Institut Teknologi Sepuluh November (ITS)
Teknik Geofisika
Kuliah Tamu, 11 Mei 2024

Sedimentasi dan Akumulasi Migas Cekungan Jawa Timur

Awang Harun Satyana
Geolog - Independen

Diskusi

1. Jawa Timur Cekungan Migas
2. Syarat Akumulasi Migas: Sistem Petroleum
3. Evolusi Cekungan Jawa Timur
4. Paleogeografi dan Sedimentasi
5. Kejadian Akumulasi Migas di Cekungan Jawa Timur
6. Sedimentasi dan Potensi Migas Cekungan Jawa Timur

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Exploring Petroleum in East Java Basin: 1888 - 2021

http://teknik-perminyakan-indonesia.blogspot.com/2015/10/sejarah-perminyakan-di-indonesia.html

Oil drilling in Cepu, East Java Basin, BPM (1929)

https://www.energyfacts.eu/petronas-makes-oil-discovery-in-east-java-indonesia/

Oil drilling in North Madura offshore, Hidayah-1, Petronas (2021)

Exploration and Production History of East Java Basin

TABLE 6. *Data about the productive oil fields of Java and Madura.* (According to an unfinished report by I. E. HÜNDLING of the Bureau of Mines, and data provided by the B.P.M.). Arranged in historical succession of development.

Name of the field	No. on fig. 6	In production from—to	Cumulative production until 1941 (in 1000 kgt)	Total number of wells	Greatest depth attained (in metres)	Number of productive horizons
Kuti-Kruka	1					
Kuti	(1a)	1888—1937	104	115	676	3
Kruka	(1b)	1929—1941	454	74	549	1
Lidah	2	1893—1941	2005	834	1062	1
Dandangilo	3					
Wonotjolo	(3a)	1896—1940	1609	213	980	8
Ngrajong	(3b)	1909—1931	137	26	588	3
Ledok	4					
Ledok	(4a)	1896—1941	2644	252	1263	11
Kedinding	(4b)	1904—1931	14	15	1553	5
Sekarkorong	5					
Metatu	(5a)	1894(6)—1940	45	82	812	3
Sekarkorong	(5b)	1911—1931	8	35	590	5
Nglobo	6					
Semanggi	(6a)	1900—1941	638	86	1270	6
Nglobo	(6b)	1909—1941	1524	44	1130	8
Banjuasin	(6c)	1912—1941	90	22	564	4
Bogomiring	—	1901—1908	8	17	434	1
Ngapus	7	1901—1910	4	2	272	1
Kertegeneh (Mad.)	8	1901—1905	2	11	656	3
Tungkul	9(a)	1901—1923	15	41	517	3
Gabus	9(b)	1905—1939	111	60	825	3
Trembes	9(c)	1906—1917	4	6	652	3
Klantung—Sodjomerto [1]		1898—1933	14	29	?	?
Tjipluk [1]	10	1903—1912	0,4	12	537	1
Tjandi	11	1904—1916	9	24	918	3
Gunung Kendeng [6]	—	1903	12			
Plantungan-Kalipiting	12	1905—1921	13	66	517	3
Banjubang	13	1906—1932	67	31	677	3
Kawengan	(20)					
- Wonosari [2]	14	1909—1919	10	33	680	4
Ngudal [2]	—	1897—1901	1,6	12	?	3
- Kidangan [2]	19	1926—1935	4	8	1045	3
- Kawengan [3]	20	1926—1941	4610	83	1548	1
Petiken [4]	—	1910—?	10	?	?	?
Gegunung	15	1910—1931	51	20	705	5
Metes	16	1911—1914	4	8	1031	4
Petak	—	1914—1941	98	24	1563	3
Ngiono	17	1915—1918	0,05	7	145	1
Tawun	18	1915—1917 and 1938—1941	4	7	3104	1
Trembul		1917—1941	44	23	1017	3
Sumber-Kuntjung [5]		1930—?	0,3	10	?	?
Lusi	—	1932—1941	69	26	1536 (Petak)	3

Van Bemmelen (1949)

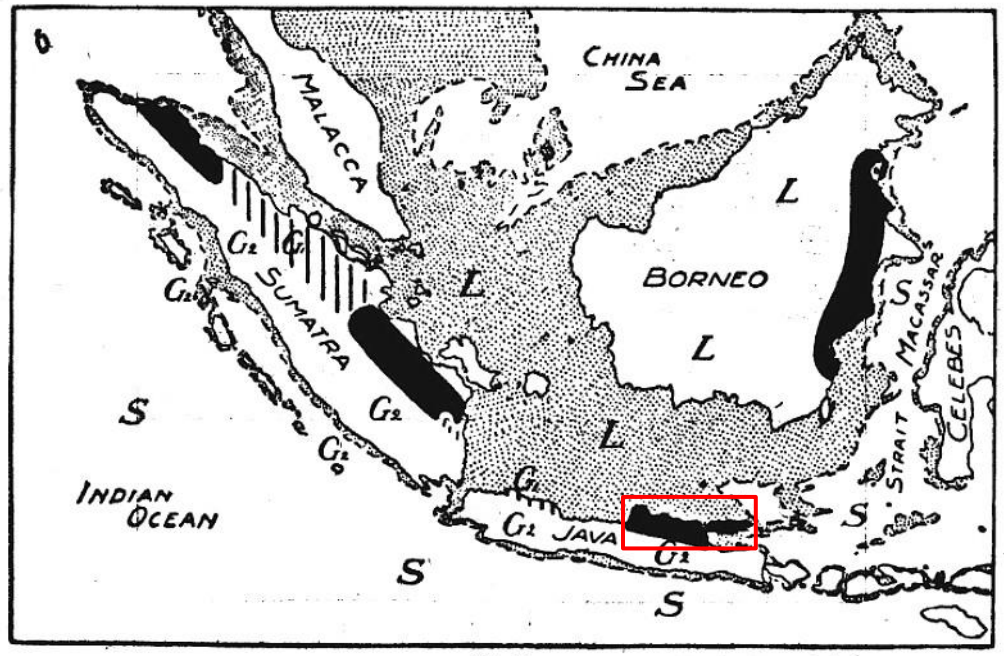


Fig. 2.

Black vertical lining: Neogene geosynclinal deposits, in which the occurrence of petroleum has not yet been established.
Solid black: Oilfields in Neogene geosynclinal deposits.
Dots: The dotted area represents the Sunda shelf; together with Malacca, Sumatra, Java and Borneo it indicates the largest extension of the Sunda Land in Pleistocene time.

Molengraaff (1920)

The most important fields are Kawengan, Ledok, Lidah, Dandanilo-Wonotjolo, and Nglobo, having each more than 1,000,000 tons of cumulative production.

[1]) See fig. 303 in Vol. I.

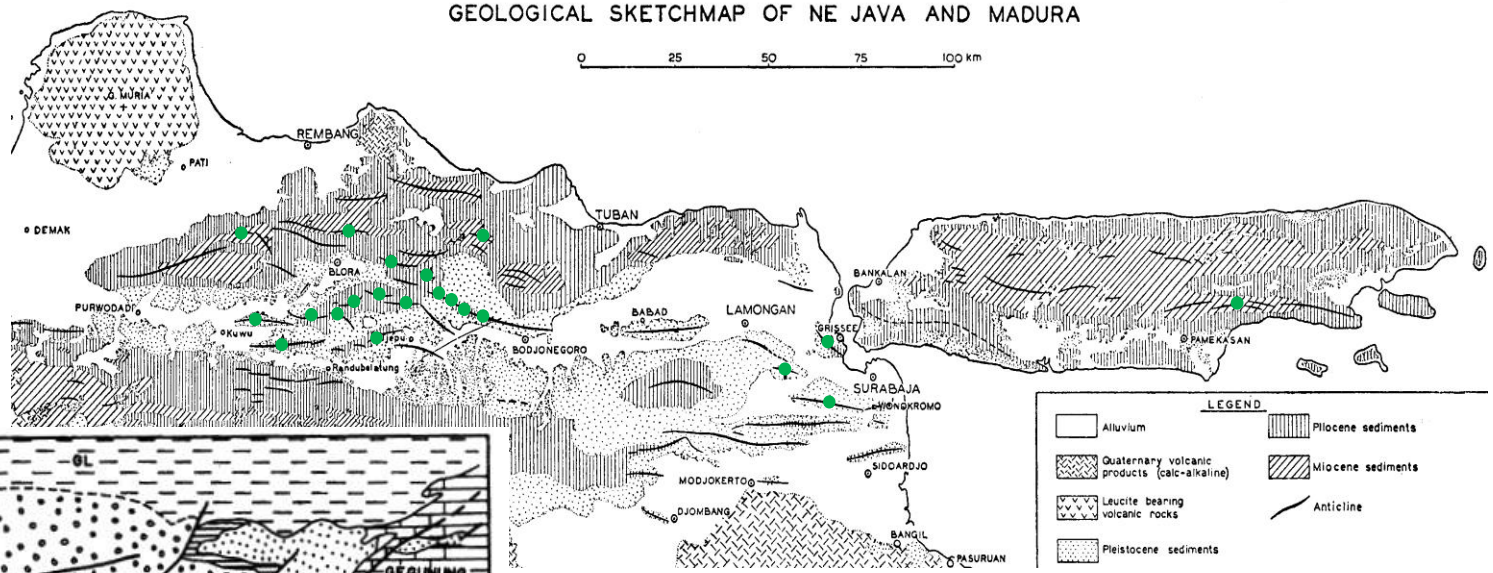
[2]) Production from the Wonotjolo Beds.

[3]) Production from the top of the Ngrajong Beds.

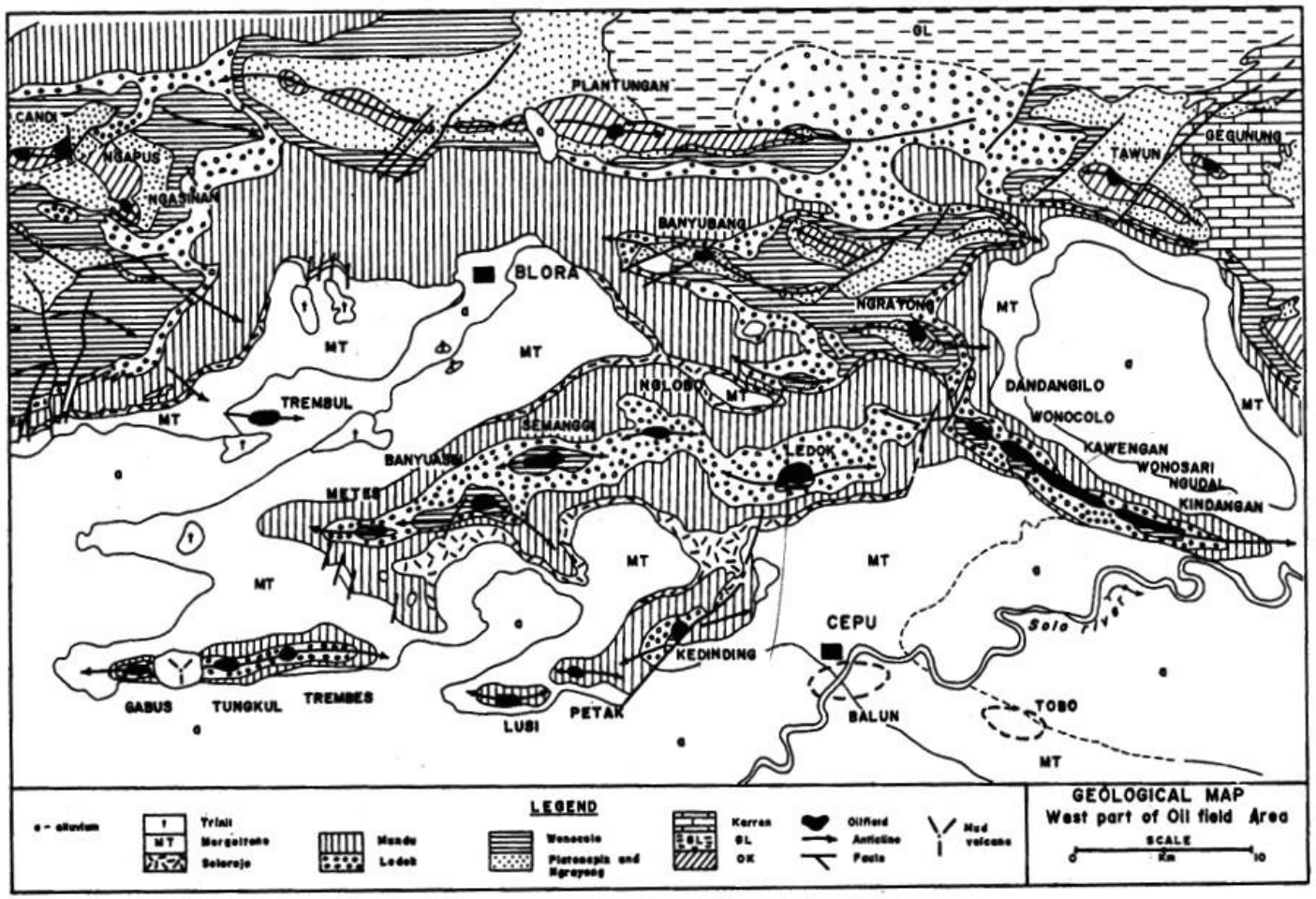
[4]) Gujangan anticline, iodine borings.

[5]) The oil production of this field, situated on the Genukwatu - Lingsir anticline, was a by-product of the iodine bearing waters, which were worked by the mining company "Sumber Kuntjung". This company had an exploitation contract since 1928. The drilling field is situated West of the mining concession "Petiken", between Banju Urip and Kesamben.

[6]) This name comprises the area of the Lidah anticline and the Genukwatu - Lingsir anticline, at the eastern end of the Kendeng Ridge, SW of Surabaja. On the Genukwatu - Lingsir anticline a number of small oil fields are situated, which belonged to the Dortsche Petroleum Maatschappij (Randegan, Lingsir, Sepat, Banju Urip and Kesamben). The present mining concession "Twaalf dessa's" on the Lidah anticline, was granted in 1892 under the name: mining concession "Gunung Kendeng". It is not certain, whether the commulative production of 12.000 kgt mentioned in HÜNDLING's report, pertains to all above mentioned fields, or that the production of "Twaalf dessa's" has been calculated together with the production of the Lidah oil field.



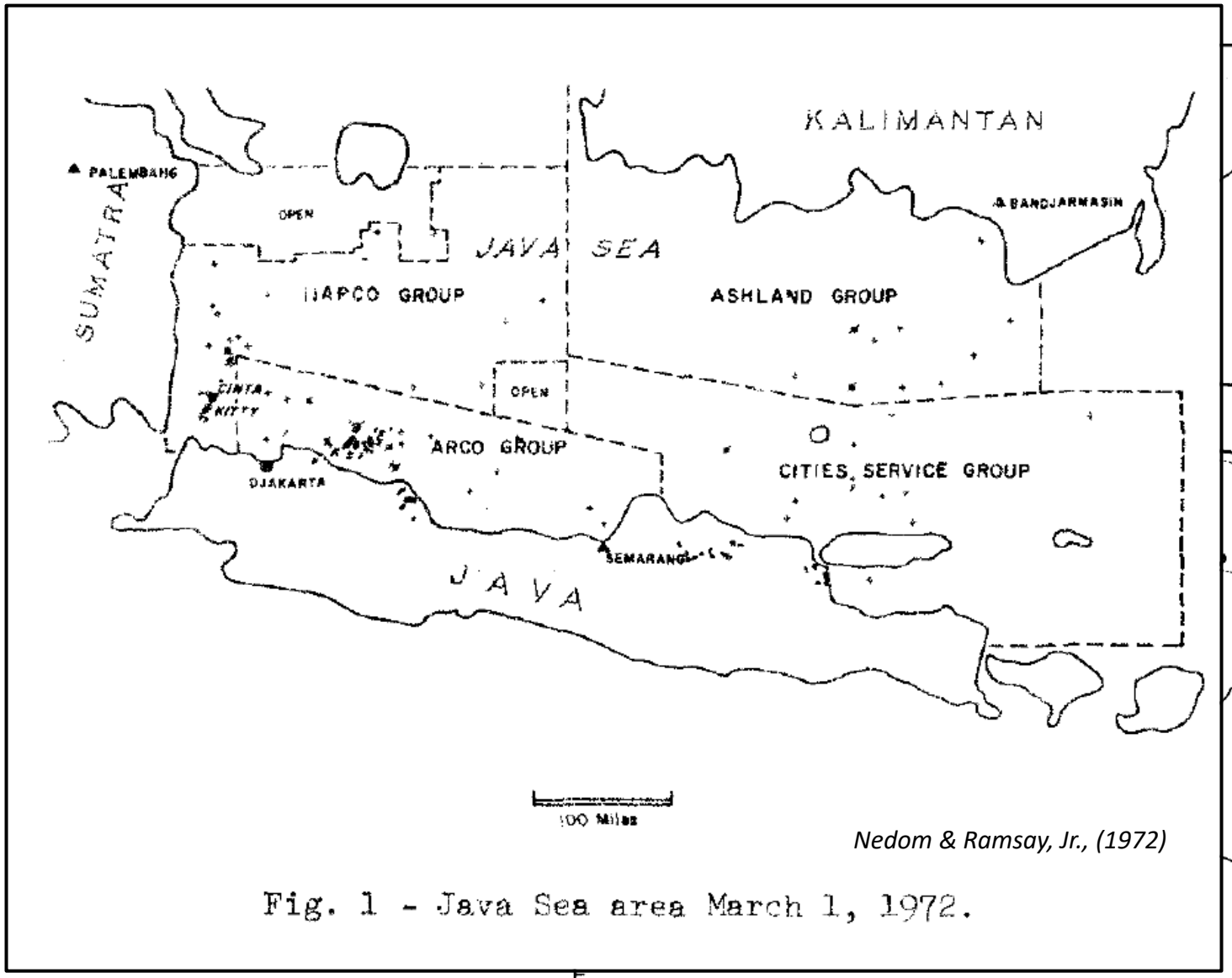
van Bemmelen (1949)



Old Oil fields of East Java basin

Soetantri et al. (1973)

History of Offshore Exploration, East Java Basin



Nedom & Ramsay, Jr., (1972)

Fig. 1 - Java Sea area March 1, 1972.

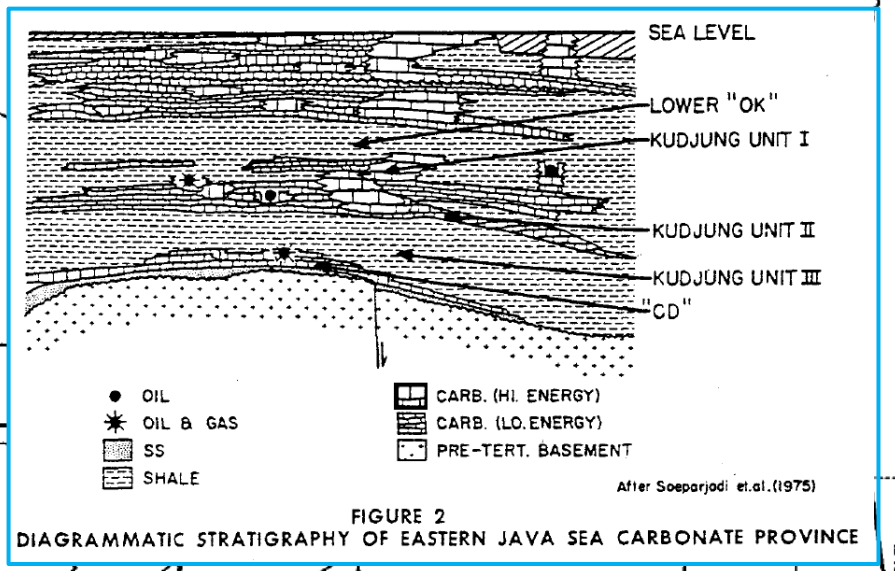
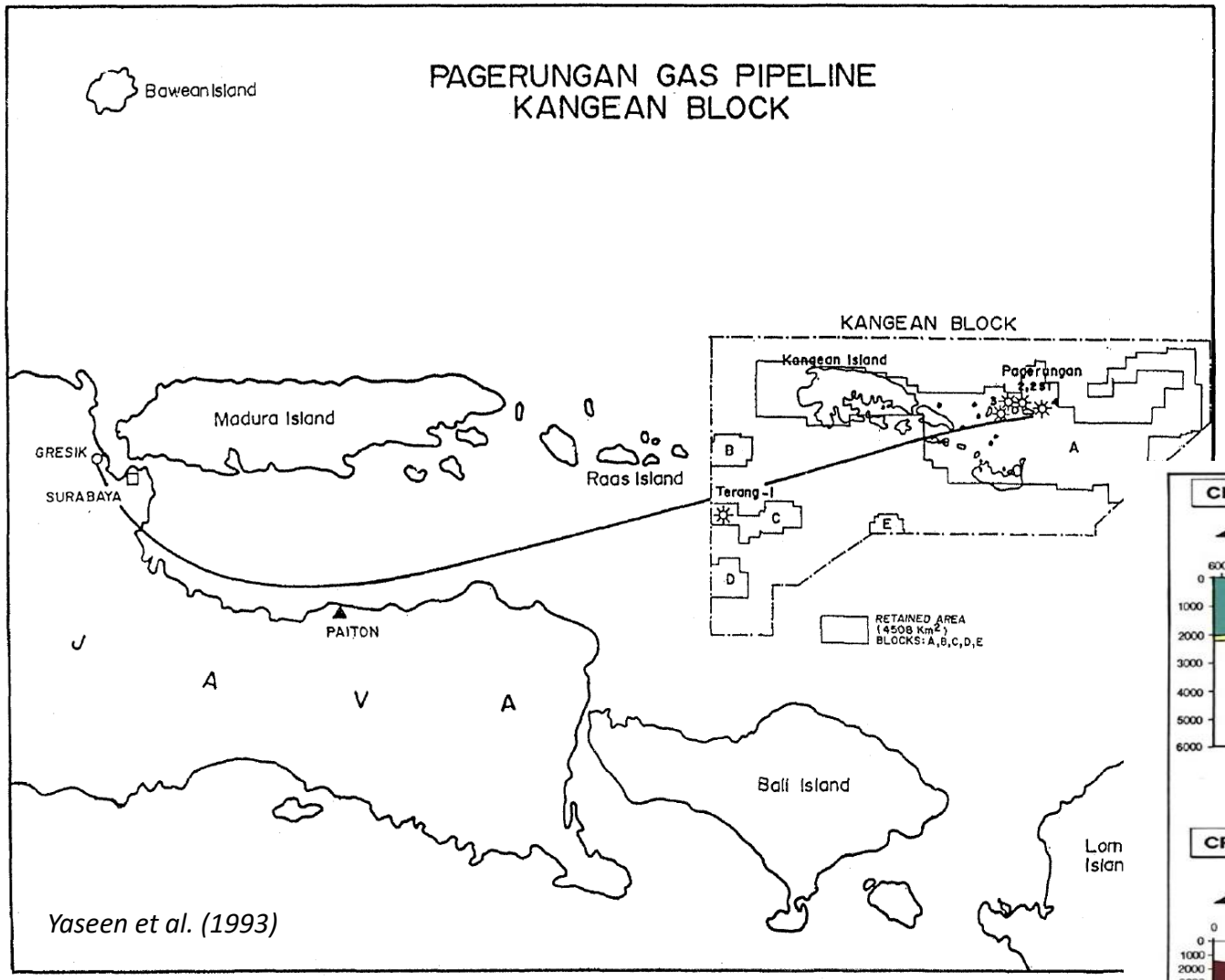


FIGURE 2
DIAGRAMMATIC STRATIGRAPHY OF EASTERN JAVA SEA CARBONATE PROVINCE

Seery (1978)

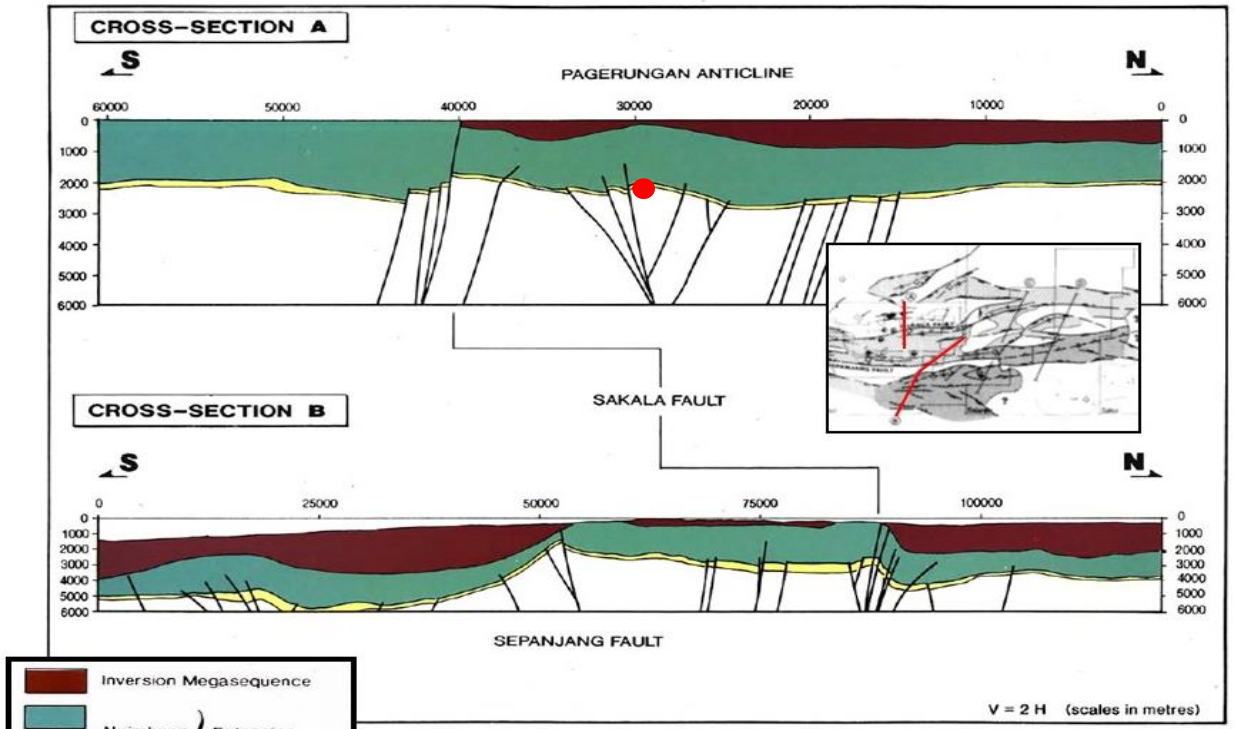
In November 1972, the Poleng Field discovery well was drilled and tested oil at a rate of 5450 BOPD. The field. was put on' production on November 24, 1975

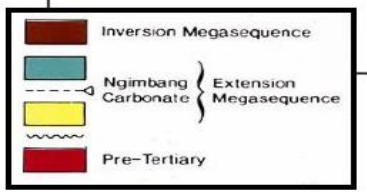
History of Gas Exploration and Production, East Java Basin



Yaseen et al. (1993)

FIGURE 10 - Gas pipeline map from Pagerungan Besar Island-Porong-Gresik.

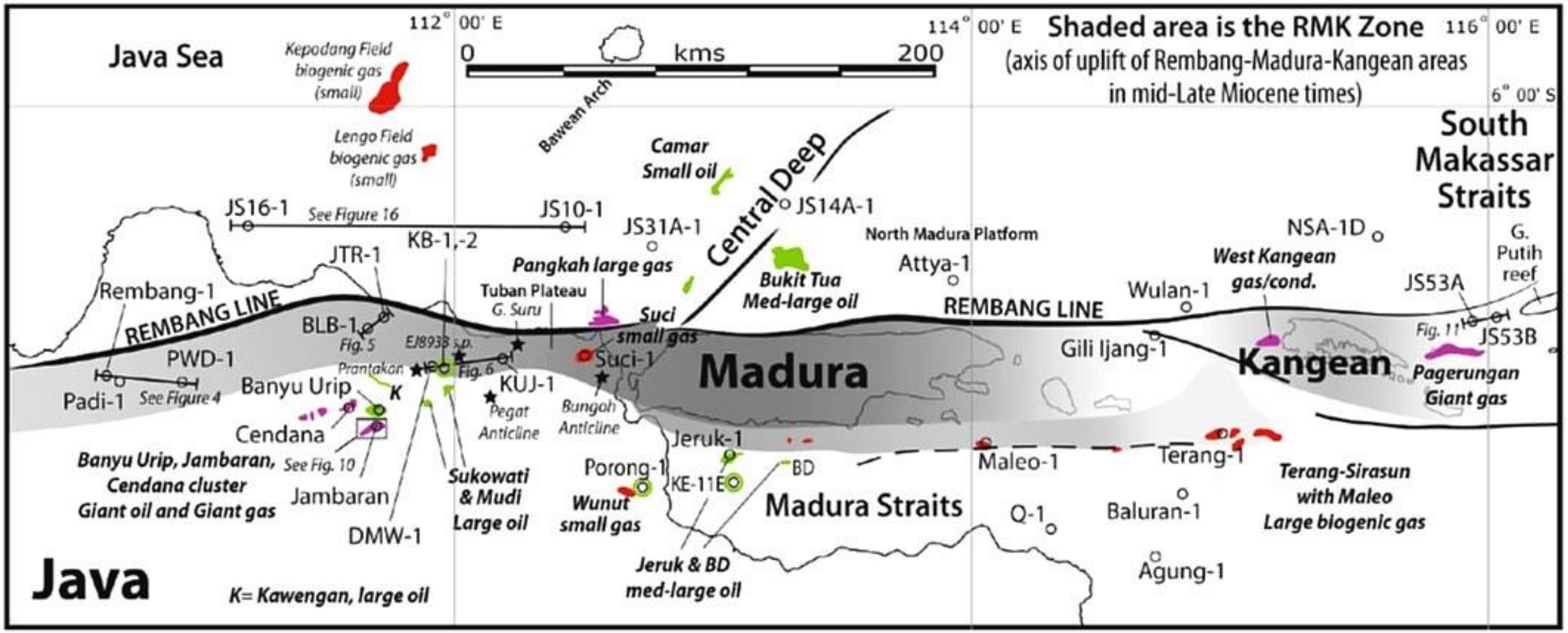




Bransden and Matthews (1992)

Regional section across Pagerungan field

Some Accumulation of Oil and Gas Fields of East Java Basin Discovered > 1970's

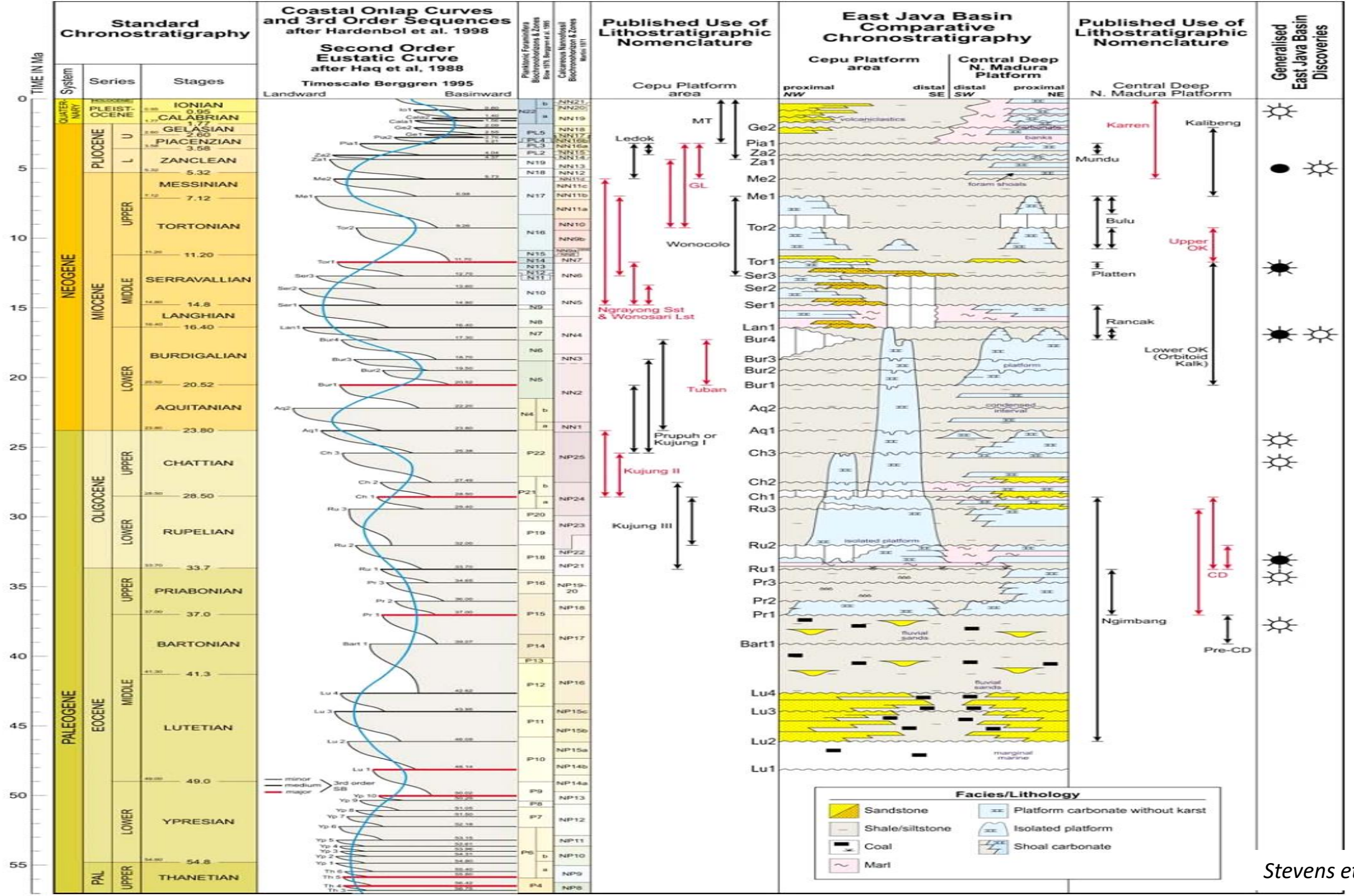


OIL FIELD

GAS FIELD, THERMOGENIC

GAS FIELD, BIOGENIC

Luan & Lunt (2021)



Stevens et al. (2006)

Diskusi

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SISTEM MIGAS/PETROLEUM

1. Batuan induk *(source rocks)*
2. Batuan penimbun *(overburden rocks)*
3. Batuan reservoir*(reservoir rocks)*
4. Batuan penyekat/tudung *(sealing rocks of trap)*
5. *Batuan media migrasi (carrier beds)*
6. *Batuan penyekat media migrasi (sealing of carrier beds)*
7. Perangkap *(traps)*
8. *Pematangan batuan induk (dapur/kitchen)*
9. Migrasi migas *(petroleum migration)*
10. Pengawetan *(preservation)*

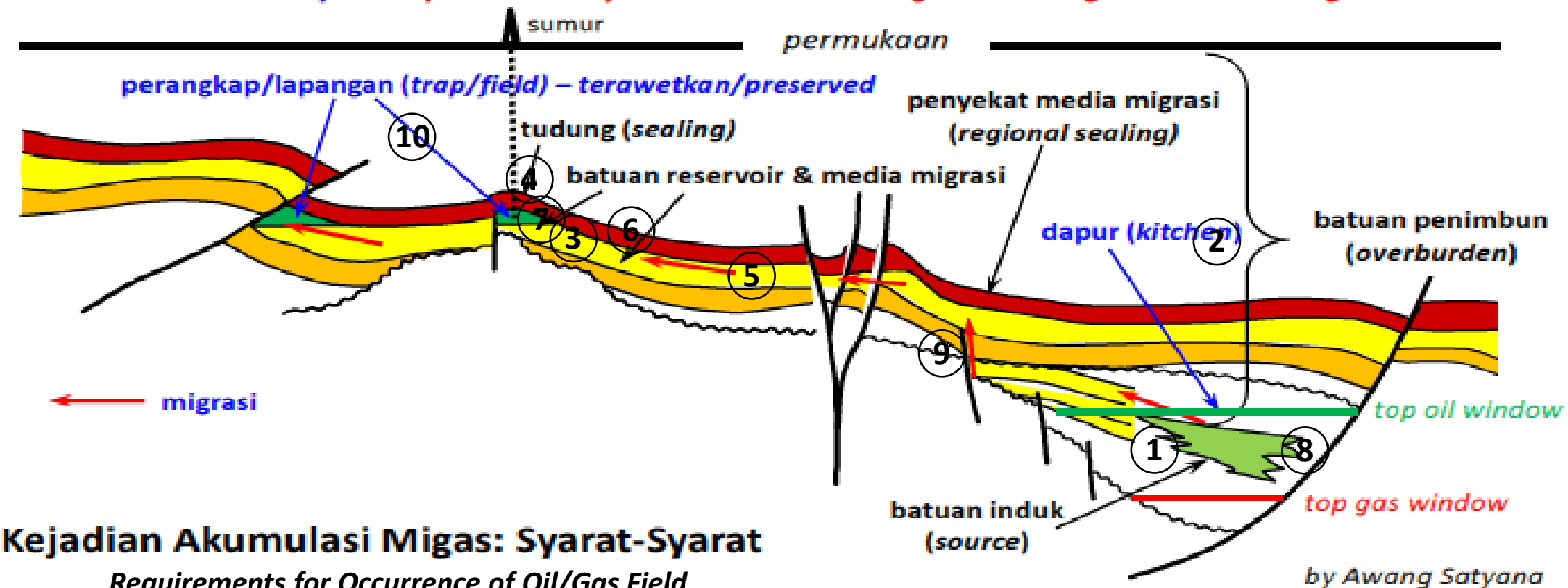
elemen
elements

proses
processes

PETROLEUM SYSTEM

elements & processes should be connected in space & time

Semua elemen dan proses petroleum system ini harus saling berhubungan dalam ruang dan waktu.

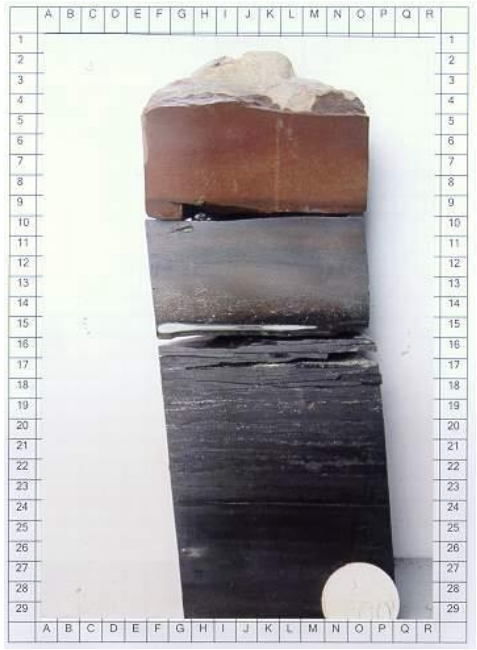


Kejadian Akumulasi Migas: Syarat-Syarat

Requirements for Occurrence of Oil/Gas Field

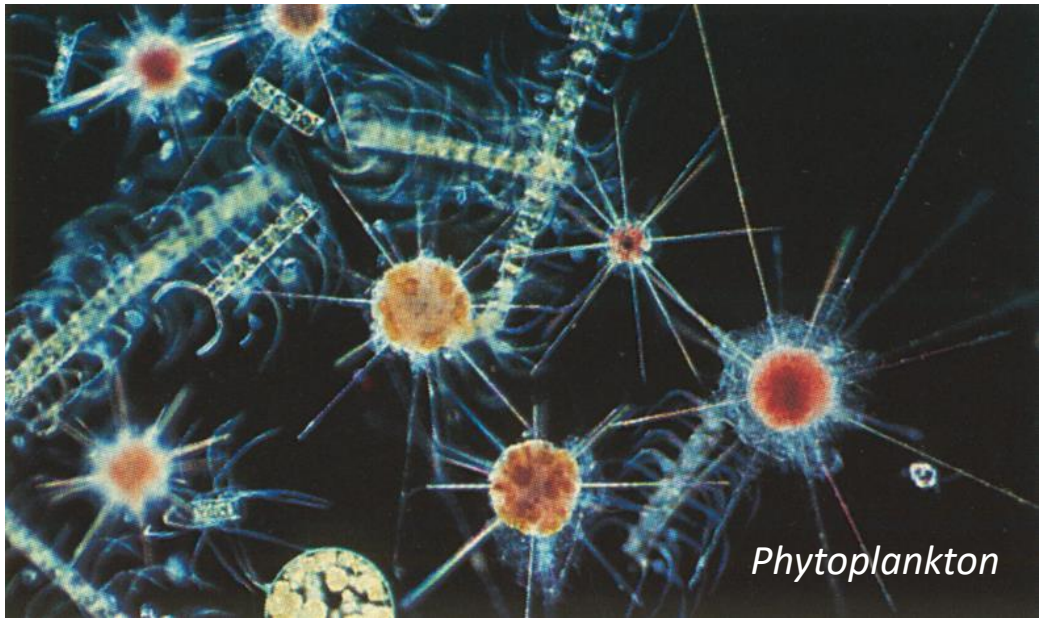
by Awang Satyana

Batuan Induk *(source)*

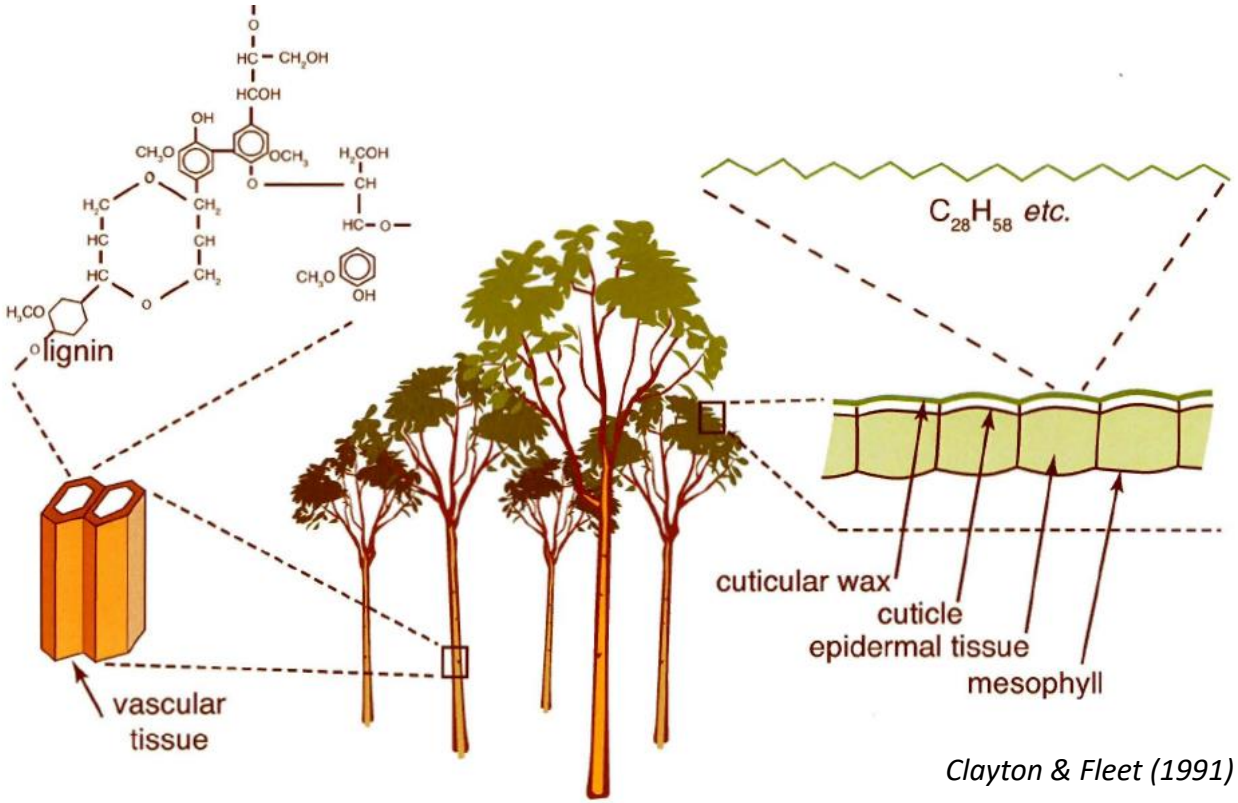


Adalah batuan yang menggenerasikan minyak dan gas Bumi.
Batuan yang dapat berfungsi sebagai batuan induk adalah batuan yang mengandung banyak zat organik, yang oleh pembebanan, waktu dan panas; zat organik tersebut akan berubah menjadi minyak dan gas bumi.
Syarat batuan induk: kaya organik dan matang.

Lingkungan danau dan pantai sering menjadi tempat yang baik untuk pengendapan sedimen yang mengandung banyak zat organik.



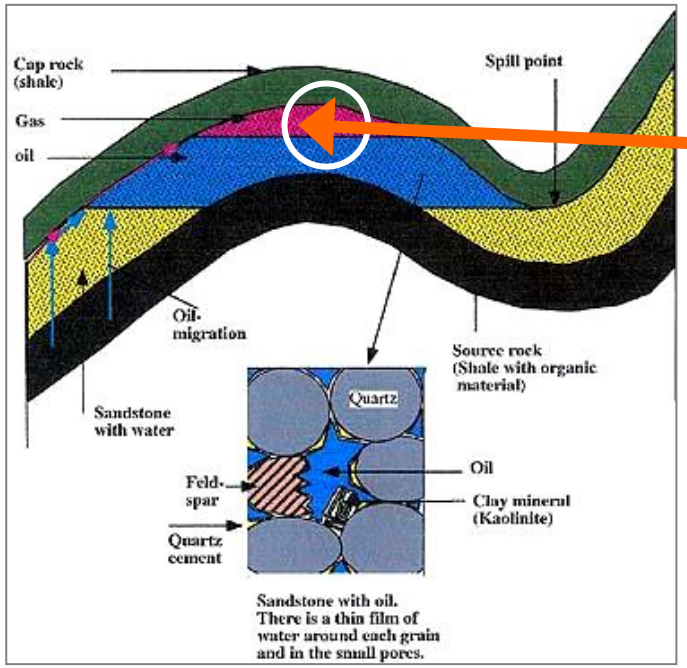
Asal migas di laut/danau: plankton, alga, dsb.



Clayton & Fleet (1991)

Asal migas di darat: pohon dan semua bagiannya

Batuan Reservoir

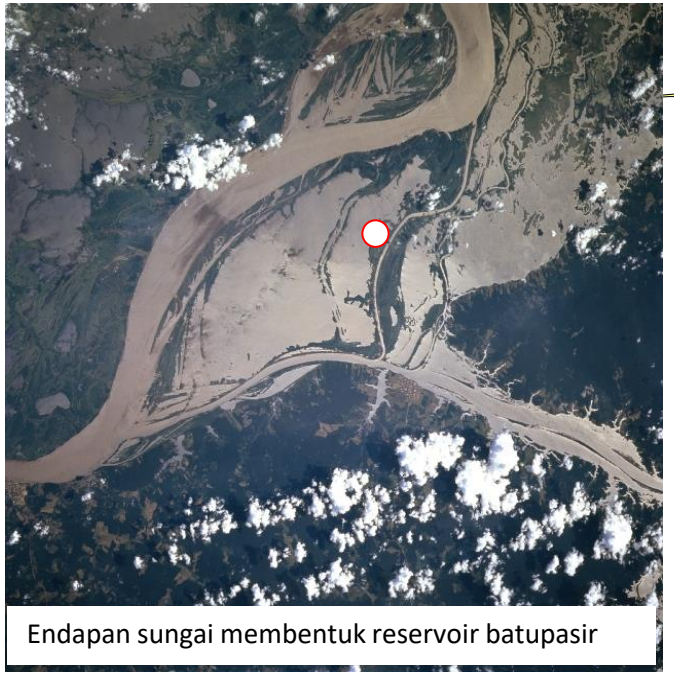


Adalah tempat terkumpulnya dan terjebaknya minyak dan gas bumi secara alami di bawah permukaan, di dalam batuan yang berpori (*porous*) dan dapat meneruskan aliran fluida (*permeable*).

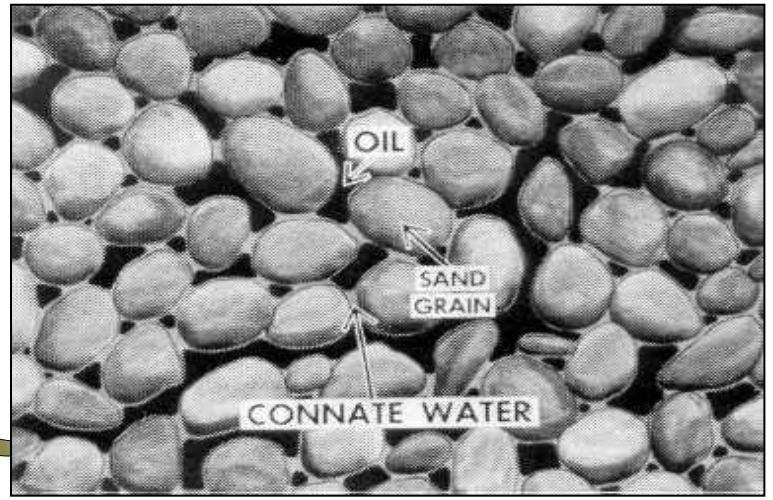
Jenis batuan reservoir terbanyak:

1. batupasir
2. batugamping

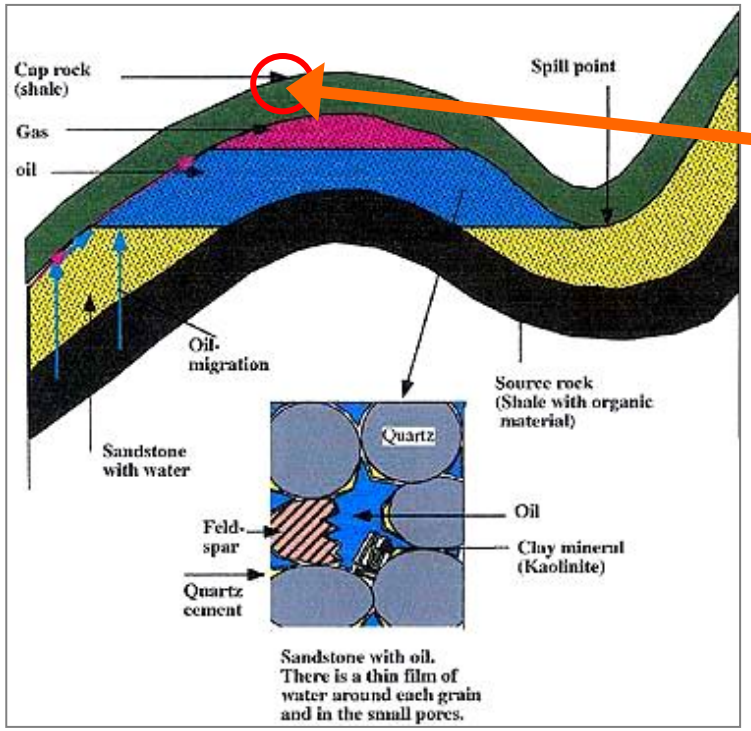
Syarat utama: Memiliki pori-pori yang saling berhubungan



Endapan sungai membentuk reservoir batupasir



Batuan Penyekat/Tudung *(seal)*



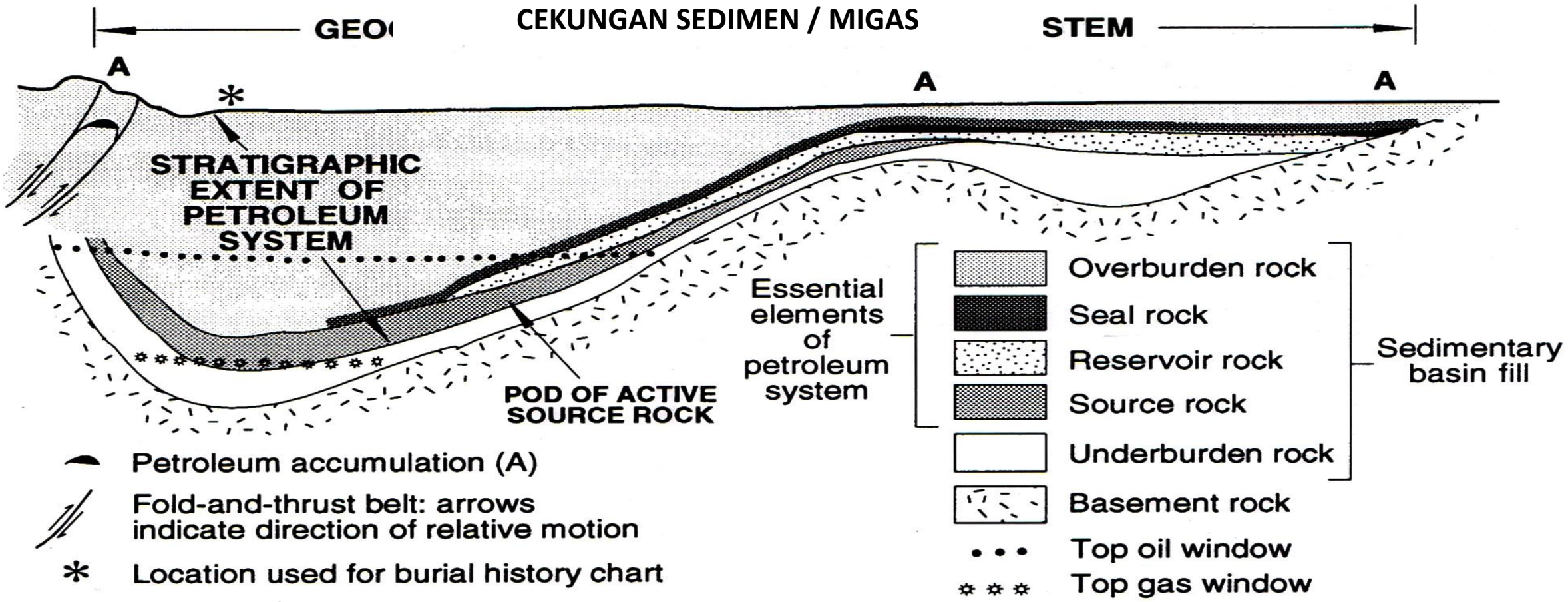
Adalah batuan yang berfungsi untuk menyekat dan menghalangi agar minyak dan gas bumi yang sudah terperangkap tidak lepas atau bermigrasi ke tempat lain. Batuan penyekat berupa batuan yang tidak dapat meneruskan aliran fluida (*impermeable*)

Contoh Jenis batuan tudung:

1. batulempung
2. batugaram
3. Batugamping yang ketat

Syarat Utama: Susah dilalui oleh fluida (kedap)

Semua elemen dan proses sistem petroleum terdapat dan terjadi di dalam cekungan sedimen (sedimentary basin) dan terjadi pada masa lalu (zaman geologi). Cekungan sedimen adalah tempat cekung di permukaan Bumi yang berisi sedimen lebih tebal daripada sekitarnya. Cekungan sedimen penghasil migas disebut cekungan migas.



Magoon and Dow (1994)

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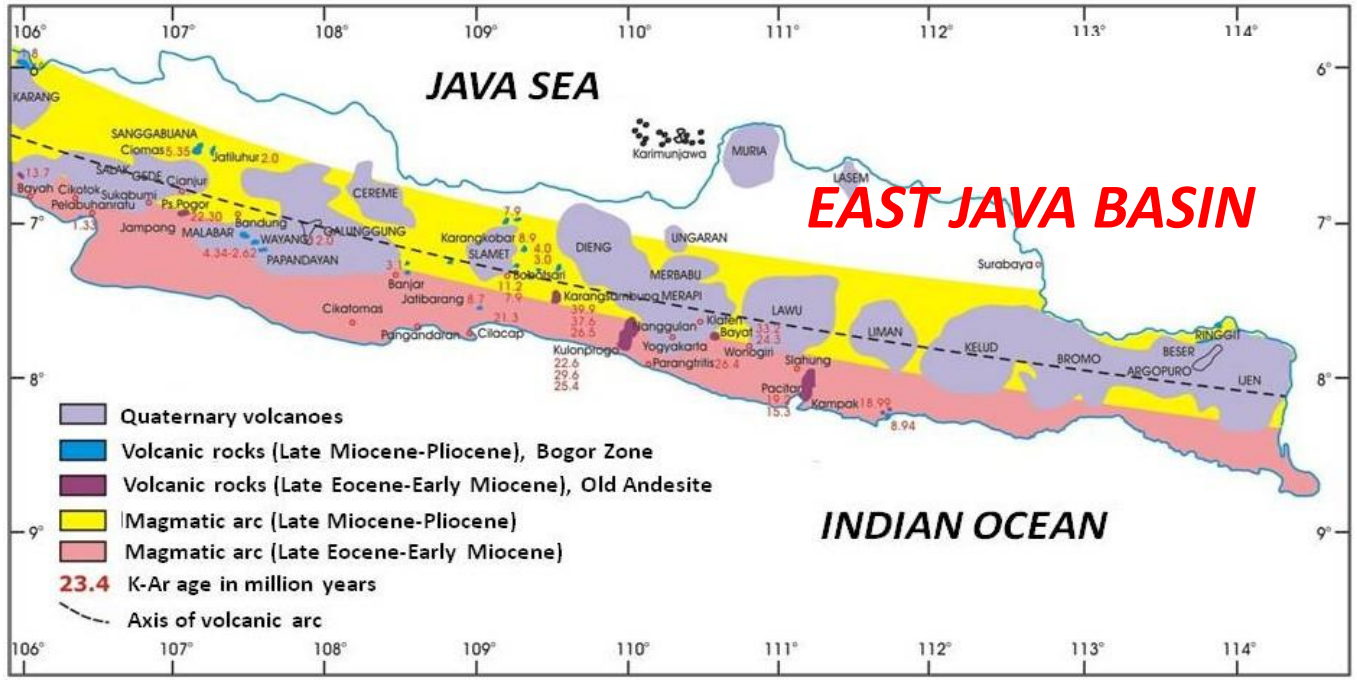
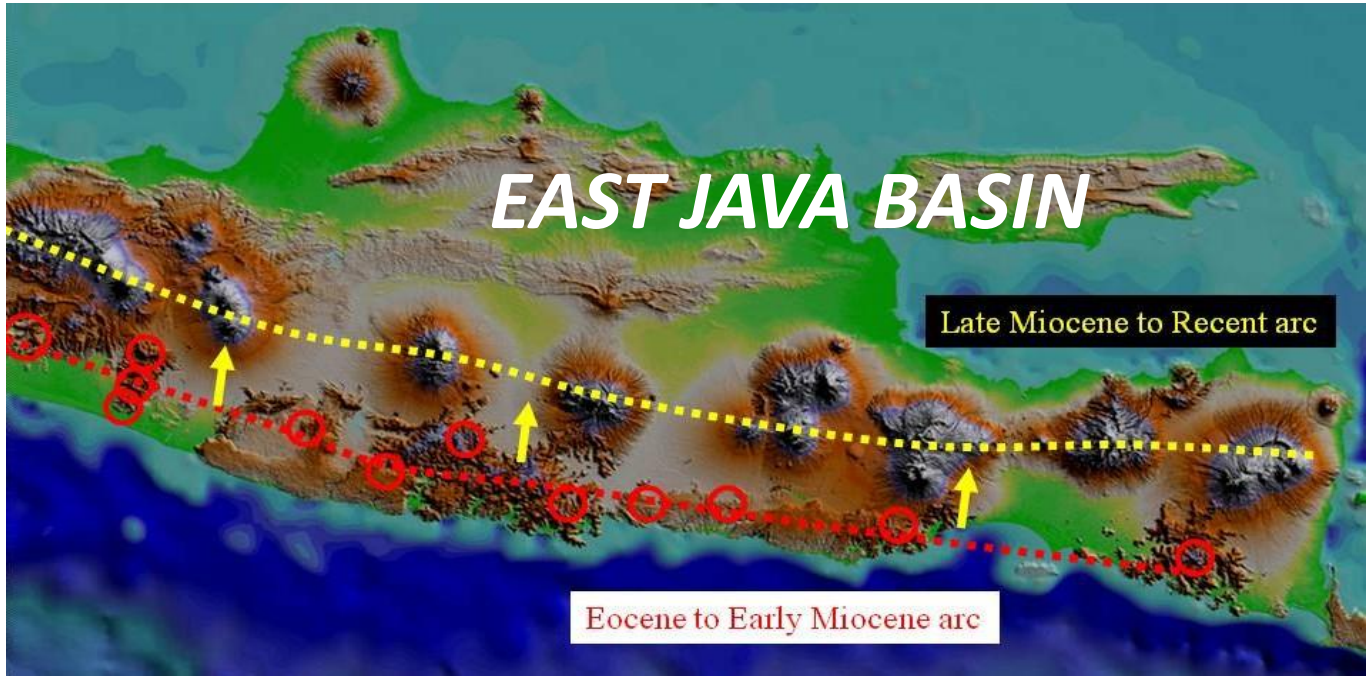
East Java Basin Location


Java Is.
EAST JAVA BASIN
VOLCANIC ARC
N
STS046-90-29
center point: 8.0S/112.0E

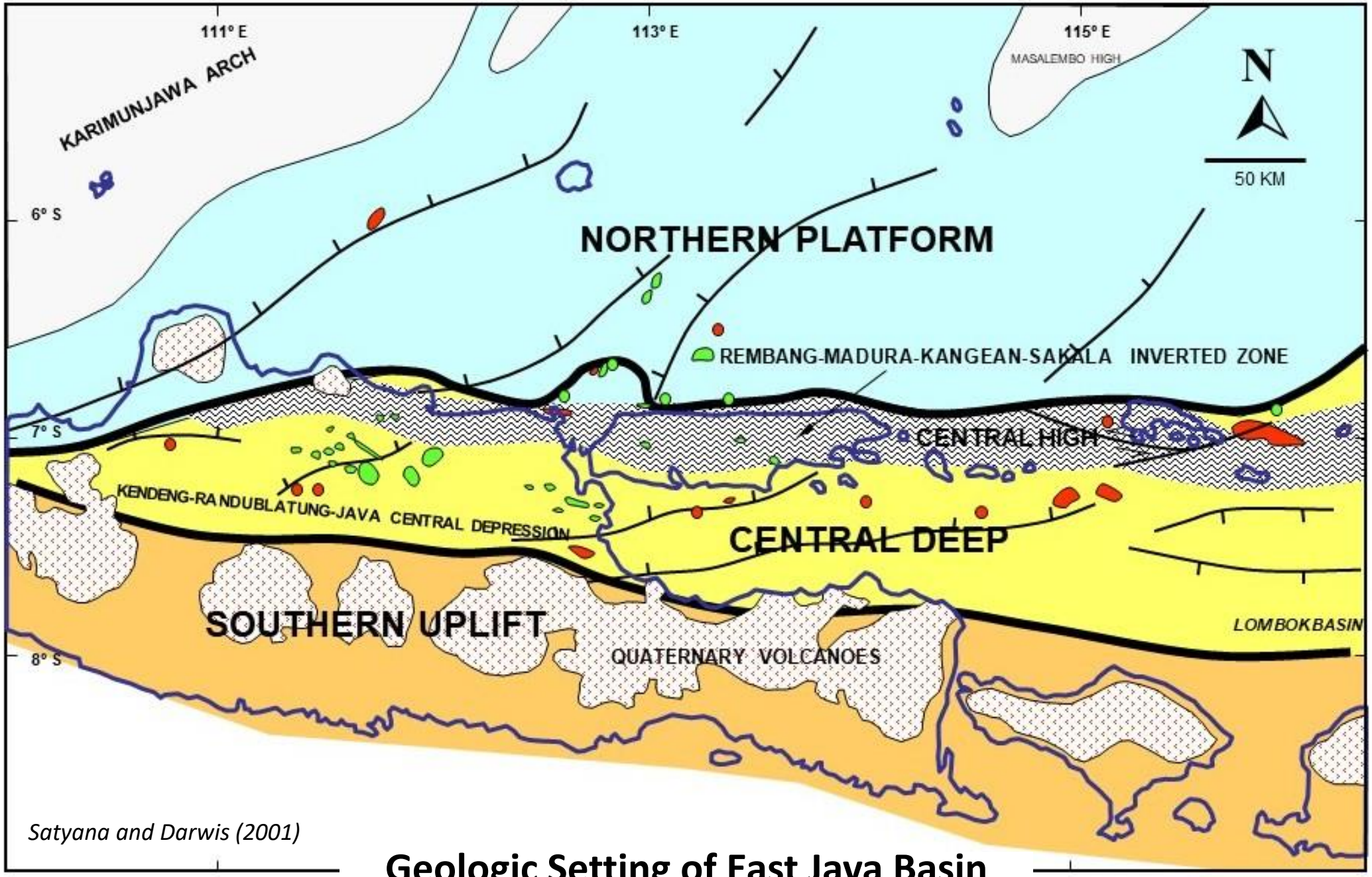
East Java Basin has been a back- arc basin since the Eocene



Soeria-Atmadja et al. (1994)

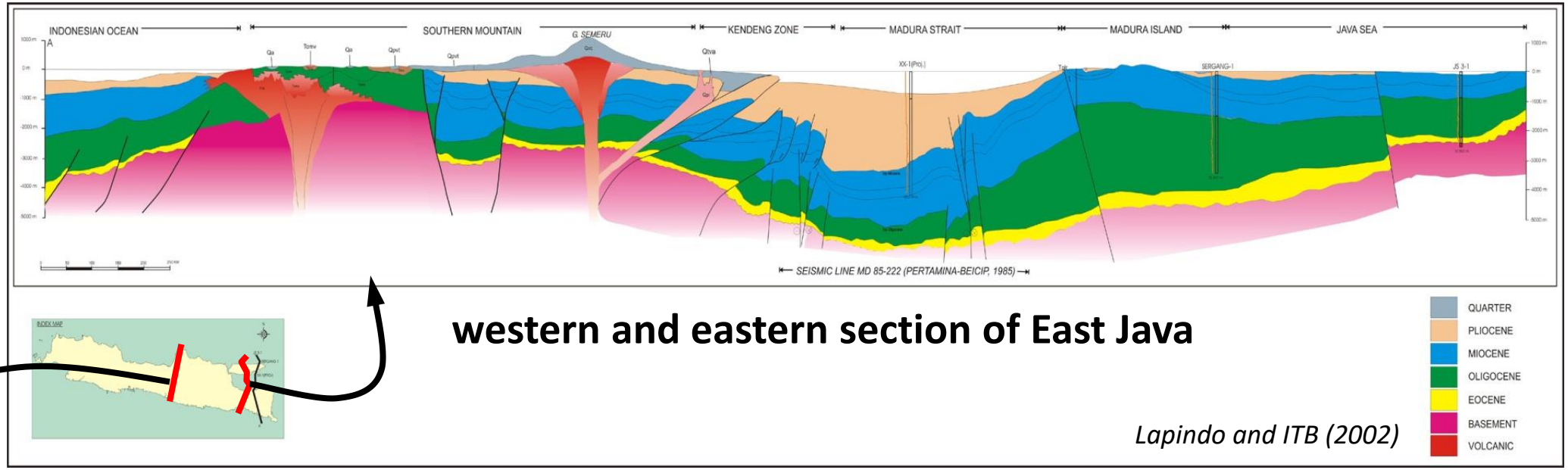


Smyth et al. (2005)



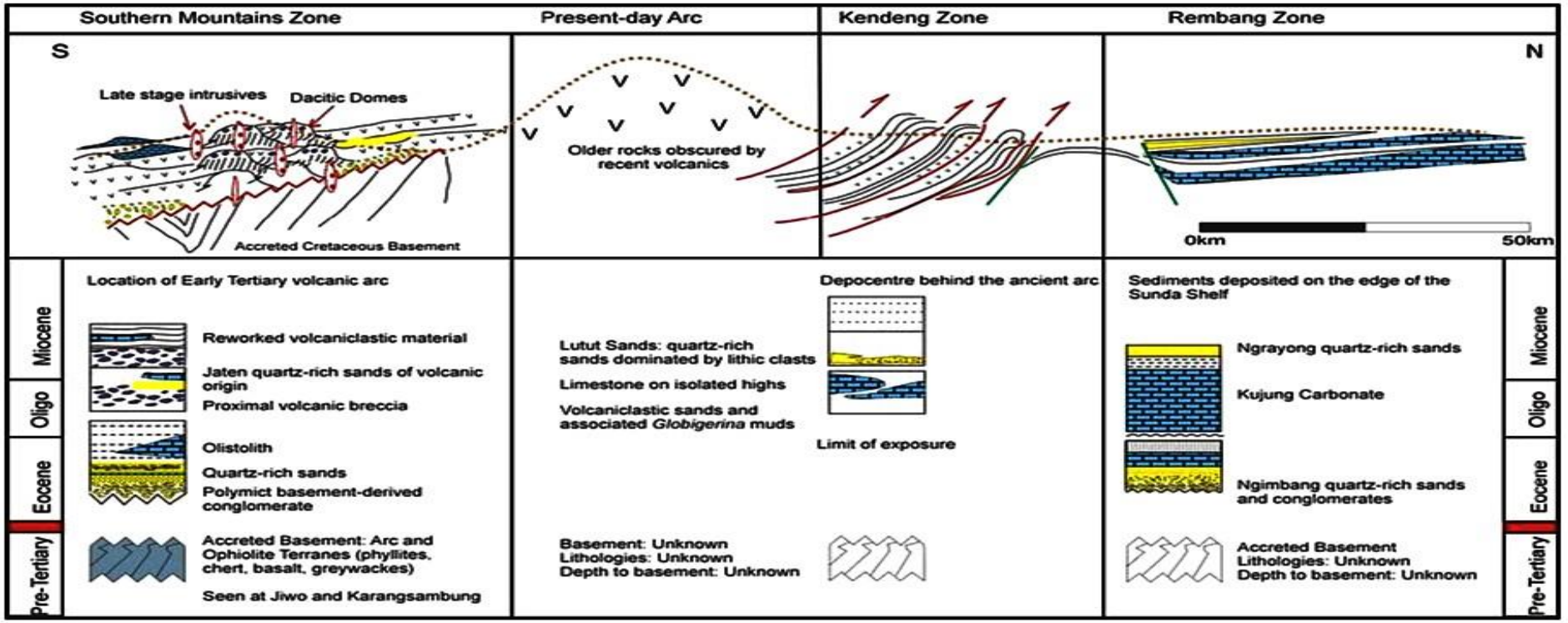
Satyana and Darwis (2001)

Geologic Setting of East Java Basin



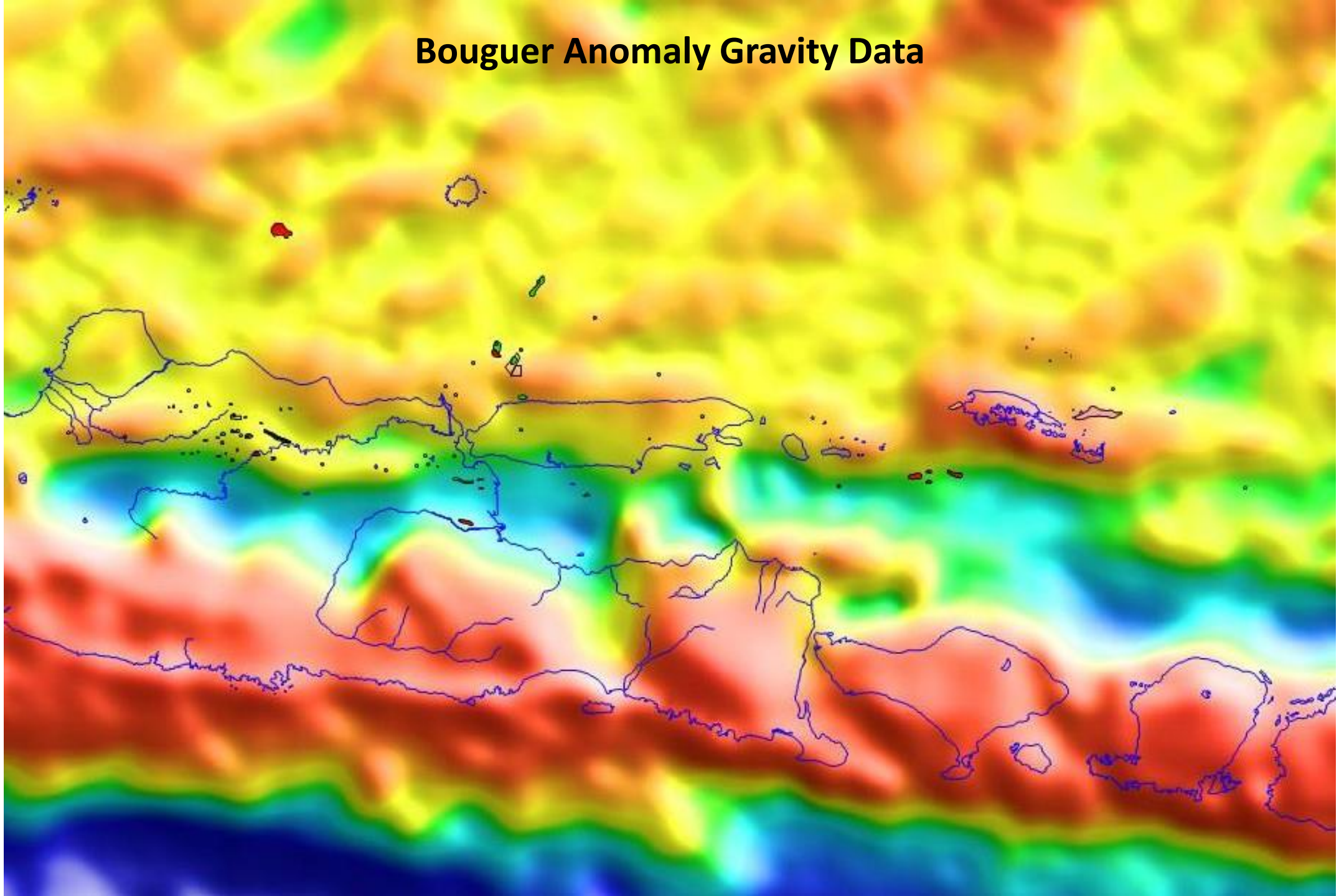
western and eastern section of East Java

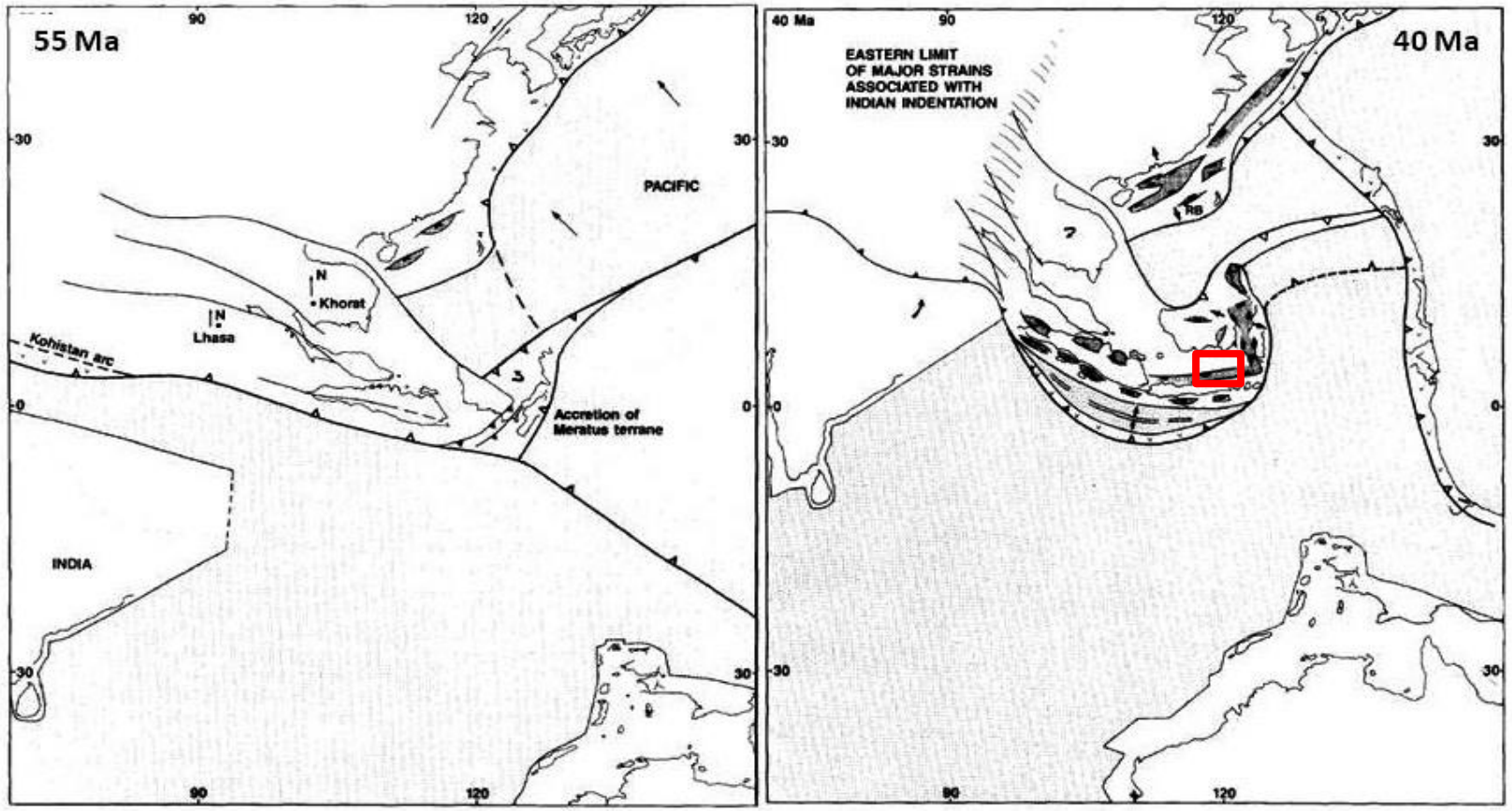
Lapindo and ITB (2002)



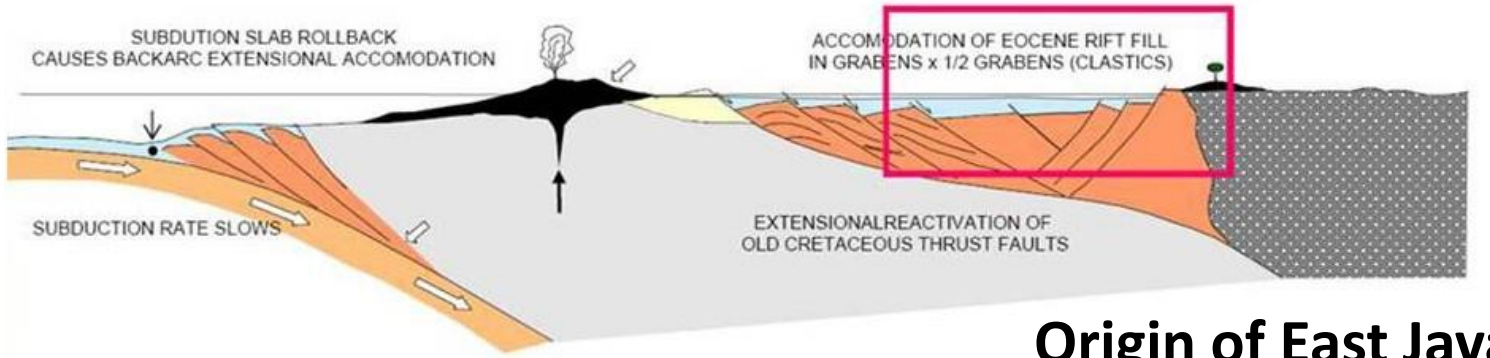
Smyth et al. (2003)

Bouguer Anomaly Gravity Data



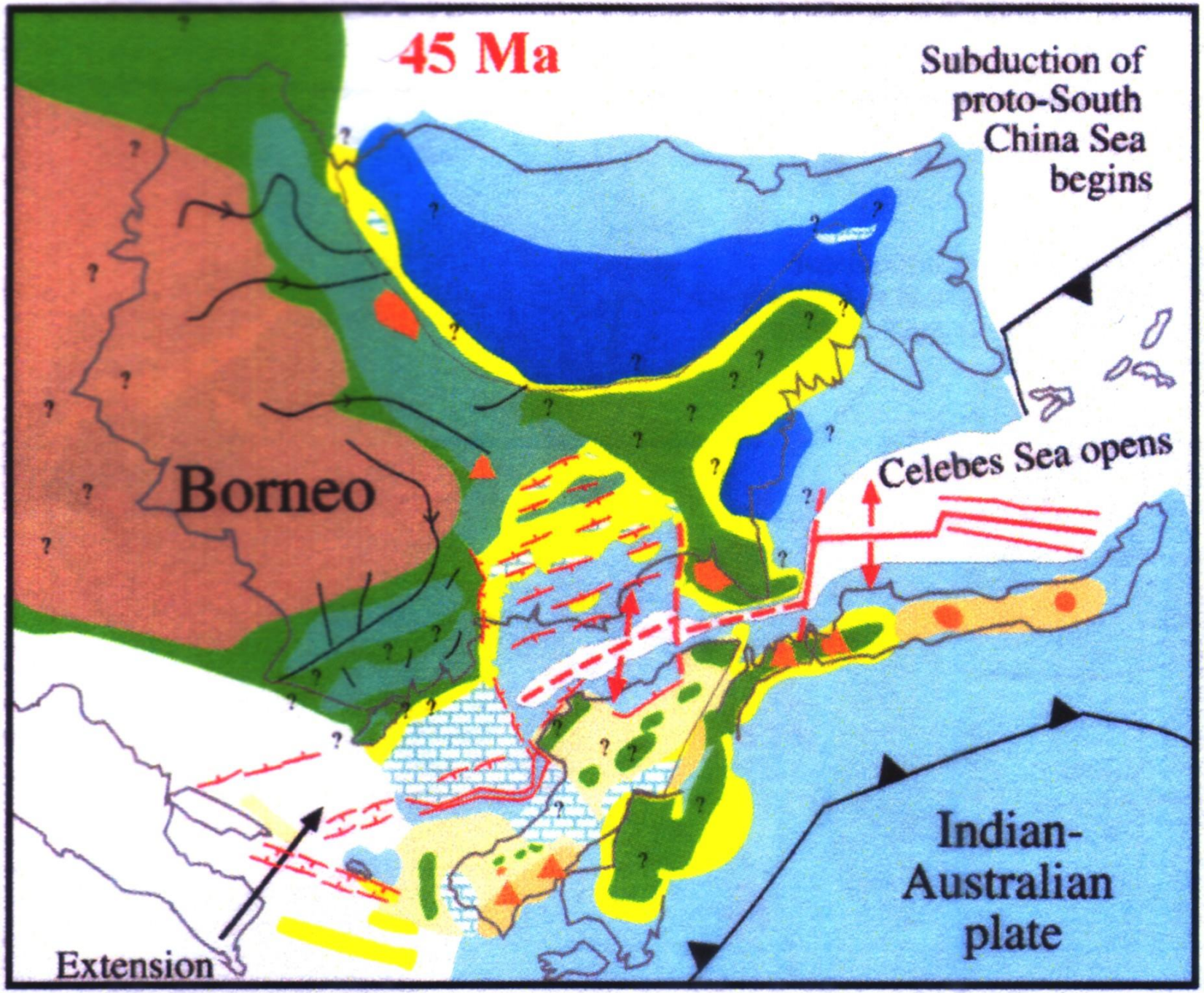


Daly et al. (1991)



Origin of East Java Basin

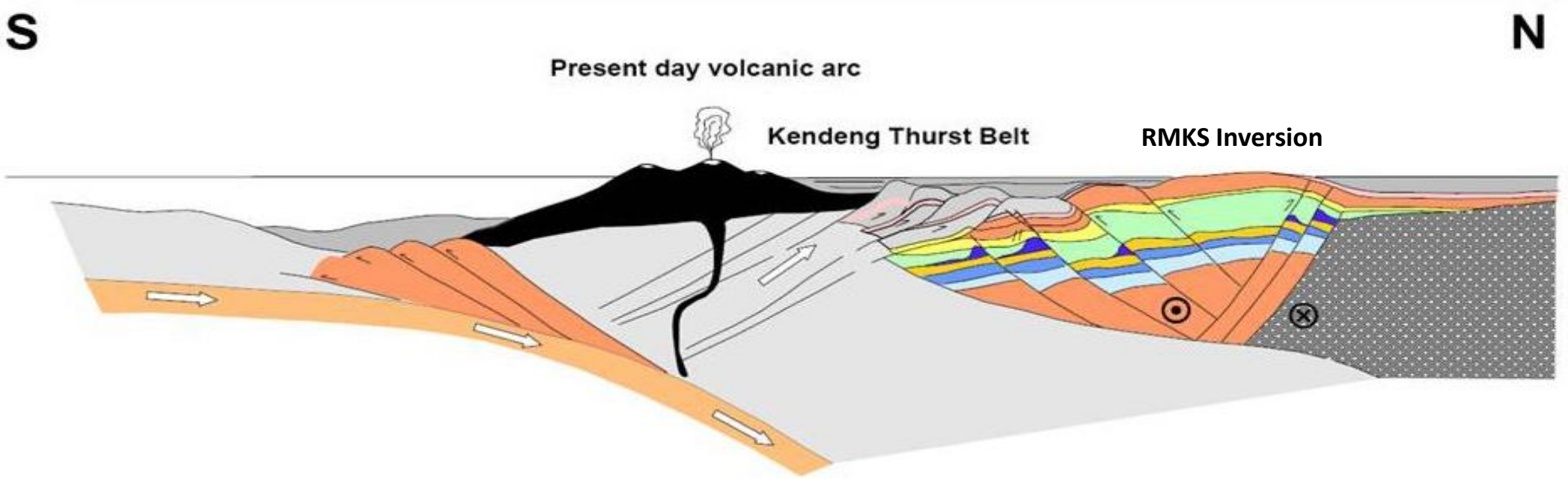
Bransden & Matthews (1992); Santos Company (2004)



Basin's origin triggered by Makassar Strait rifting

Unocal (2001)

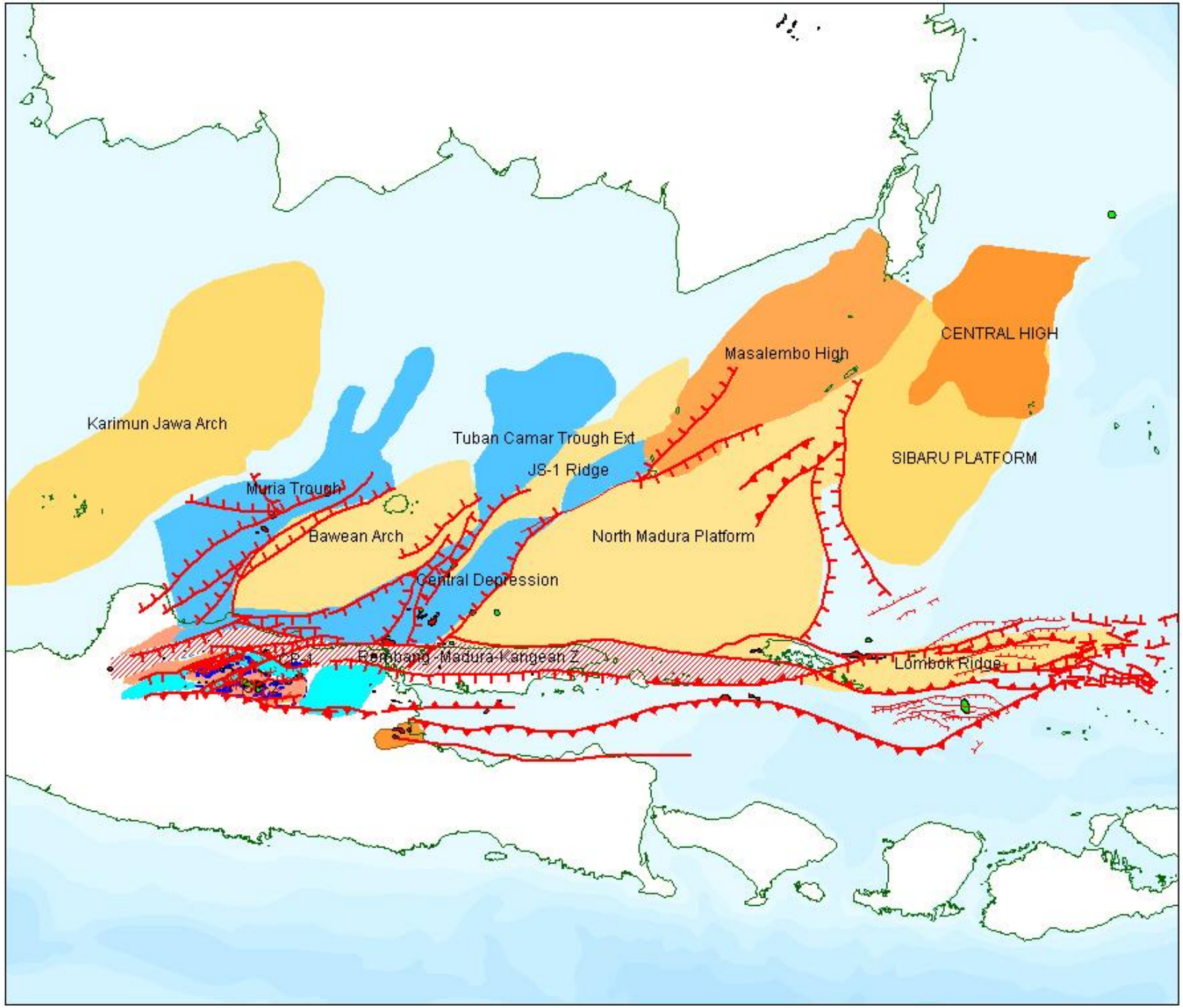
Neogene Deformation



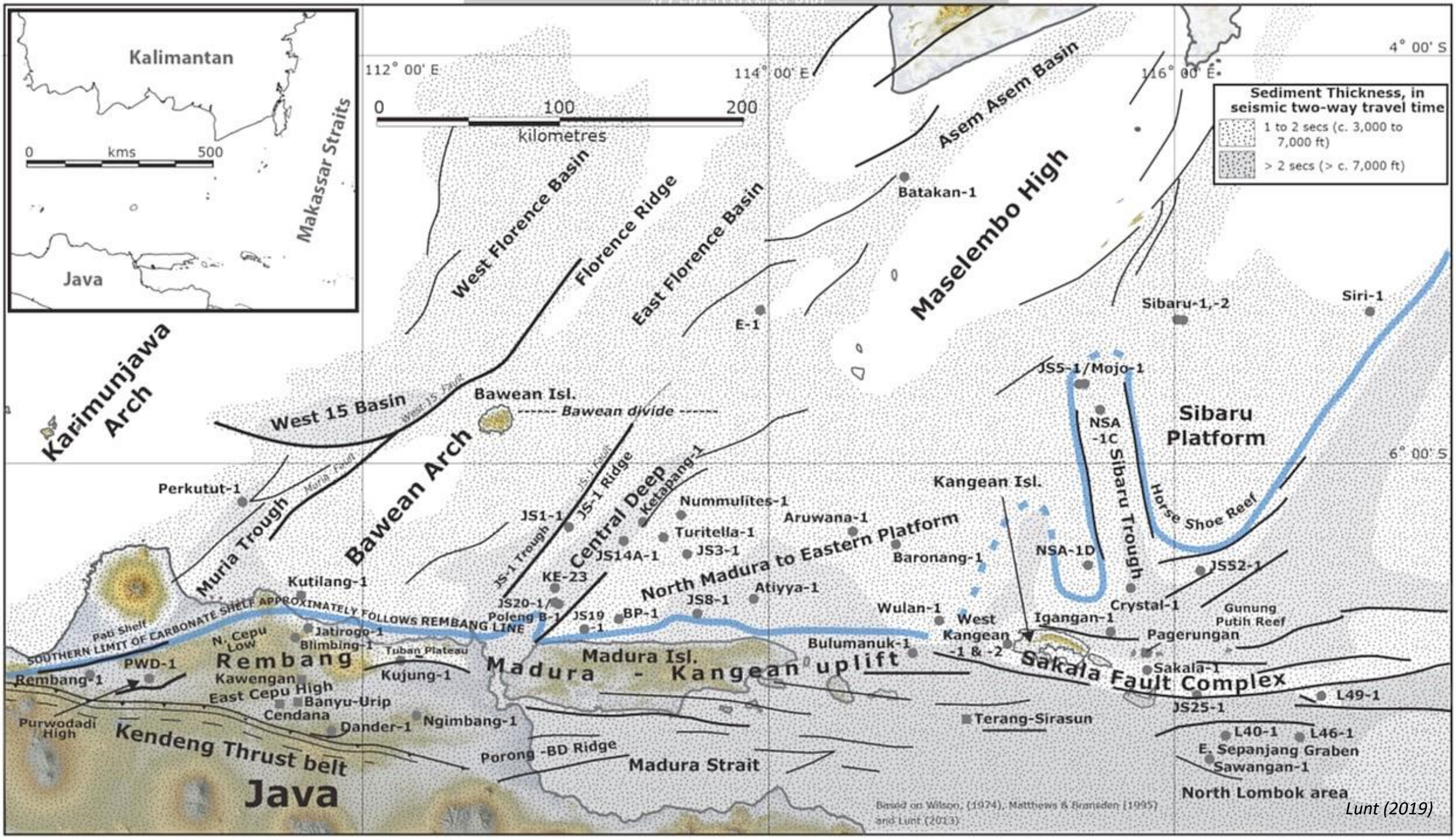
Bransden & Matthews (1992); Santos Company (2004)

- Back-arc basin bounded to the south by Quaternary volcanic arc and to the north by SE Sundaland platform
- Back-thrusting along the north of the arc develops Kendeng thrust belt along the southern margin of the basin
- Left-lateral transpression along the RMKS (Rembang-Madura-Kangean-Sakala) fault zone resulted in inversion of the basin deep and uplift along this trend

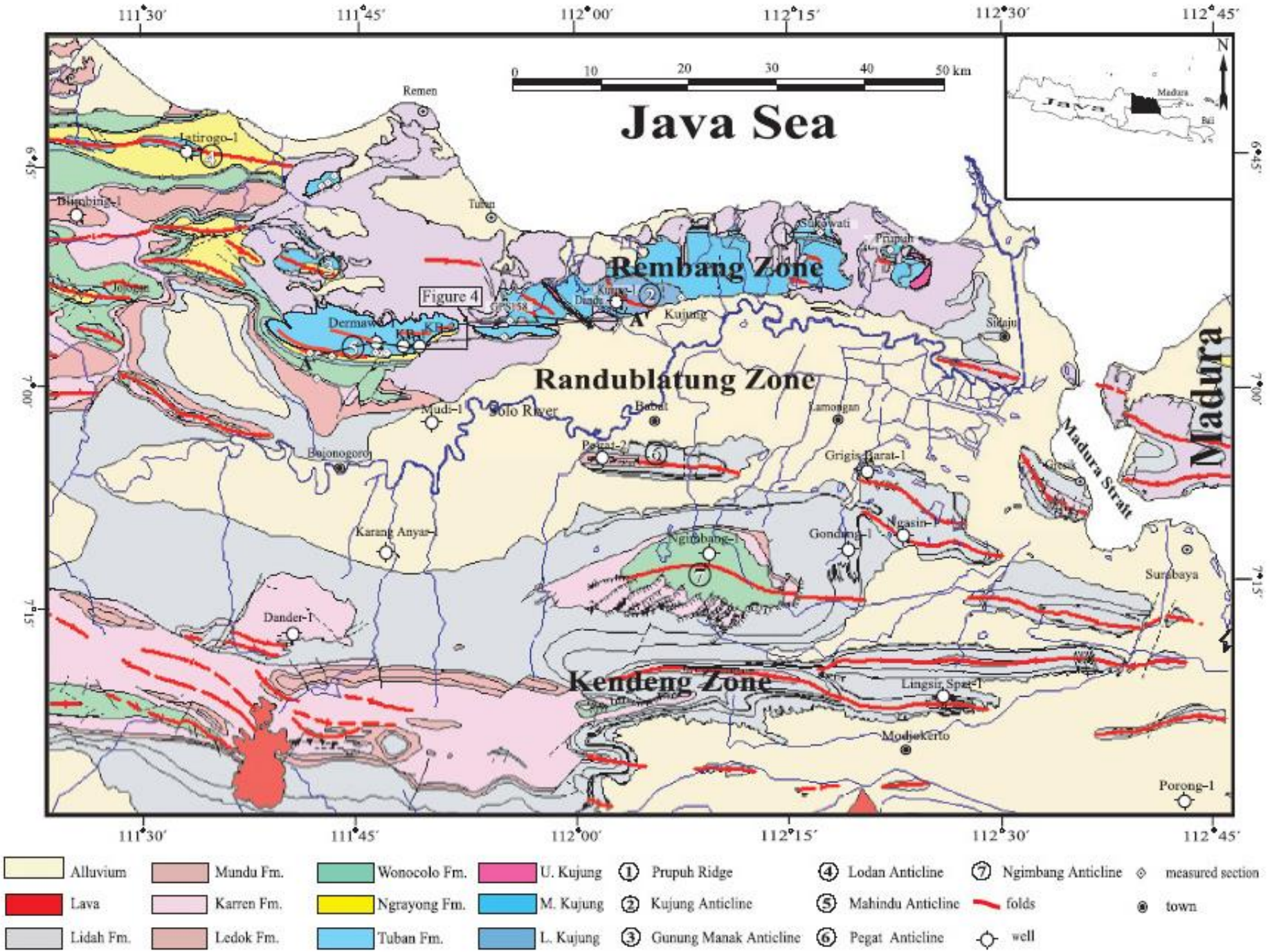
NE Java Basinal Area Major Tectonic Elements



Pertamina BPPKA (1996)


Kalimantan
Java
Makassar Straits
0 kms 500
112° 00' E
114° 00' E
116° 00' E
4° 00' S
6° 00' S
0 100 200
kilometres
Sediment Thickness, in seismic two-way travel time
1 to 2 secs (c. 3,000 to 7,000 ft)
> 2 secs (> c. 7,000 ft)
Asem Asem Basin
West Florence Basin
Florence Ridge
East Florence Basin
Maselembo High
Batakan-1
E-1
Siri-1
Sibaru-1,-2
JS5-1/Mojo-1
NSA -1C
Sibaru Platform
Sibaru Trough
Horse Shoe Reef
NSA-1D
JS52-1
Crystal-1
Gunung Putih Reef
Pagerungan
Sakala-1
Sakala Fault Complex
L49-1
JS25-1
L40-1
L46-1
E. Sepanjang Graben
Sawangan-1
North Lombok area
Karimunjawa Arch
West 15 Basin
West 15 Fault
Bawean Isl.
Bawean divide
Bawean Arch
Perkutut-1
Muria Trough
Muria Fault
JS1-1
JS-1 Fault
JS-1 Ridge
JS-1 Trough
Central Deep
Ketapang-1
Nummulites-1
Turitella-1
JS14A-1
JS3-1
KE-23
JS20-1/ Poleng B-1
JS19 -1
BP-1
JS8-1
Atiyya-1
Aruwana-1
Baronang-1
North Madura to Eastern Platform
Kangean Isl.
Wulan-1
West Kangean -1 & -2
Bulumanuk-1
Igangan-1
Madura - Kangean uplift
Madura Isl.
Kutilang-1
SOUTHERN LIMIT OF CARBONATE SHELF APPROXIMATELY FOLLOWS REMBANG LINE
Pati Shelf
N. Cepu Low
Jatirogo-1
Blimbing-1
Tuban Plateau
Rembang
Kujung-1
Rembang-1
PWD-1
Kawengan
East Cepu High
Banyu-Urip
Cendana
Dander-1
Ngimbang-1
Purwodadi High
Kendeng Thrust belt
Java
Porong -BD Ridge
Madura Strait
Terang-Sirasun
Based on Wilson, (1974), Matthews & Bransden (1995) and Lunt (2013)
Lunt (2019)

Geological Map, Part of East Java Basin

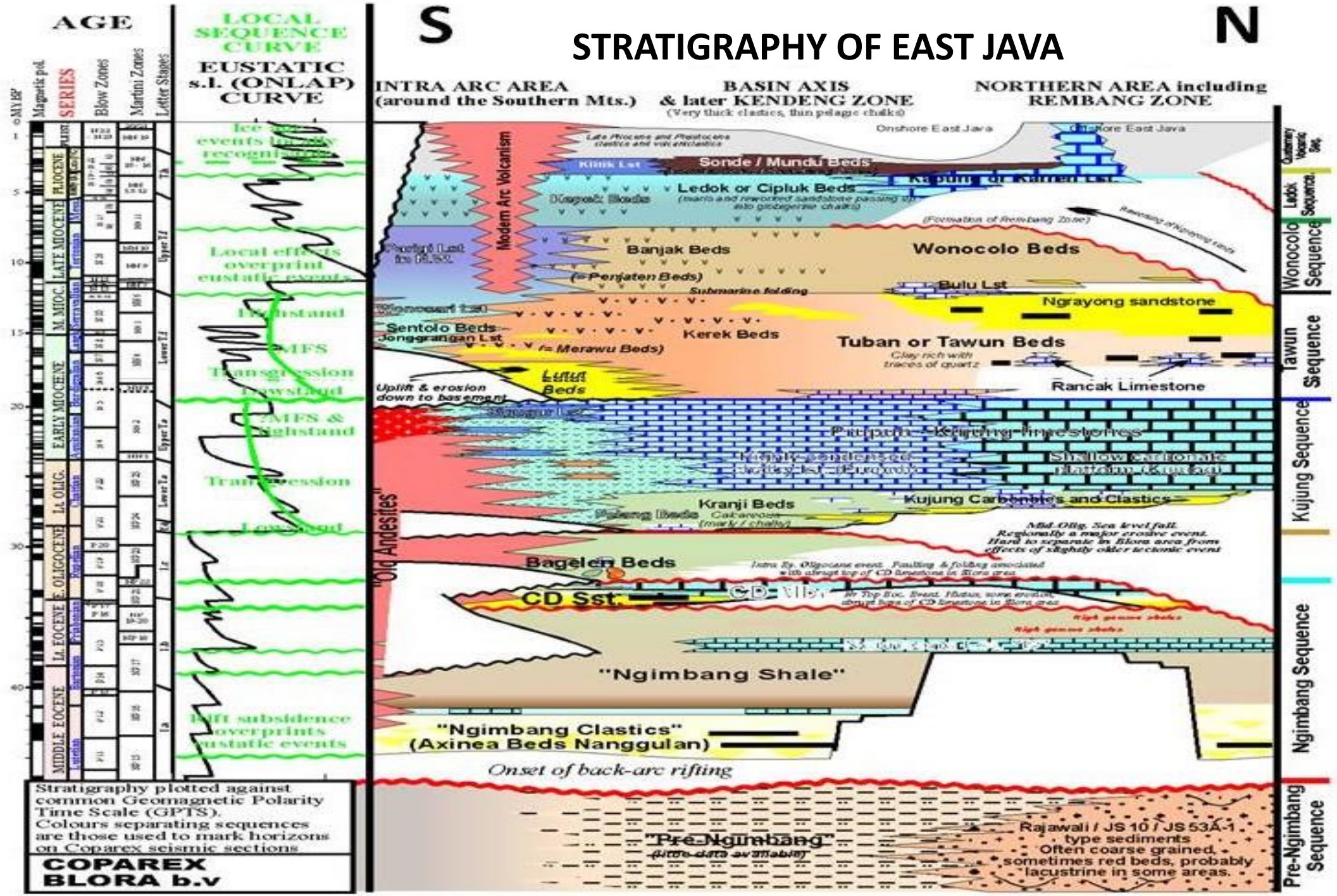


Sharaf (2005)

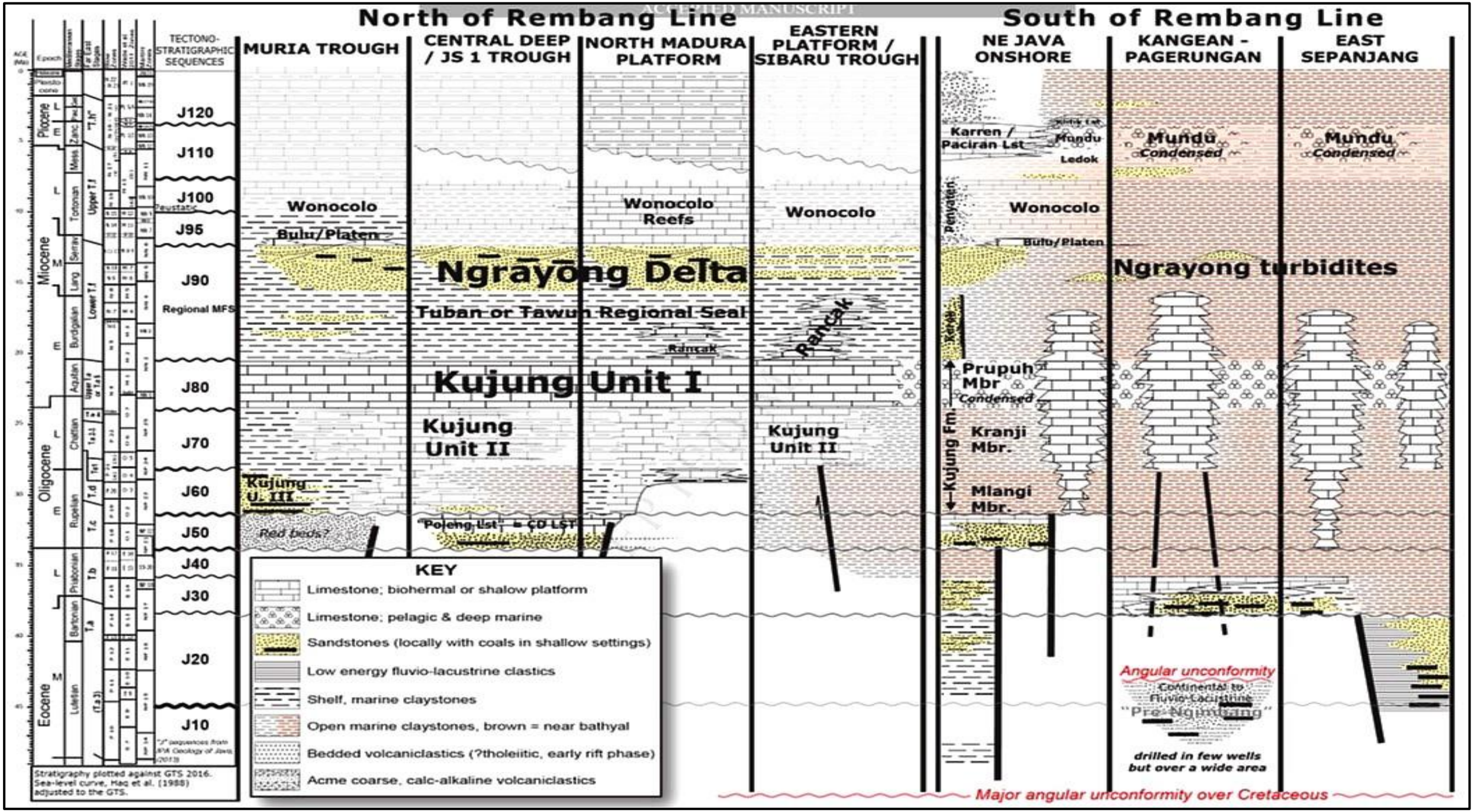
Diskusi

1. Jawa Timur Cekungan Migas
2. Syarat Akumulasi Migas: Sistem Petroleum
3. Evolusi Cekungan Jawa Timur
4. **Paleogeografi dan Sedimentasi**
5. Kejadian Akumulasi Migas di Cekungan Jawa Timur
6. Sedimentasi dan Potensi Migas Cekungan Jawa Timur

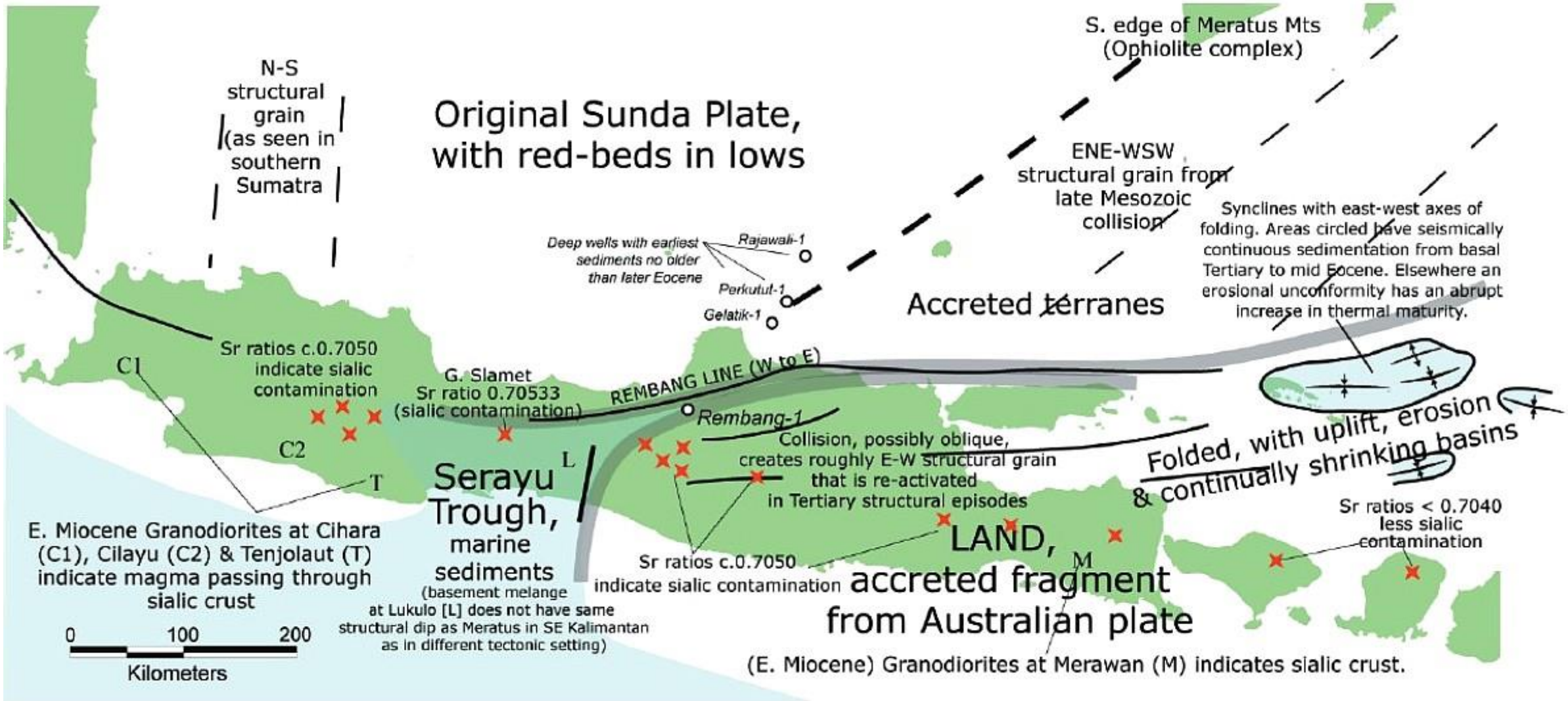
STRATIGRAPHY OF EAST JAVA



Lunt (2003)

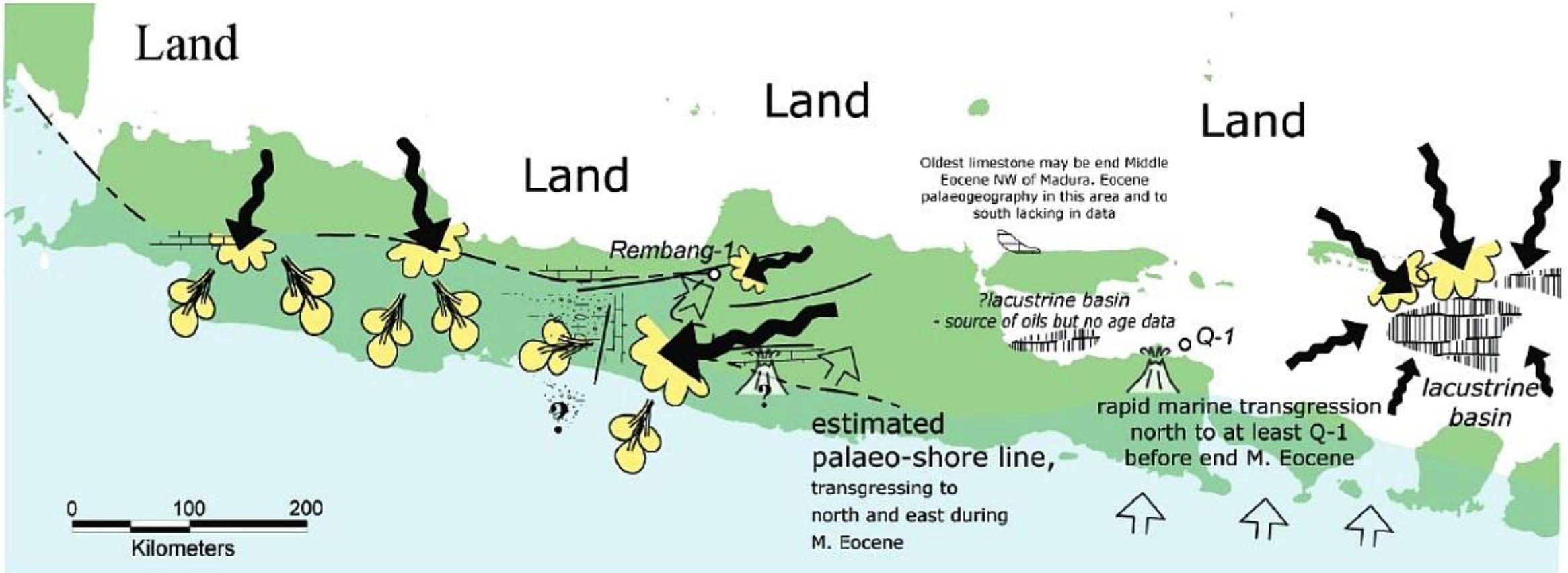


Lunt (2019)



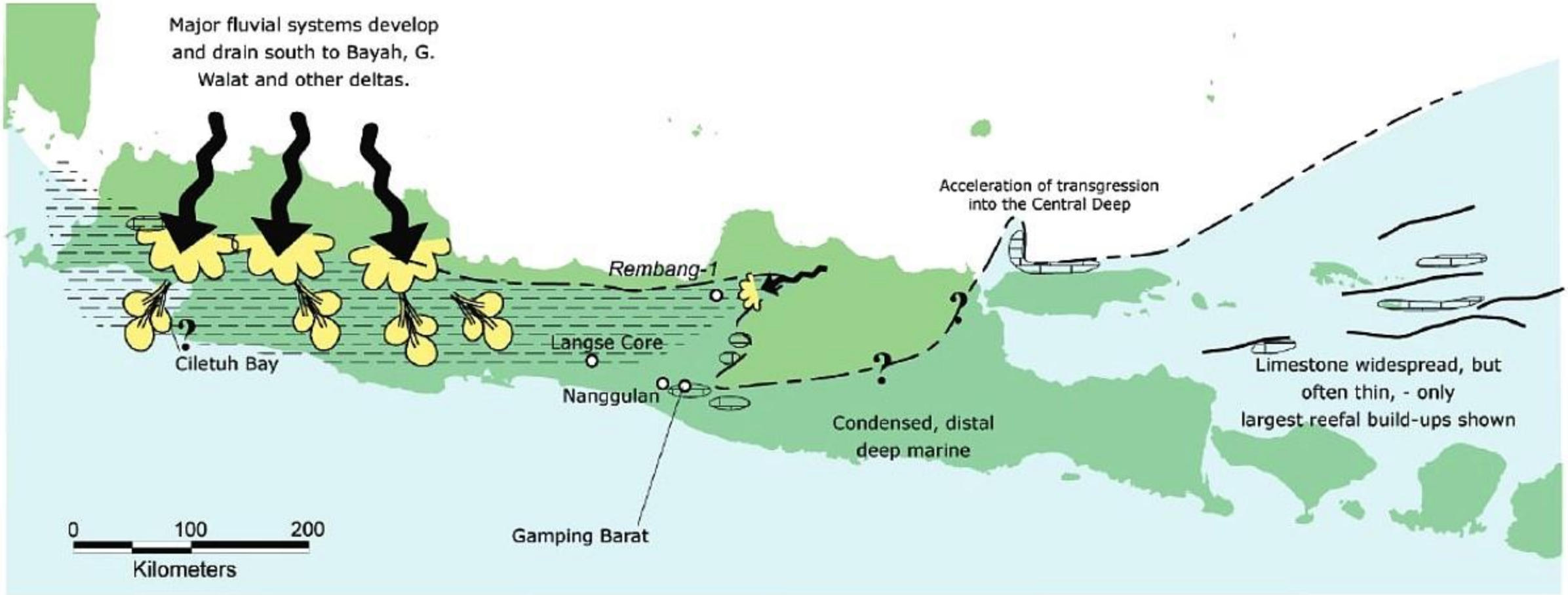
Palaeogeography in earliest Tertiary times (J10)

Lunt (2013)



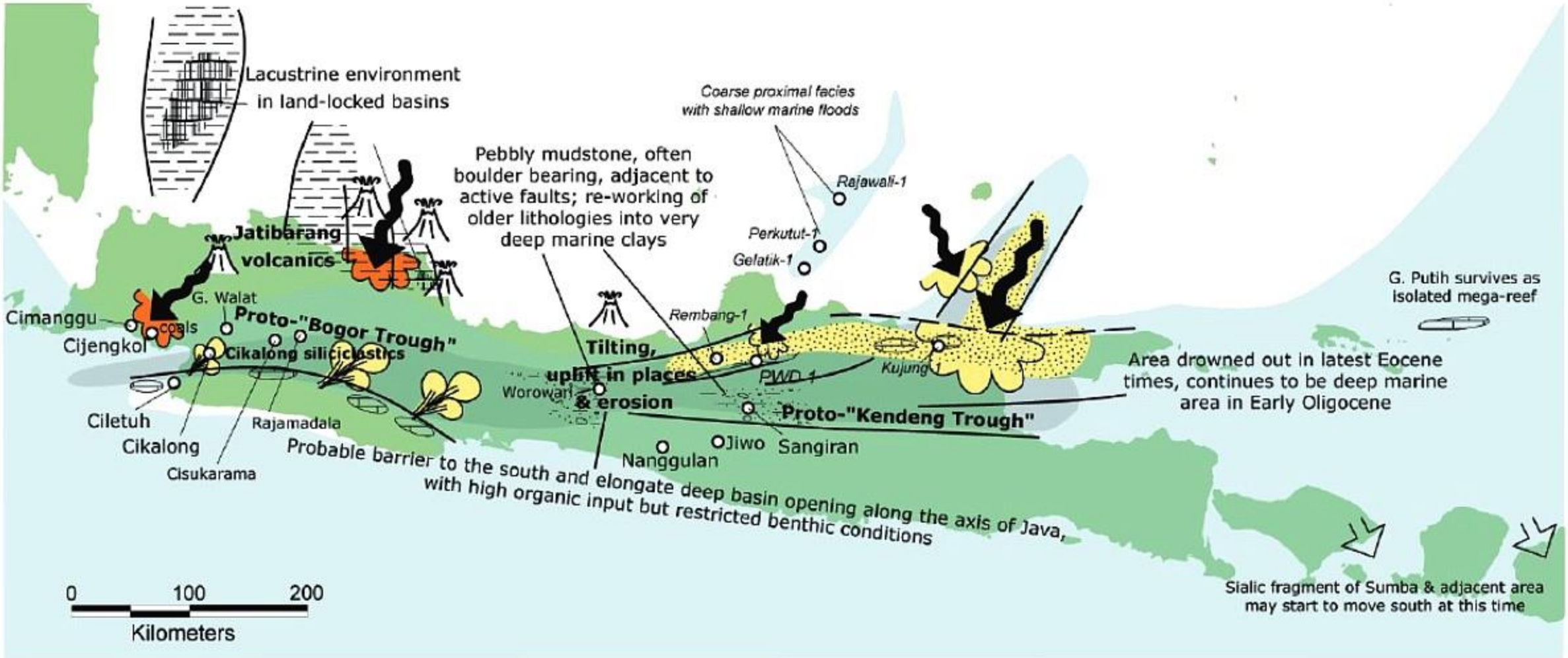
Palaeogeography in J20, later Middle Eocene. Palaeogeography at this time was probably genuinely complex as well as lacking in data to resolve detail. There are marine indicators NW of Madura, but oils in the BD field and Carat seep to the south have lacustrine sources which are presumed to be the same Middle Eocene age as the delta-lacustrine complex north of Lombok. There was probably collision / accretion of terranes northeast of Karangsambung, in Central Java, and in the west available data indicates deep marine conditions at Ciletuh in SW Java, yet Ujong Kulong-1 is interpreted to have had exposed basement - see text for discussion.

Lunt (2013)



Palaeogeography in Late Eocene times

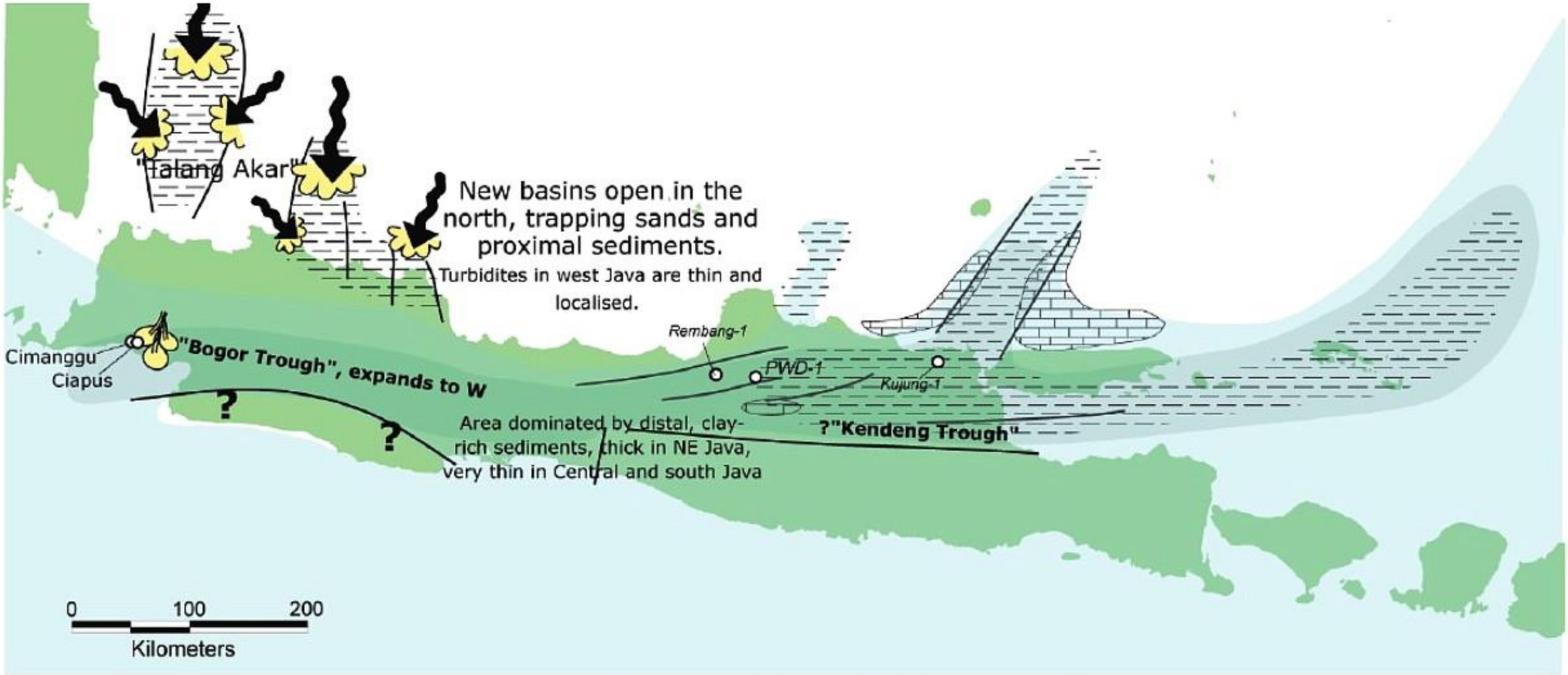
Lunt (2013)



Palaeogeography in earliest Oligocene times.

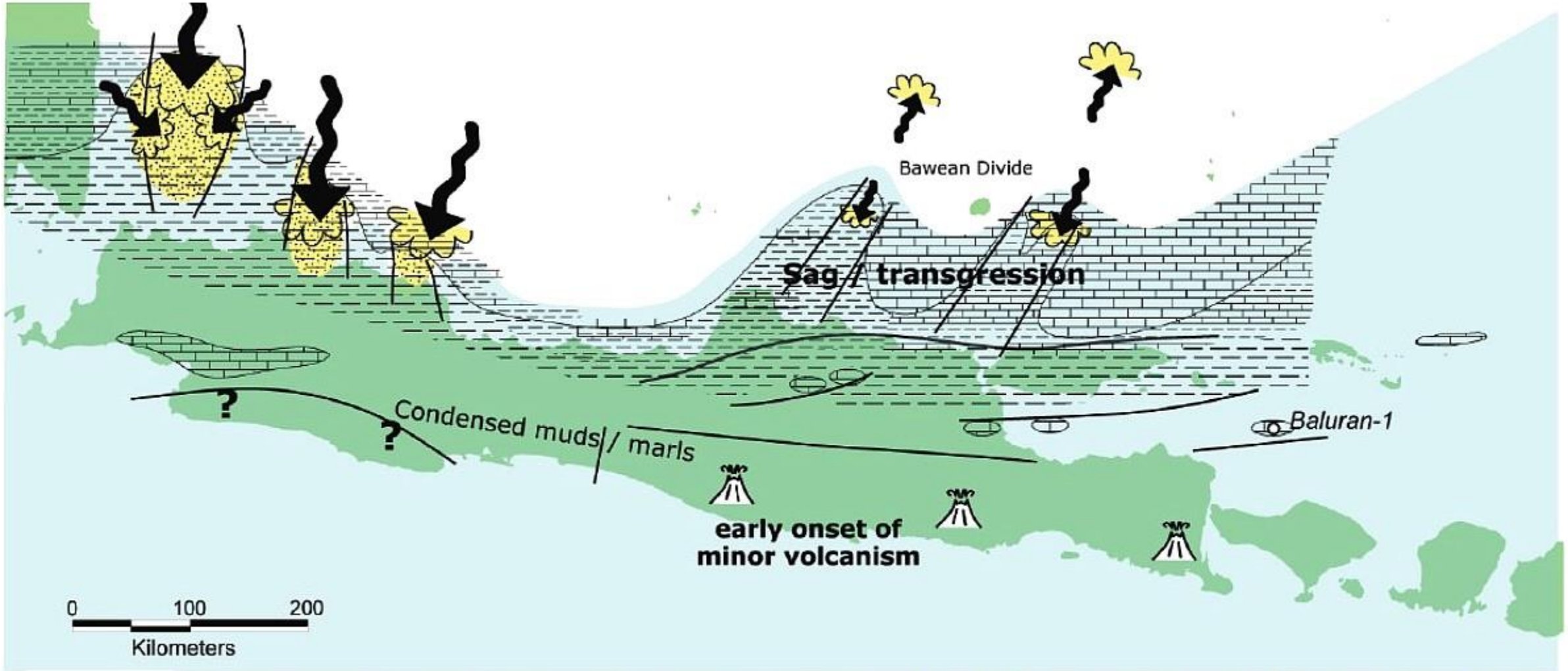
Enough data is available for this age to shows an increase in tectonic complexity and local variation in facies compared to the Late Eocene.

Lunt (2013)



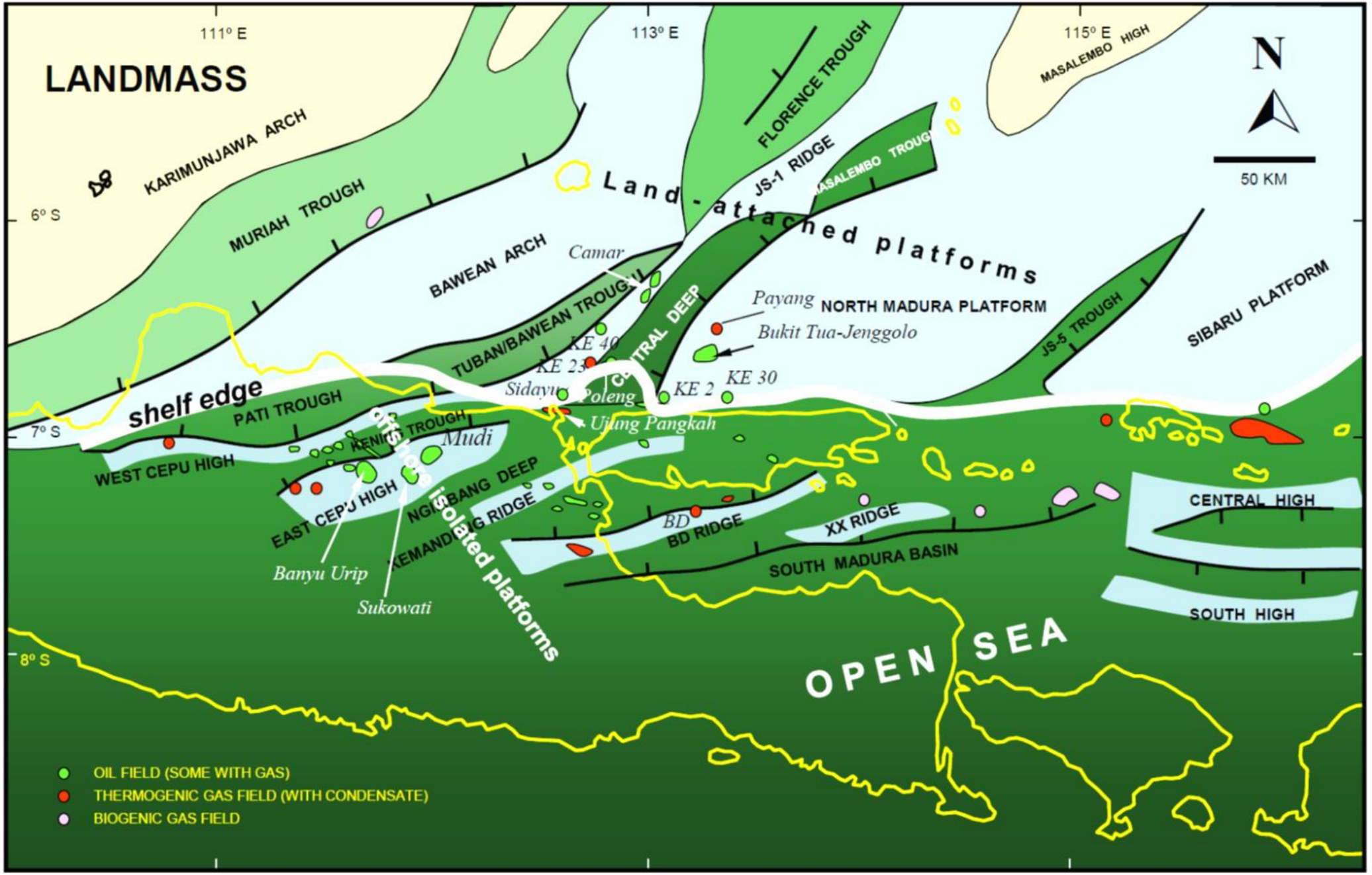
Palaeogeography in mid Oligocene (J60) times.

Lunt (2013)



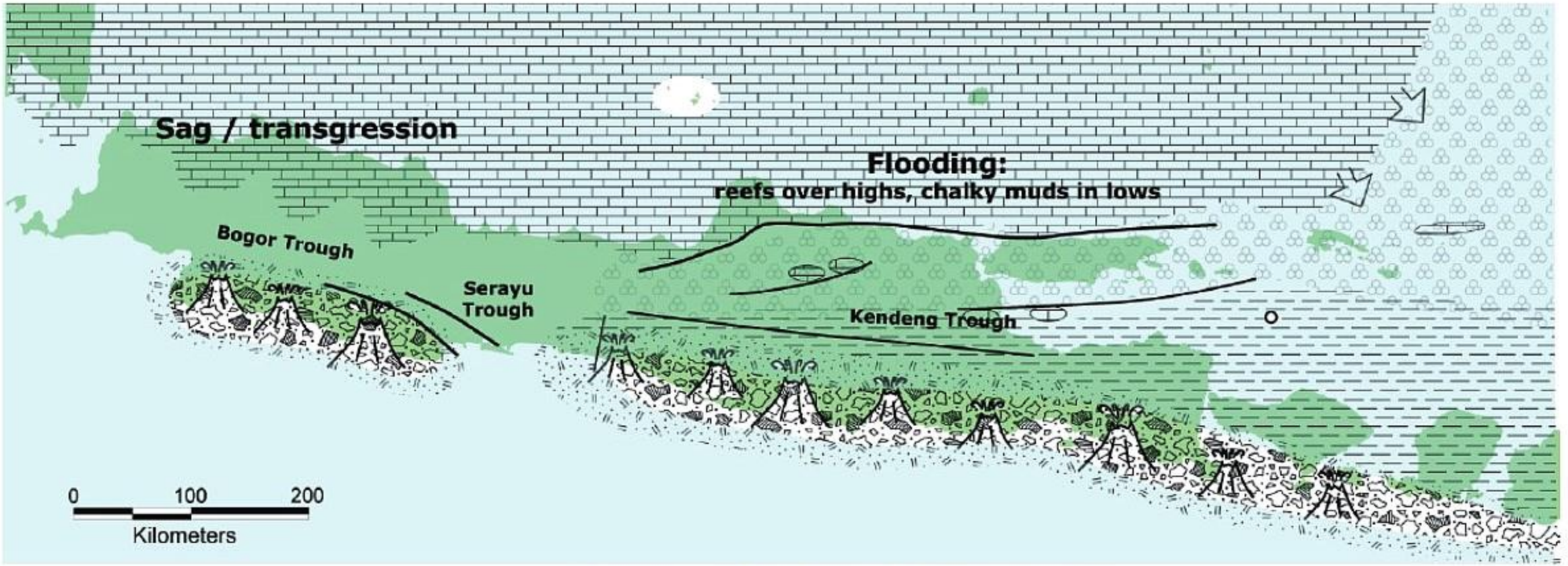
Palaeogeography in later Oligocene (J70) times. Onshore Java is typified by condensed sedimentation, although in the SW the Old Andesite volcaniclastics are beginning to source sediments. In the Java Sea to the north there is thick sedimentation in the lows, with a trend for increasingly marine sediments to the east.

Lunt (2013)



Paleogeography of East Java Basin during Paleogene

Satyana and Darwis (2001)



Palaeogeography in basal Miocene (J80) times.

Lunt (2013)

Batugamping Gelam
(eq. Kujung I)
Miosen Bawah,
P. Bawean

Awang Satyana (2015)

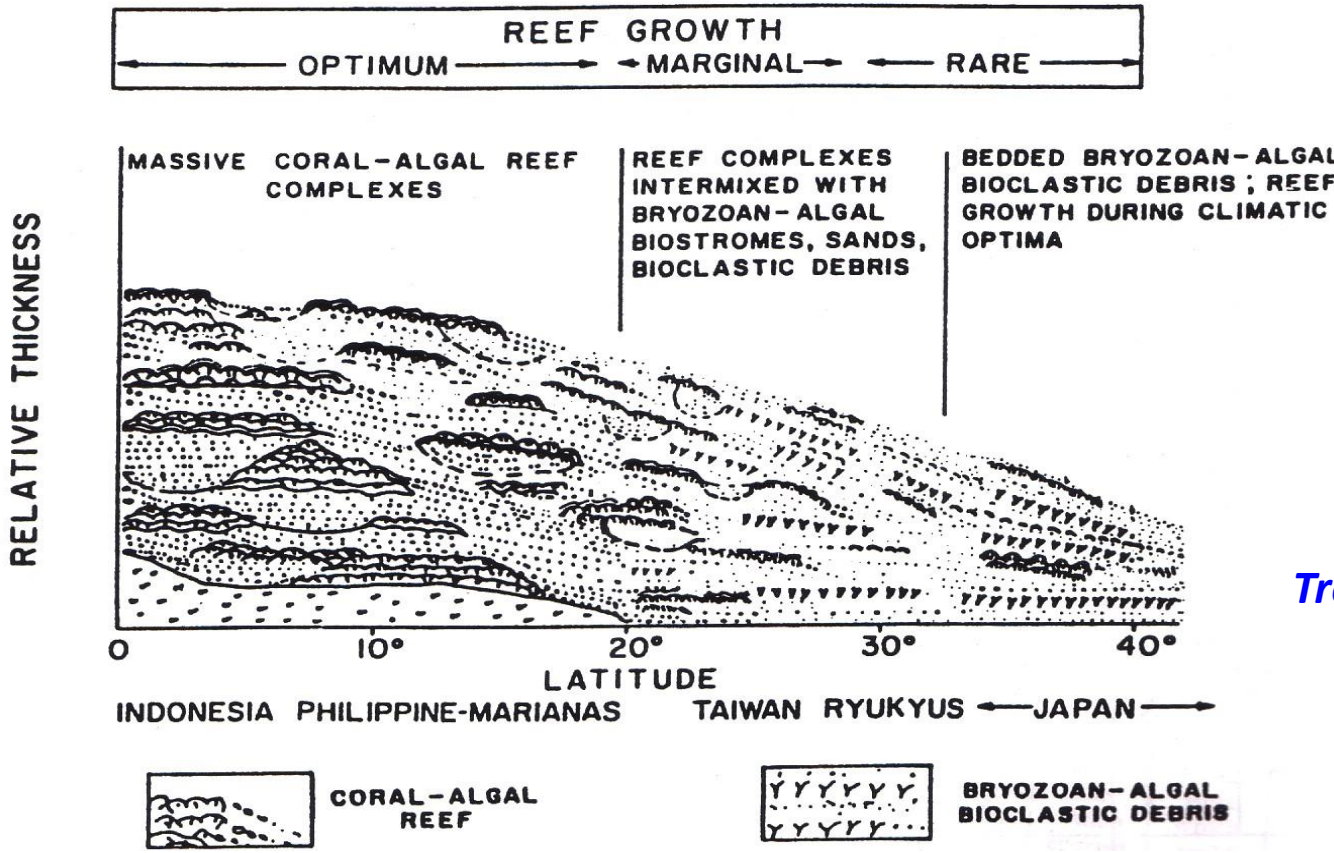
Batugamping Prupuh (Miosen Bawah)

Awang Satyana (2015)

Batugamping Prupuh (Miosen Bawah)

Shofiyuddin (2015)

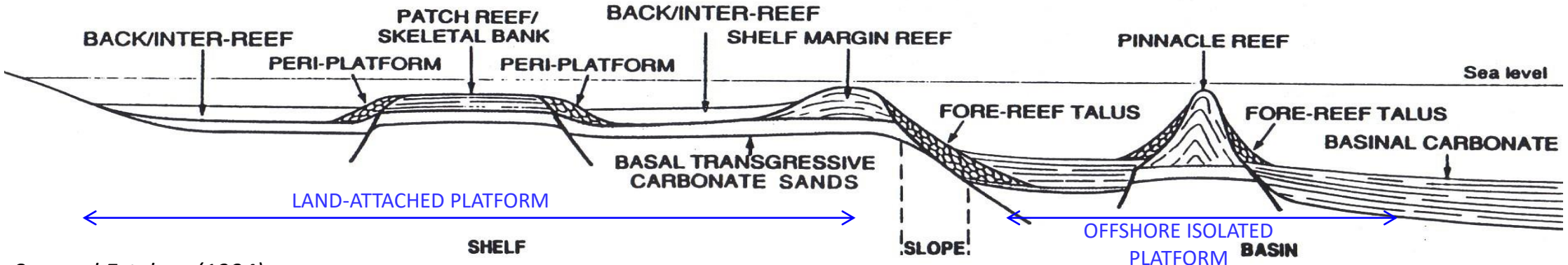
SE Asia Carbonate Facies



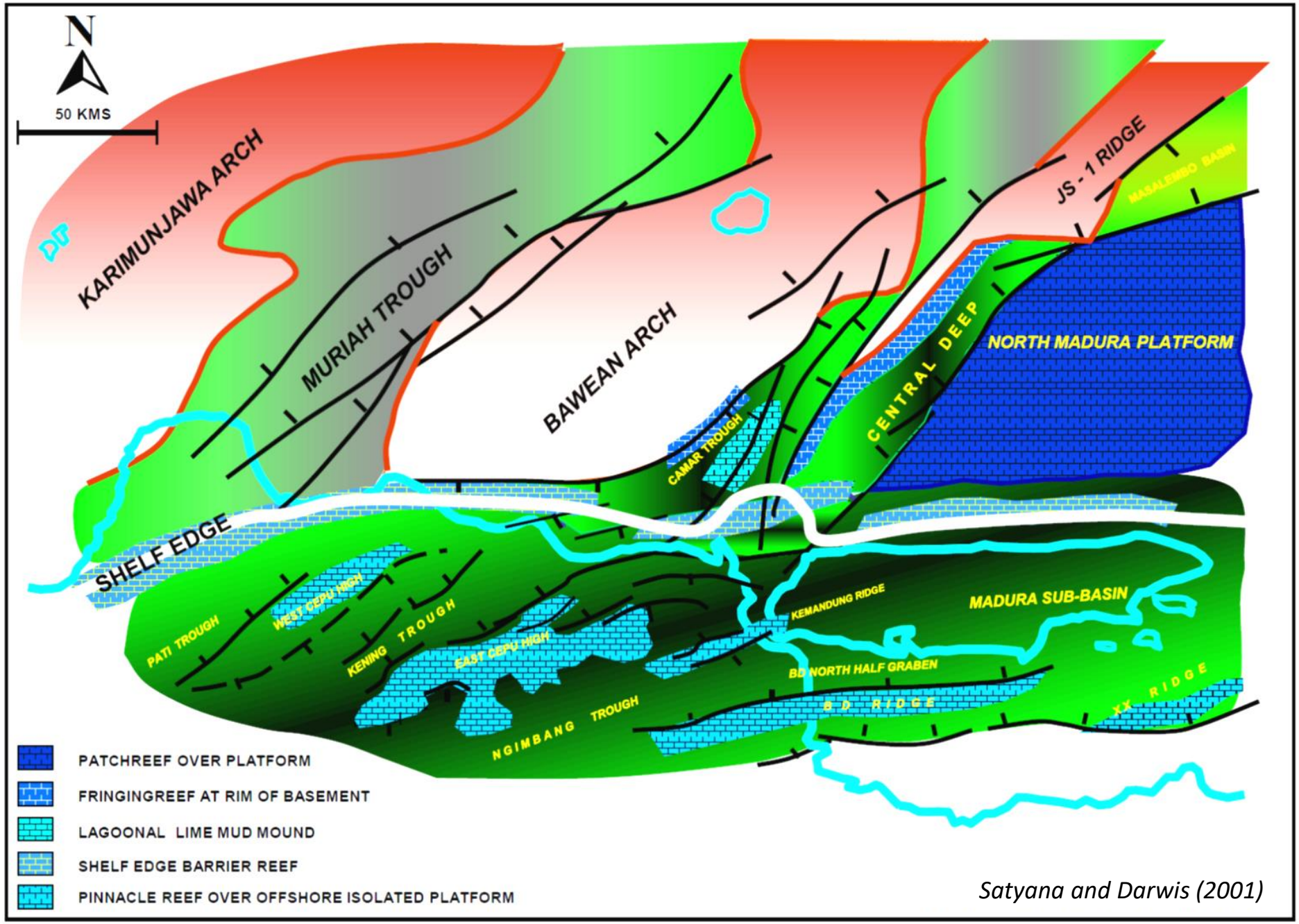
Tropical to temperate carbonate facies

Schlanger (1981)

Types of Oligo-Miocene carbonates

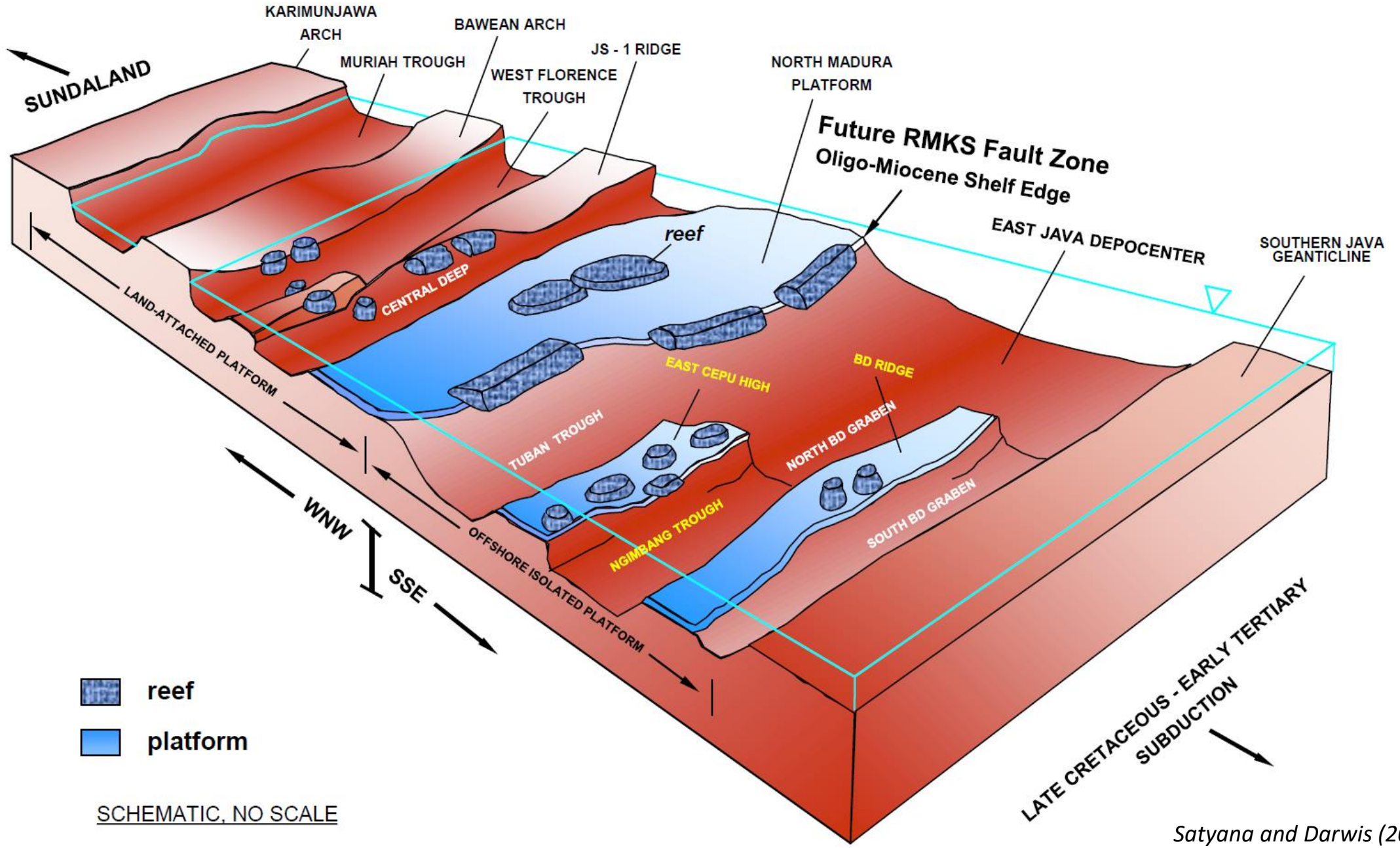


Sun and Esteban (1994)



Satyana and Darwis (2001)

Depositional Facies of the Oligo-Miocene Carbonates of the East Java Basin



Satyana and Darwis (2001)

Oligo-Miocene carbonate development on segmented East Java basement

Banyu Urip Field, onshore East Java

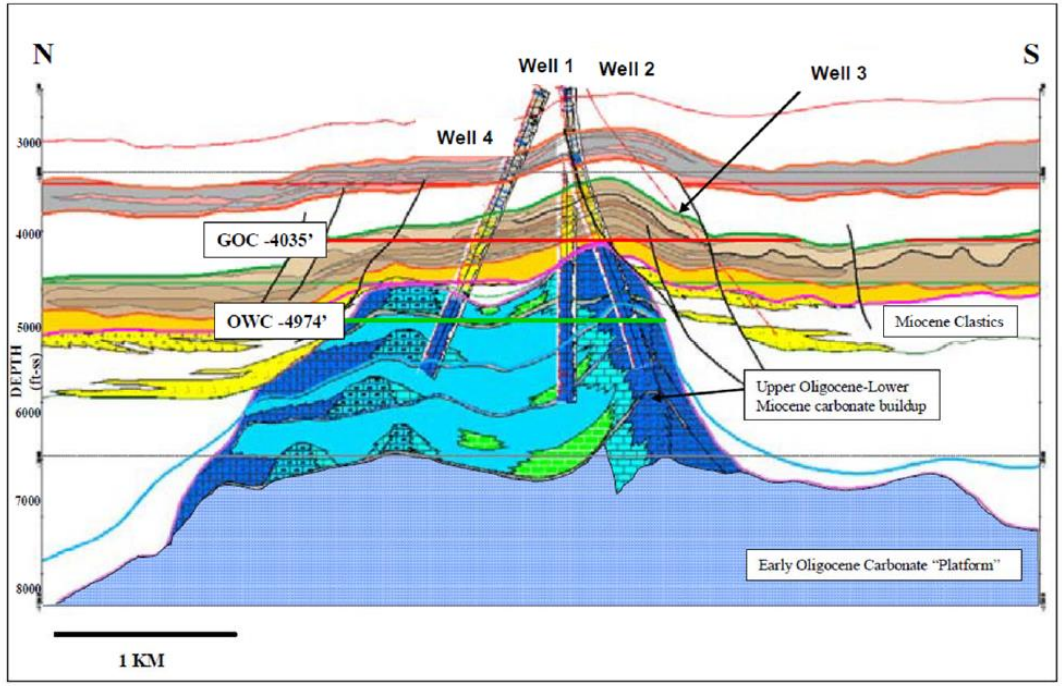
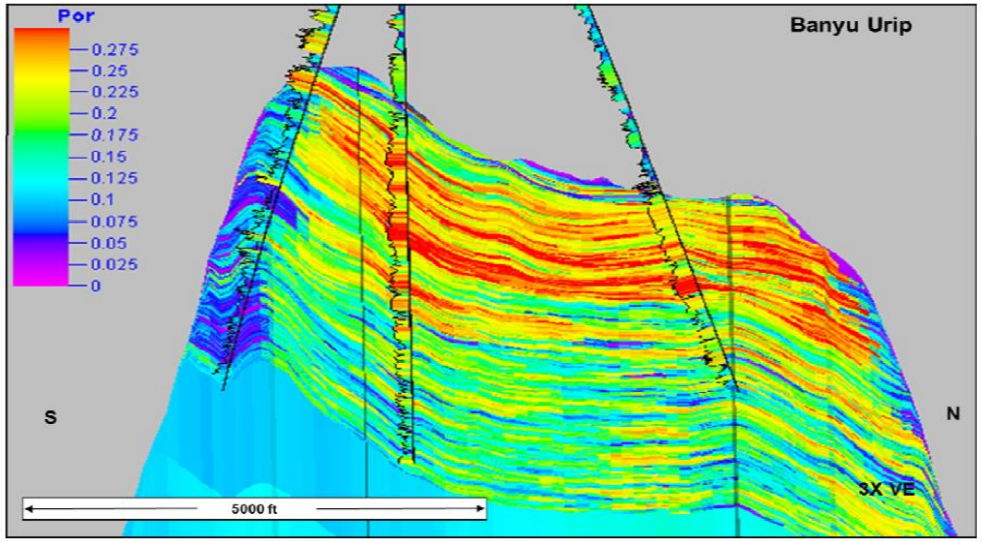
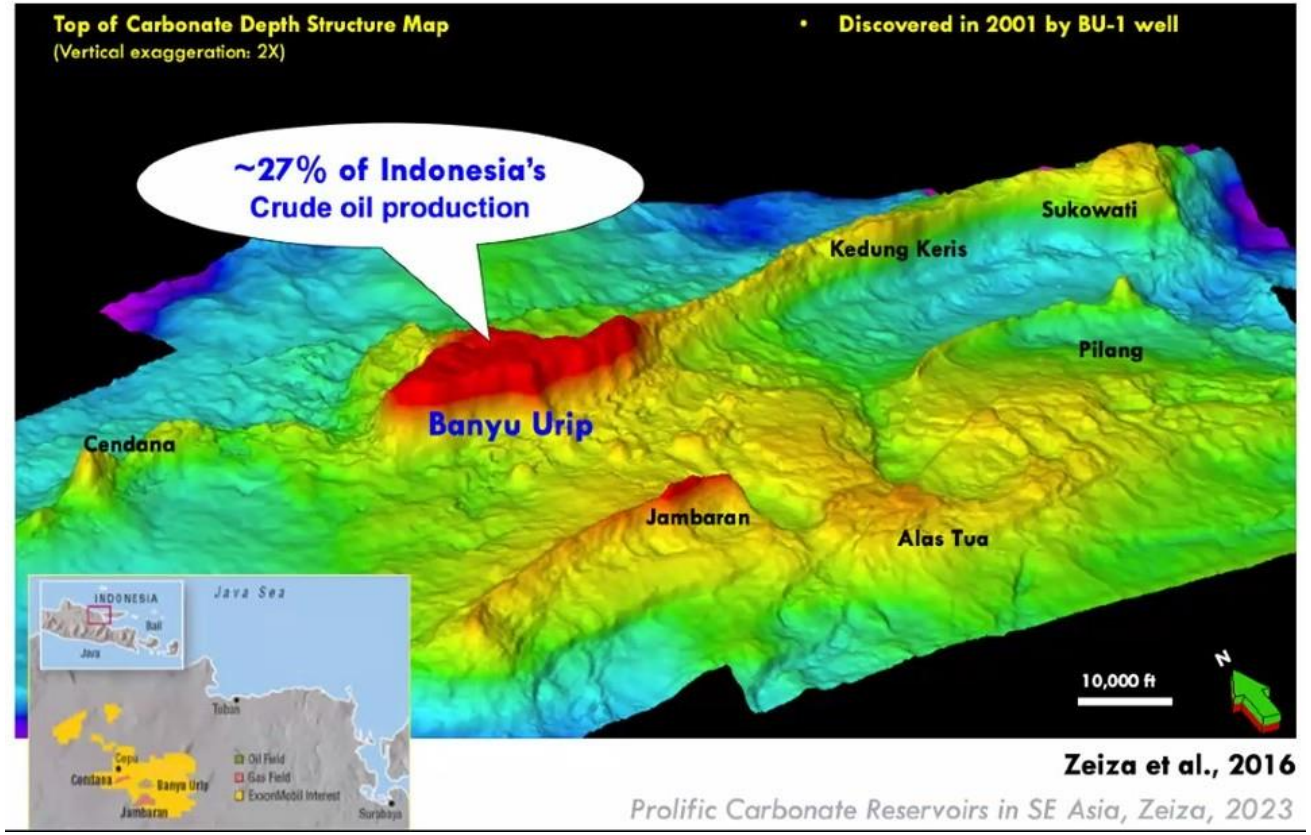


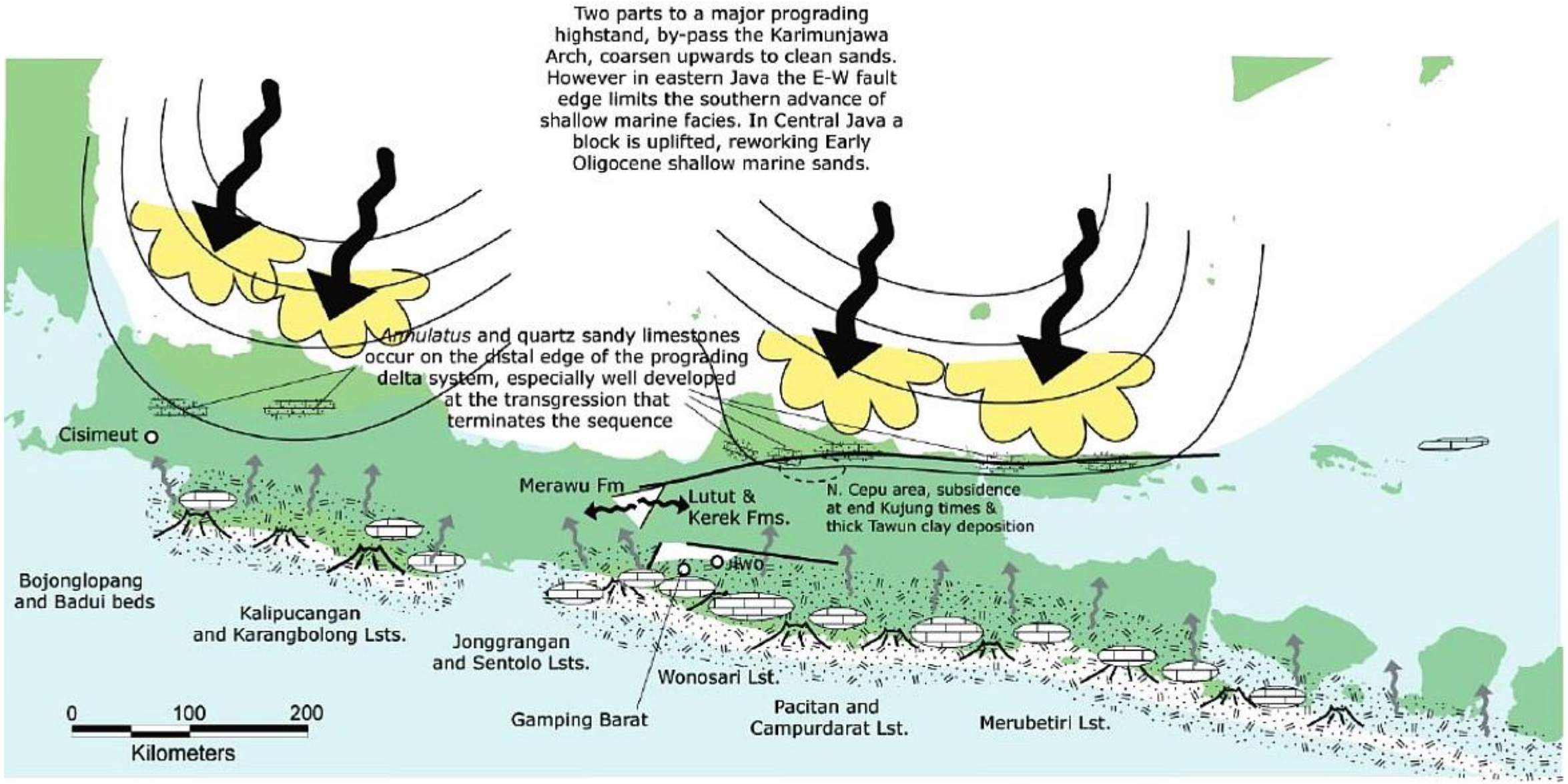
Figure 3 - North South Cross-section through Banyu Urip field showing carbonate and clastic hydrocarbon accumulations.



4 - South North Cross-section through Banyu Urip field porosity model showing vertical cycles and good lateral connectivity.

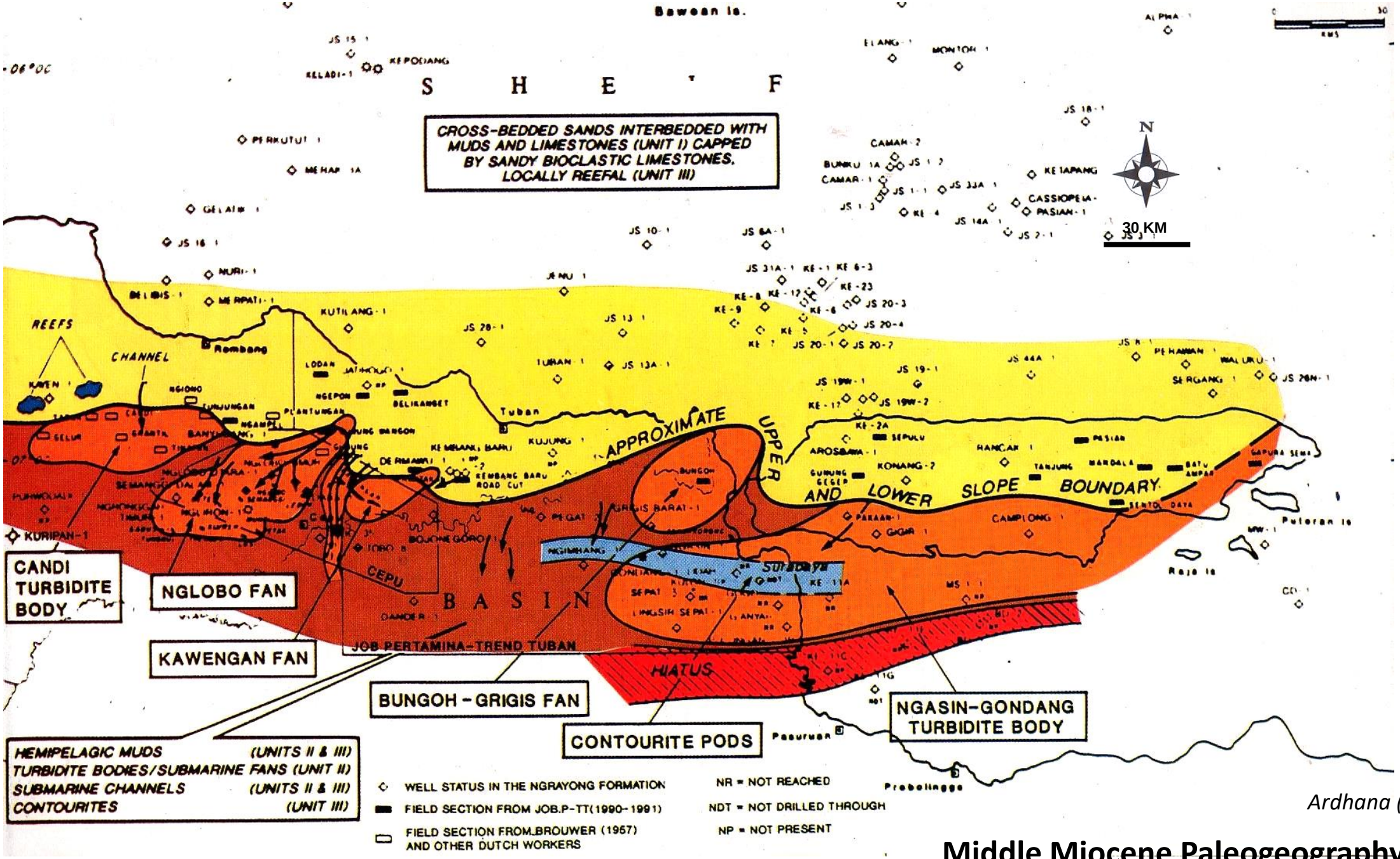


Musgrove & Sun (2012)



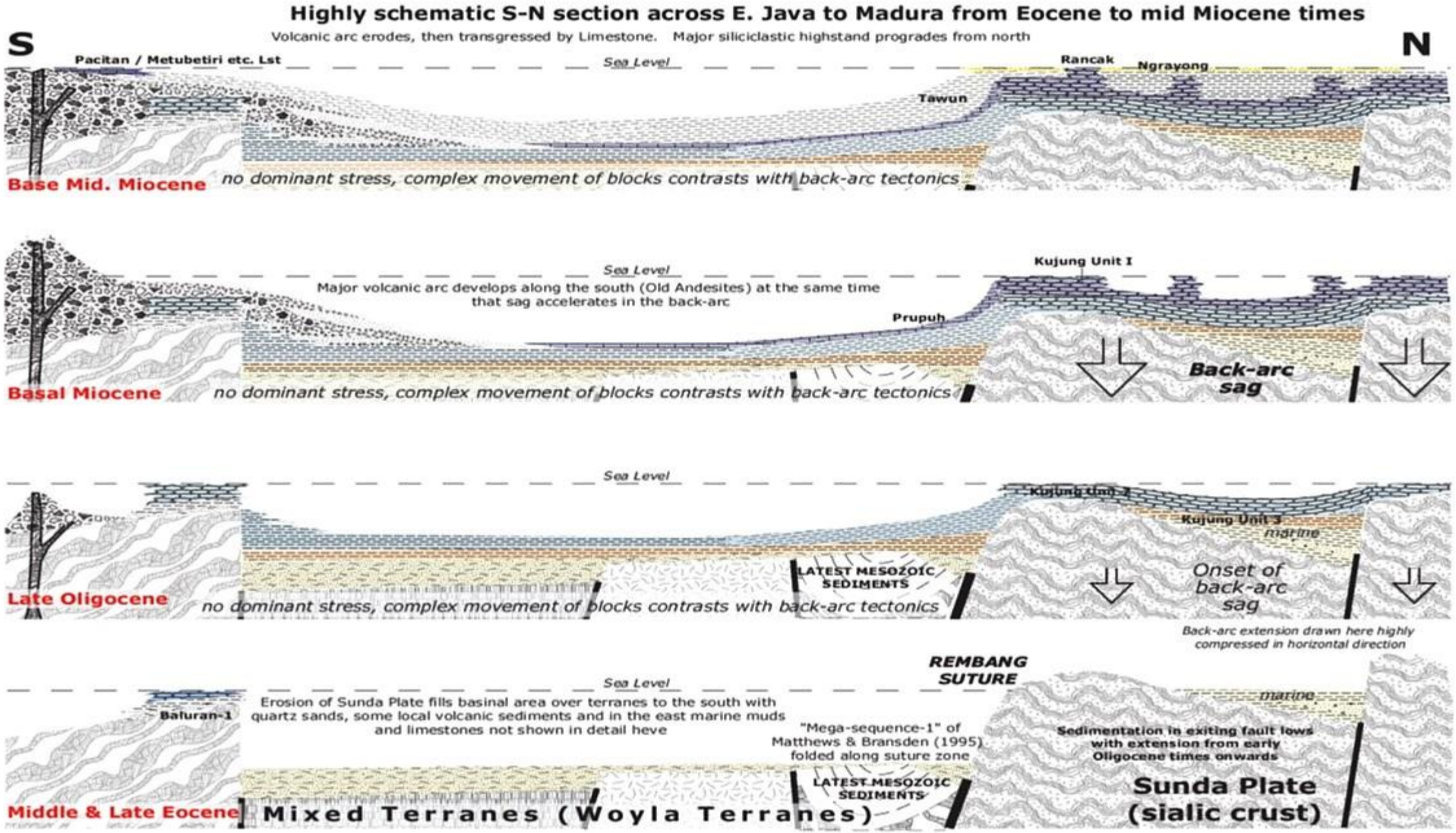
Palaeogeography in later Early to basal Middle Miocene (J90) times.

Lunt (2013)

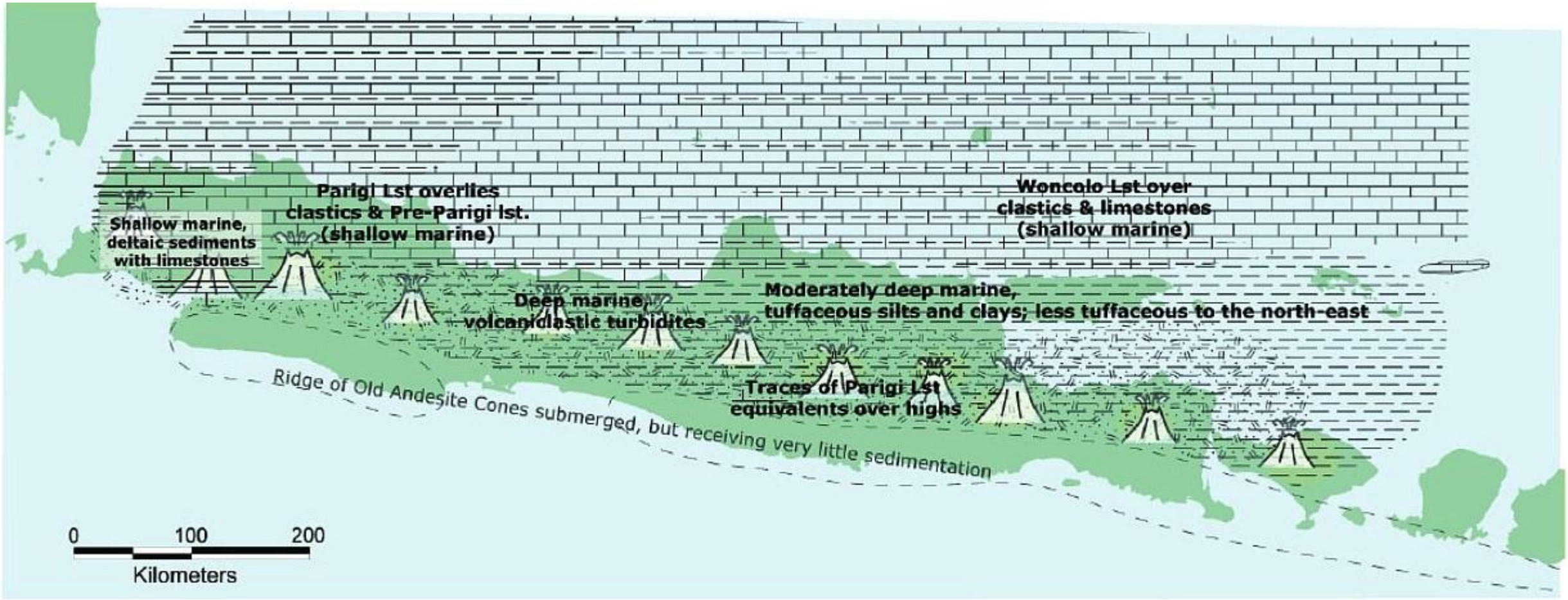


Ardhana (1993)

Middle Miocene Paleogeography


Highly schematic S-N section across E. Java to Madura from Eocene to mid Miocene times
Volcanic arc erodes, then transgressed by Limestone. Major siliciclastic highstand progrades from north
S
N
Pacitan / Metubetiri etc. Lst
Sea Level
Rancak
Ngrayong
Tawun
Base Mid. Miocene
no dominant stress, complex movement of blocks contrasts with back-arc tectonics
Sea Level
Major volcanic arc develops along the south (Old Andesites) at the same time that sag accelerates in the back-arc
Kujung Unit I
Prupuh
Basal Miocene
no dominant stress, complex movement of blocks contrasts with back-arc tectonics
Back-arc sag
Sea Level
Kujung Unit 2
Kujung Unit 3
marine
LATEST MESOZOIC SEDIMENTS
Late Oligocene
no dominant stress, complex movement of blocks contrasts with back-arc tectonics
Onset of back-arc sag
Back-arc extension drawn here highly compressed in horizontal direction
REMBANG SUTURE
Sea Level
Baturan-1
Erosion of Sunda Plate fills basinal area over terranes to the south with quartz sands, some local volcanic sediments and in the east marine muds and limestones not shown in detail heve
"Mega-sequence-1" of Matthews & Bransden (1995) folded along suture zone
marine
Sedimentation in exiting fault lows with extension from early Oligocene times onwards
LATEST MESOZOIC SEDIMENTS
Middle & Late Eocene
Mixed Terranes (Woyla Terranes)
Sunda Plate (sialic crust)

Lunt (2013)



Palaeogeography in basal late Miocene (J100) times.

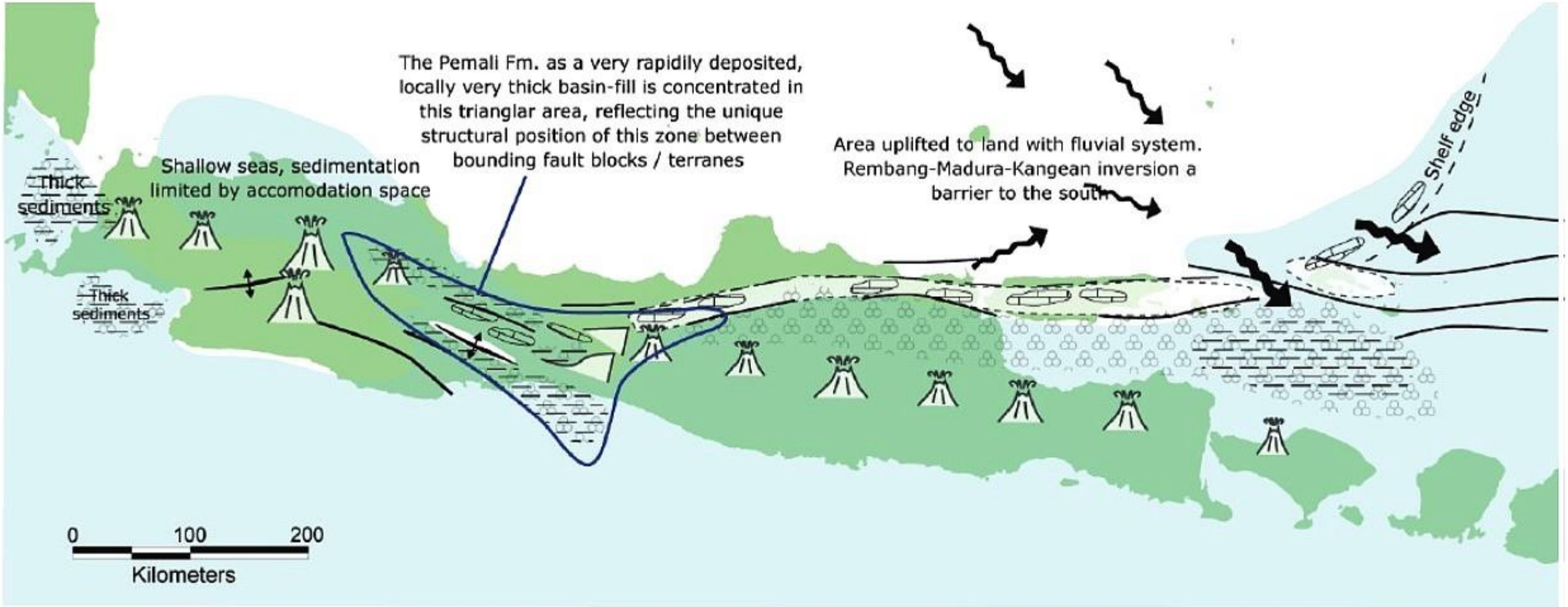
Lunt (2013)

Napal & Batugamping Wonocolo (Miosen Atas)

Shofiyuddin (2015)

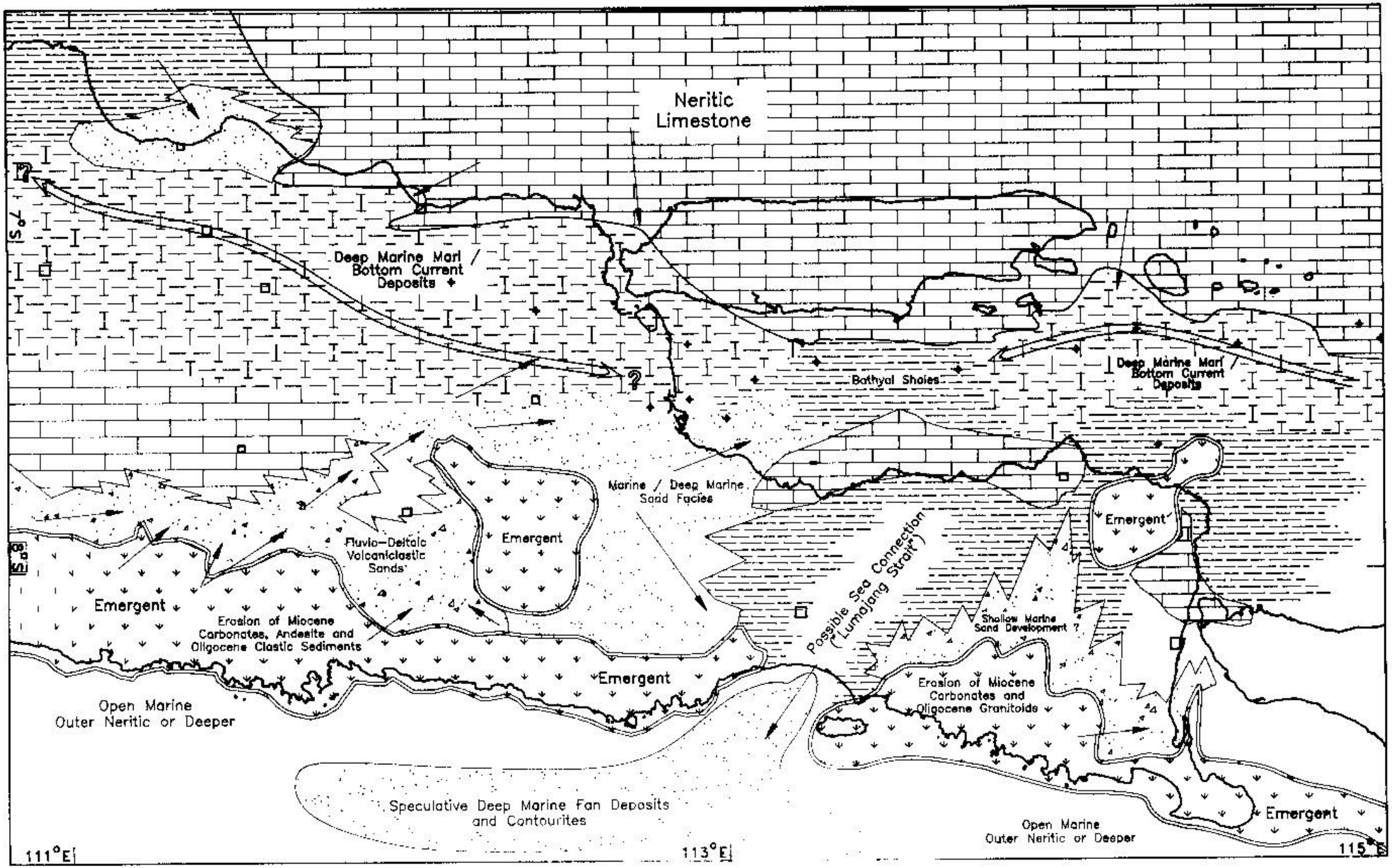
Napal Wonocolo (Miosen Atas)

Shofiyuddin (2015)



Palaeogeography in later Late Miocene (J110) times.

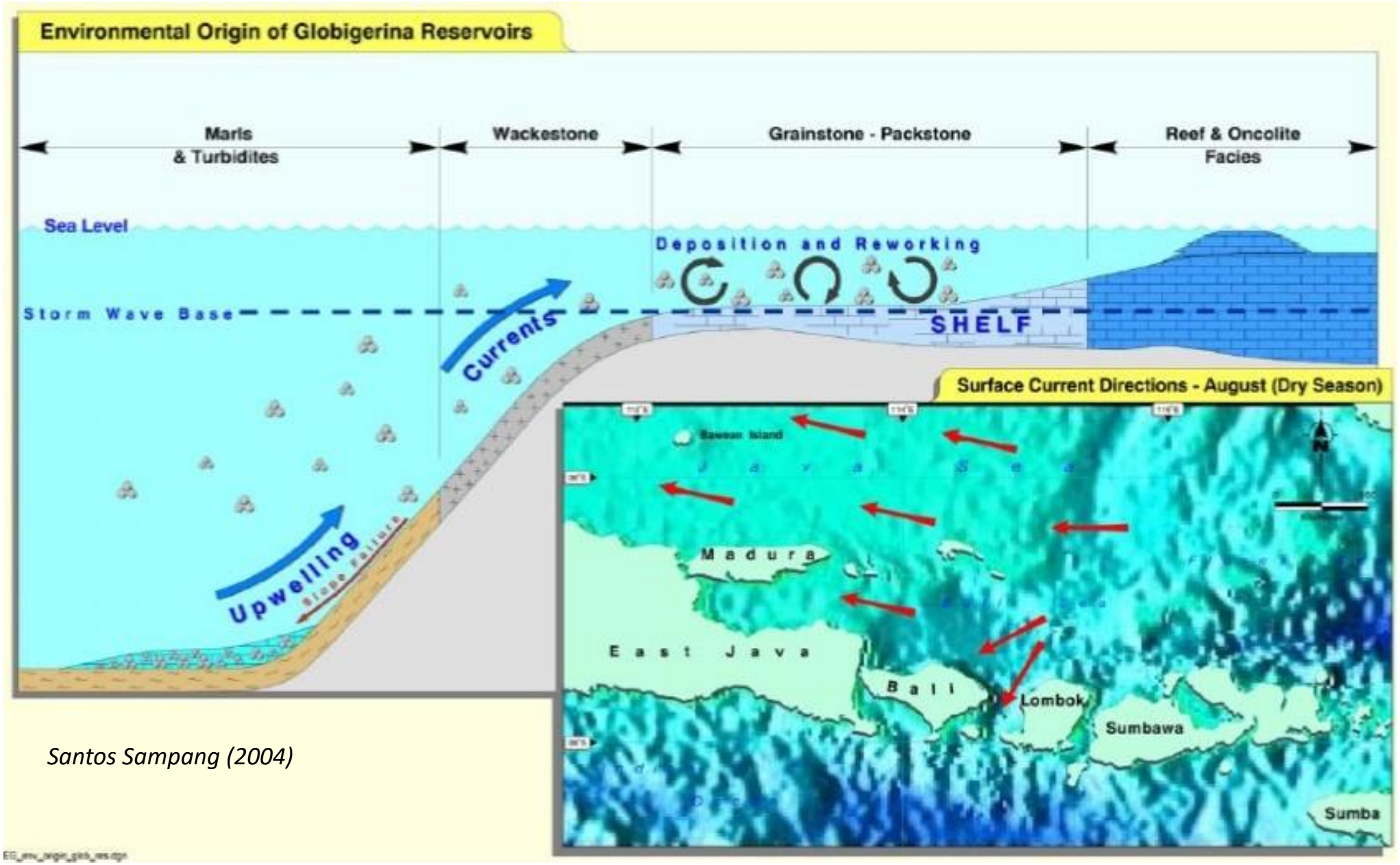
Lunt (2013)



Early Pliocene Paleogeography

Schiller et al. (1994)

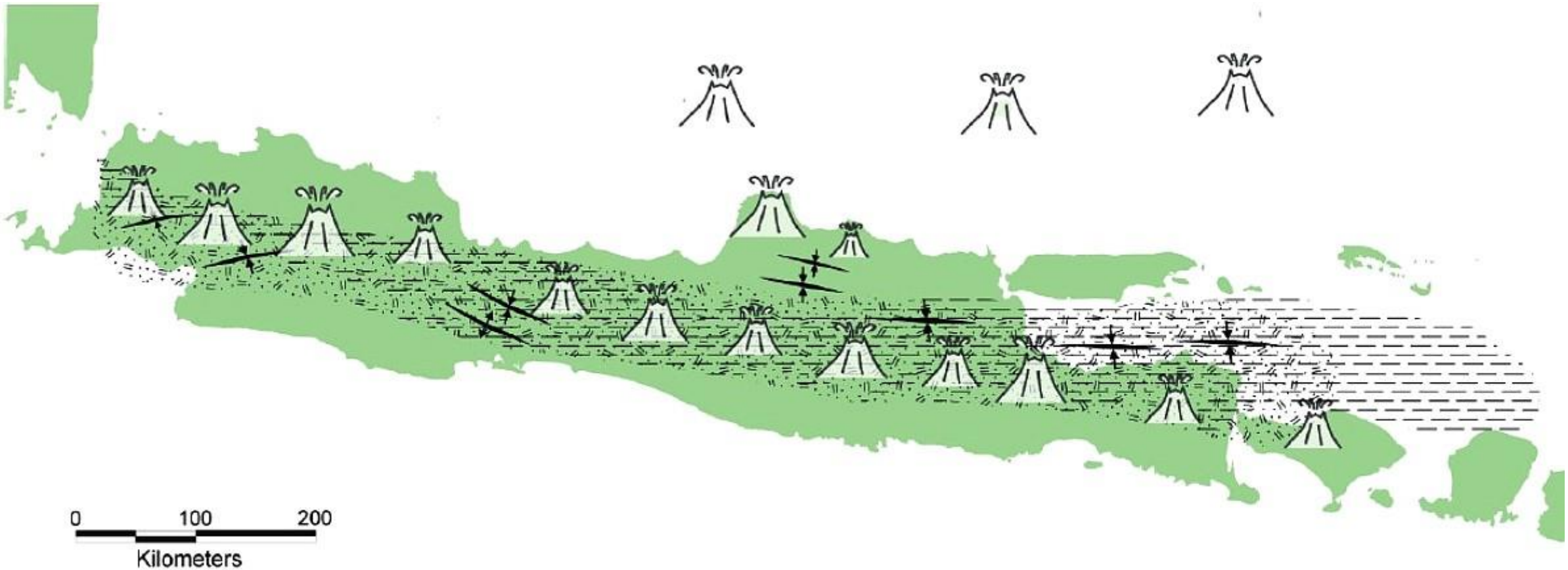
Mundu Formation Reservoir Depositional Processes



Santos Sampang (2004)

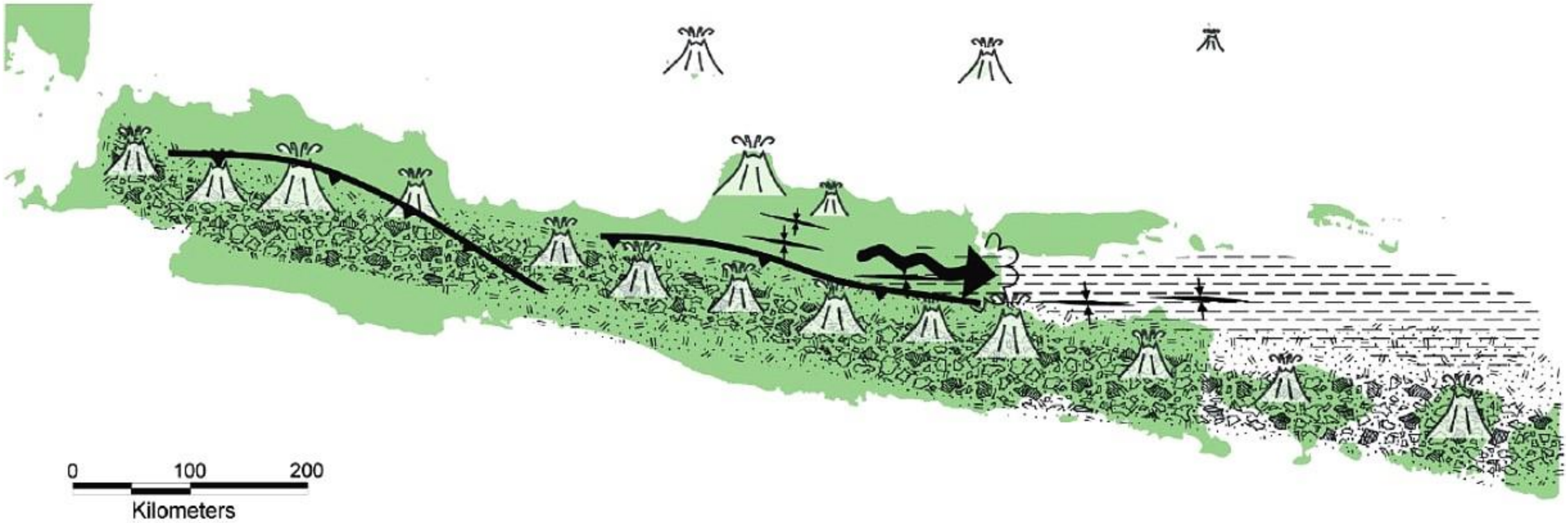
Batugamping Paciran (Pliosen Bawah)

Shofiyuddin (2015)



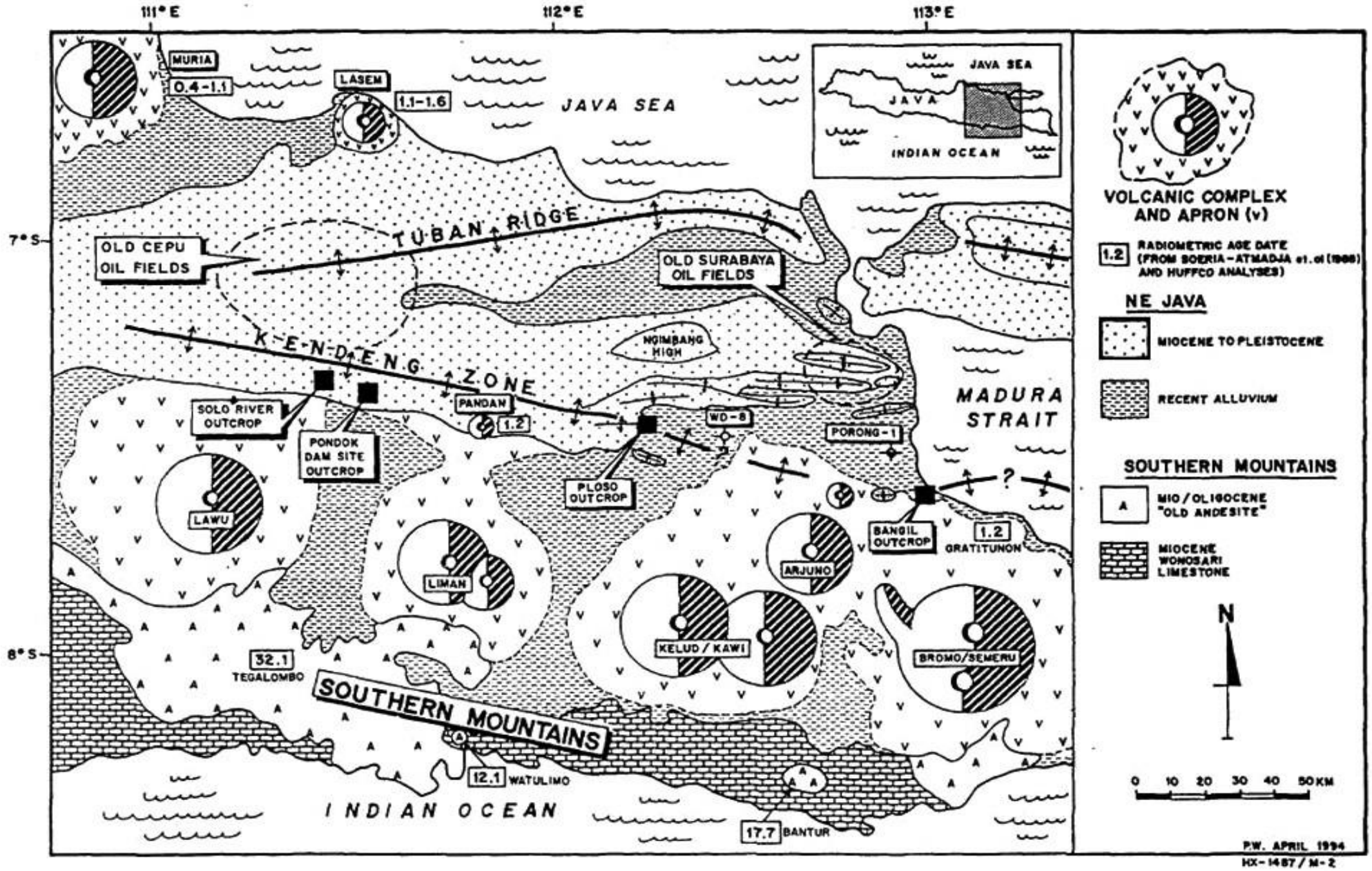
Palaeogeography in mid Pliocene (J120) times.

Lunt (2013)



Palaeogeography in Pleistocene times.

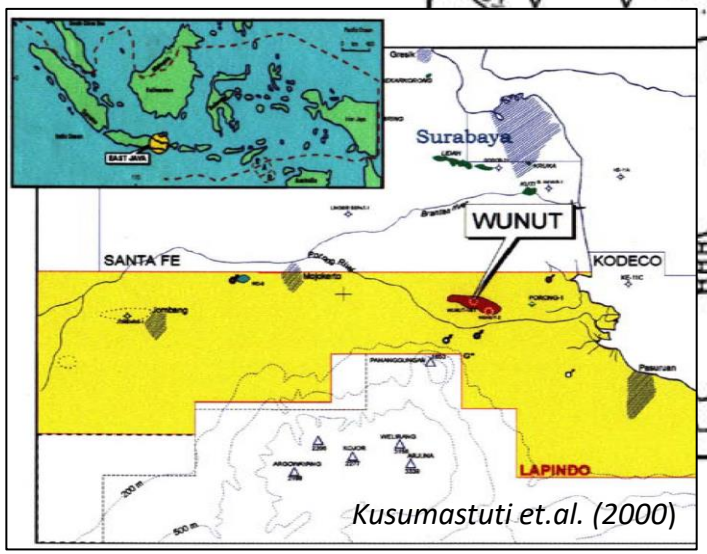
Lunt (2013)



Pleistocene Paleogeography

Willumsen and Schiller (1994)

Pleistocene volcaniclastic objective

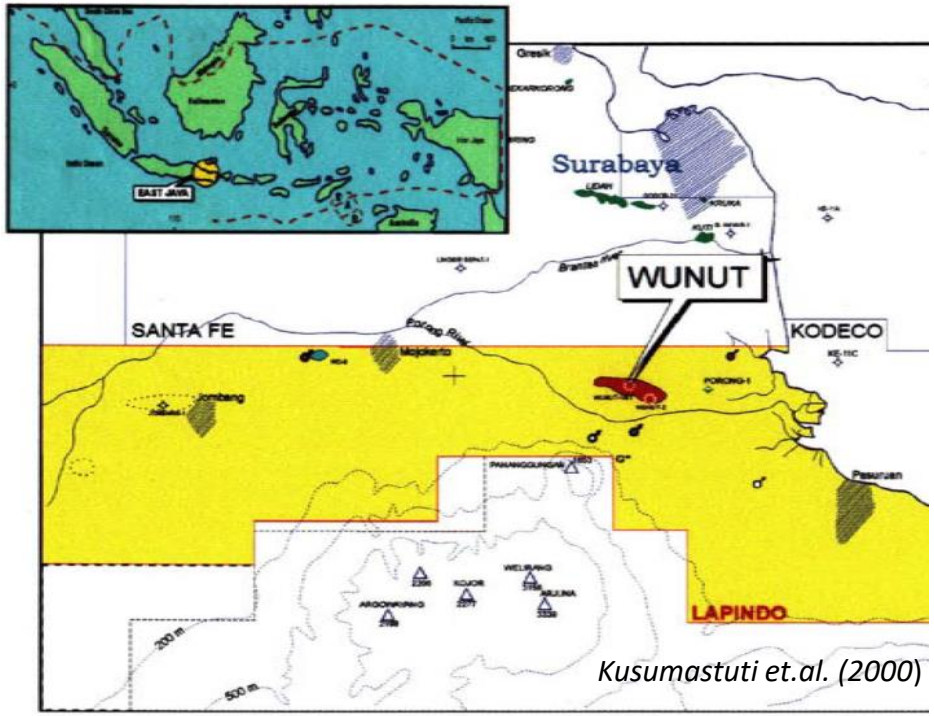


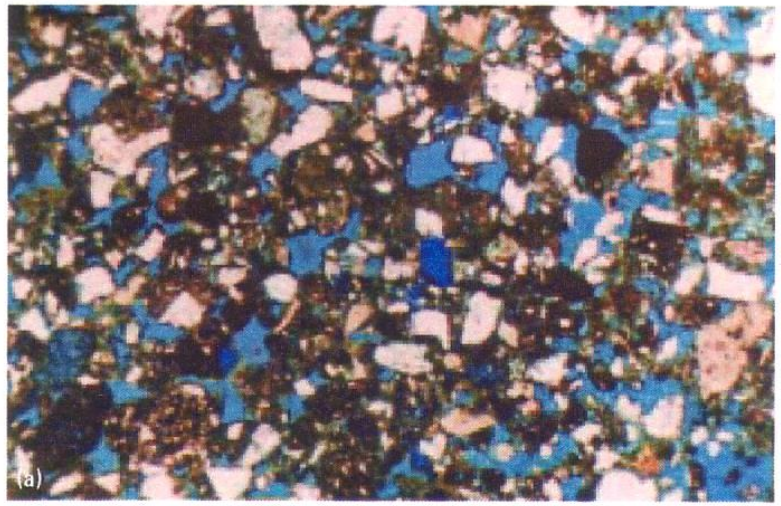
Kusumastuti et.al. (2000)

Pleistocene Paleogeography

Willumsen and Schiller (1994)

Pleistocene volcaniclastic objective





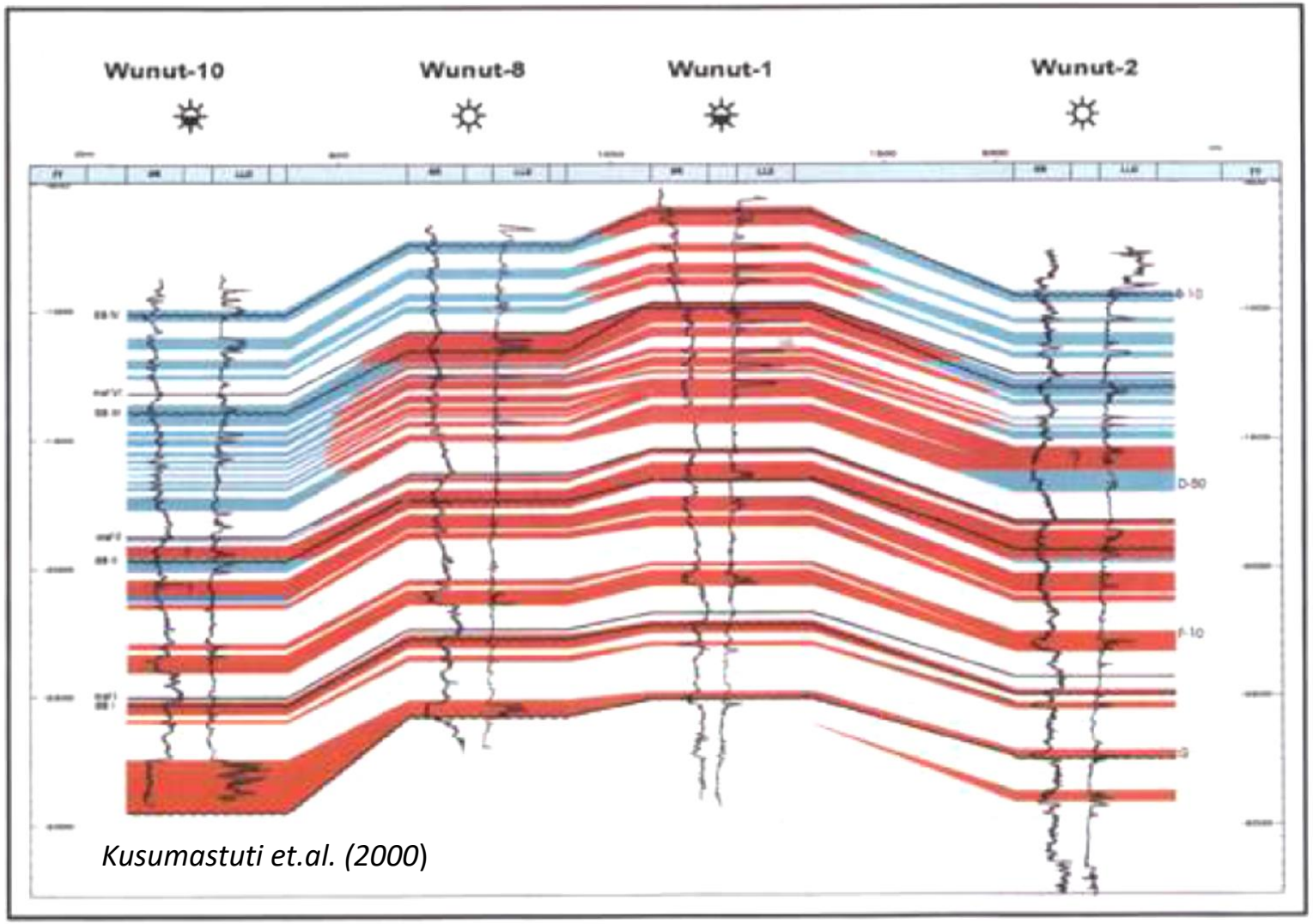
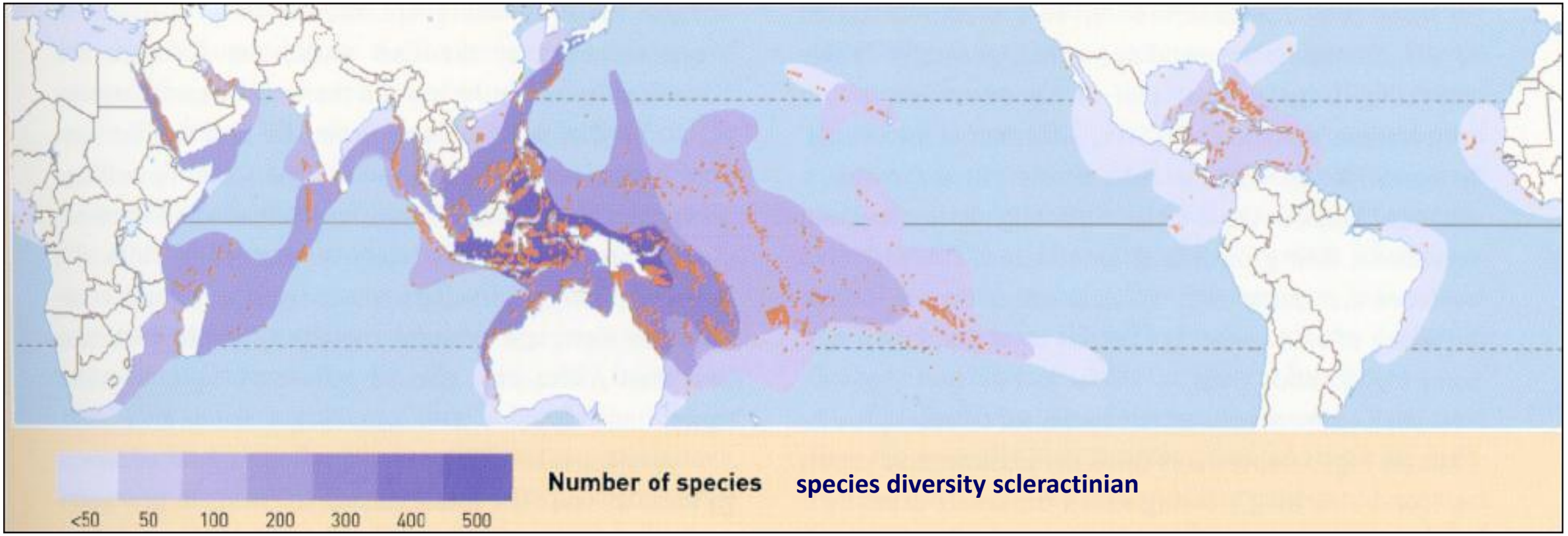


Figure 28a: Pleistocene volcaniclastic sands. This volcaniclastic sandstone reservoir in the Wunut gas field, onshore Java, is characterized by excellent intergranular and dissolution porosity after feldspar (photo courtesy of Lapindo).

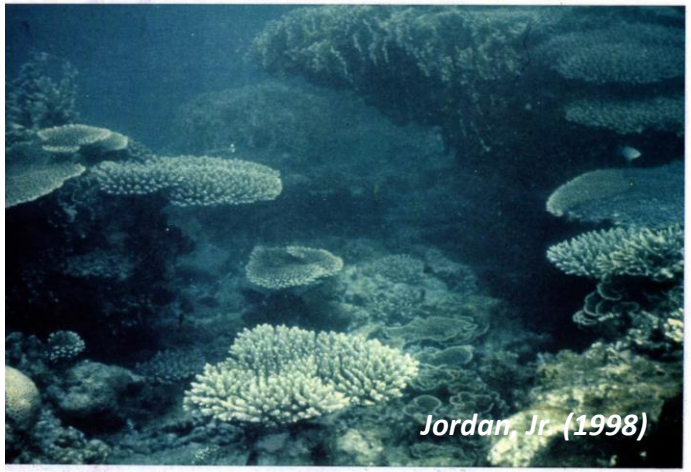
Netherwood (2000)


Lepas Pantai P. Bawean
Hade Maulin (2015)

SE Asia Carbonate Sedimentation: the Global Context



- Largest modern equatorial carbonate province
- Excellent Cenozoic record
- 50% hydrocarbon reservoirs

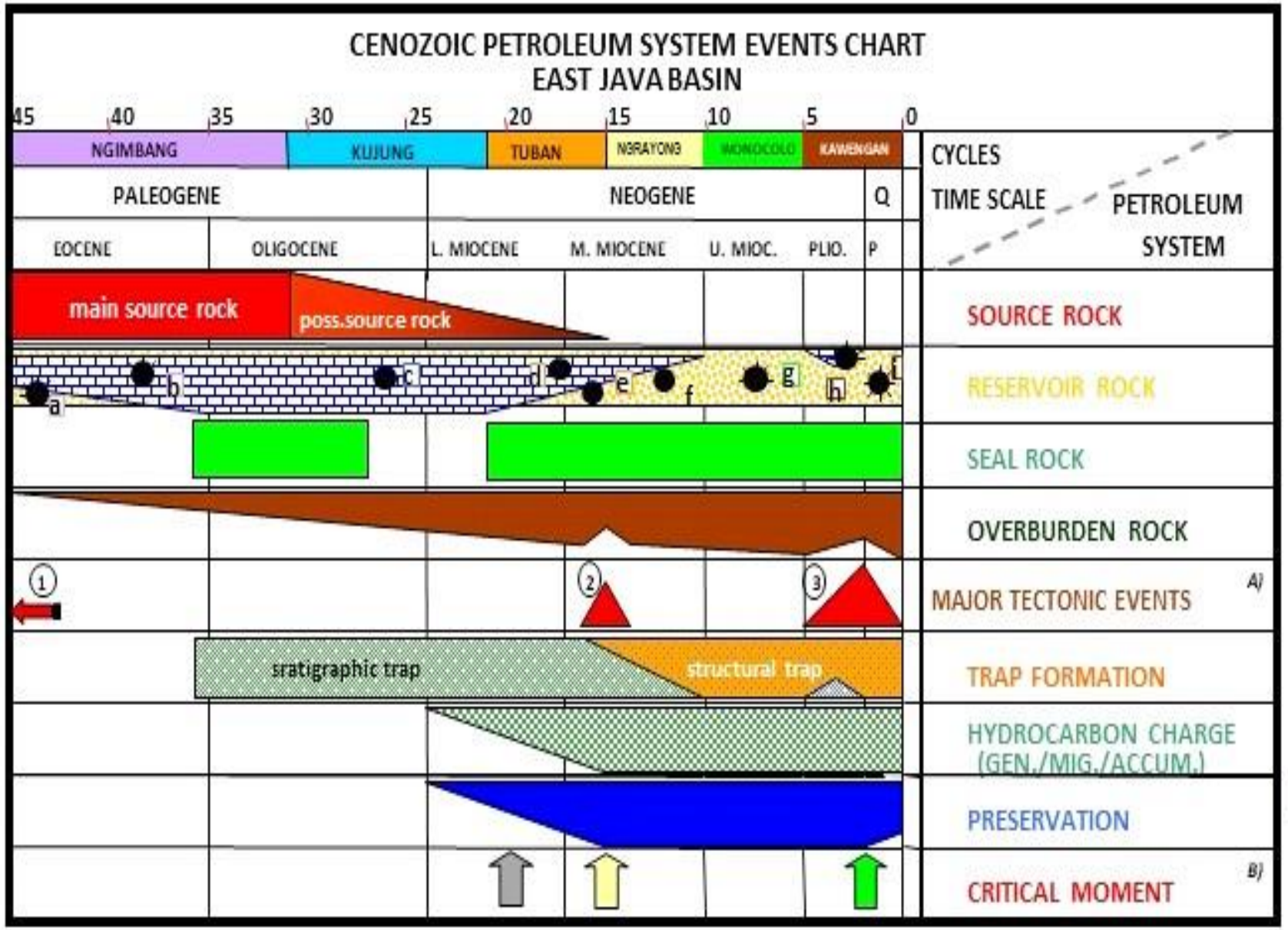


Wilson (2006)

Diskusi

1. Jawa Timur Cekungan Migas
2. Syarat Akumulasi Migas: Sistem Petroleum
3. Evolusi Cekungan Jawa Timur
4. Paleogeografi dan Sedimentasi
5. **Kejadian Akumulasi Migas di Cekungan Jawa Timur**
6. Sedimentasi dan Potensi Migas Cekungan Jawa Timur

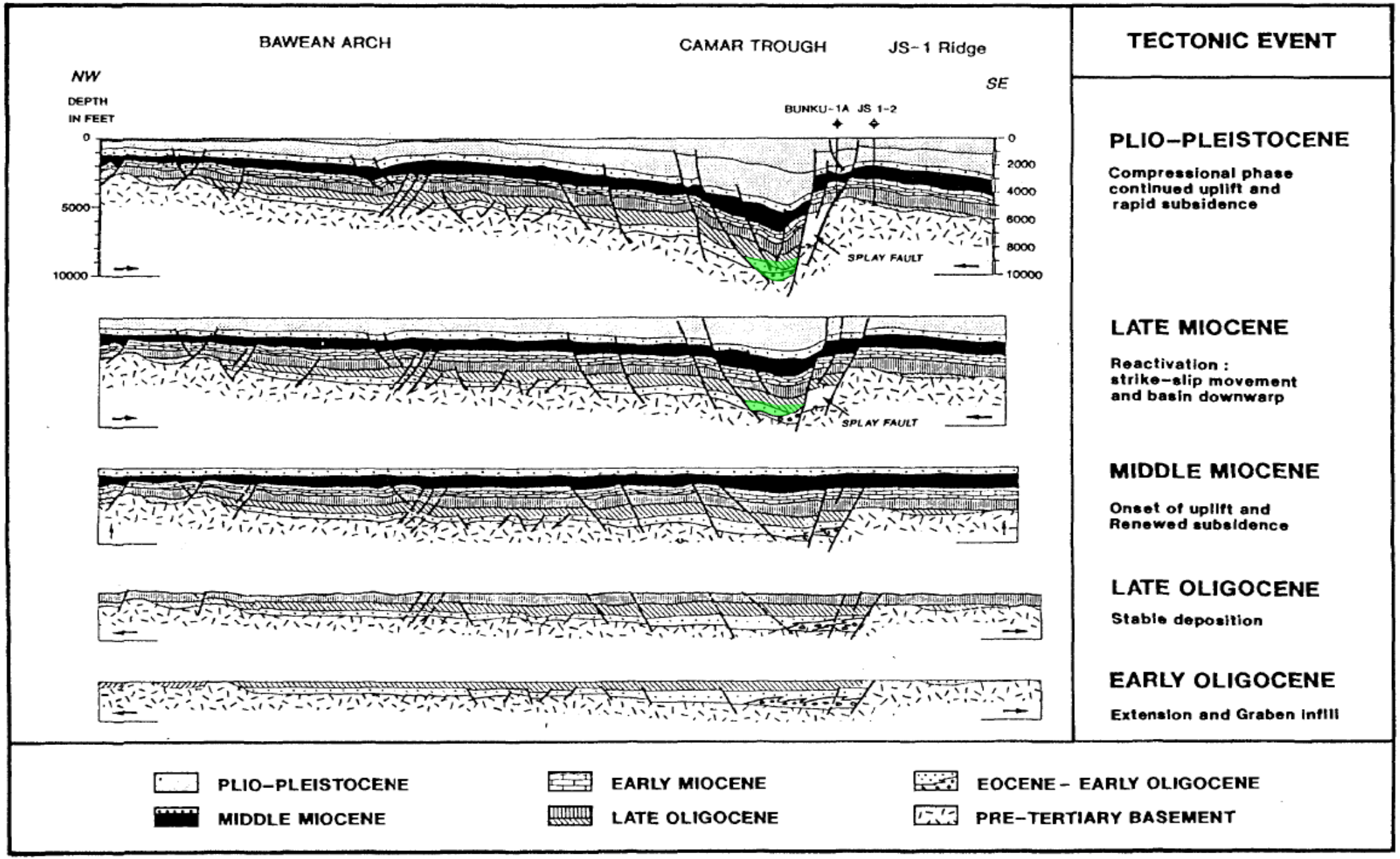
Tertiary Petroleum System Events Chart



HYDROCARBON OCCURRENCES :

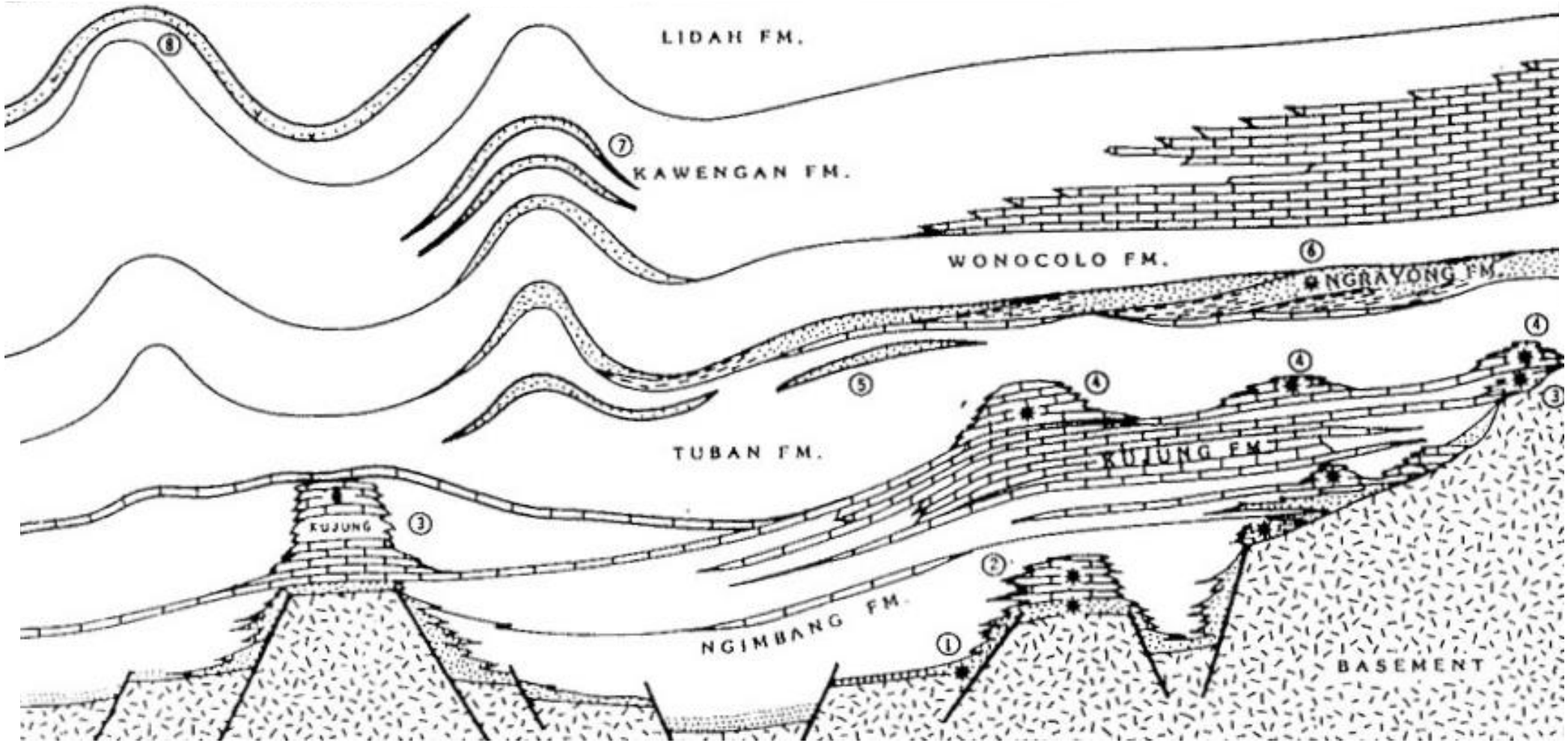
- a — KE 6-3 (2072 BOPD), KUJUNG-1 (OIL SCUM + MINOR JS 14a-1 GAS), (16.5 MMFCD)
- b — KE-7 (1837 BOPD), KE6-3 (1631 BOPD), JS 53-A1 (1522 BOPD+ GAS)
- c — JS 19W-1(2882 BOPD), JS 20-1 (2330 BOPD), CAMAR-1 TO 3 (3037-980 BOPD)
- d — MUDI FIELD, KE-2A (4627 BOPD)
- e — FIELDS : TAWUN (40 MBO), GEGUNUNG (415 MBO), LERPAC, MANDALA, KERTEGENEH, ETC.
- f — FIELDS : KAWENGAN (95 MMBO), SEKARKORONG (60 MBO), NGLOBO, SEMANGGI, BANYUBANG, ETC.
- g — FIELDS : BANYUASIN (660 MBO), KAWENGAN, NGLOBO, SEMANGGI.
- h — FIELDS : LIDAH (16.2 MMBO), BOGOMIRING (60 MBO), METATU (340 MBO).
- i — WUNUT-1 (8.9 MMFCD), KUTI FIELD (700 MBO), METATU FIELD (340 MBO).

JOB Pertamina-Petrochina Tuban



sections after Manur & Barraclough (1994)

S — *surface* — N



1.NGIMBANG CLASTICS (SURU,LANGOR,MELATEN)
2.NGIMBANG CARBONATES (LANGOR,BUNGOH)
3.KUJUNG II CARBONATES (BLIMBING,SUMBER,SALE)
4.KUJUNG I CARBONATES (GRESIK,MUDI,SUKOWATI,SAWO)
5.TUBAN CLASTICS (LEBOYO,SOUTH BUNGOH)
6.NGRAYONG CLASTICS AND CARBONATES (GRIGIS BARU,LEBOYO, SOUTH BUNGOH)
7.KAWENGAN CLASTICS (SOUTHERN STRUCTURES)
8.LIDAH VOLCANICLASTICS

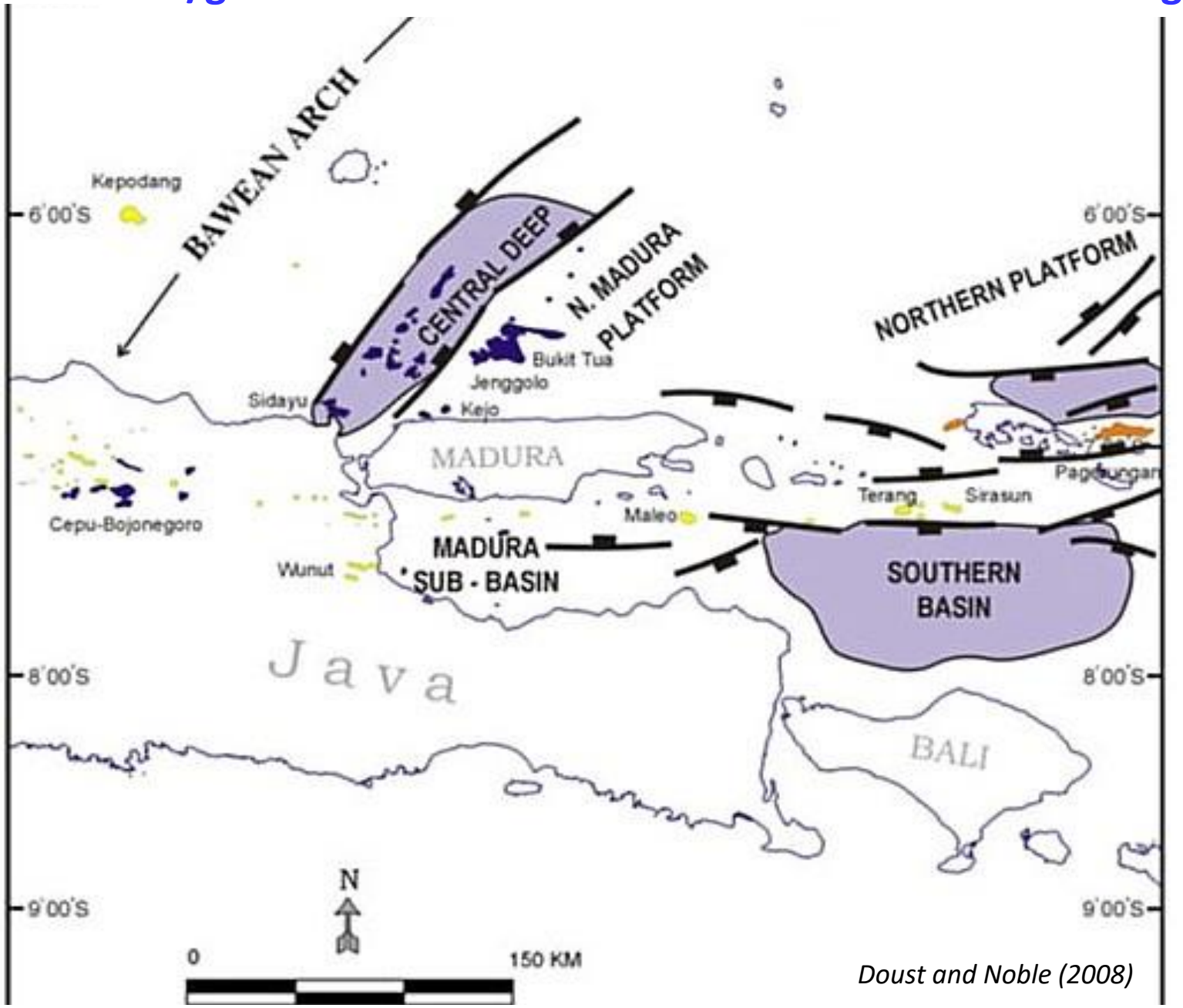
NORTHEAST JAVA BASIN
PLAY TYPES

Pertamina & Trend Energy (1991)

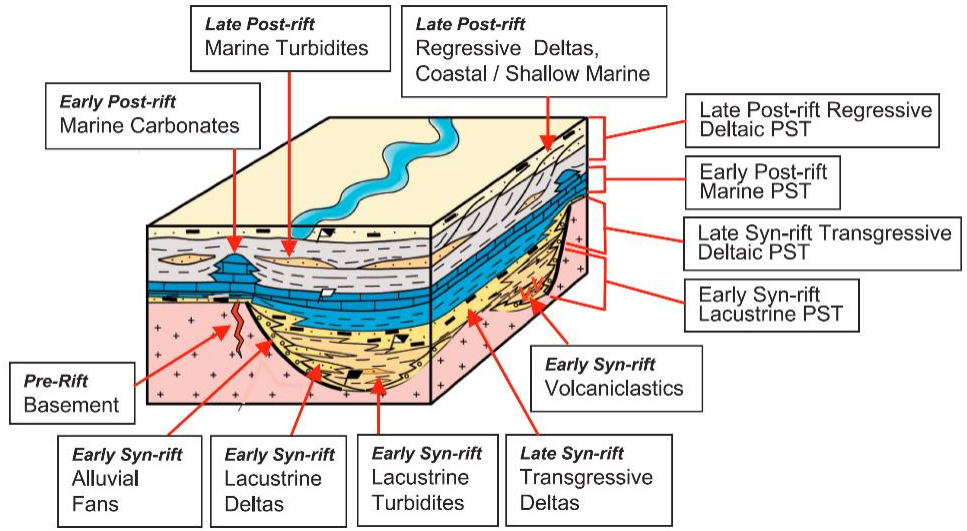
Diskusi

1. Jawa Timur Cekungan Migas
2. Syarat Akumulasi Migas: Sistem Petroleum
3. Evolusi Cekungan Jawa Timur
4. Paleogeografi dan Sedimentasi
5. Kejadian Akumulasi Migas di Cekungan Jawa Timur
6. **Sedimentasi dan Potensi Migas Cekungan Jawa Timur**

Oil/gas fields of East Java Basin based on tectono-stratigraphic settings of their reservoirs



Doust and Noble (2008)



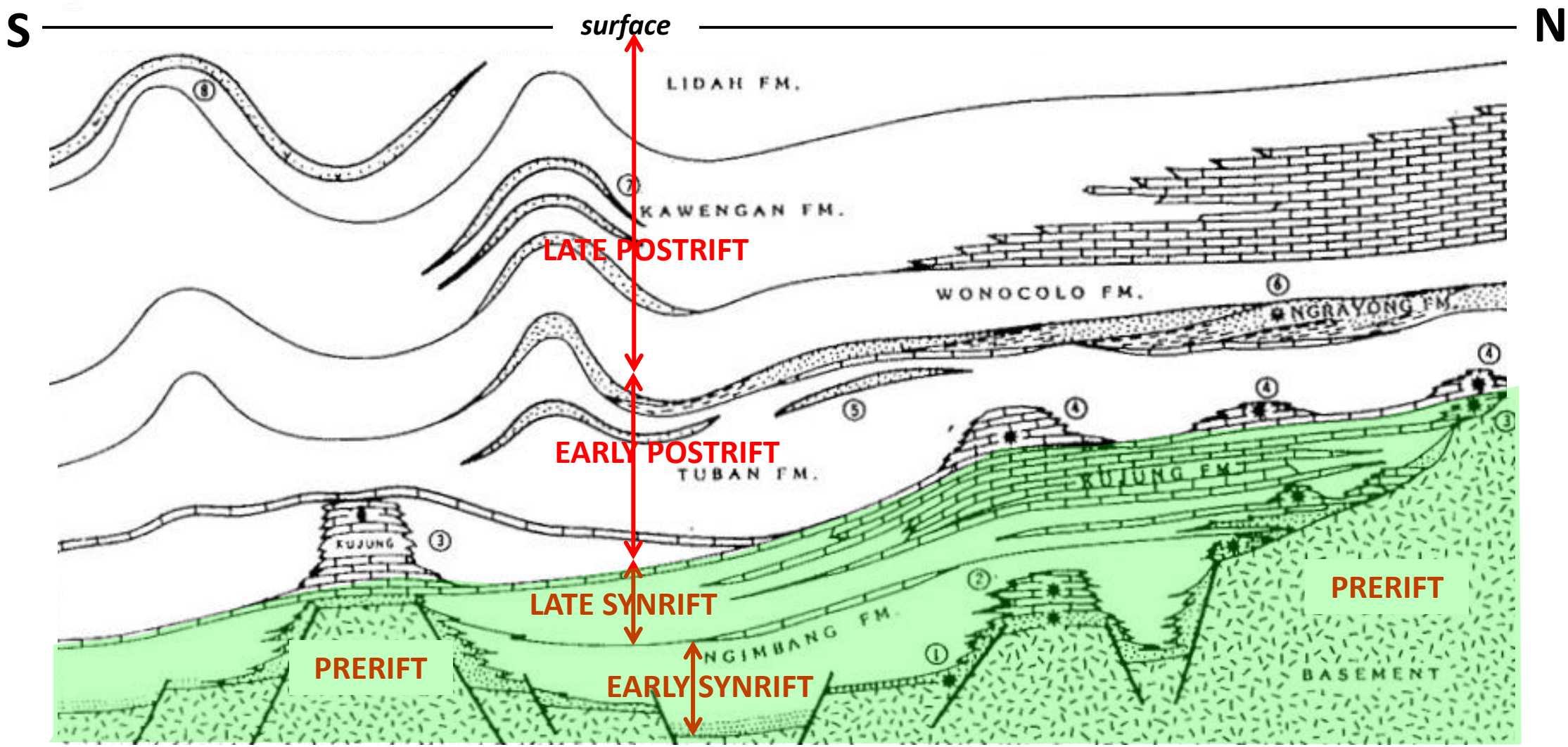
Doust and Sumner (2007)

Legend :

- Late Post Rift Oil/Gas Field
- Early Post Rift Oil/Gas Field
- Late Syn Rift Oil/Gas Field
- Early Syn Rift Oil/Gas Field

} *the most common*

Inferred area of active Hydrocarbon Generation



1.NGIMBANG CLASTICS (SURU,LANGOR,MELATEN)
2.NGIMBANG CARBONATES (LANGOR,BUNGOH)
3.KUJUNG II CARBONATES (BLIMBING,SUMBER,SALE)
4.KUJUNG I CARBONATES (GRESIK,MUDI,SUKOWATI,SAWO)
5.TUBAN CLASTICS (LEBOYO,SOUTH BUNGOH)
6.NGRAYONG CLASTICS AND CARBONATES (GRIGIS BARU,LEBOYO, SOUTH BUNGOH)
7.KAWENGAN CLASTICS (SOUTHERN STRUCTURES)
8.LIDAH VOLCANICLASTICS

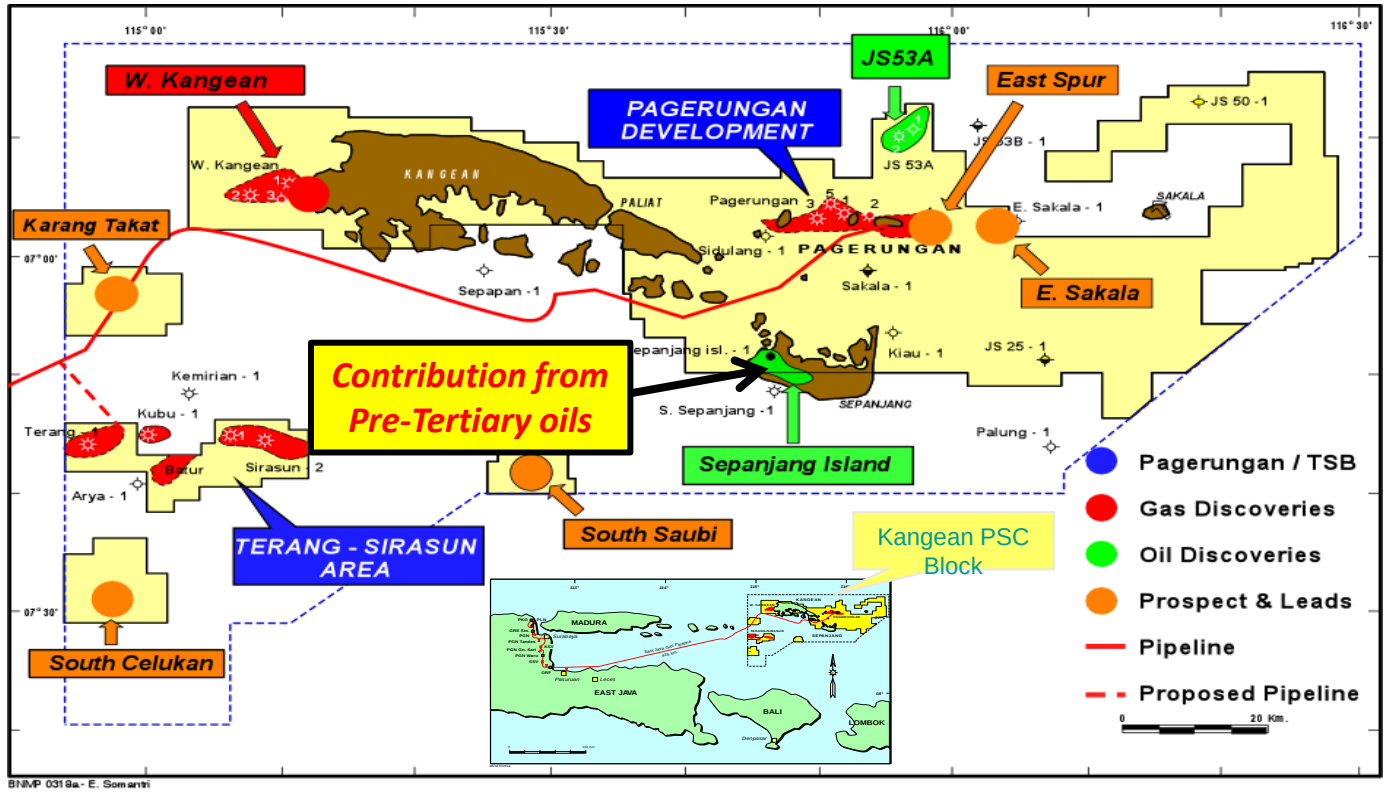
NORTHEAST JAVA BASIN
PLAY TYPES

Pertamina & Trend Energy (1991)

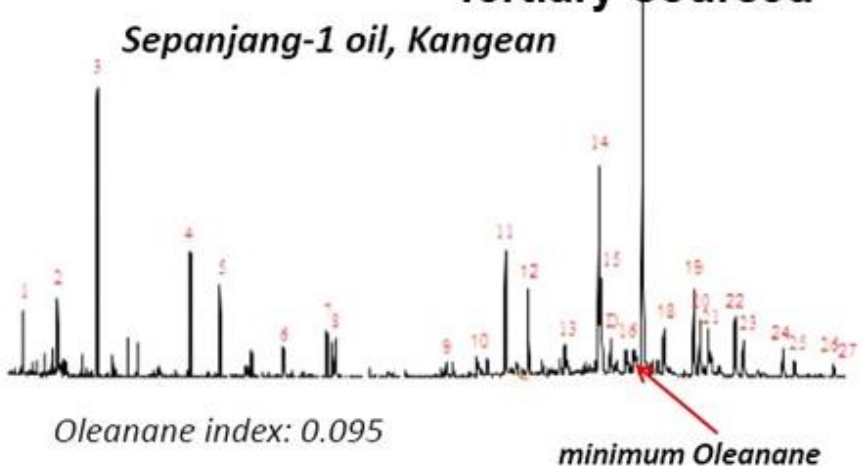
East Java Basin: Remaining/Future Potentials

- Late Postrift: Pleistocene volcanics & Subvolcanic plays
- Late Postrift: Pliocene Globigerinid grainstones
- Early Postrift: Middle Miocene deepwater Ngrayong
- Late Synrift: Ngimbang & CD carbonates
- Early Synrift: Ngimbang siliciclastics
- Prerift: Fractured Basement
- Prerift: Pre-Tertiary petroleum system

Sepanjang Oil Field, Kangean: Contribution from Lower Cretaceous Source Beds



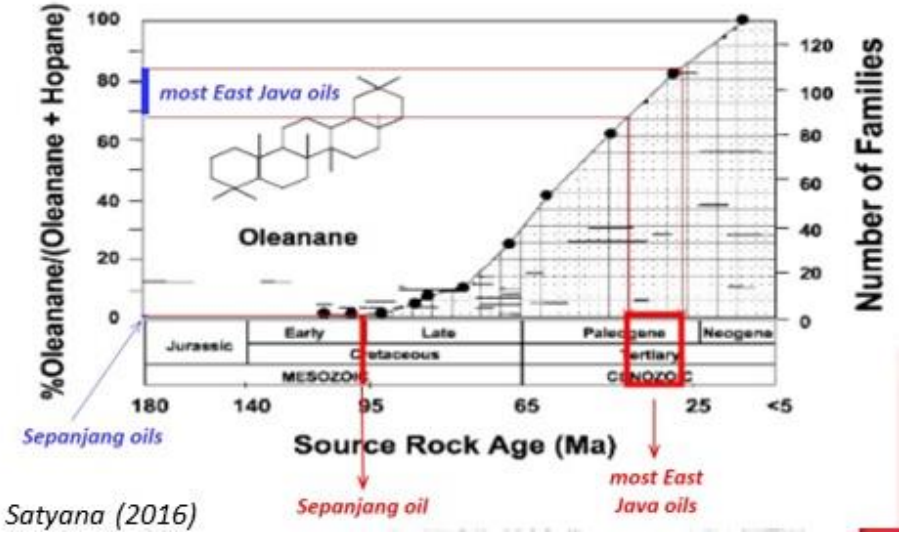
Sepanjang oil is not typical East Java oils. It is marine and pre-Tertiary sourced



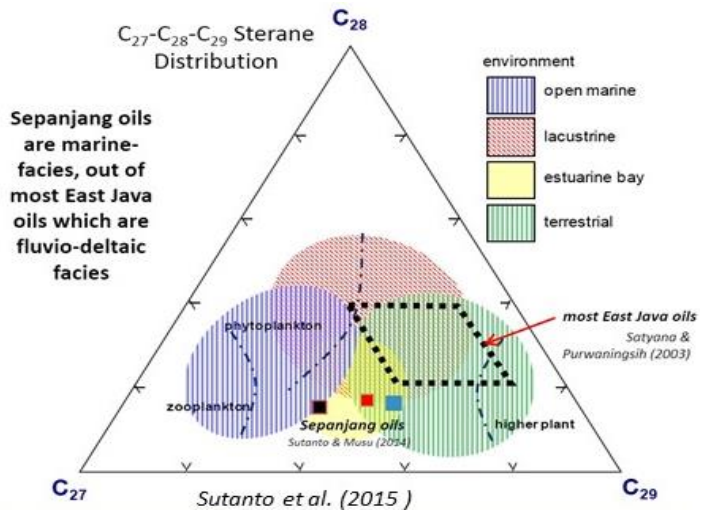
Satyana (2015)

Age-diagnostic biomarker of oleanane

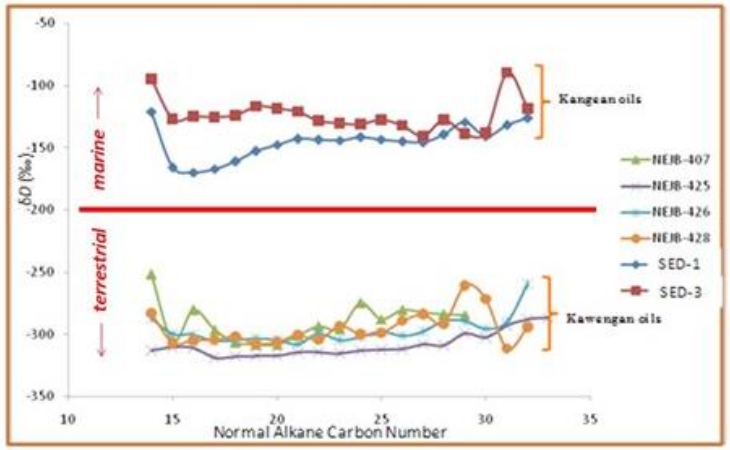
crossplot after Moldowan et al. (1994)



Satyana (2016)

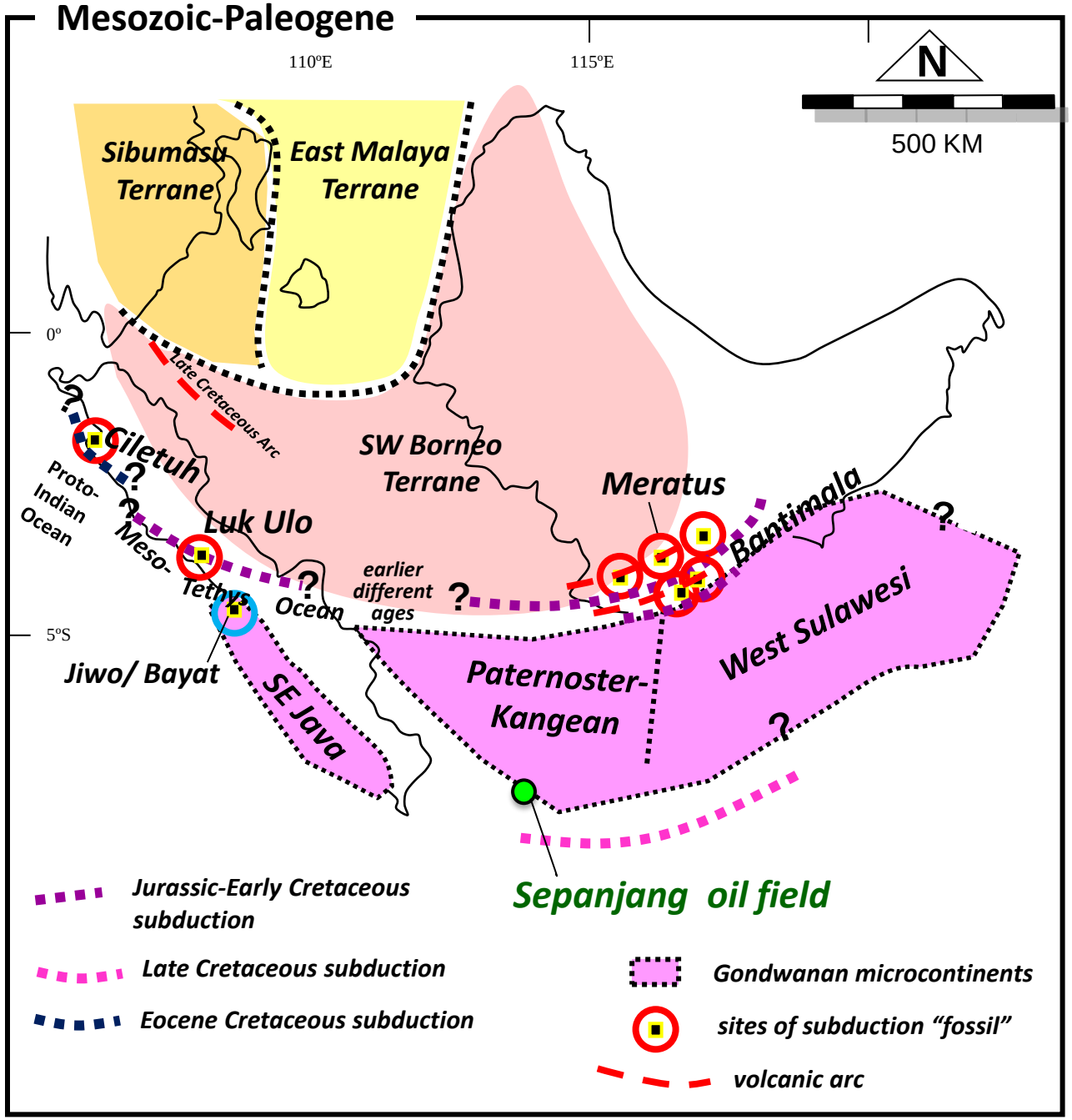


Sutanto et al. (2015)

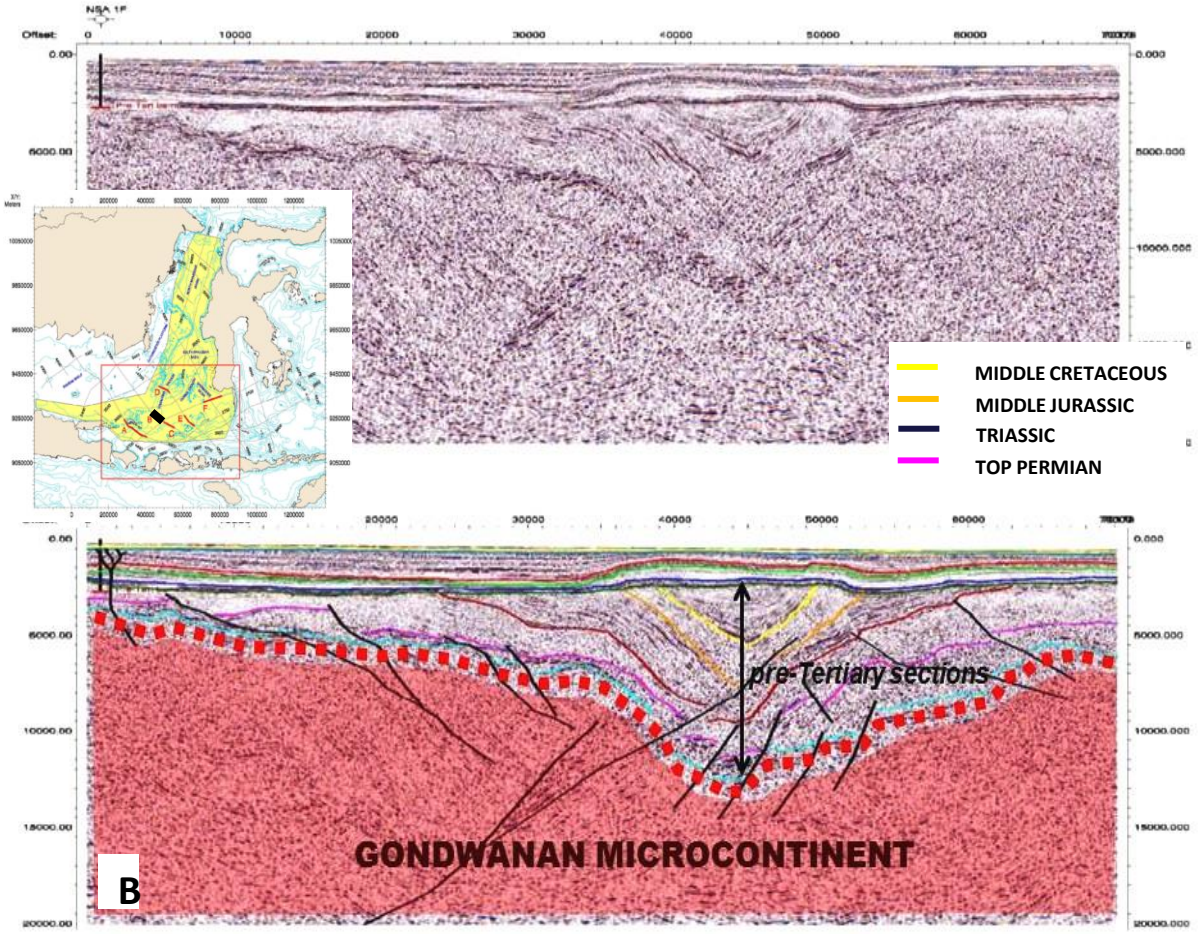


The δD (‰) profile of Sepanjang and Kawengan oils

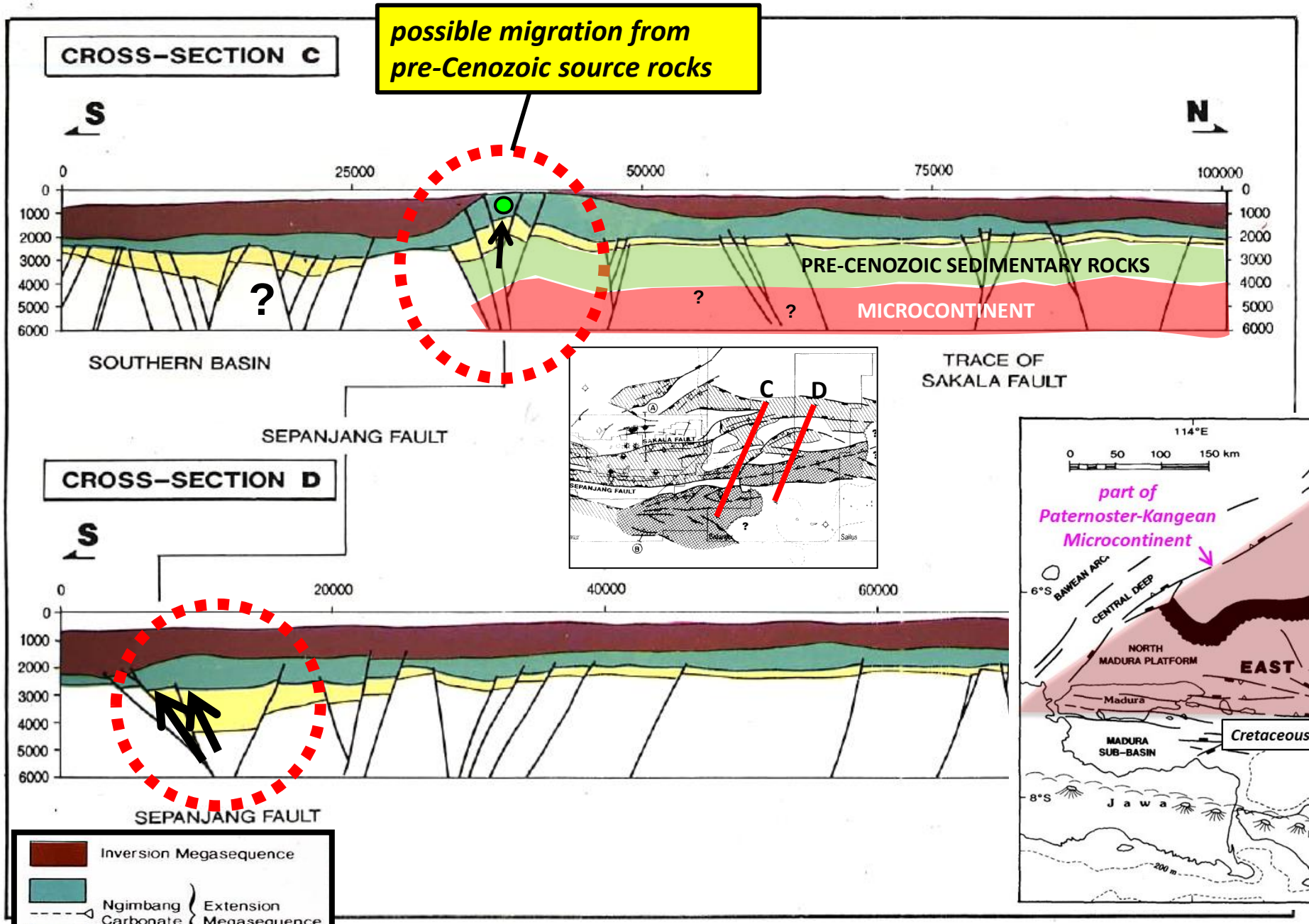
Musu et al. (2015)

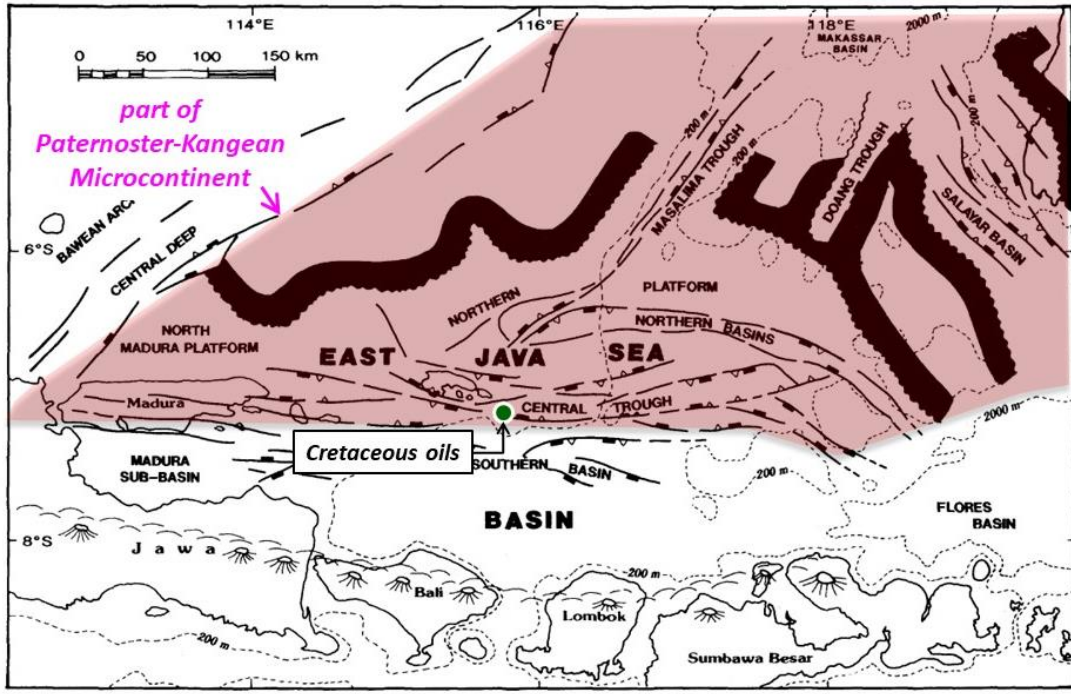


mod. Satyana (2014)



mod. after Emmet et al., 2009

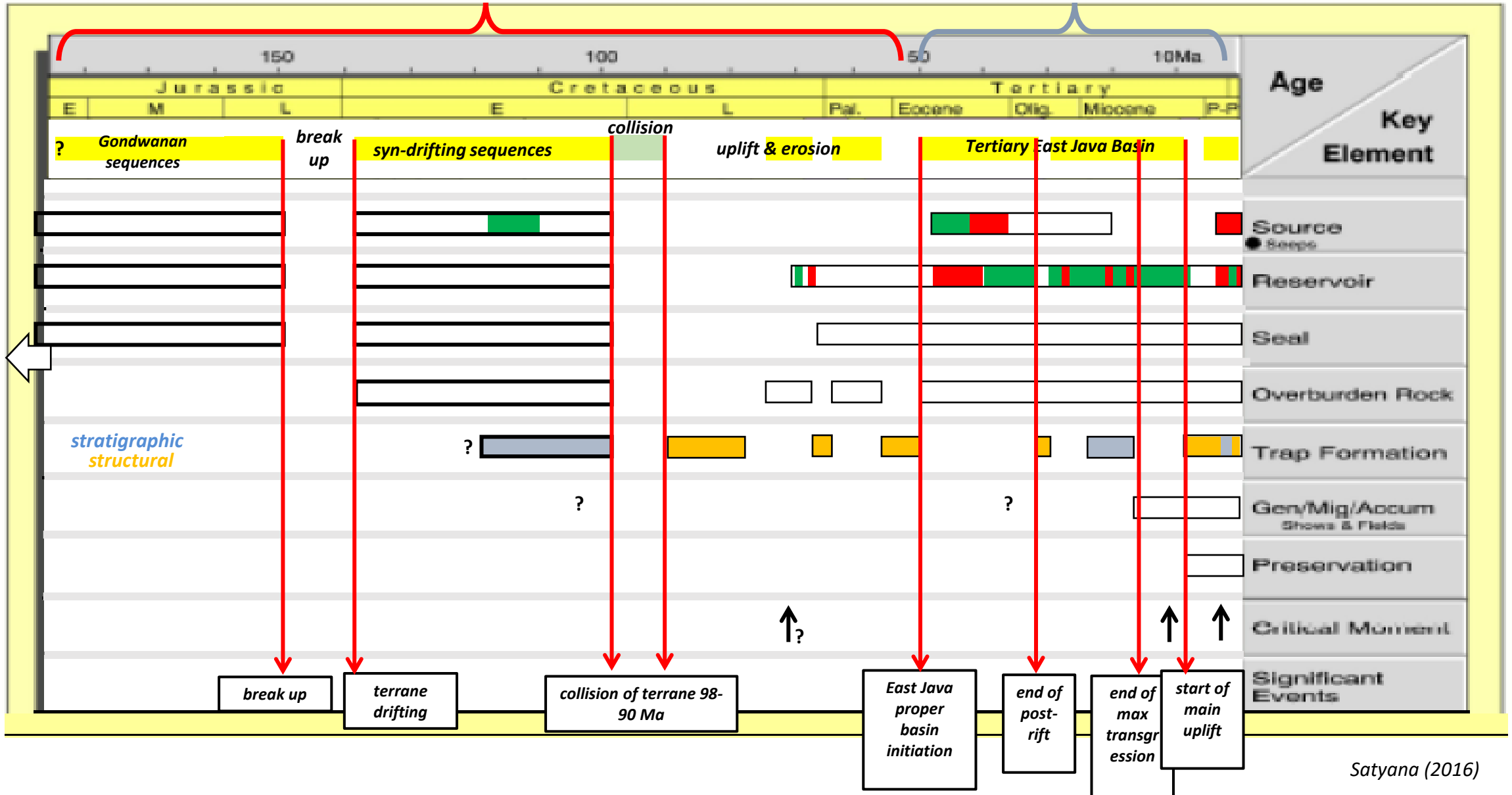




Regional section across Kangean

mod. after Bransden and Matthews (1992)

Revised East Java Basin Petroleum System Events Chart: Jurassic to Recent



Satyana (2016)

Pantai selatan Jawa Timur (2019)

Terima kasih atas perhatian Anda.

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Awang Satyana

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