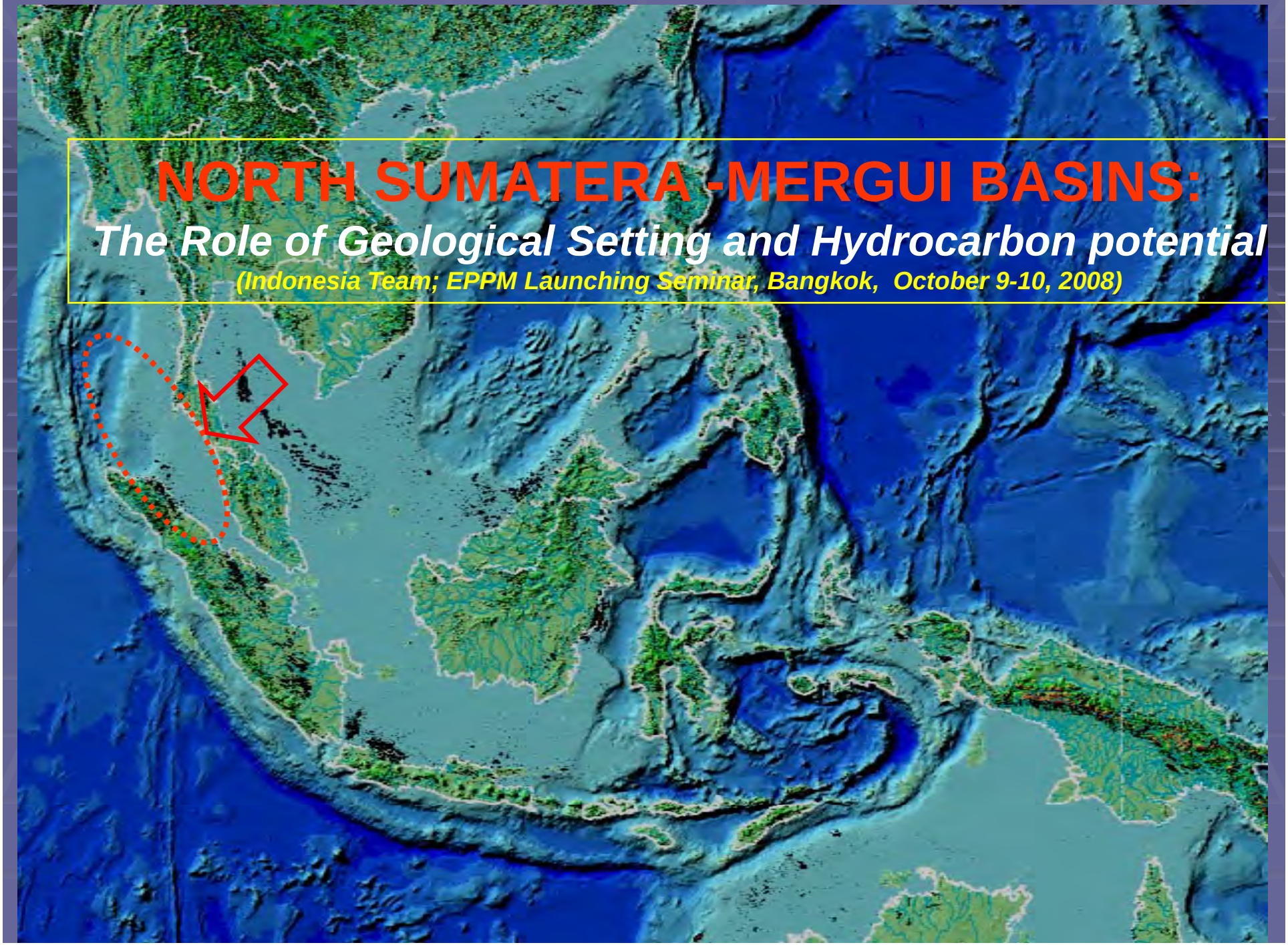


NORTH SUMATERA -MERGUI BASINS:

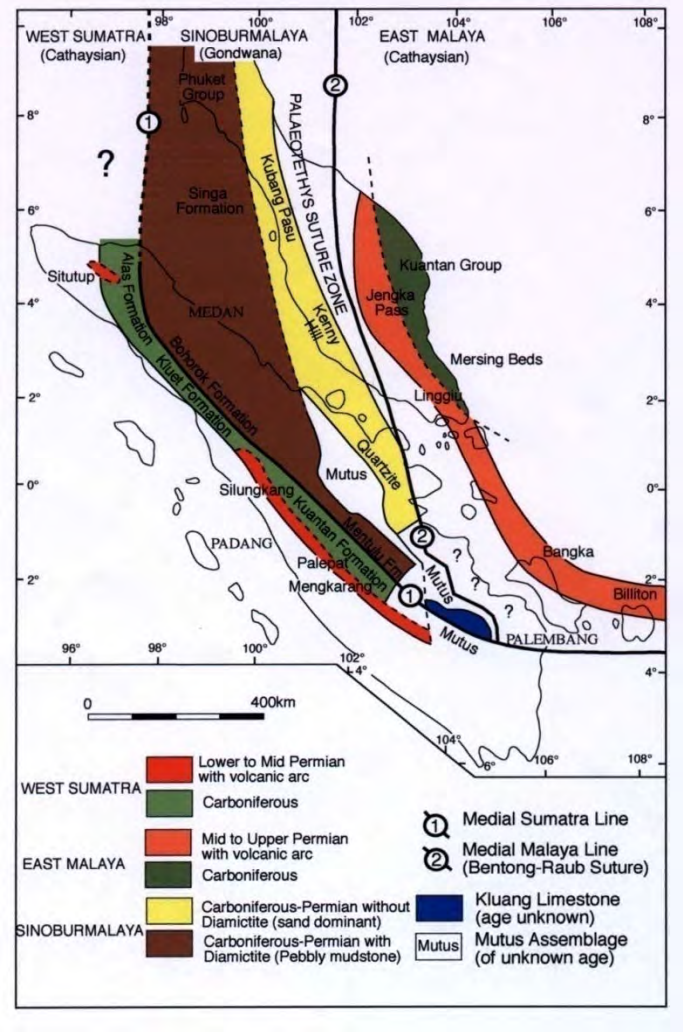
The Role of Geological Setting and Hydrocarbon potential

(Indonesia Team; EPPM Launching Seminar, Bangkok, October 9-10, 2008)

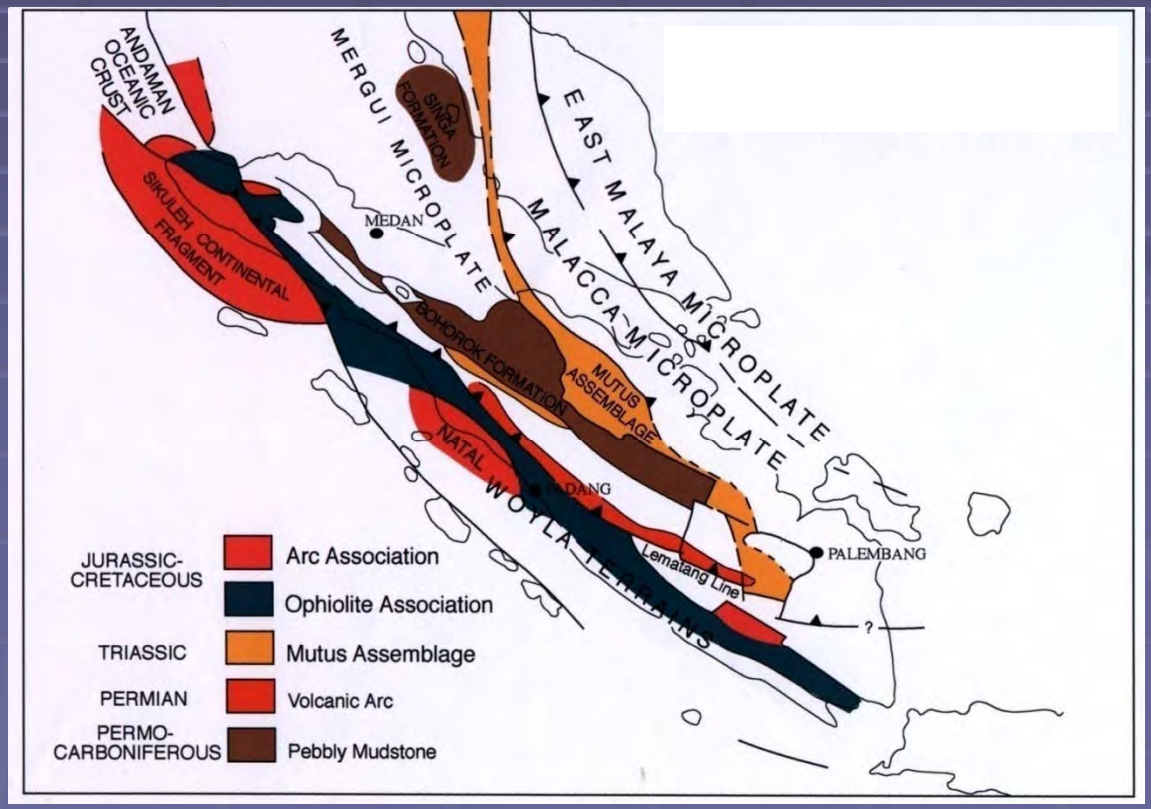
GEOLOGICAL SETTING
OF
NORTH SUMATERA

Sumatera-Malaya Terrains

(Hutchinson, 1994)

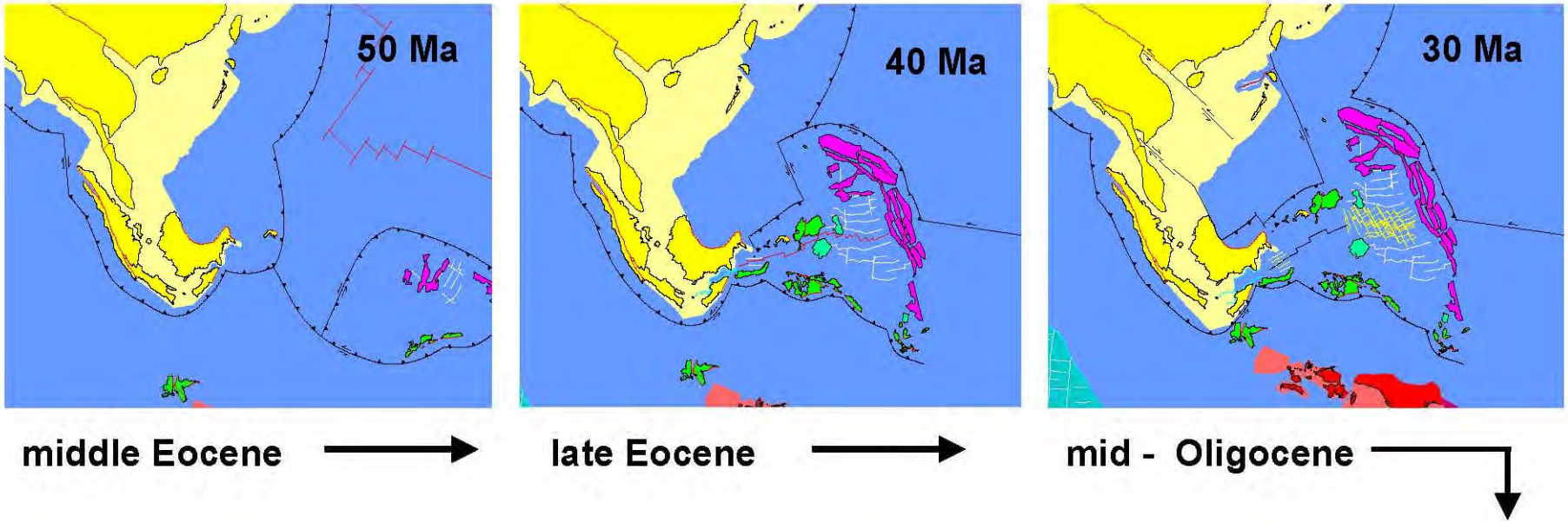


(Cameron and Pulunggono, 1984)



Indonesia : Tertiary tectonic reconstruction

Hall (2004)



THE ROLE OF GEOLOGICAL SETTING & PETROLEUM POTENTIAL

SUMATERA (WESTERN INDONESIA)

Sumatera / Western Indonesia Tectono-stratigraphy

1. *Syn-rift and Associated Rift-valley Fill Deposition* (Eocene-Oligocene)
2. *'Post-rift' Transgressive Phase Deposition* (Oligocene-Early Miocene)
3. *Syn-orogenic Regressive Phase Deposition* (Middle Miocene-Present)

Sumatera / Western Indonesia Tertiary Basin Development

- **Paleogene Phase:**

  Rift-valley Basin Formation

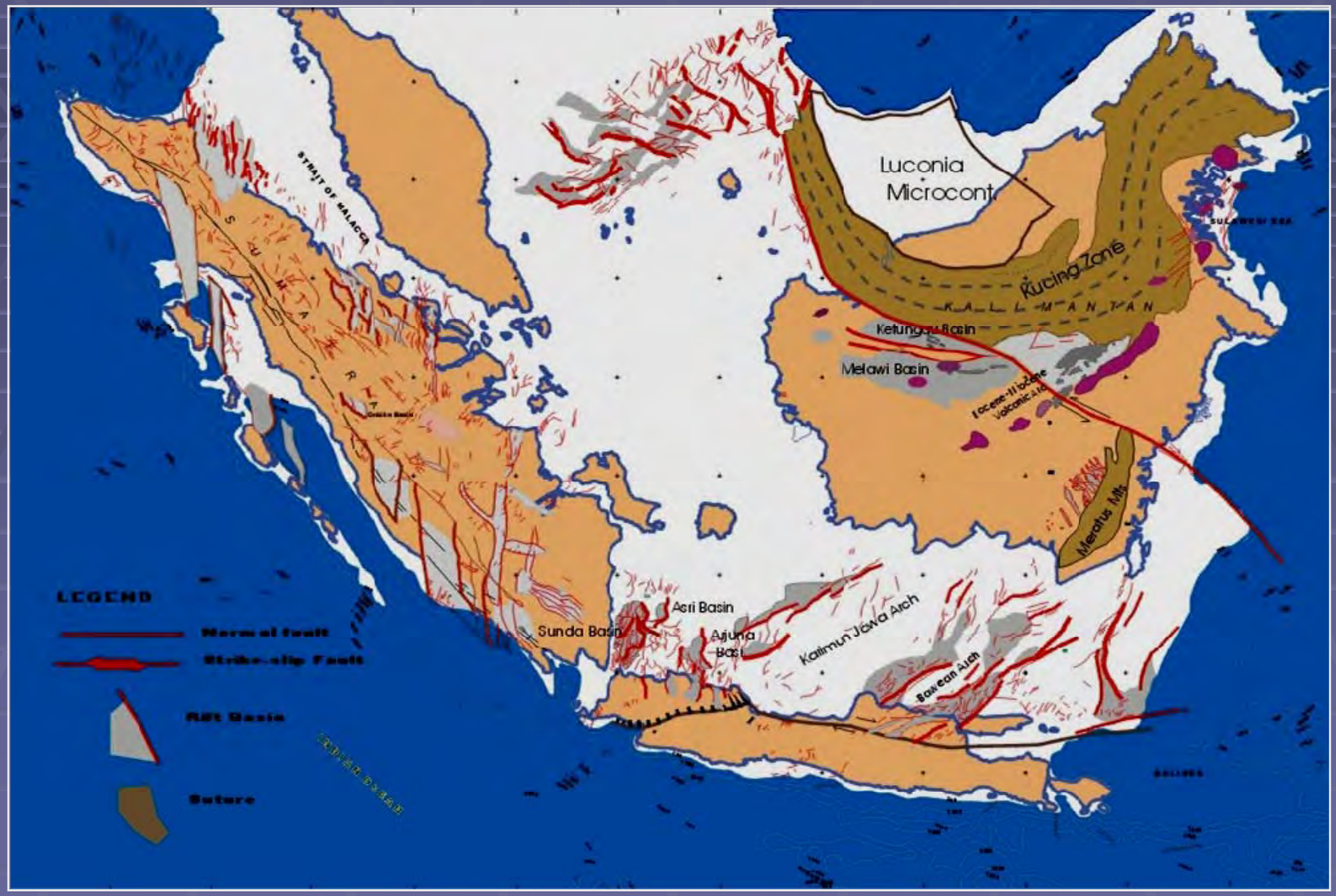
- **Neogene Phase:**

  Compressive Basin Formation: Fore-arc and Back-arc Basins

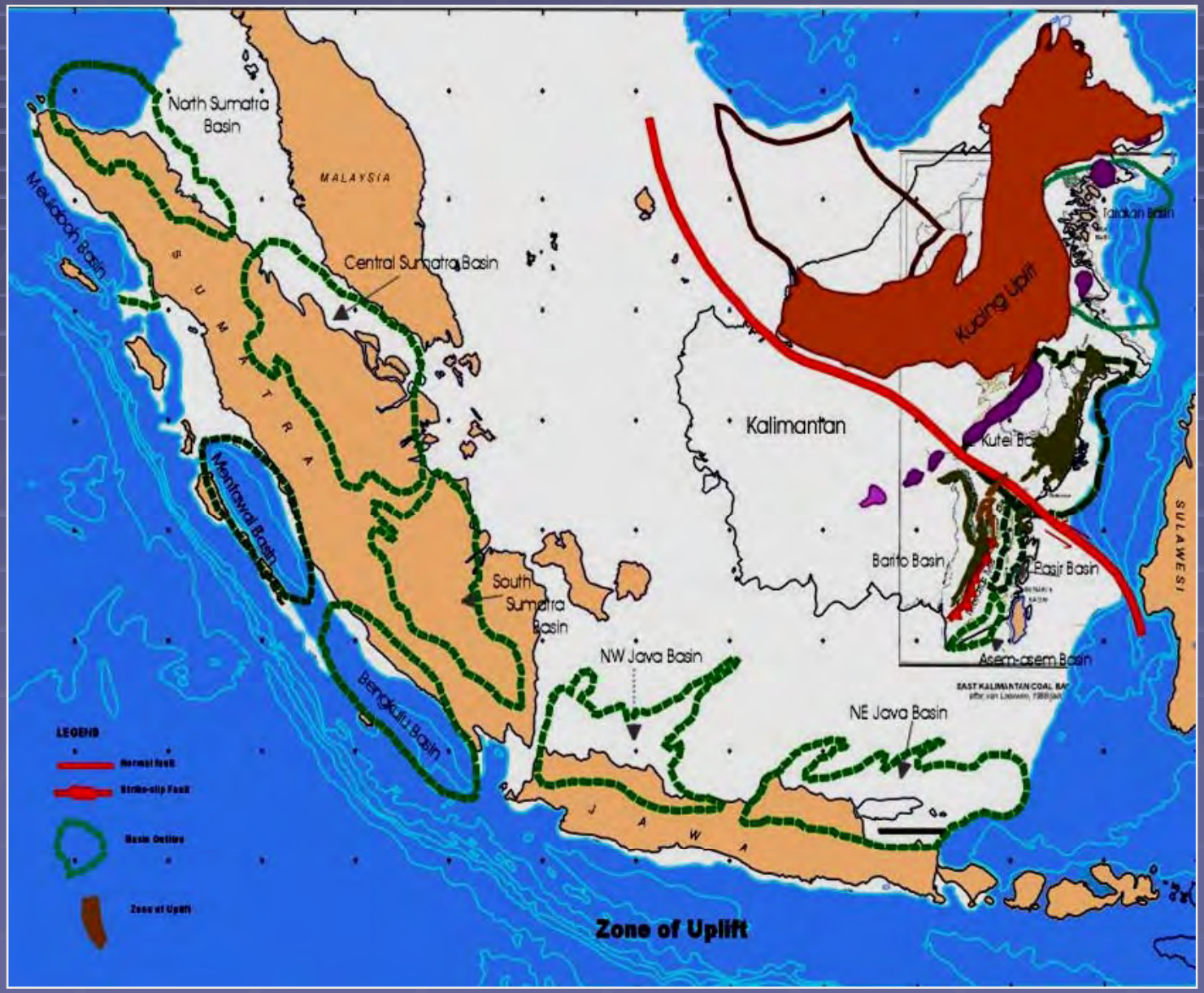
Sumatera / Western Indonesia Paleogene Basin Development

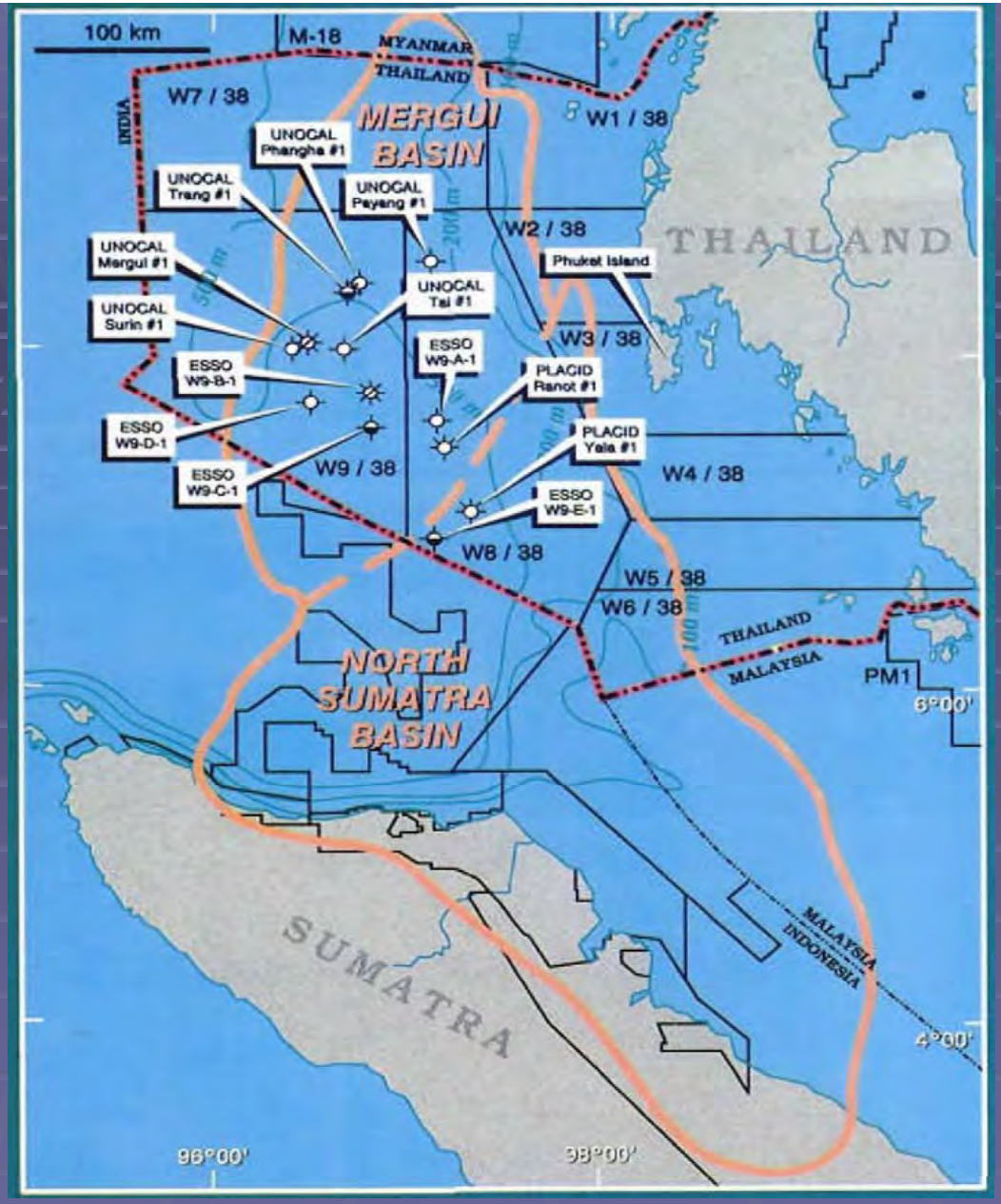
- Rifting And Rift-valley Basins.
- Collisions And Foreland Basins.
- Subduction, Fore-arc Basins.

Western Indonesia Paleogene Basins

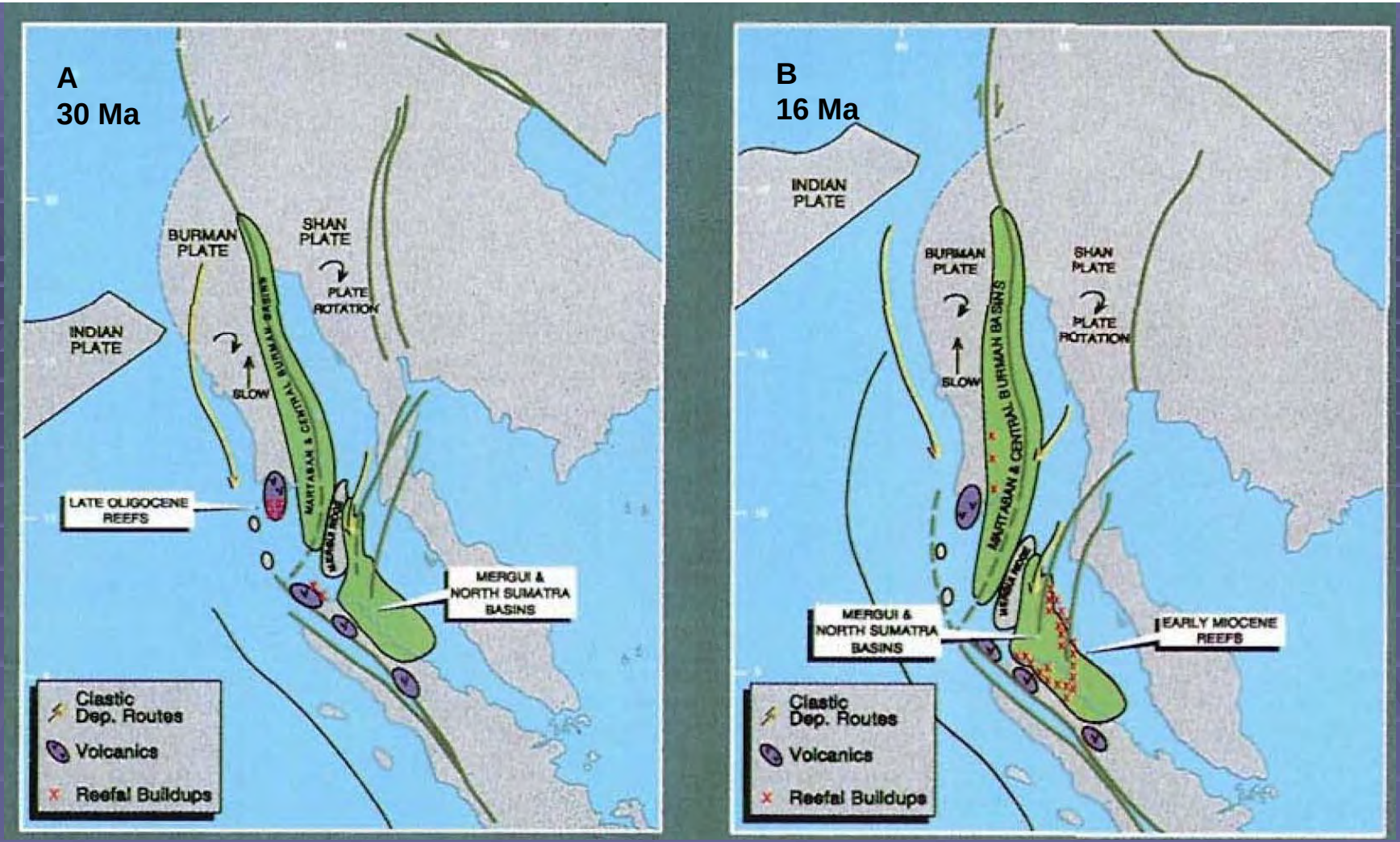


Western Indonesia Neogene Basin





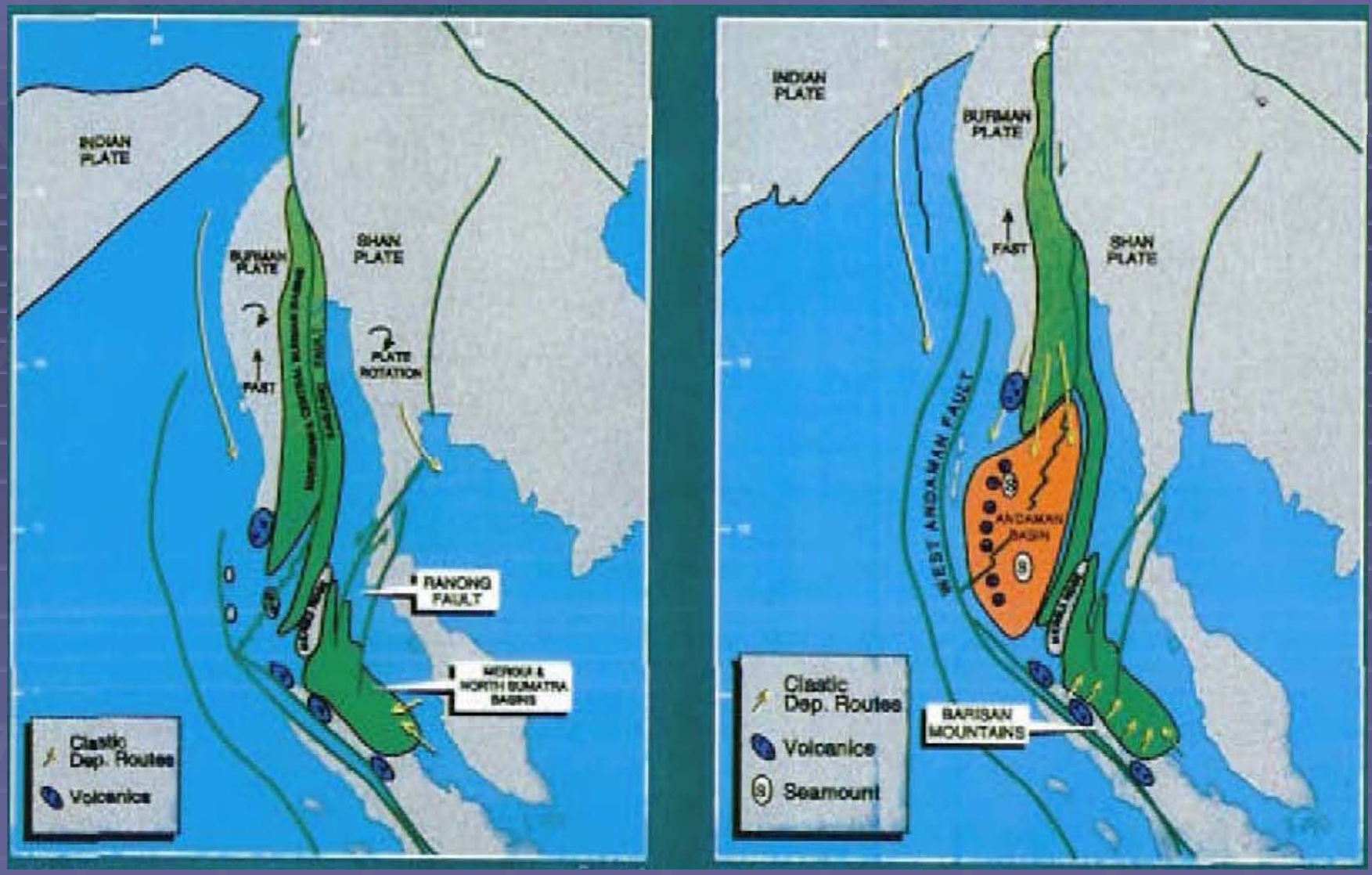
North Sumatera-Mergui Basins, Thai Sector Well Results
(Andreason, et al., 1997)



BASIN EVOLUTION

A - Oligocene (30 Ma) plate reconstruction and basin evolution showing the Burman plate being slowly dragged northward by the Indian plate. Clockwise rotation of the Burman and Shan plates causes the opening (rifting) of the Mergui, North Sumatra, Martaban, and Central Burman basins.

B - Early Miocene (16 Ma) plate reconstruction and basin evolution showing continued northward drift of the Burman plate and rotation of the Burman and Shan plates. **(Andreason, et al., 1997)**

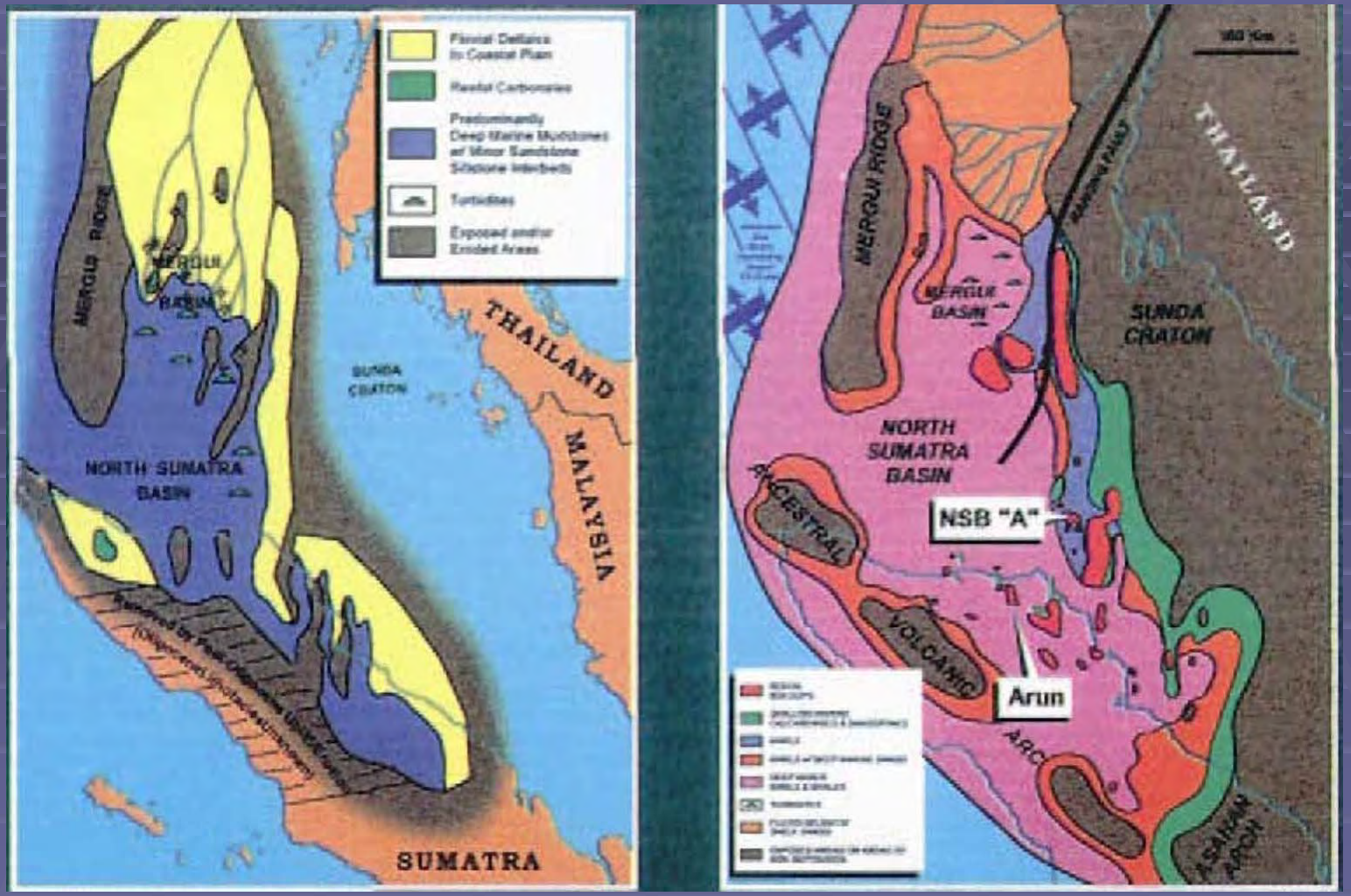


C - Middle Miocene (13 Ma) plate reconstruction and basin evolution. Accelerated northward drift of the Burman plate causes the opening of the modern Andaman Basin west of the Mergui ridge. Compression intensifies as plate rotation causes major left-lateral motion along the Ranong fault.

B - Early Pliocene (5 Ma) plate reconstruction and basin evolution. Sediments pouring off the rising Barisan Mountains on Sumatra cause significant down-warping of the southern North Sumatra Basin margin. **(Andreason, et al., 1997)**

A

B



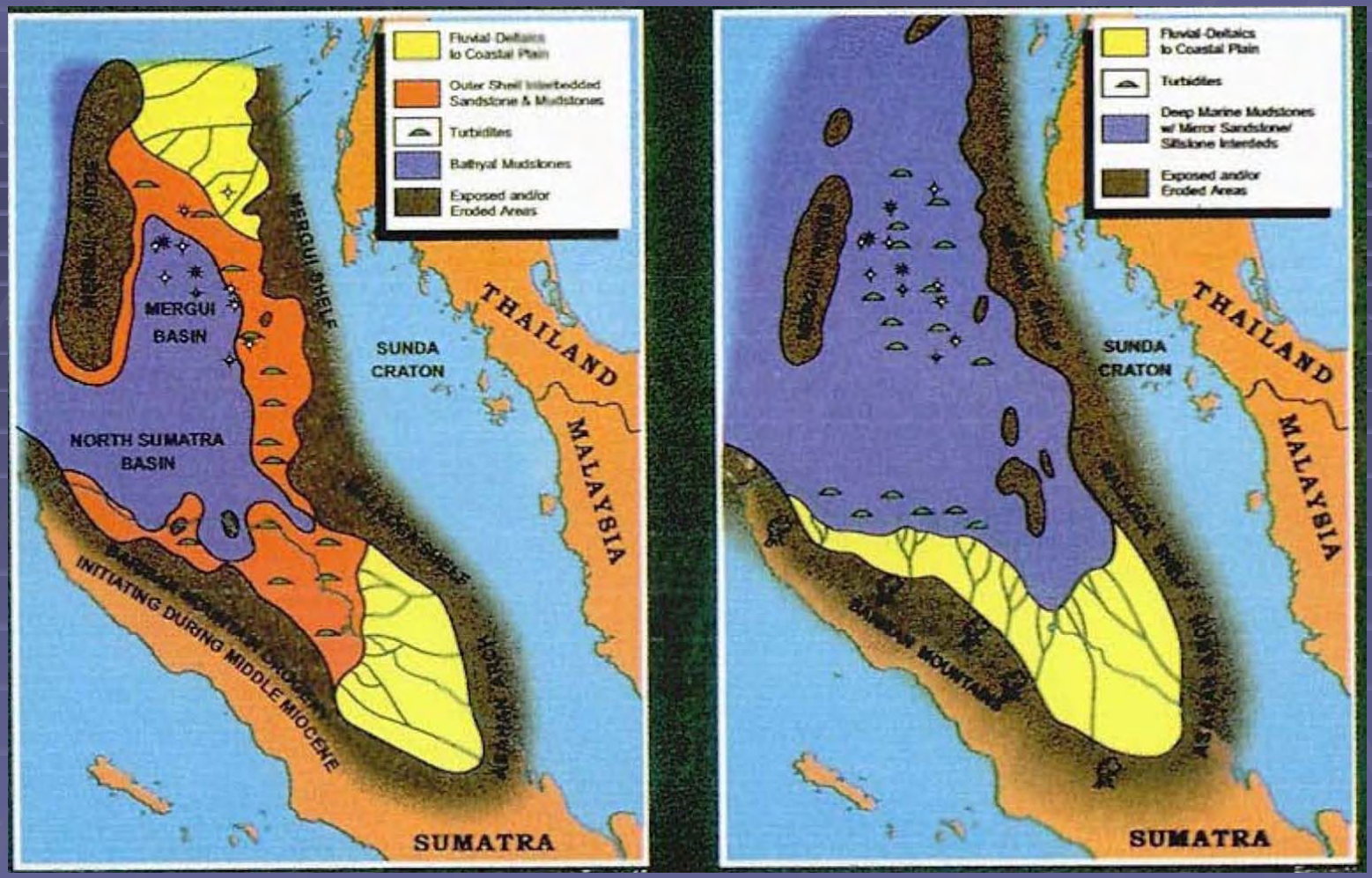
PALEOGEOGRAPHY AND LITHOFACIES

A - Bampo sequence (Late Oligocene) lithofacies showing fluvial-deltaic sandstone deposition dominating the northern half of the Thailand Andaman Sea while shale deposition dominates to the south. Thailand exploratory wells shown for reference.

B - Peutu sequence (Early Miocene) lithofacies. Reef growth is at a zenith during this time due to the tectonic calm, the sea-level maxima, and the suppression of clastic contamination.

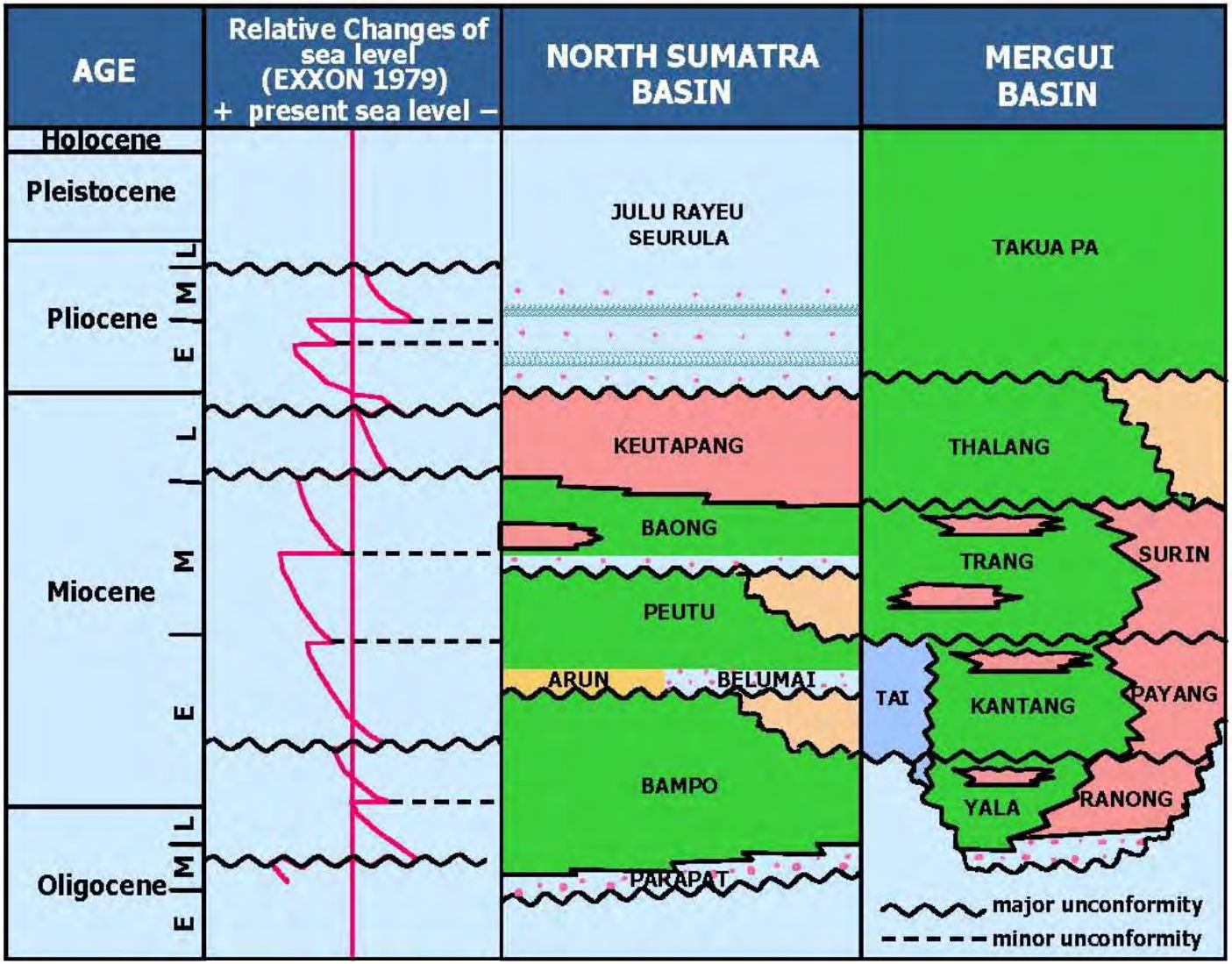
C

D

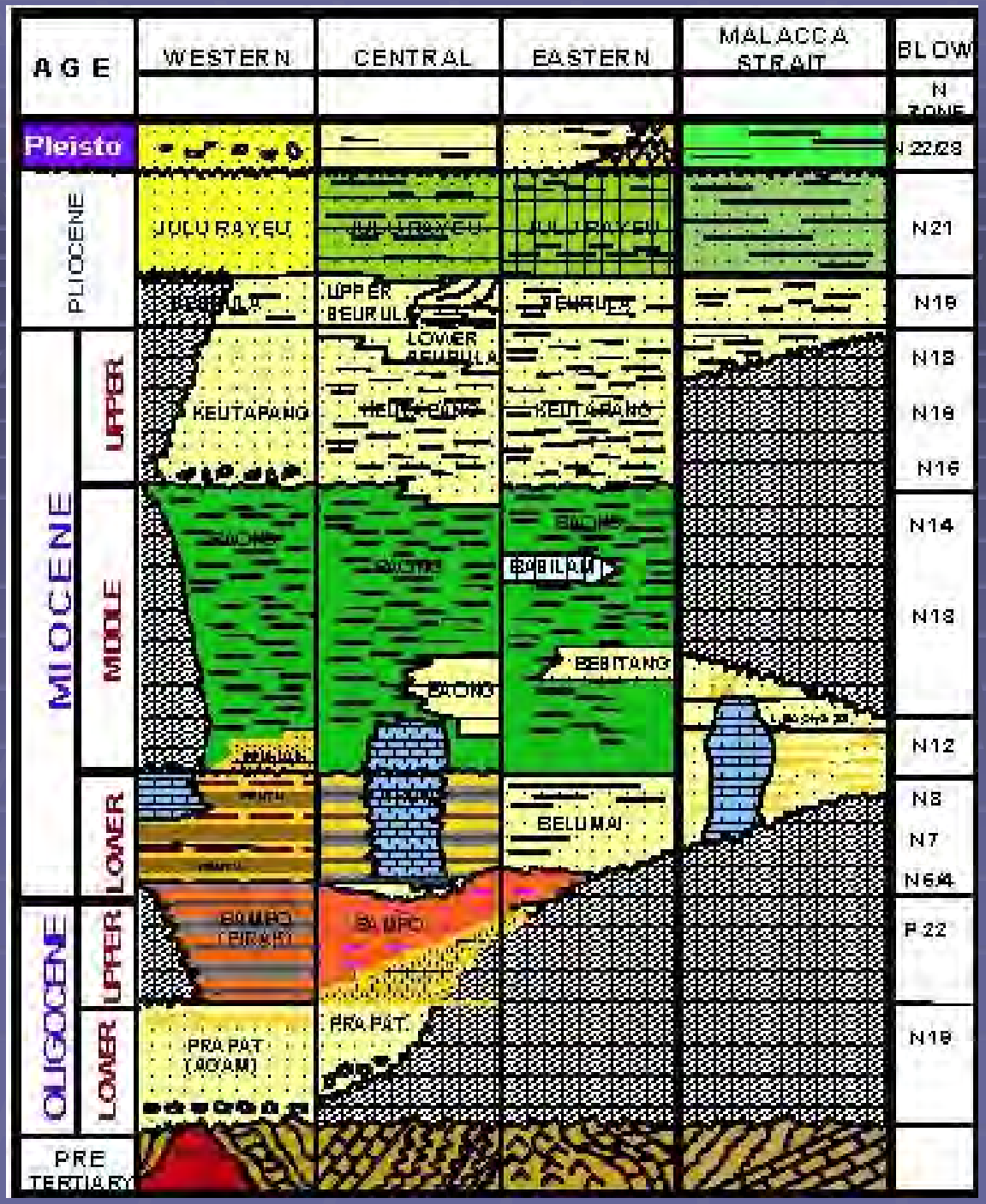


C Baong sequence (Middle Miocene) lithofacies. Deposition is generally restricted to the rapidly subsiding basin centers while the shelves undergo subaerial exposure.

B Keutapang sequence (Upper Miocene) lithofacies. Deep water deposition dominates the central basins while shelves remain regions of exposure. **(Andreason, et al., 1997)**

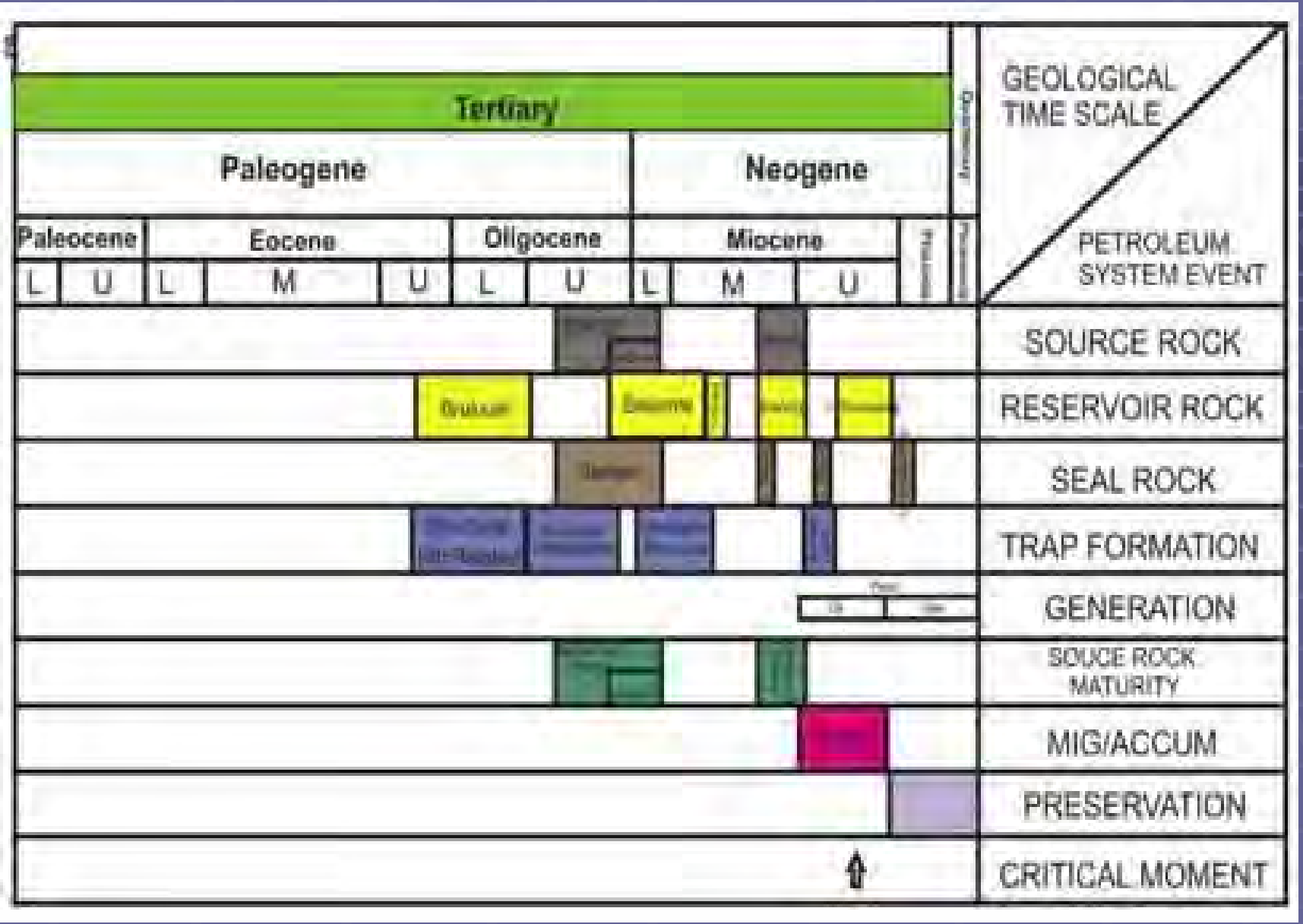

AGE
Relative Changes of sea level (EXXON 1979)
+ present sea level –
NORTH SUMATRA BASIN
MERGUI BASIN
Holocene
Pleistocene
Pliocene
Miocene
Oligocene
E
M
L
JULU RAYEU
SEURULA
KEUTAPANG
BAONG
PEUTU
ARUN
BELUMAI
BAMPO
PARAPAT
TAKUA PA
THALANG
TRANG
SURIN
TAI
KANTANG
PAYANG
YALA
RANONG
major unconformity
minor unconformity

Anonym (2008)

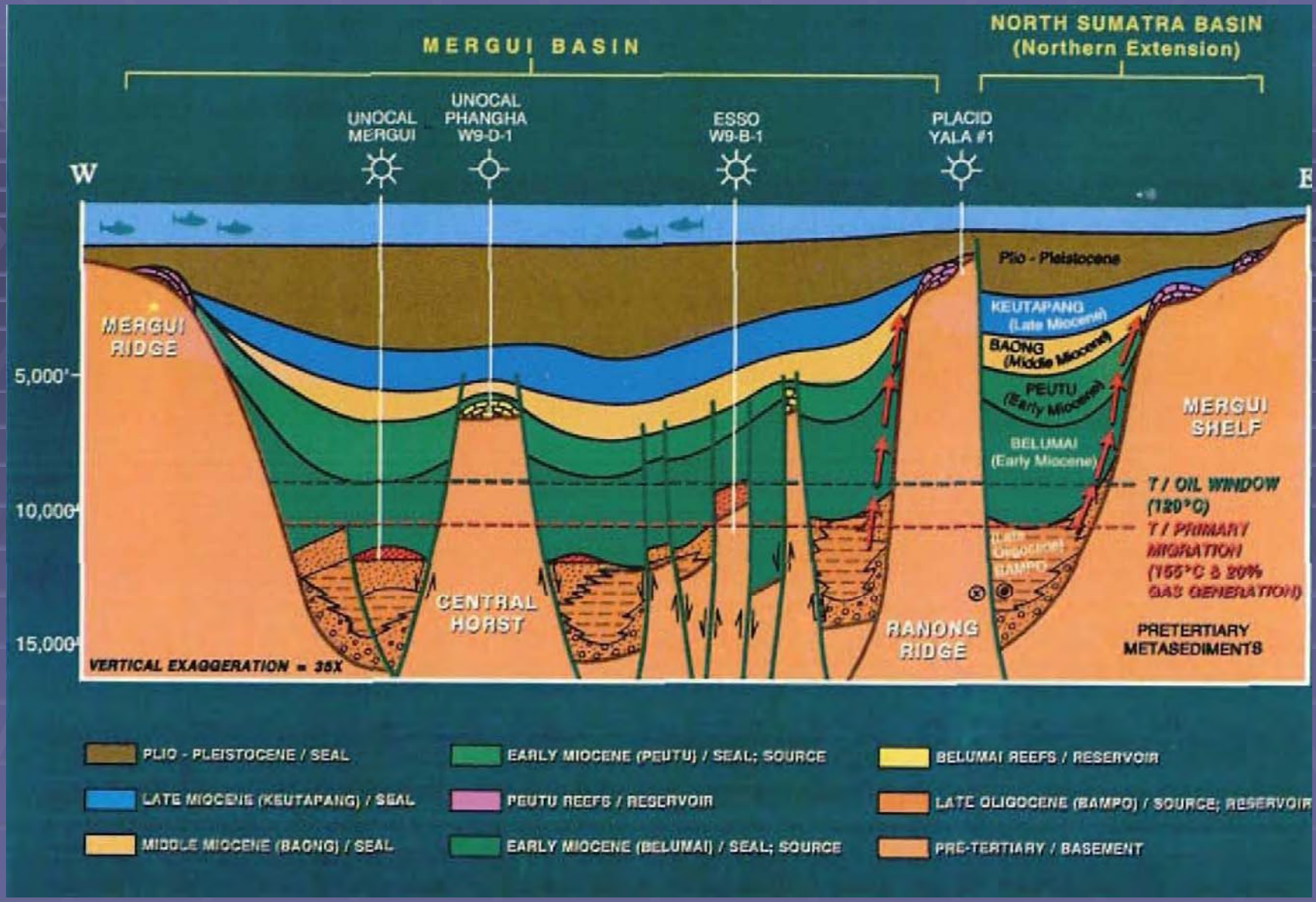


Generalized Stratigraphy of North Sumatera Basin (Hakim, et al., 2007)

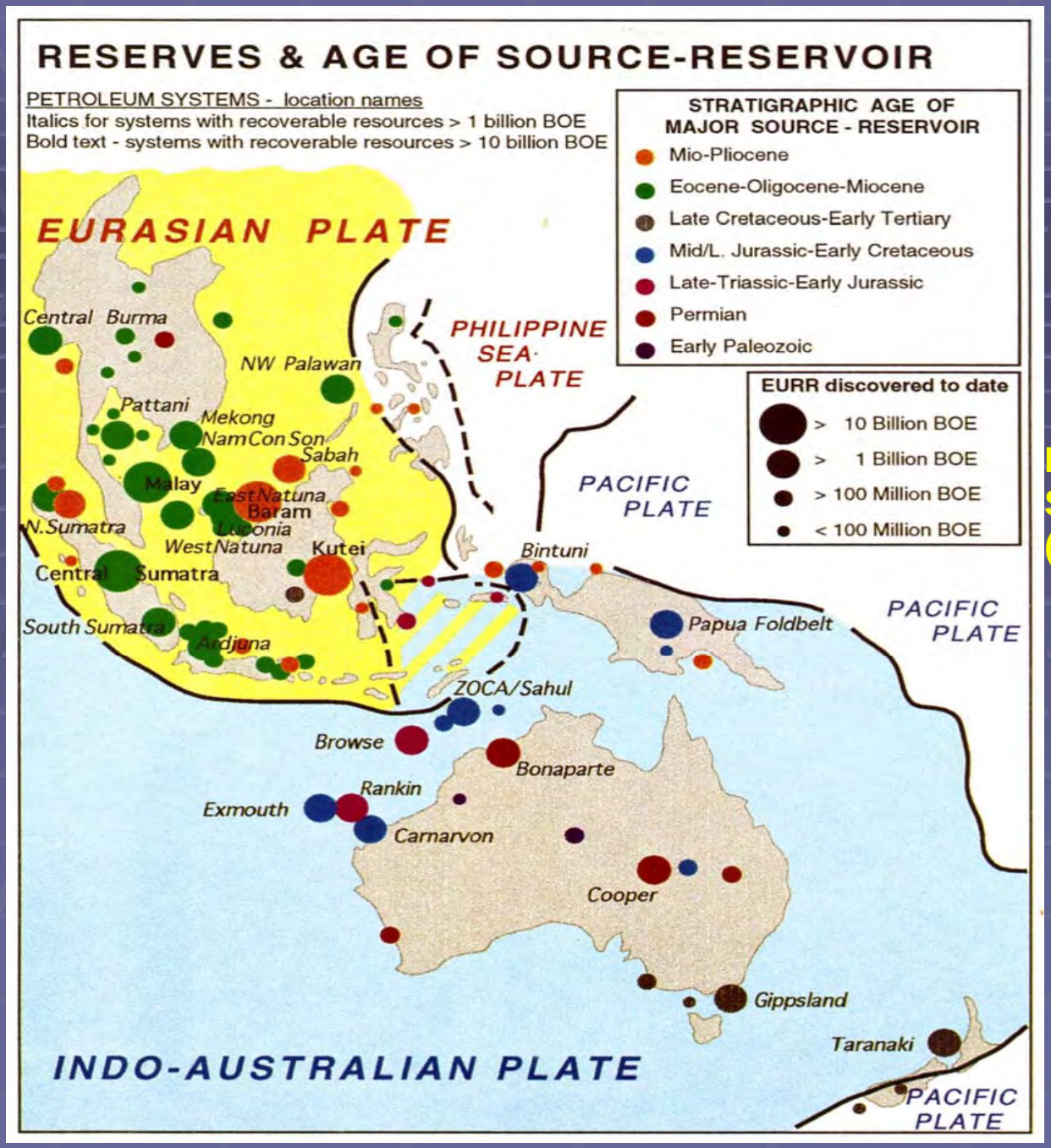
PETROLEUM SYSTEM



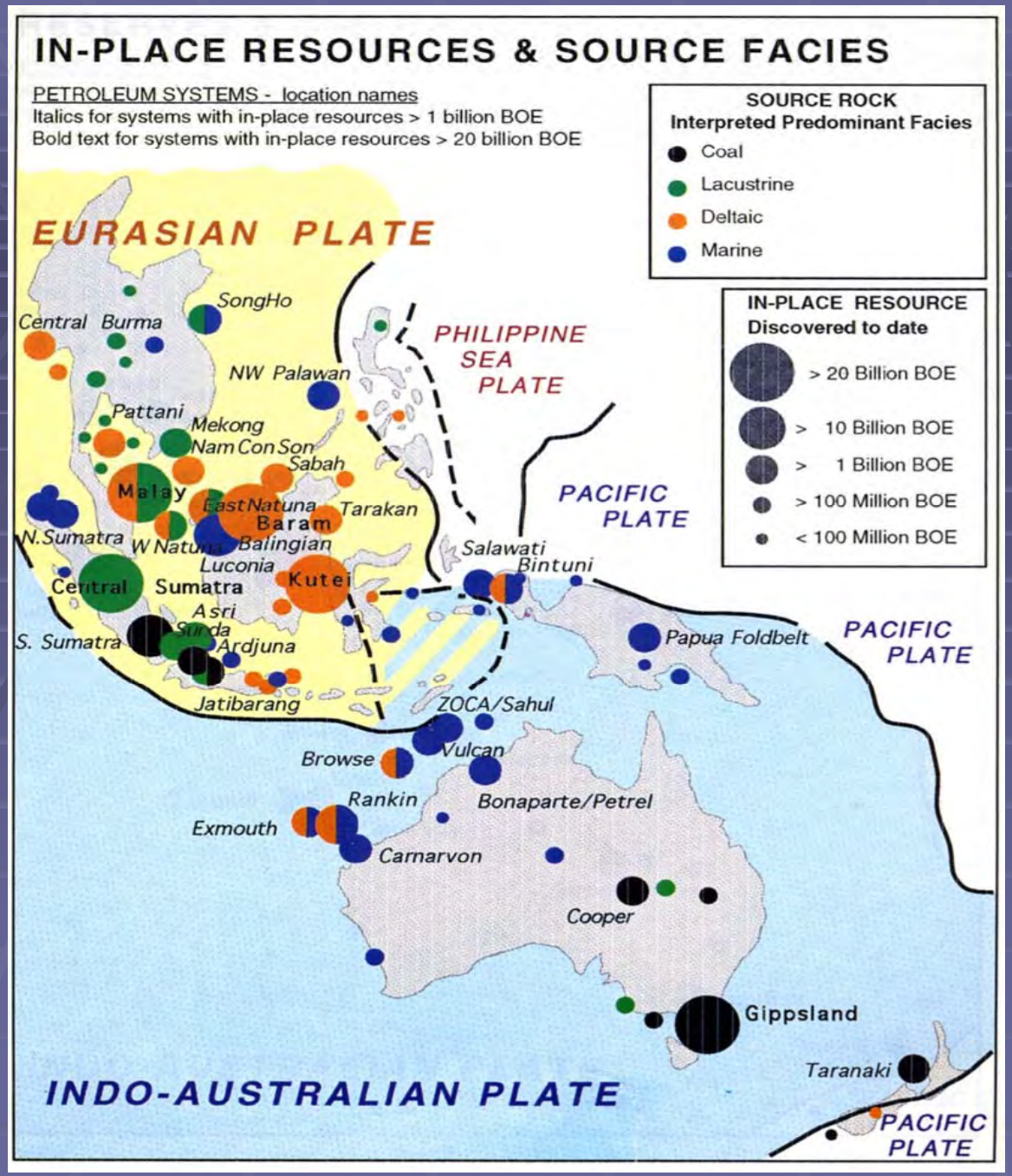
Petroleum System of North Sumatera Basin (Hakim, et al., 2007)



Petroleum System of Mergui-North Sumatera Basins
(Andreason, et al., 1997)



Productive petroleum Systems of SE Asia-Australasia (Howes, 1997)

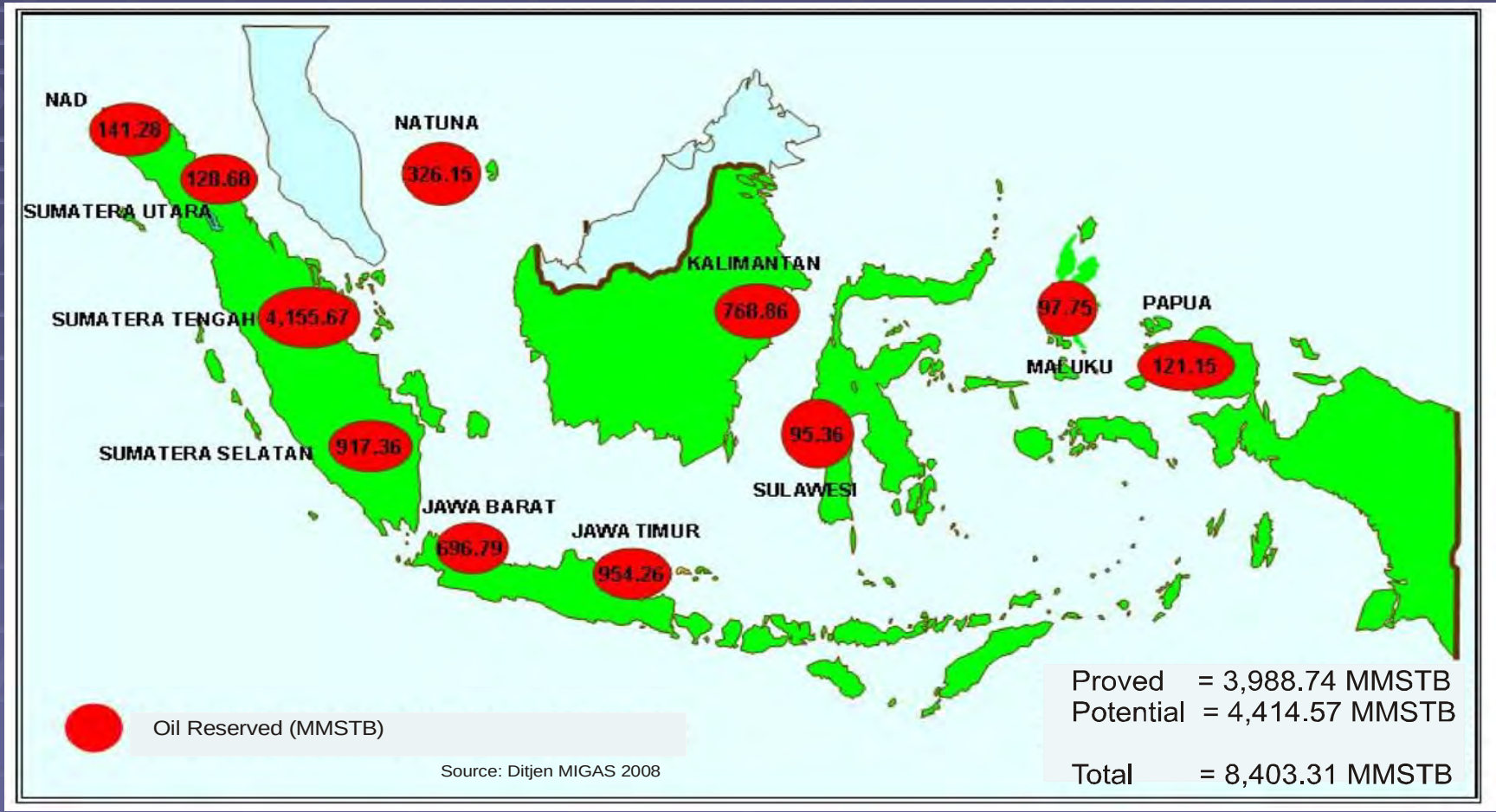


Productive petroleum systems SE Asia-Australia showing Dominant facies and in-place petroleum resources (Howes, 1997)

O & G RESERVED
FOR INDONESIA

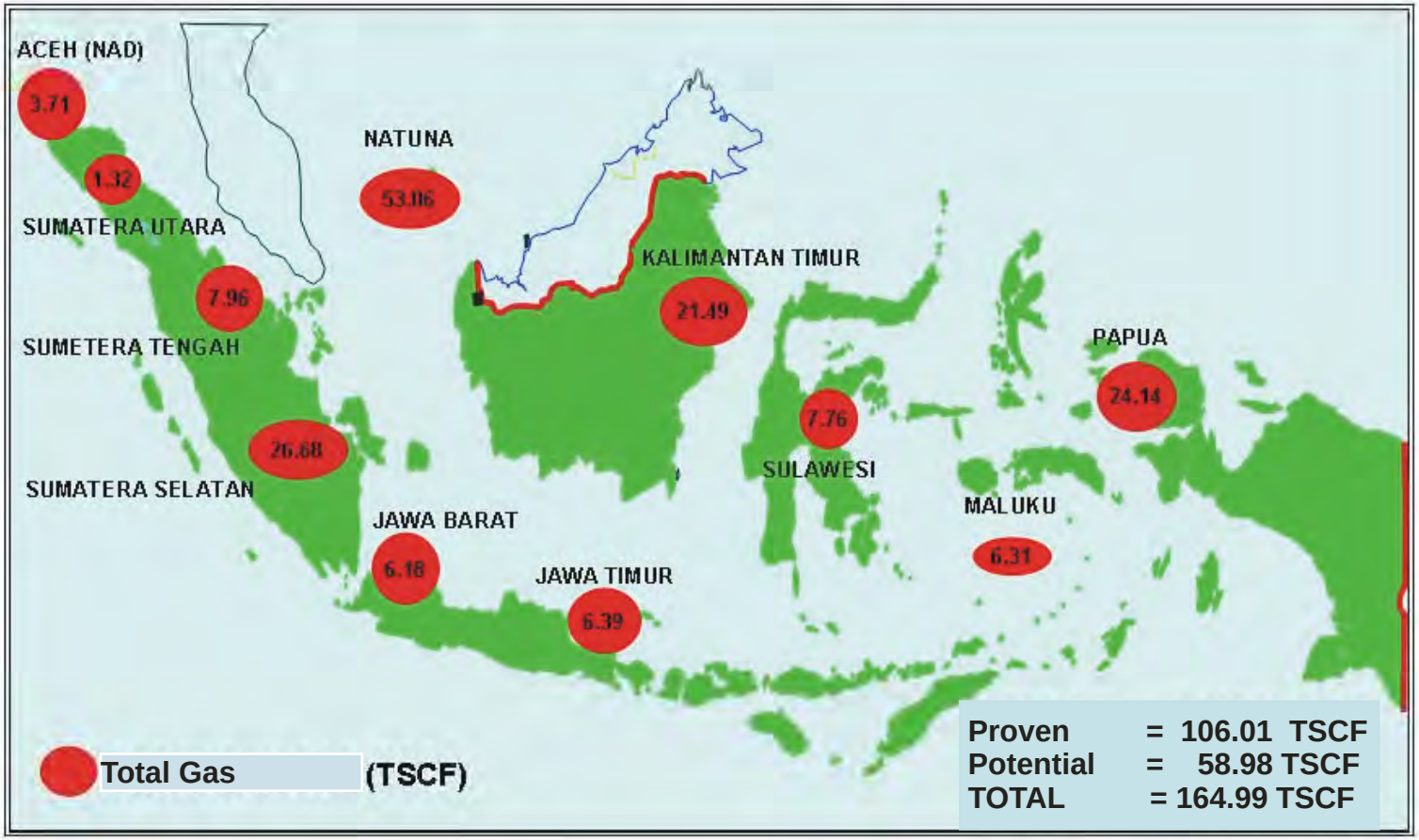
OIL RESERVED OF INDONESIA

Status 1 January 2007



GAS RESERVED OF INDONESIA

(STATUS : 1 JANUARI 2007)



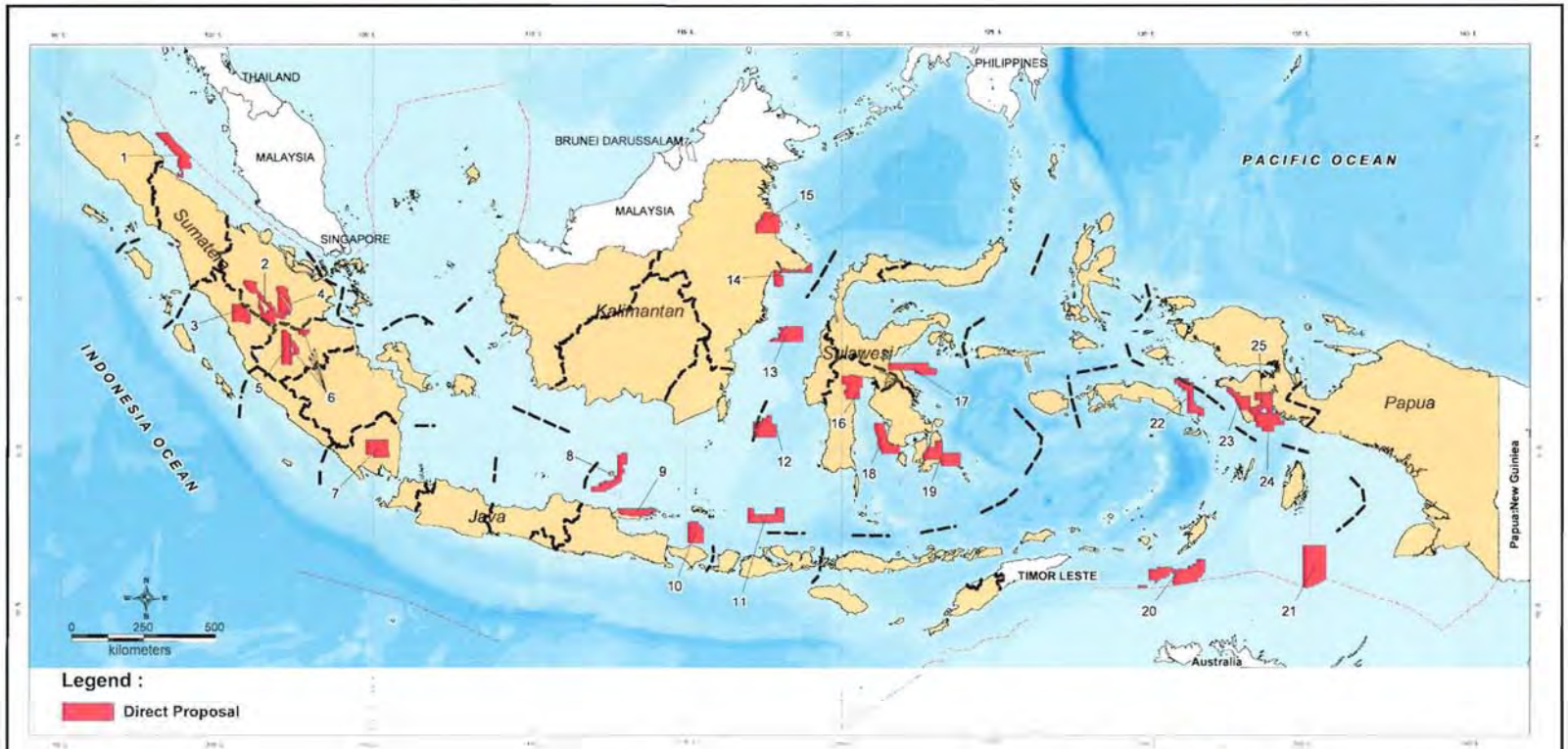
INDONESIA PETROLEUM WORKING AREA (2006)

BADAN PELAKSANA KEGIATAN
USAHA HULU MINYAK DAN GAS BUMI

DEPARTEMEN ENERGI DAN SUMBER DAYA MINERAL
DIREKTORAT JENDERAL MINYAK DAN GAS BUMI

29 MAY 2008

INDONESIA PETROLEUM FIRST BIDDING ROUND YEAR 2008



DIRECTORATE GENERAL OF OIL AND GAS
Directorate of Upstream Business Development

Direct Proposal :

I. SUMATRA

1 EAST SERUWAY
2 SOUTH CPP
3 SOUTH WEST BUKIT BARISAN
4 LIRIK - II
5 WEST TUNGKAL
6 SOUTH EAST TUNGKAL
7 LAMPUNG - III

II. JAWA, BALI & NUSA TENGGARA

8 EAST MURIAH
9 MADURA
10 NORTH BALI - II
11 NORTH SUMBAWA-II

III. KALIMANTAN & MAKASSAR STRAIT

12 WEST SAGERI
13 S. E. GANAL-I
14 S. E. SANGATTA
15 SOUTH BENGARA - II

IV. SULAWESI

16 NORTH BONE
17 SOUTH MATINDOK
18 BONE BAY
19 BUTON - I

V. MALUKU & PAPUA

20 NORTH MASELA
21 ARAFURA SEA
22 SERAM
23 WEST PAPUA - I
24 WEST PAPUA - II
25 WEST PAPUA - III

FUTURE AND PROGRAM

- More detailed study and research on G-G explorations and developments in the North Sumatera-Mergui Basins.
- Thus, it will open a challenge to enhance for new hydrocarbon discoveries in the near future.

Thank You