



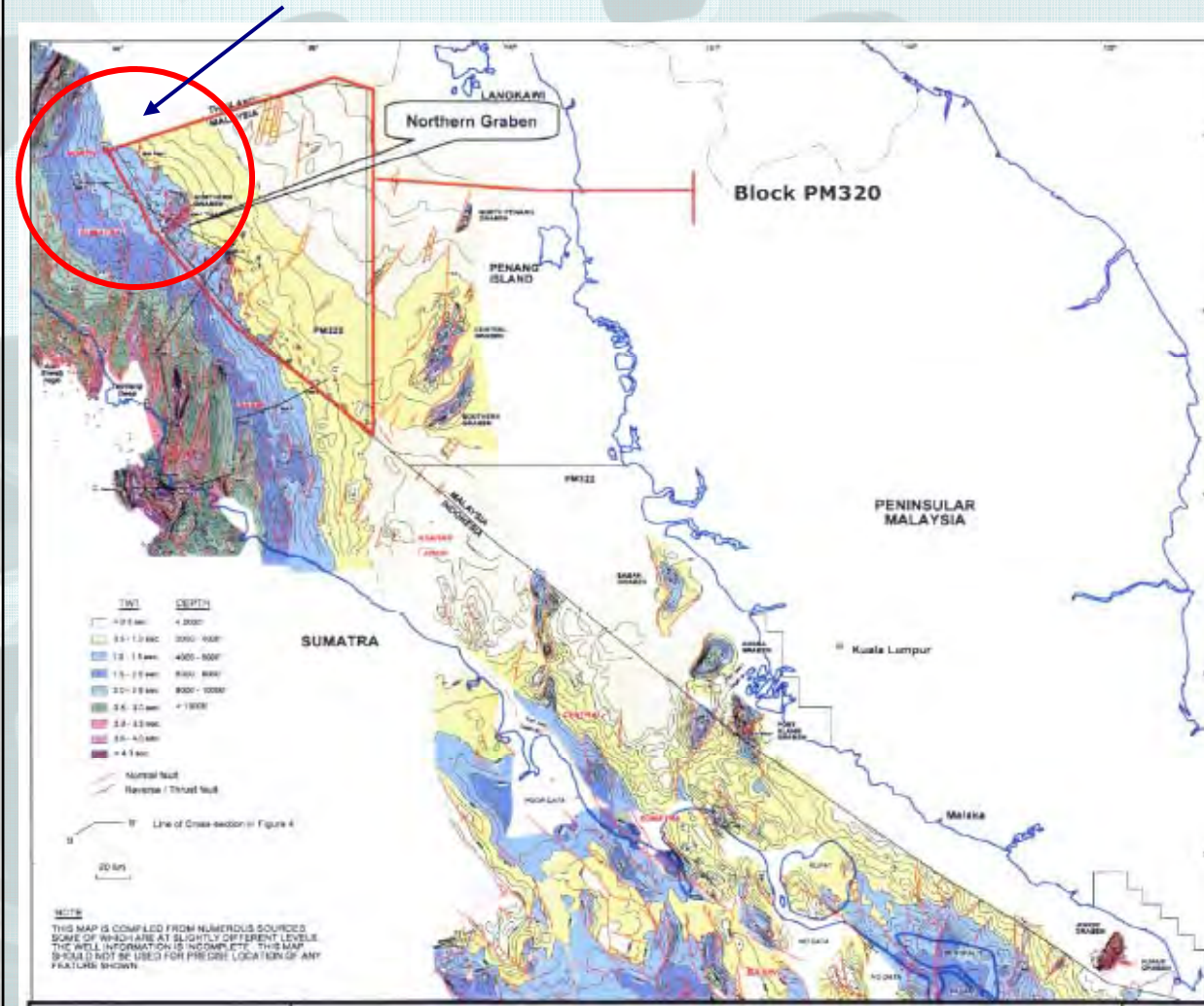
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PETROLEUM RESOURCE EXPLORATION

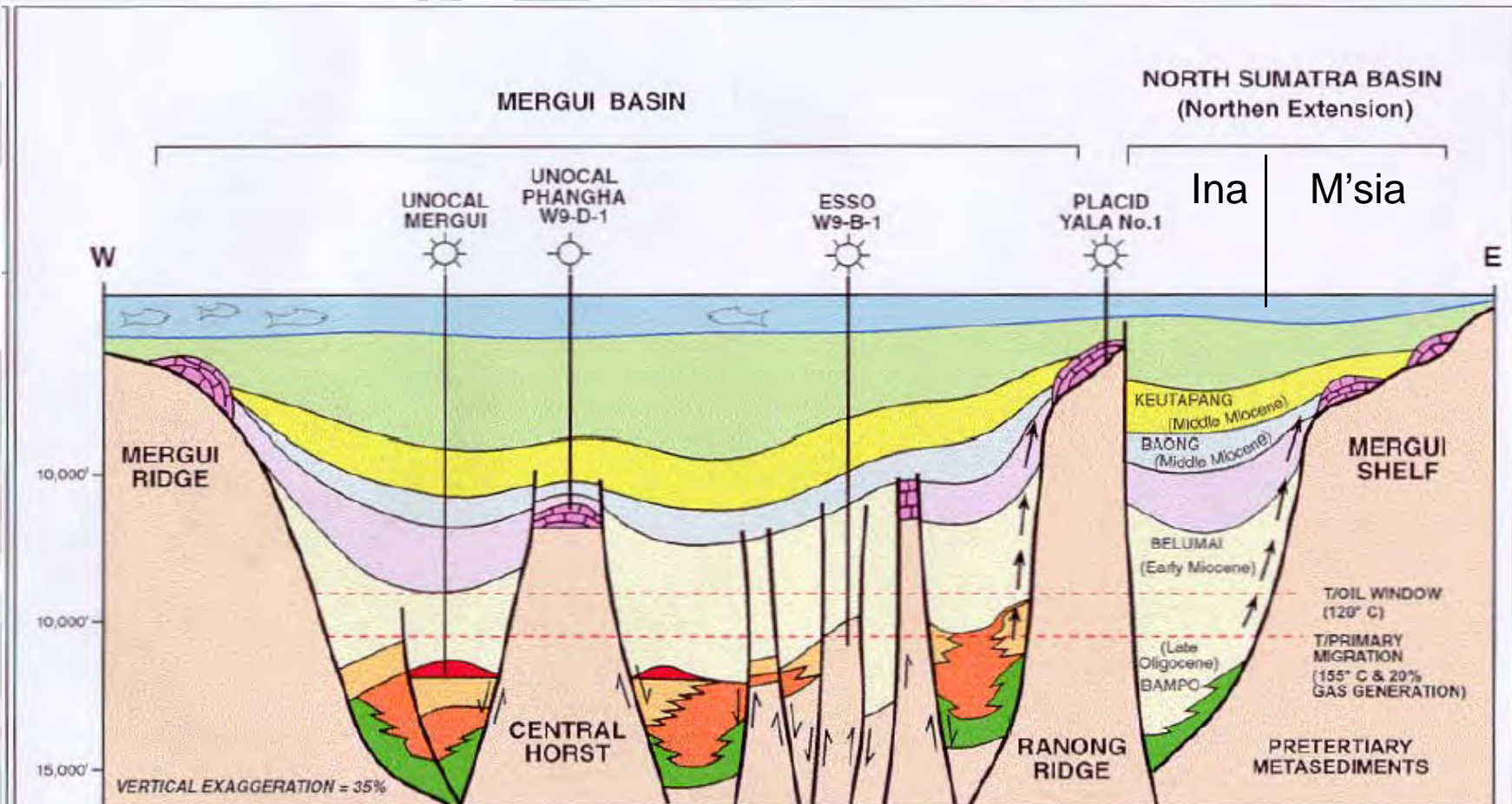
MERGUI-NORTH SUMATRA BASIN

AN OVERVIEW

LOCATION OF CROSS-BORDER STUDY



**Map Showing
Location of the
basin, overlain on
Basement Structure
Map**



STRUCTURAL CROSS-SECTION OF MERGUI-NORTH SUMATRA BASIN

Exploration History (Malaysian Side)

MOBIL (1971-1975)

- Acquired 5500 km of 2D seismic and drilled 2 wells – MSS-AX and MG-AX.
- Both wells tested potential Pre-Tertiary Tampur Carbonate basement plays.
- Good reservoirs were encountered at both wells but failed due to lack of top seal.

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- acquired 2000 km of 2D seismic data in 1983.

SUN MALAYSIA PETROLEUM (1987-1992)

- Acquired 5657 km 2D seismic and drilled 3 exploration wells in the Western most part of the block.
- Singa Besar-1 and Langgun Timur-1 had minor gas shows and the third well, Dayang-1 was dry.
- The acreage was relinquished in December 1992 upon the expiry of the exploration period.

SHELL (1999 – 2001)

- Acquired and processed 1053 line-km 2D seismic data.
- Re-processed 1000 line-km vintage 2D seismic data.
- Conducted a regional study of the Straits of Melaka comprising evaluation of the hydrocarbon habitat and tectonic framework.

2002 onwards-no exploration activities.



Location of Exploration wells on Malaysian side

Structural Map of Mergu-North Sumatra Basin-Tertiary Basement

SUMMARY OF EXPLORATION WELL RESULTS

Well	Operator	Year	TD (m)	Objectives	Results
MSS-XA	Mobil	1972	1294	Calcarenites and sandstones below Baong Shale	Dry
MG-XA	Mobil	1974	1651	Synrift graben fill reservoirs	Dry
Dayang-1	Sun	1989	1142	Melaka carbonate/ Bampo Formation	Dry. Trace Gas/oil shows
Singa Besar-1	Sun	1989	844	Melaka Carbonate on top of basement	3.3m NGS, Flowing at 3.7MMSCF/day
Langgun Timur-1	Sun	1989	2028	Tampur Carbonate and Middle Graben Fill clastics	Minor gas shows TD in Tampur carbonates

Prospectivity and Challenges

- ❖ Previous evaluation shows that there are four remaining potential hydrocarbon plays in the area namely:
 - 1) Baong transgressive sandstones-main risk is top seal by Baong shales
 - 2) Stratigraphic onlap trap of Baong sandstone onto basement-main risk is top seal by Baong shales and lateral seal by basement,
 - 3) Miocene carbonate build-up/reef-main risk is the top seal.
 - 4) Pre-Tertiary basement high (Tampur carbonates)-main risk is the reservoir.
 - 5) Synrift play (Parapat sandstone)-main risk is the maturity of local source rocks



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The End





Figure 3.31: Criteria Used for Defining Group Tops of PM320

SEQUENCE	AGE	SEISMIC	SEISMIC ATTRIBUTES	LOG ATTRIBUTES	DEPOSITION OF ENVIRONMENT	DESCRIPTION	DEPTH
Basement	Pre-Tertiary		Poor resolution – internal configurations or patterns not very distinct.			Tampur Carbonate	1410m
Orange	Late Oligocene		Reflectors show moderate continuity and moderate amplitudes.	Time equivalent to Bampo/Parapat formation (claystone, mudstone, shale).	Continental deposits of sandstone, conglomerate and claystone.	Syn-rift graben-fill deposit.	1180m
Green	Early Miocene		Reflectors are moderate to high continuity and moderate to high amplitudes.	Time equivalent to the Belimal formation.	Marine influence, predominantly mudstone with interbedded limestone and sandstone.	Post-rift upper graben-fill.	1103m
Tb2.2/2.3	Late Early-Middle Miocene		Parallel reflectors show generally high amplitudes with moderate to high continuity. In general, top of reflector shows strong reflector top. On some lines, erosional cuts are clearly visible.	Good correlation between log and seismic, marking the start and end of sandy interval.	Shelf platform environment – middle neritic. Alternating sandstone and shale.	On-lapping onto underlying Green sequence. Distinct erosional features visible. Biostratigraphy indicates an age gap of 9 Ma between Tb2.2/2.3 to Tb3.2/3.3. Clear strong unconformity is observed, indicating possible sub-aerial exposure.	956m
Tb3.2/3.3	Middle-Late Miocene		Parallel reflectors with low to moderate amplitudes, with moderate to high continuity.	High gamma ray values indicate deeper environment of deposition than Tb2.2/2.3.	Predominantly shale with silty sands. Mid Neritic.	On-lapping onto Tb2.2/2.3 and minor erosional truncations at the top.	881m
Tb3.5	Early Pliocene		Parallel to sub-parallel relatively continuous reflector, moderate amplitudes.		Shaly deposits, in shallow outer neritic.	Lies conformably over Tb3.2/3.3.	795m

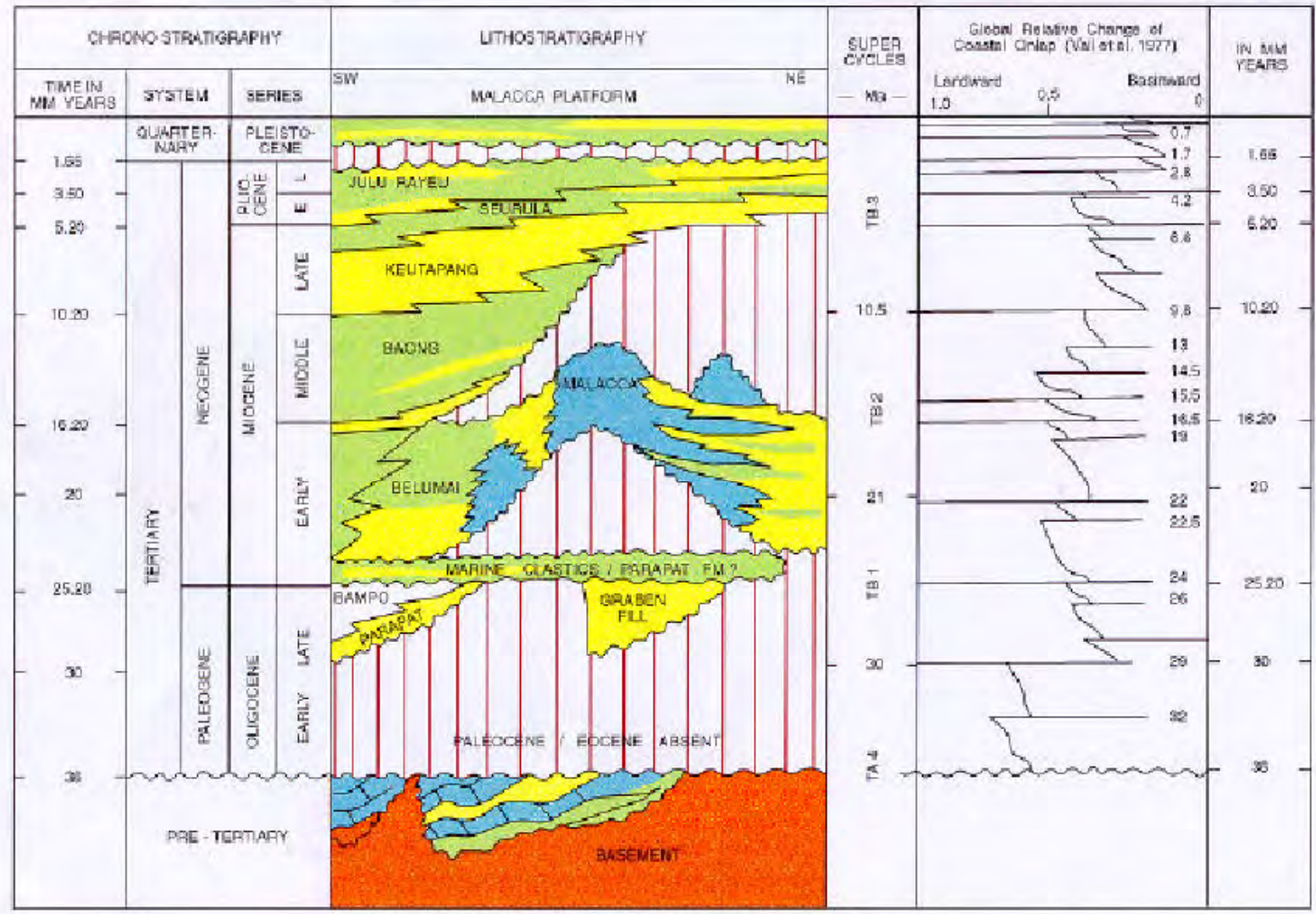


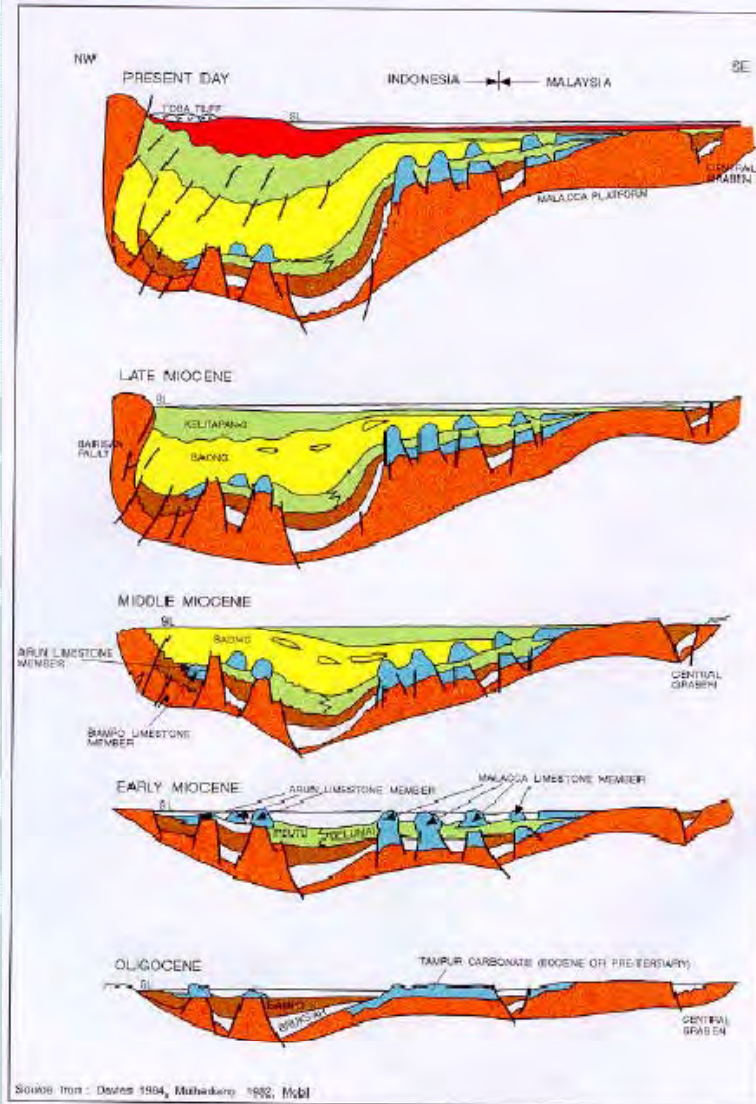
SSB/SSPC
 DEPT : EPD-CUR
 DATE : June 1996
 DRAWING : DRSH/EMAS/PCA

PENINSULAR MALAYSIA REVIEW - BLOCKS PM320, PM321 AND PM322

GENERALISED STRATIGRAPHY OF THE STRAITS OF MALACCA

Fig. No. 3

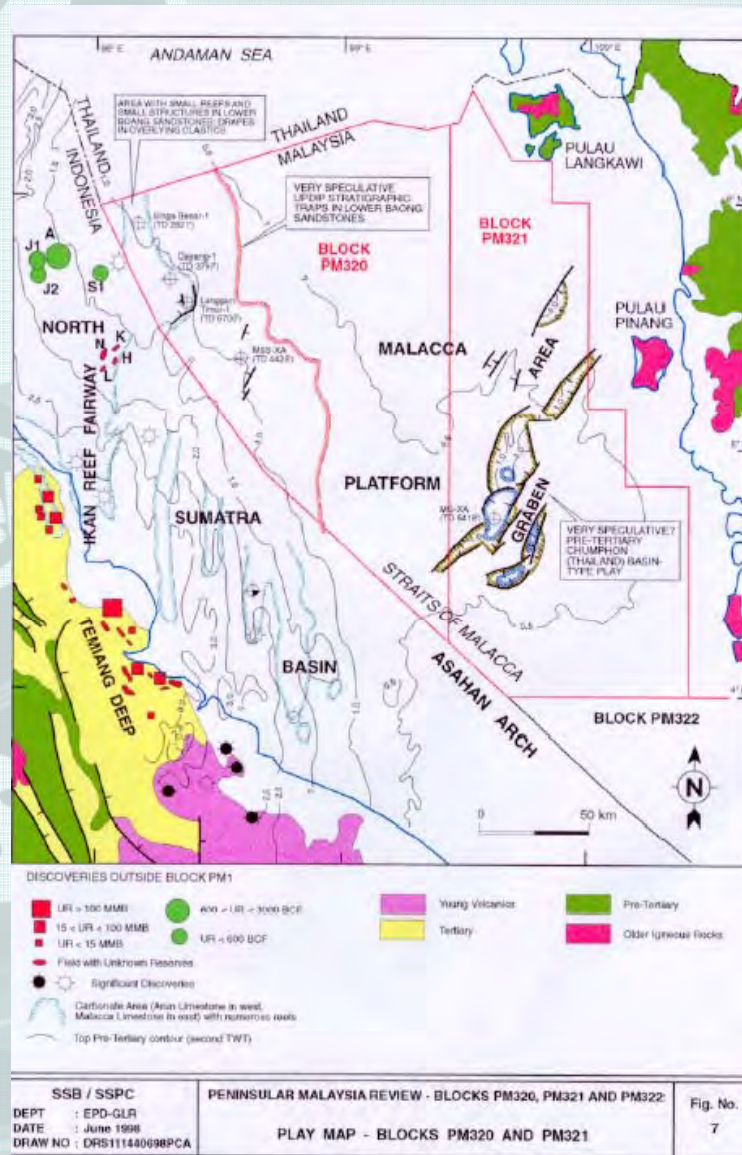




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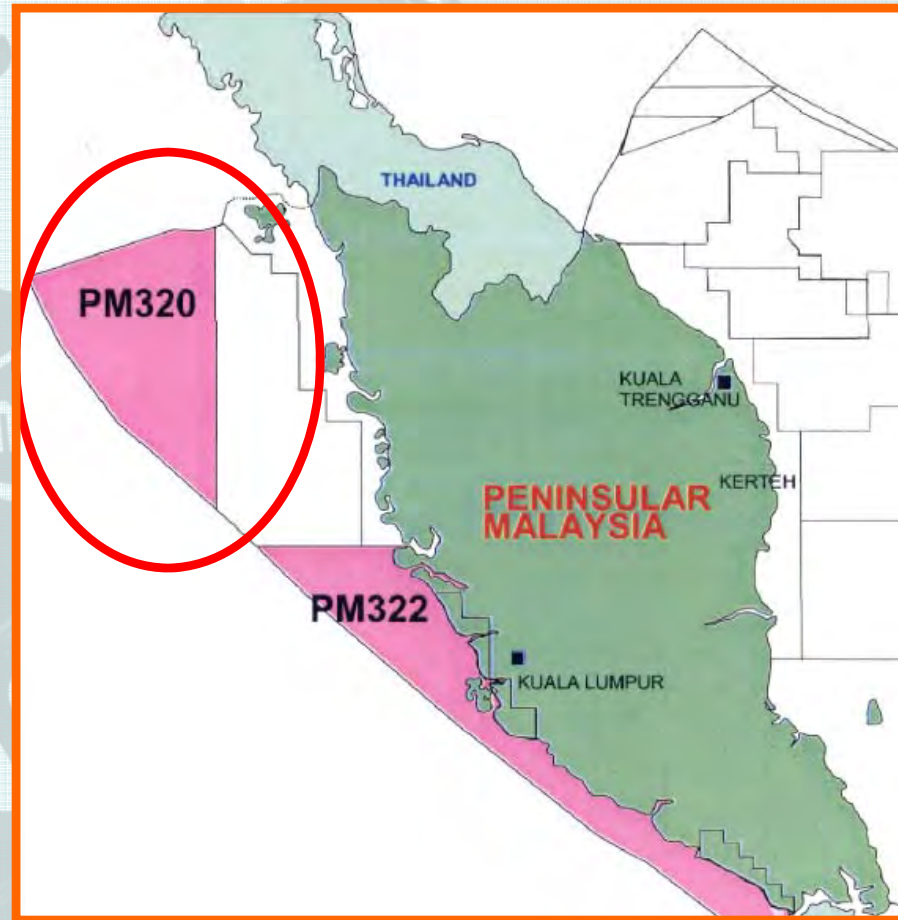
PENINSULAR MALAYSIA REVIEW - BLOCKS PM320, PM321 AND PM322
 SCHEMATIC SEDIMENTATION HISTORY OF
 THE NORTH SUMATRA BASIN

Fig. No
 6





Location



General Geology

- ❖ PM320 is situated on the Northwest flank of Straits of Malacca and constitutes a shelfal extension on the North Sumatra Basin (NSB).
- ❖ NSB comprises of Tertiary sediments over pre-Tertiary metasedimentary complex.
- ❖ NSB is a part of the hydrocarbon-rich series of Tertiary back-arc basin chain of the Sunda Island arc.
- ❖ NSB was formed during the early tertiary (Eocene – Oligocene) as a series of alternating N-S trending structural highs (horst) and deeps (grabens).
- ❖ NSB consist of Tertiary sediments overlying pre-Tertiary sedimentary complex.
- ❖ PM320 Basement consists of predominantly Pre-Tertiary carbonates (Tampur Formation).
- ❖ Basement occurs at about 2000m in the half grabens and in the west and rises gently towards the east and northeast.