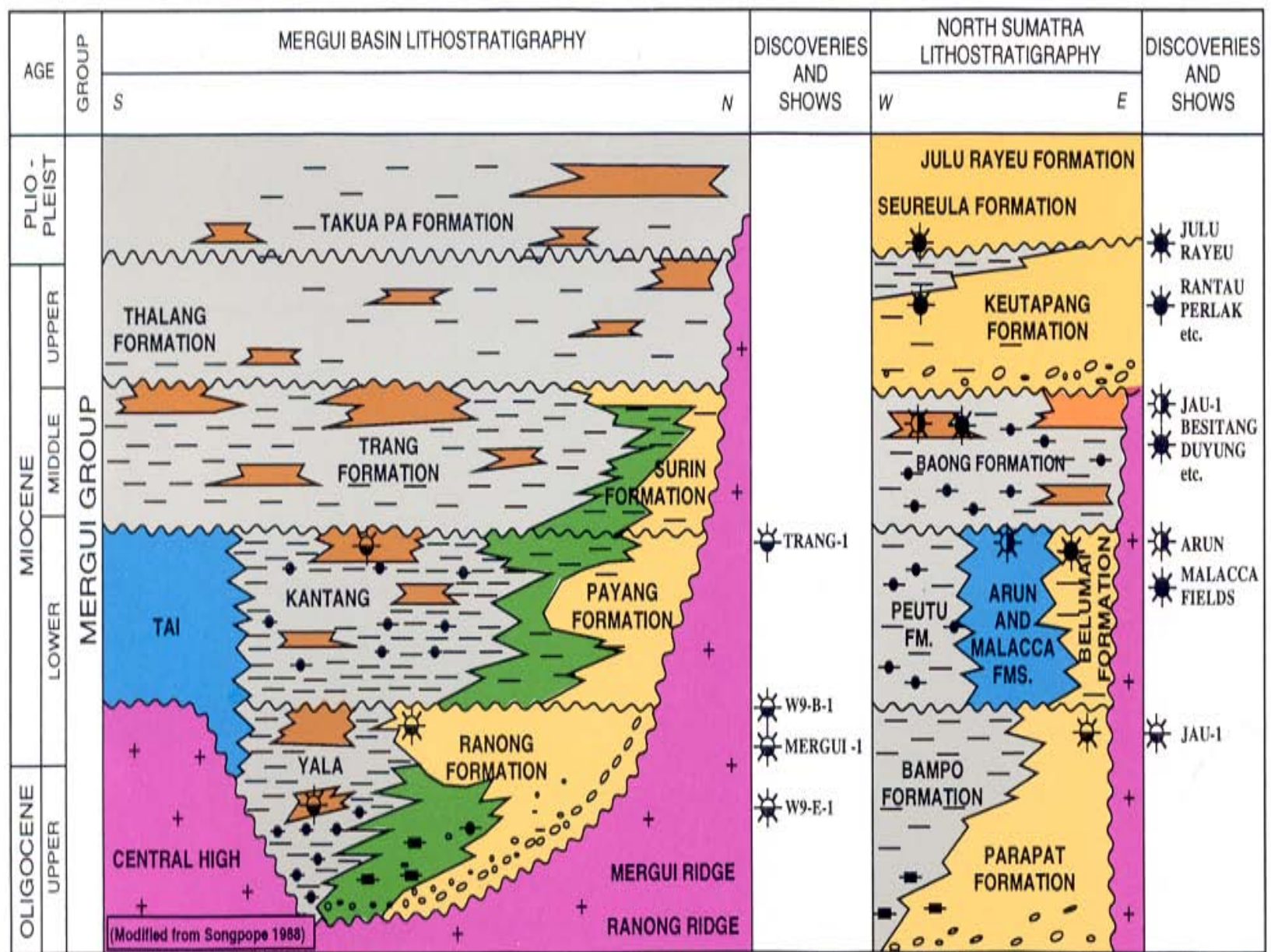
(Modified after Polachan, 1988)



# Seismic Vertical Sections across the Northern, the Central, and the Southern areas.



# Stratigraphic Correlation of the Mergui and N-Sumatra Basin



# PETROLEUM GEOLOGY

# Petroleum Potential

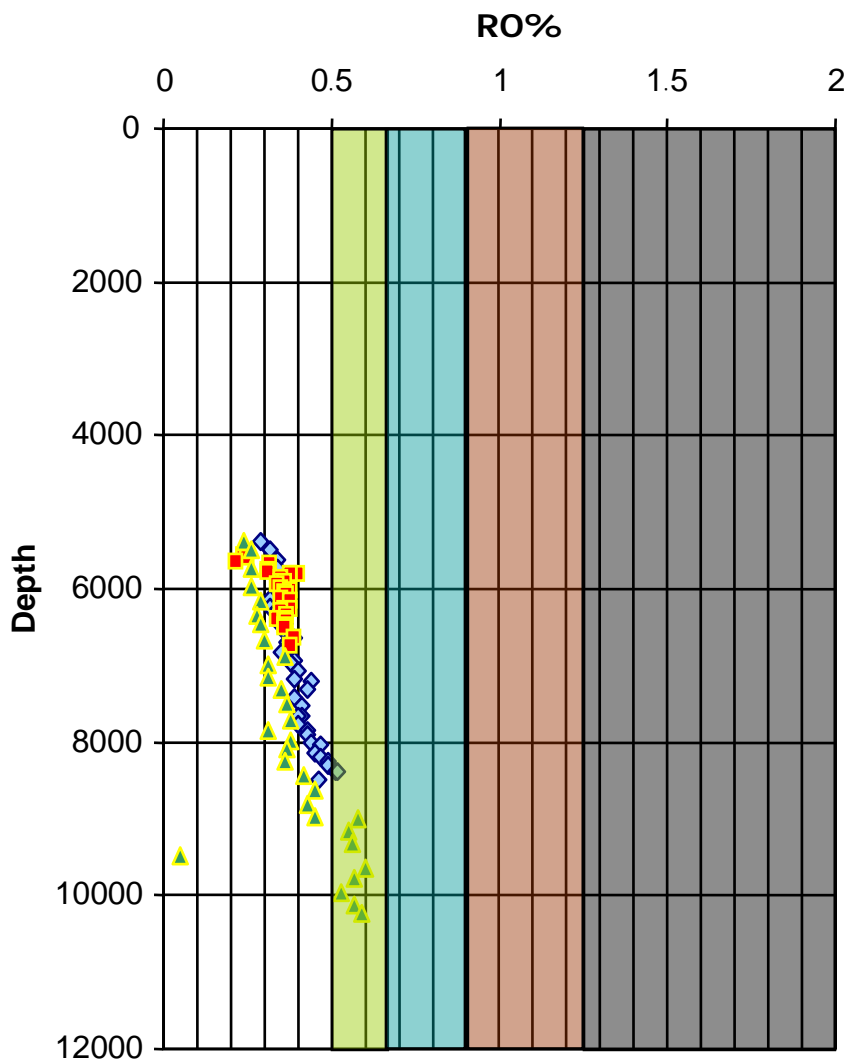
- **Presence of Mature Source Rocks for Hydrocarbon Generation and Expulsion**
- **Presence of Good Reservoirs Characteristics**
- **Presence of Trapping Mechanism**
- **Presence of a Gas Accumulation**

# Source Rocks

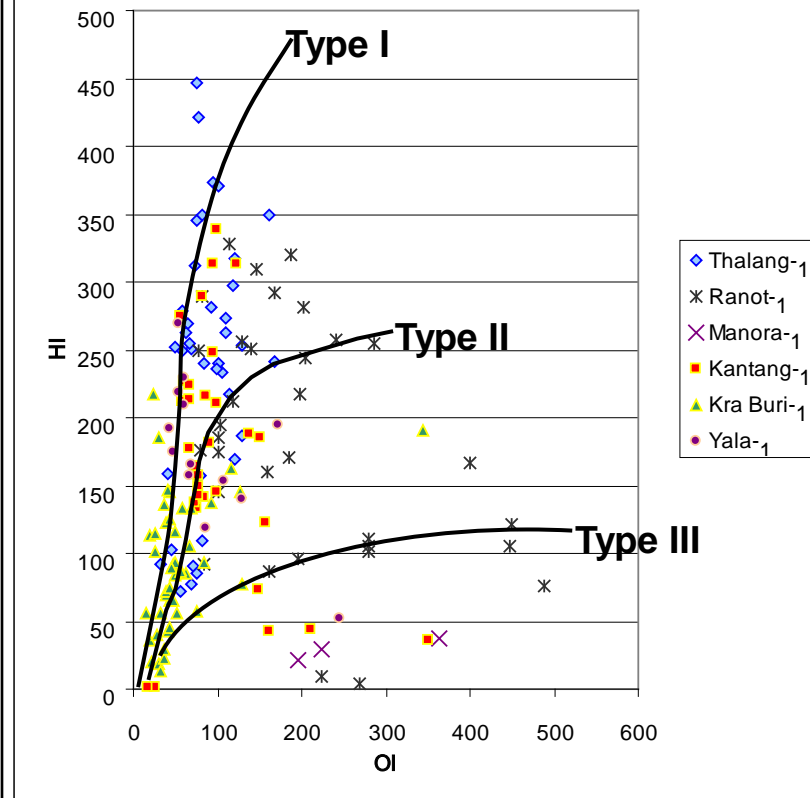
- **Gas Prone Basin**
- **Oligocene and L-M Miocene Shales with Landplant Derived Organic Matter**
- **Source Rock Potential is Poor to Fair**
- **Type II and III Kerogen**
- **Mature Source Rocks are Restricted in the Deep Part of the Basin**
- **Expulsion Began in the Late Miocene-Pliocene**

# Petroleum Source Rocks

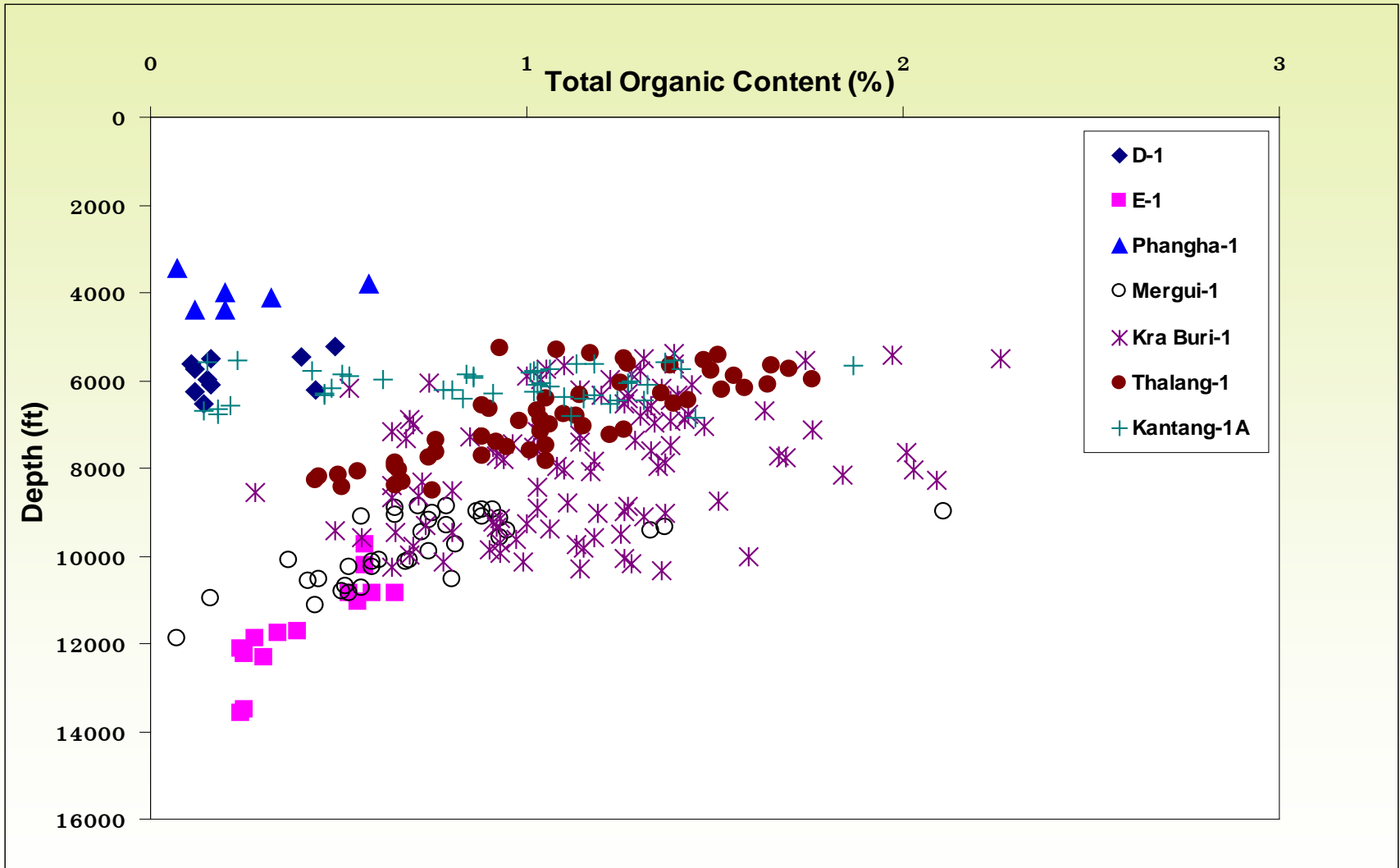
## Depth vs. RO



## OI vs. HI



# Total Organic Content vs Depth



# Reservoir Rocks

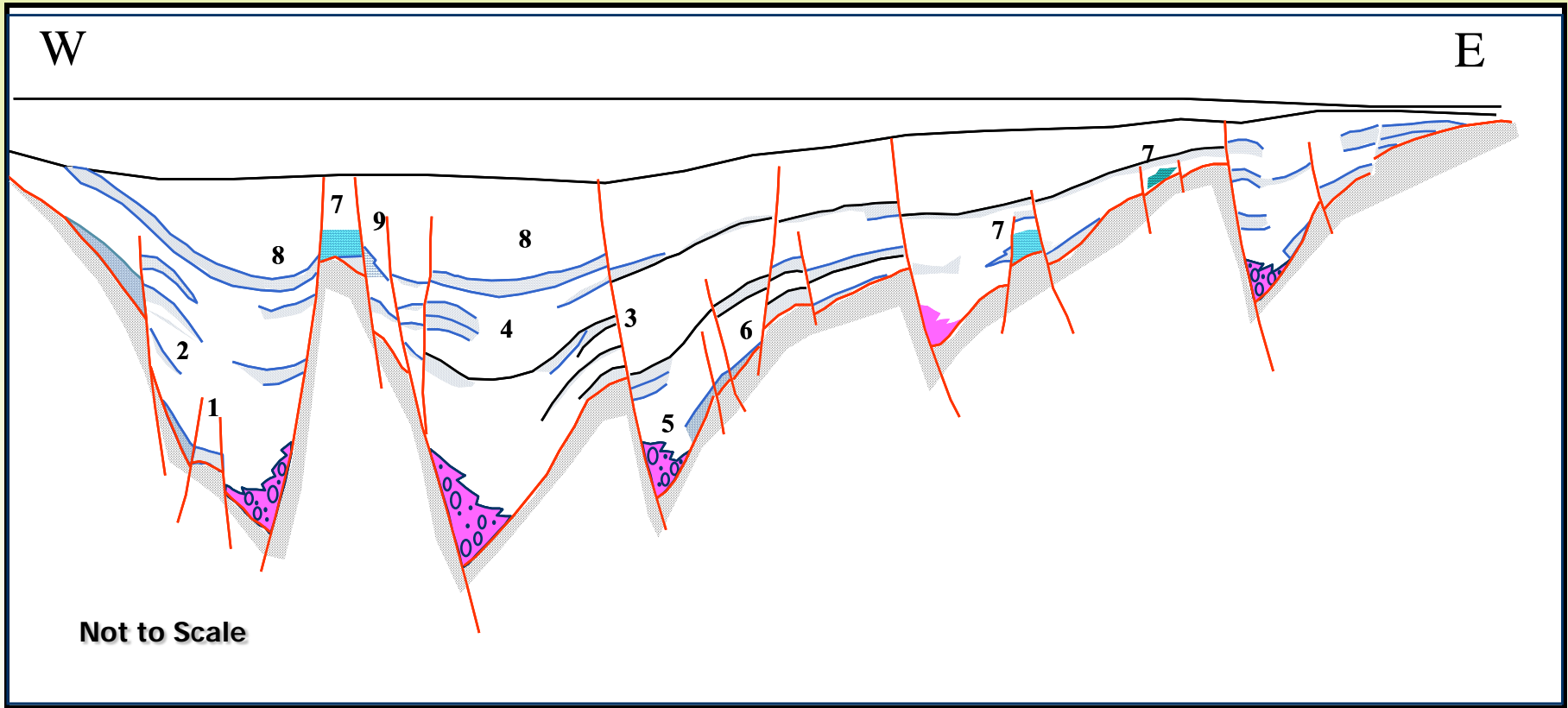
- **Oligocene Shallow Marine/Deltaic Sandstone**
- **Oligocene Mid Fan Turbidites**
- **Lower Miocene Sandstone**
- **Lower Miocene Carbonate Build-up**



# Traps and Seals

- **Structural and Stratigraphic Traps are Defined**
- **Tilted Fault, Wrench related Anticline, Shale Diapirs, Draped Horsts, Reef, Buried Hill Types**
- **Miocene/Upper Miocene, Pliocene Marine Shale Seals**

# Conceptual Play Types in the MG Basin



## Structural Traps

- 1) **Drape over Basement High of Lower Oligocene Deltaic sand**
- 2) **Roll-over of Upper Oligocene sand**
- 3) **Crest of block of Oligocene sand**
- 4) **Drag fold of Lower Miocene sand**

## Stratigraphic Traps

- 5) **Oligocene Basin Floor Fan**
- 6) **Pinch-out of Lower Oligocene Deltaic sand**
- 7) **Lower Miocene Carbonate Buildups**
- 8) **Mid-fan Turbidite of Lower Miocene sand**
- 9) **Miocene Conglomerate reef**

# Challenges

1. Quantitative Petroleum Potential Assessment
2. Additional Resource in the north/west
3. Strengthen Academic Connection among geo-scientists
4. New Exploration Technology

# Conclusions

1. Local tectonic activated periodically through time in the Mergui Basin, induced forming of various accommodation spaces for individual seismic packages, which are considered as a chance to find effective kitchen area
2. Outstanding petroleum reservoir was noticed by amount of sedimentary supply
3. Extensive Study of Seismic Interpretation in 2D data and Intensive Study in Local Source Areas are required
4. Petroleum charging from source to traps is expected
5. Additional Resource in the north remains undiscovered



**THANK  
YOU**

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