



Geolectures

BERKAH GEOWISATA INDONESIA



Jumat, 26 Mei 2023



13.30 - 16.00 WIB



Zoom ID: 9841-4661-865



Awang Harun
Satyana

Independent Geologist



Diskusi

- 1. Kepentingan Pariwisata Indonesia**
- 2. Geologi Indonesia**
- 3. Warisan Geologi, Geopark, Geowisata**
- 4. Berkah Geowisata Indonesia**



Diskusi

1. Kepentingan Pariwisata Indonesia

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4. Berkah Geowisata Indonesia





PEROLEHAN DEvisa INDONESIA MENURUT LAPANGAN USAHA (DALAM JUTA USD)

JENIS LAPANGAN USAHA	NILAI PER-TAHUN (JUTA USD)		
	2013	2014	2015
1  MINYAK & GAS BUMI	32.633,2	30.318,8	18.906,7
2  BATU BARA	24.501,4	20.819,3	16.359,6
3  MINYAK KELAPA SAWIT	15.839,1	17.464,9	15.485,0
4  PARIWISATA	10.054,1	11.166,3	12.578,6

Pariwisata menempati urutan **keempat** perolehan devisa Indonesia menurut lapangan usaha.

Pertumbuhan perolehan devisa Indonesia menurut lapangan usaha (2013-2015):

Minyak & Gas Bumi : -42% **Batu Bara : -33.23%** **Minyak Kelapa Sawit: -2.23%** **Pariwisata: +25%**



PROYEKSI PENERIMAAN DEvisa DARI SEKTOR-SEKTOR UTAMA DALAM PEREKONOMIAN INDONESIA



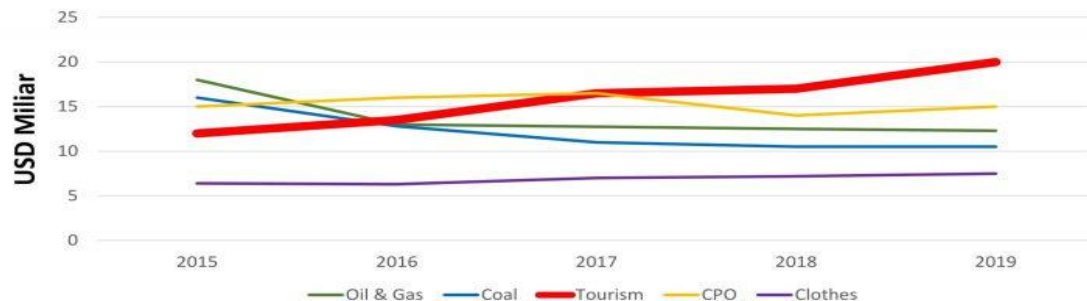
Tahun 2019, sektor *pariwisata* diperkirakan akan menjadi **penyumbang devisa terbesar** bagi **INDONESIA**

Sumber: <https://www.bps.go.id/linkTabelStatistik/view/id/1390>

PENERIMAAN DEvisa INDONESIA

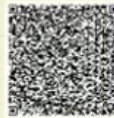
PROYEKSI PENERIMAAN DEvisa DARI SEKTOR-SEKTOR UTAMA DALAM PEREKONOMIAN INDONESIA

"Tahun 2020, sektor pariwisata merupakan penyumbang devisa terbesar bagi Indonesia"



PERKEMBANGAN PARIWISATA DESEMBER 2022

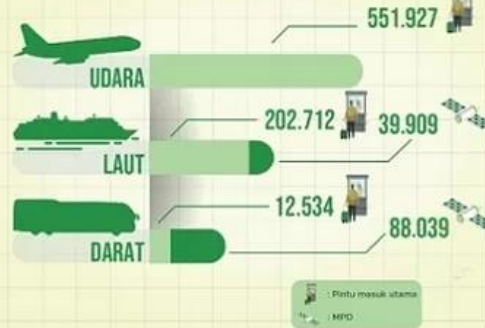
Berita Resmi Statistik No. 13/02/Th. XXVI, 1 Februari 2023



Perkembangan Kunjungan Wisatawan Mancanegara (juta kunjungan)



Jumlah Kunjungan Wisatawan Mancanegara menurut Moda Transportasi (kunjungan)



Jumlah Kunjungan Wisatawan Mancanegara (ribu kunjungan), Desember 2021–Desember 2022



Kedatangan Wisatawan Mancanegara menurut Kebangsaan (%)



Tingkat Penghunian Kamar (TPK) Hotel menurut Klasifikasi (%)



Rata-Rata Lama Menginap Tamu (RLMT) pada Hotel Klasifikasi Bintang (hari)

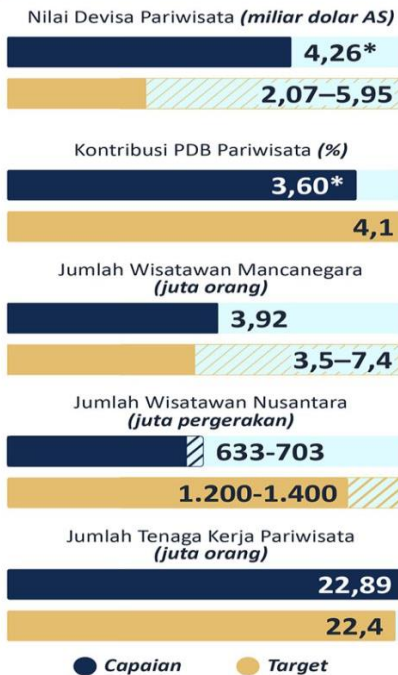


TARGET SEKTOR PARIWISATA INDONESIA 2023

Kementerian Pariwisata dan Ekonomi Kreatif (Kemenparekraf) menyusun sejumlah target yang akan dicapai pada 2023 mendatang. Untuk itu, beragam upaya akan terus dilakukan untuk memenuhi target-target tersebut.



CAPAIAN 2022 DAN TARGET 2023 (Data Kemenparekraf, per Oktober 2022)



*hingga September 2022

UPAYA KEMENPAREKRAF



Mendorong 5 Destinasi Pariwisata Super Prioritas, yakni Danau Toba (Sumut), Borobudur (Jateng), Mandalika (NTB), Labuan Bajo (NTT) dan Likupang (Sulut).



Menjalankan program-program unggulan, yakni desa wisata, Kabupaten/Kota Kreatif dan *Indonesia Spice Up the World*.



Meningkatkan kualitas sumber daya manusia (SDM) pariwisata.



Membangun infrastruktur pariwisata yang berkualitas.

TREN PARIWISATA 2023



Melibatkan wisatawan budaya setempat.



Mengutamakan kesehatan.



Memungkinkan wisatawan masih bisa bekerja dari tempat wisata.



Destinasi-destinasi wisata baru.

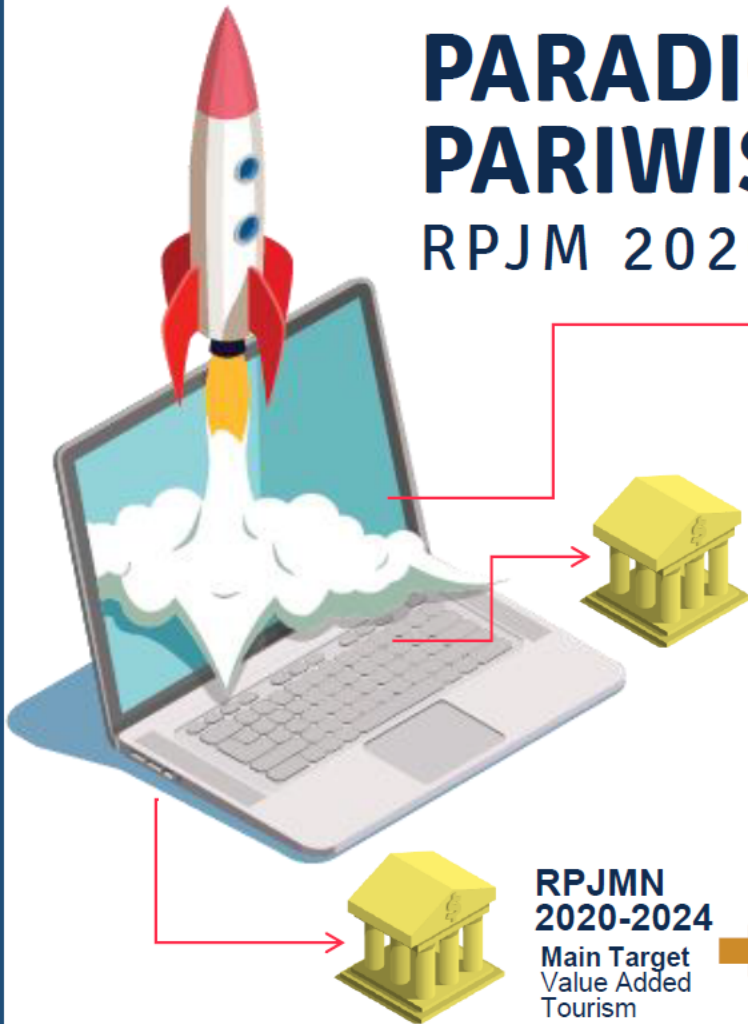
"Kami menyadari pariwisata ini baru bangkit, tapi untuk memenuhi target-target ke depan, kami bersama lintas kementerian dan juga lembaga terus berkoordinasi, terutama untuk membangun infrastruktur pariwisata."



Sandiaga Salahuddin Uno
Menteri Pariwisata dan Ekonomi Kreatif

PARADIGMA PEMBANGUNAN PARIWISATA KEDEPAN

RPJM 2020-2024



**RPJMN
2015-2019**

Main Target
Tourist
Arrivals



Numbers Oriented

Main Target:

- Number of International Tourists
- Number of Domestic Tourists

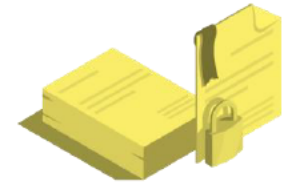
Quality Tourism Experience

Main Target:

- Foreign Exchange & Value Added Tourism
- Destination, Industry & Community readiness
- Human resource capacity
- Environmental Carrying Capacity
- Global / international Competitive Tourism Image

**RPJMN
2020-2024**

Main Target
Value Added
Tourism



Core Values:



SUSTAINABLE TOURISM



Skilled HR



Experience Satisfaction



**Product & Service
Diversification**



Technology Adoption

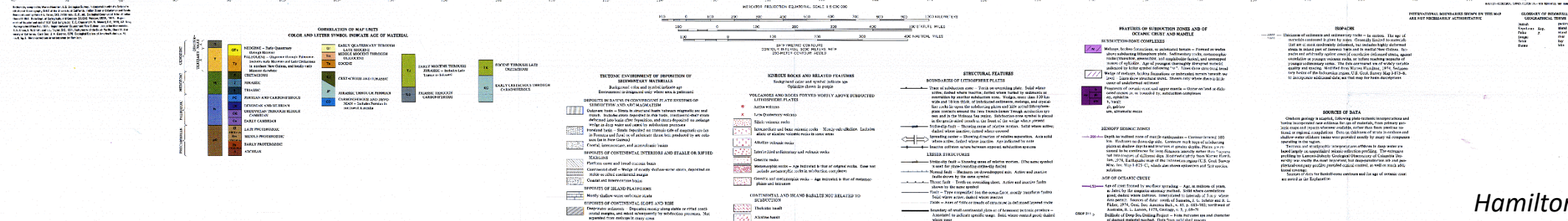
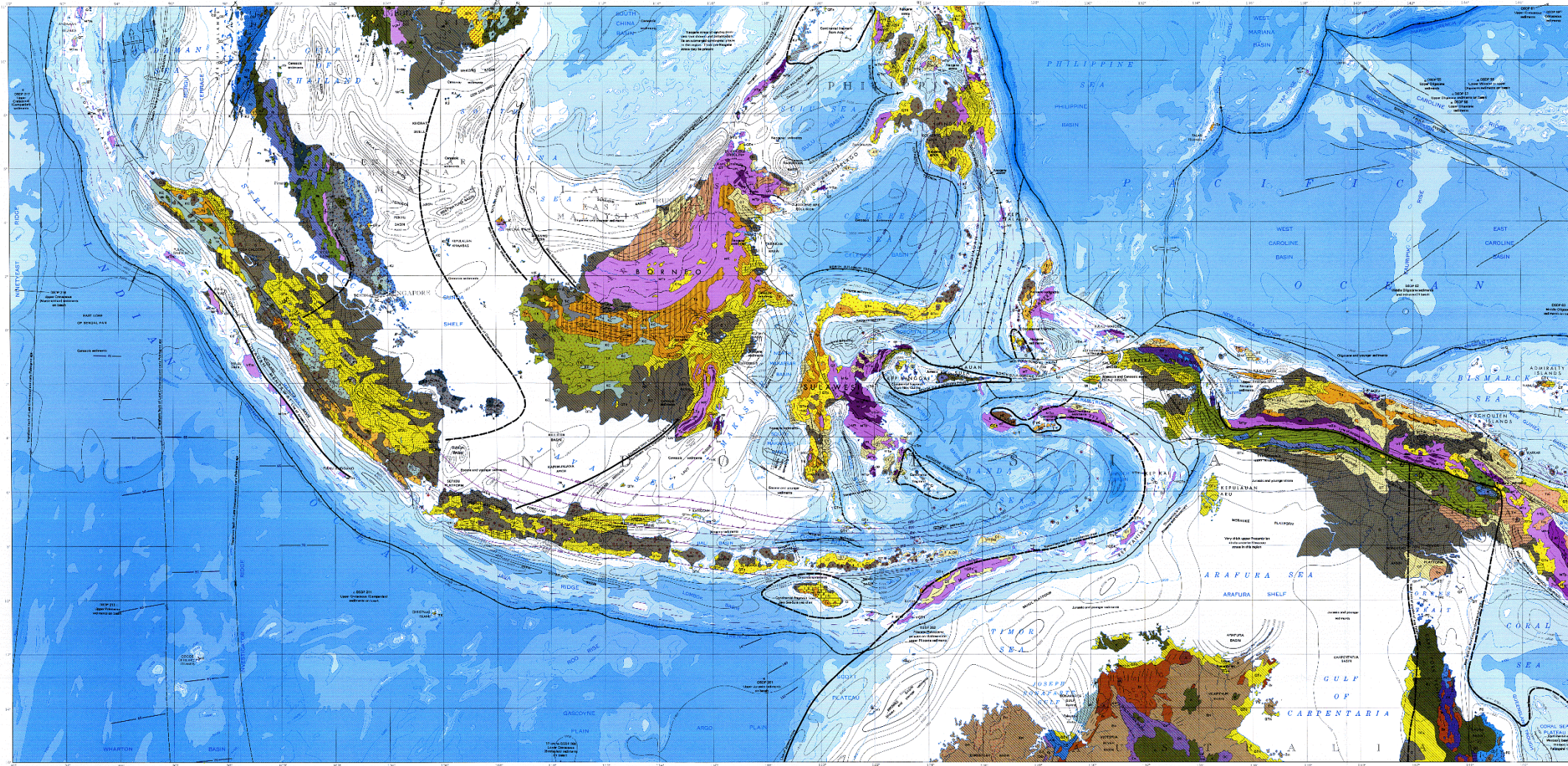
Diskusi

1. Kepentingan Pariwisata Indonesia
- 2. Geologi Indonesia**
3. Potensi Geowisata
4. Mitigasi Kebencanaan Area Geowisata





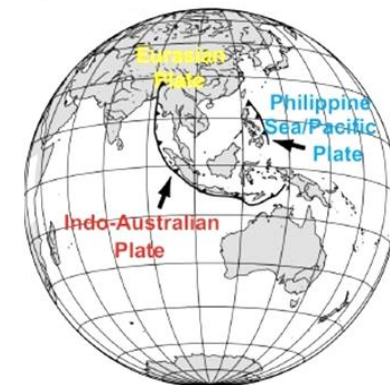
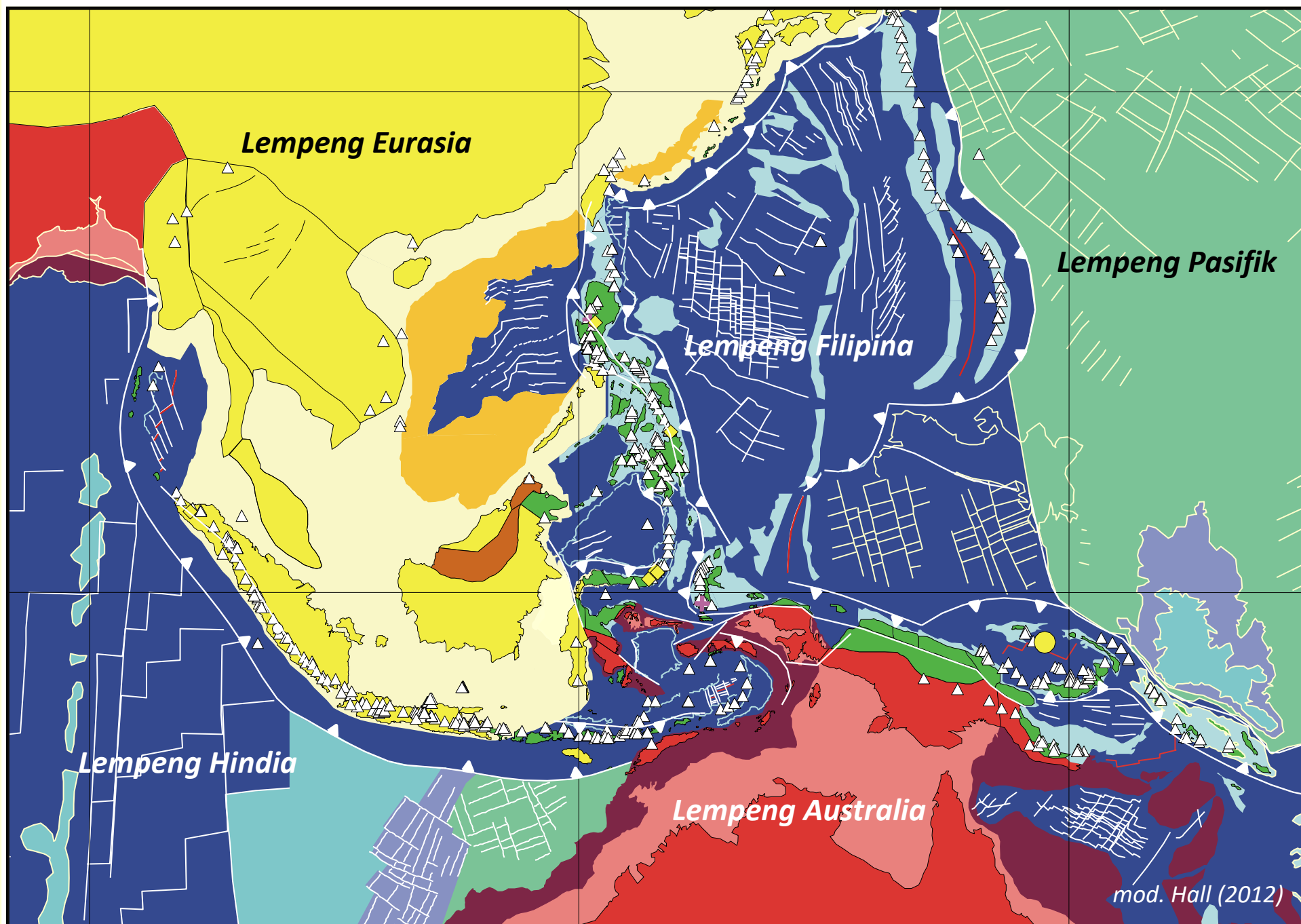
Sukamto dan Purbo-Hadiwidjyo (1993): “Dari segi ilmu kebumihan, Indonesia benar-benar merupakan daerah yang sangat menarik. Kepentingannya terletak pada rupabuminya, jenis dan sebaran endapan mineral serta energi yang terkandung di dalamnya, keterhuniannya, dan tektonikanya....”



LOKASI PRIORITAS BERDASARKAN RPJMN 2020-2024

10 Destinasi Pariwisata Prioritas, 8 Destinasi Pariwisata Pengembangan, dan 1 Revitalisasi Bali

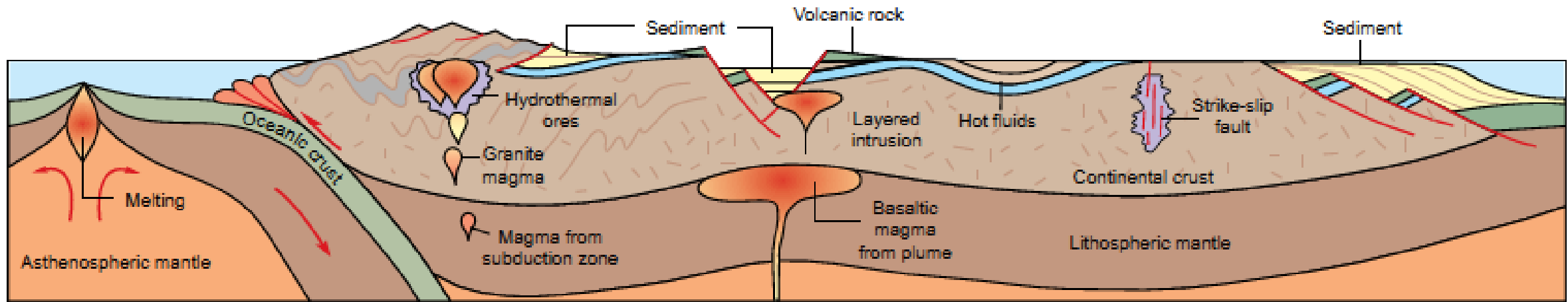




Tataan Tektonik Lempeng Indonesia Masa Kini

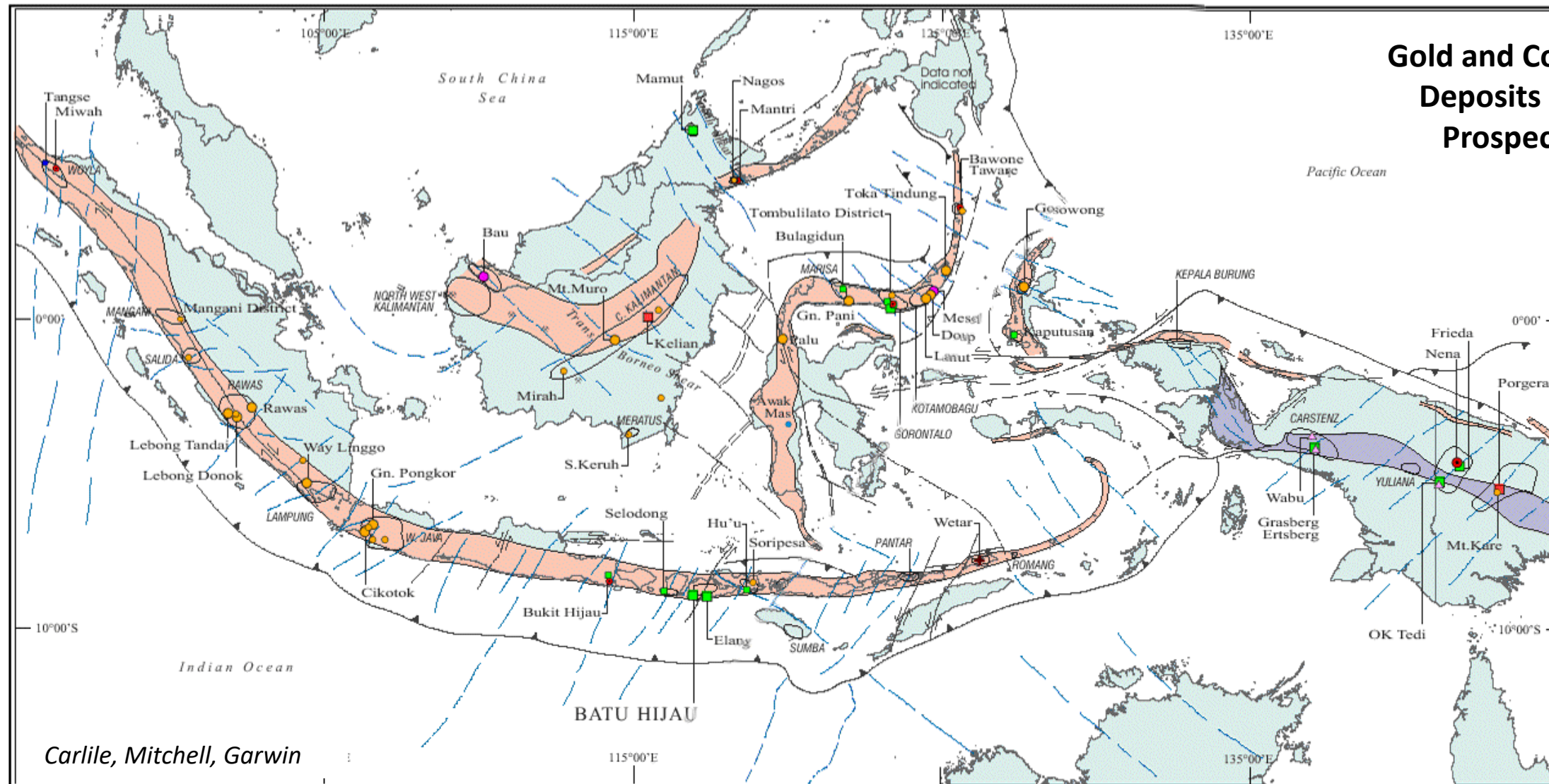
Kontrol Tektonik Lempeng atas Sumber Daya

Midoceanic ridge	Accretionary wedge	Magmatic arc	Foreland basin	Continental rift / Hot spot	Continental basin	Shield	Rifted continental margin
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Magmatic segregation chromium platinum Hydrothermal sulfides copper zinc	Oceanic ridge deposits in melange copper zinc nickel chromium	Hydrothermal vein deposits gold silver Contact metamorphic copper, lead, zinc, gold, silver, iron, tin, tungsten, molybdenum	Sedimentary coal oil oil shale gas	Magmatic segregation platinum copper, nickel Hydrothermal copper, lead, zinc, silver Sedimentary evaporites, brines sand, gravel	Sedimentary oil, gas, coal, salt Hydrothermal lead, zinc fluorite	Metamorphic shear zone gold tungsten	Sedimentary oil, gas, coal, evaporites, beach placers Precambrian Banded iron formations
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Gold and Copper: Deposits and Prospects



Carlile, Mitchell, Garwin

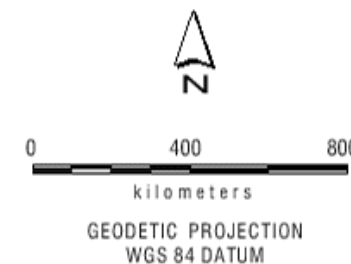
EXPLANATION

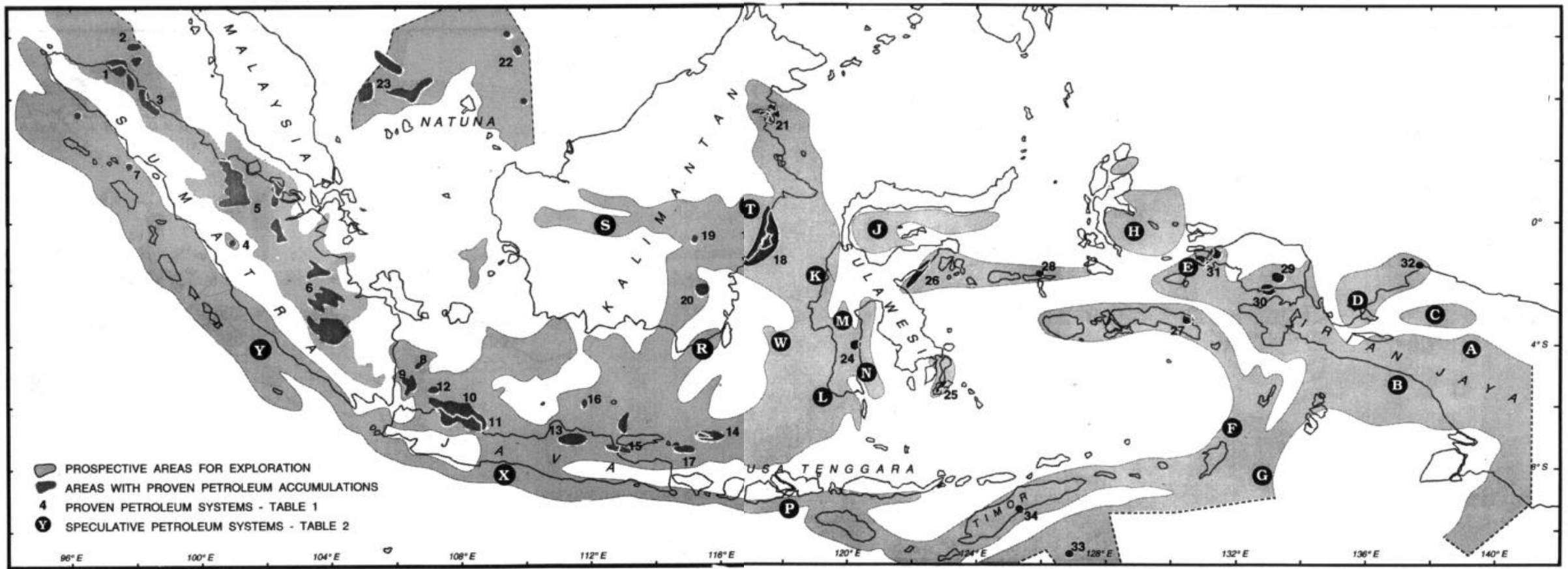
- Neogene Magmatic Arc
- Orogenic belt with significant Neogene magmatism
- Significant lineament or inferred fault
- Trace of subduction zone or thrust fault (solid teeth-active, open teeth-inactive)

- Strike-slip fault (solid-active, dashed-inactive)
- Spreading center (inactive)
- Gold district or region

DEPOSIT TYPES

- Cu-Au porphyry
- Cu-Mo-Au porphyry
- Skarn
- Carbonate-base metal-gold
- Epithermal-high sulfidation
- Epithermal-low sulfidation
- Quartz lode
- Massive sulphide
- Sediment hosted
- Placer





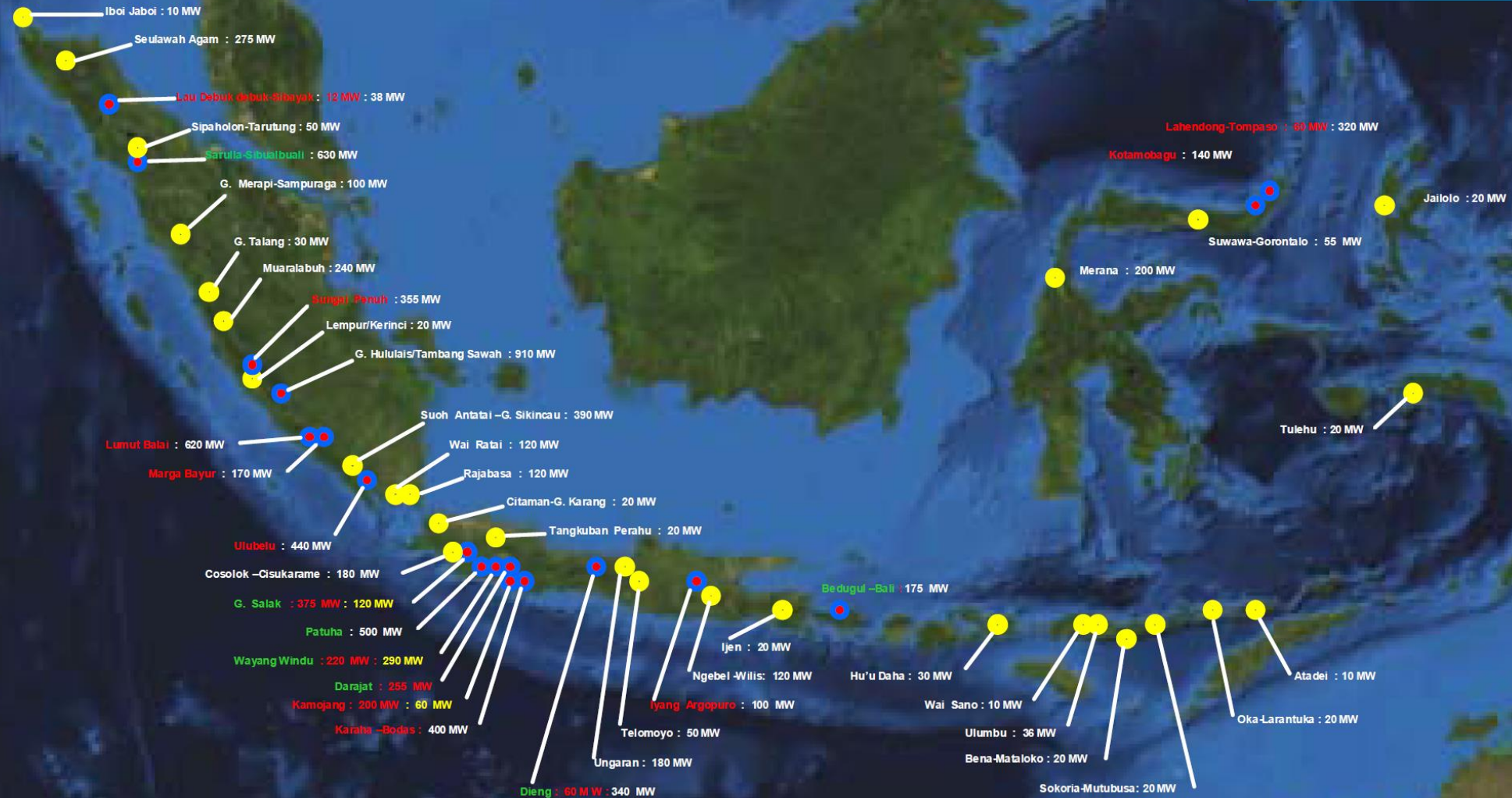
Howes & Tisnawijaya (1995)

Proven and Prospective Petroleum Areas in Indonesia

Lapangan Geotermal Produksi dan Dapat Dikembangkan di Indonesia

Legend :

- produksi
- dapat dikembangkan

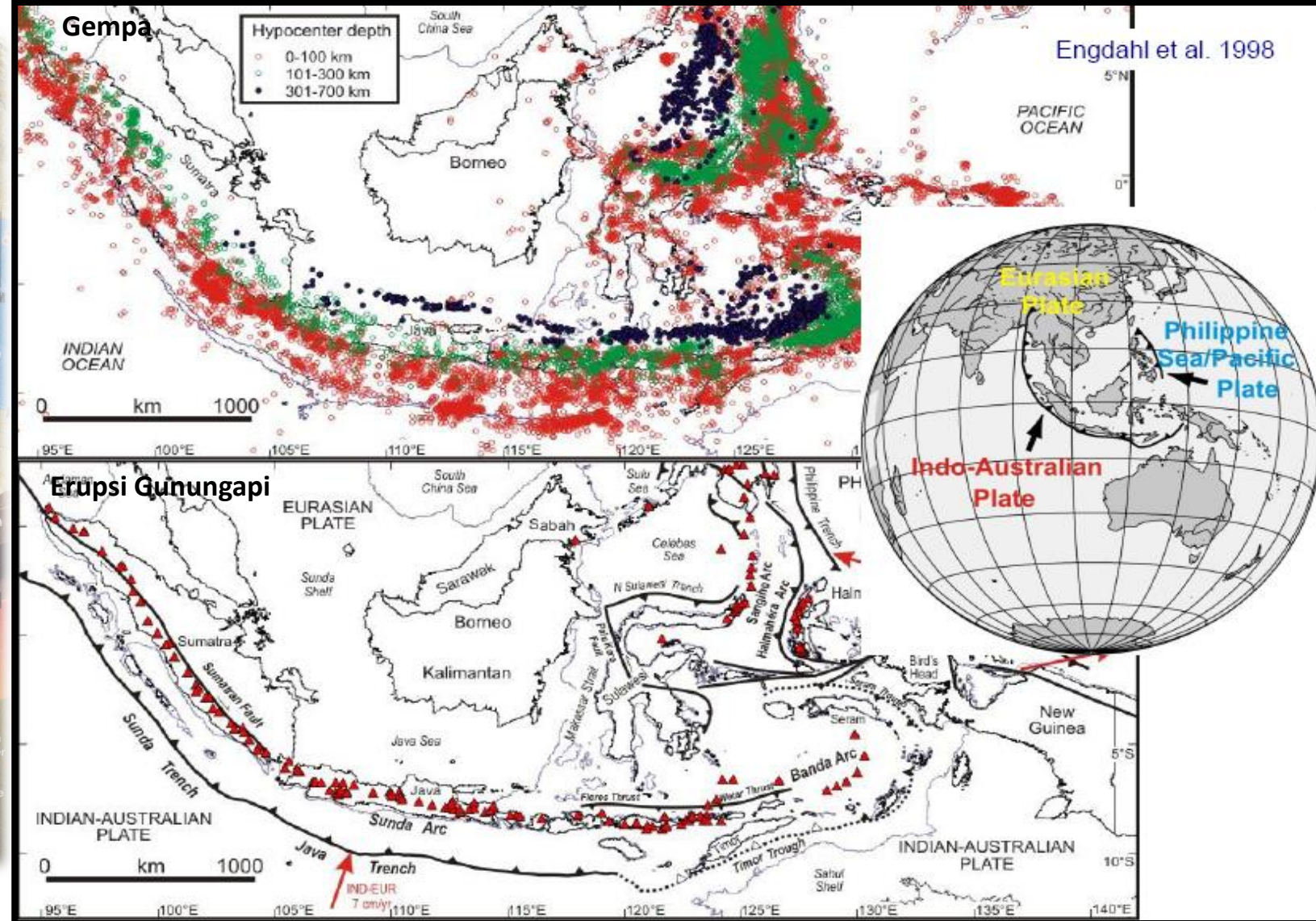


Darma et al. (2010)

Pertemuan lempeng merupakan wilayah kegempaan dan gunungapi

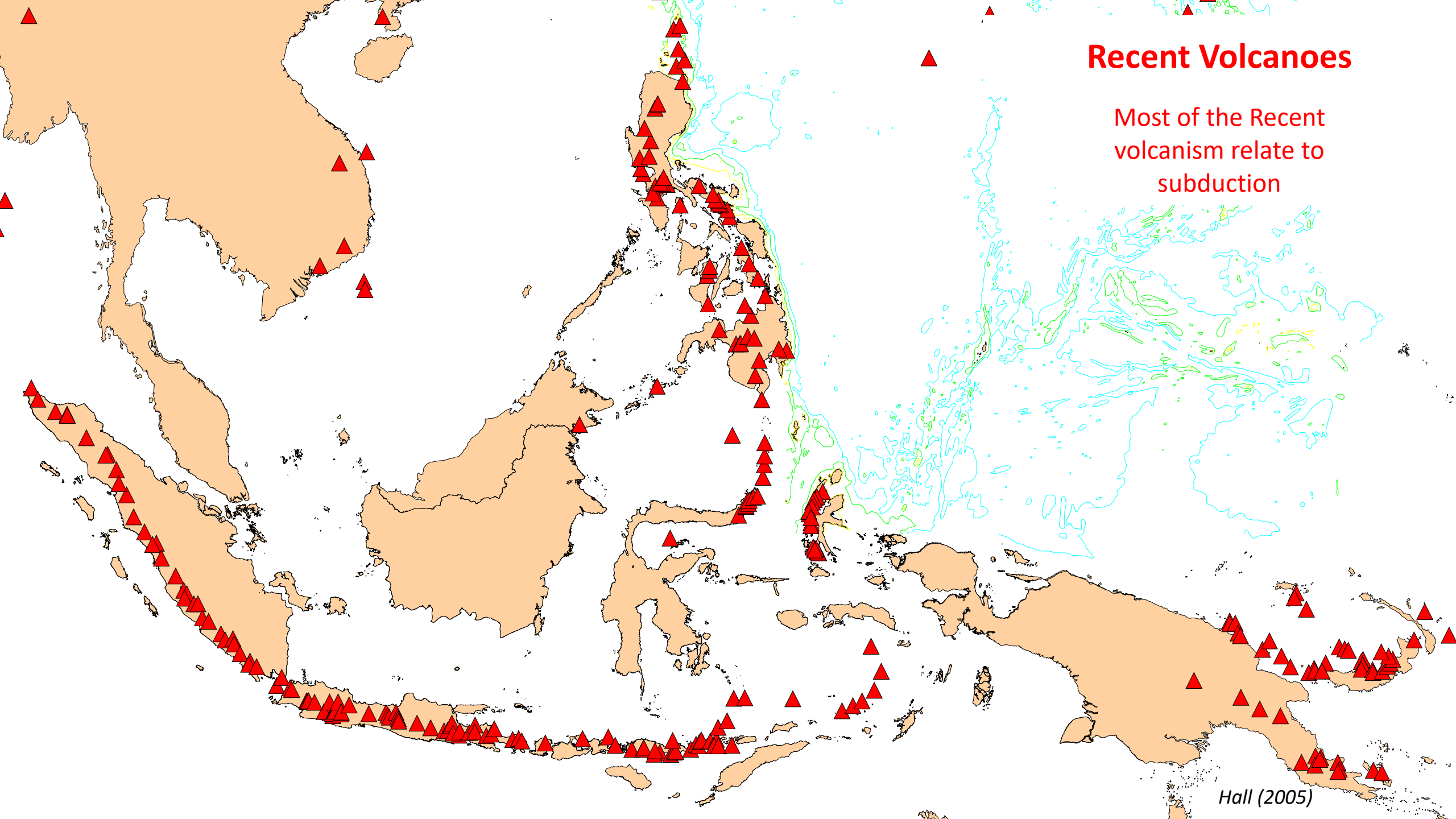


Newsweek (Dec. 2005)

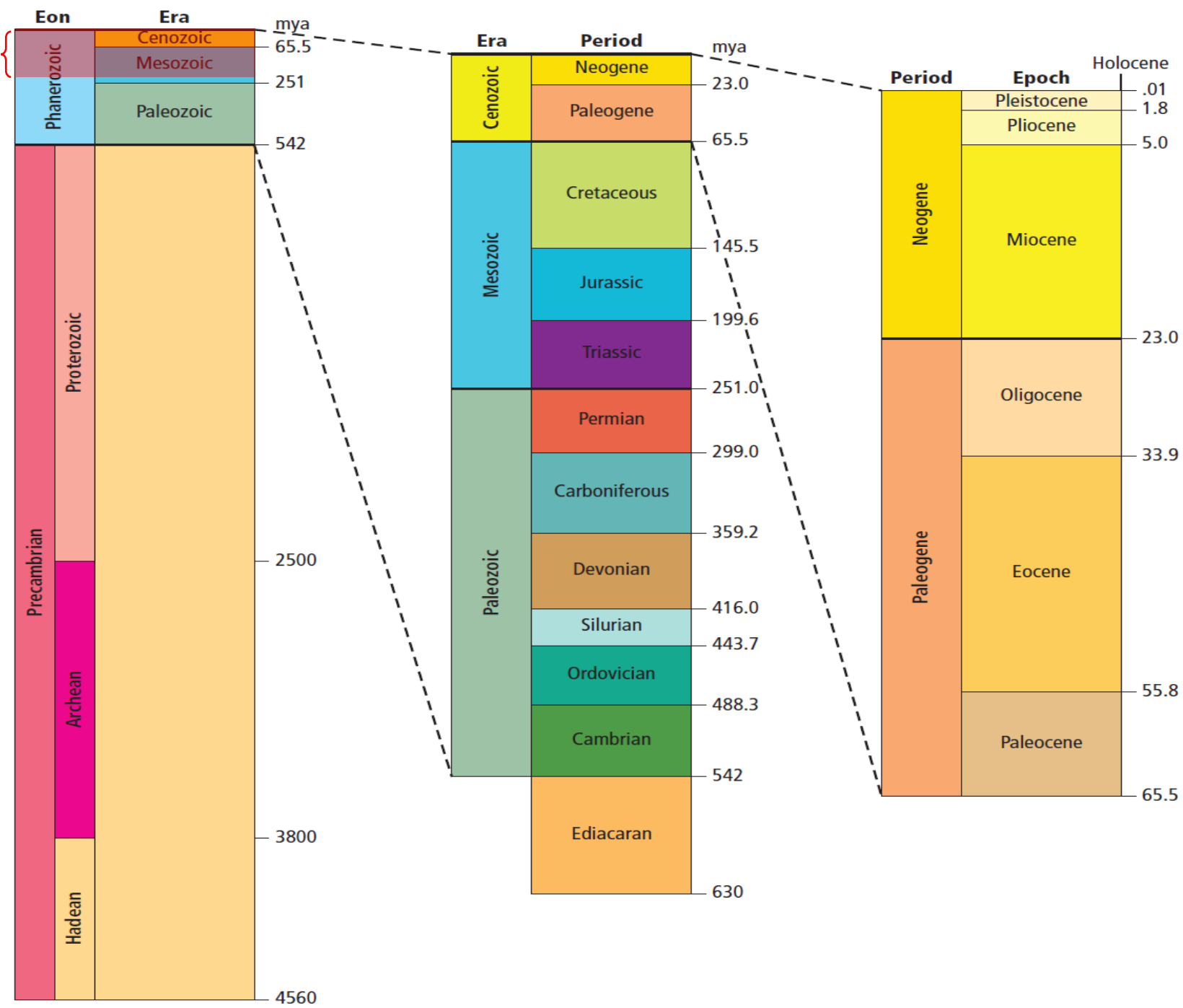


Recent Volcanoes

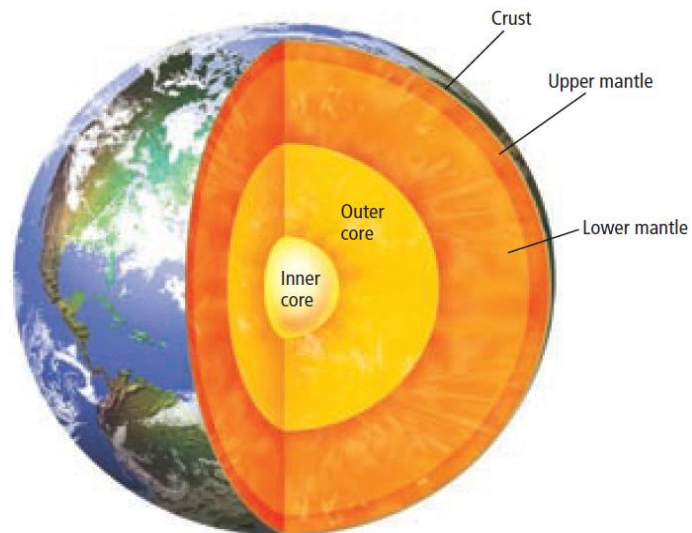
Most of the Recent
volcanism relate to
subduction



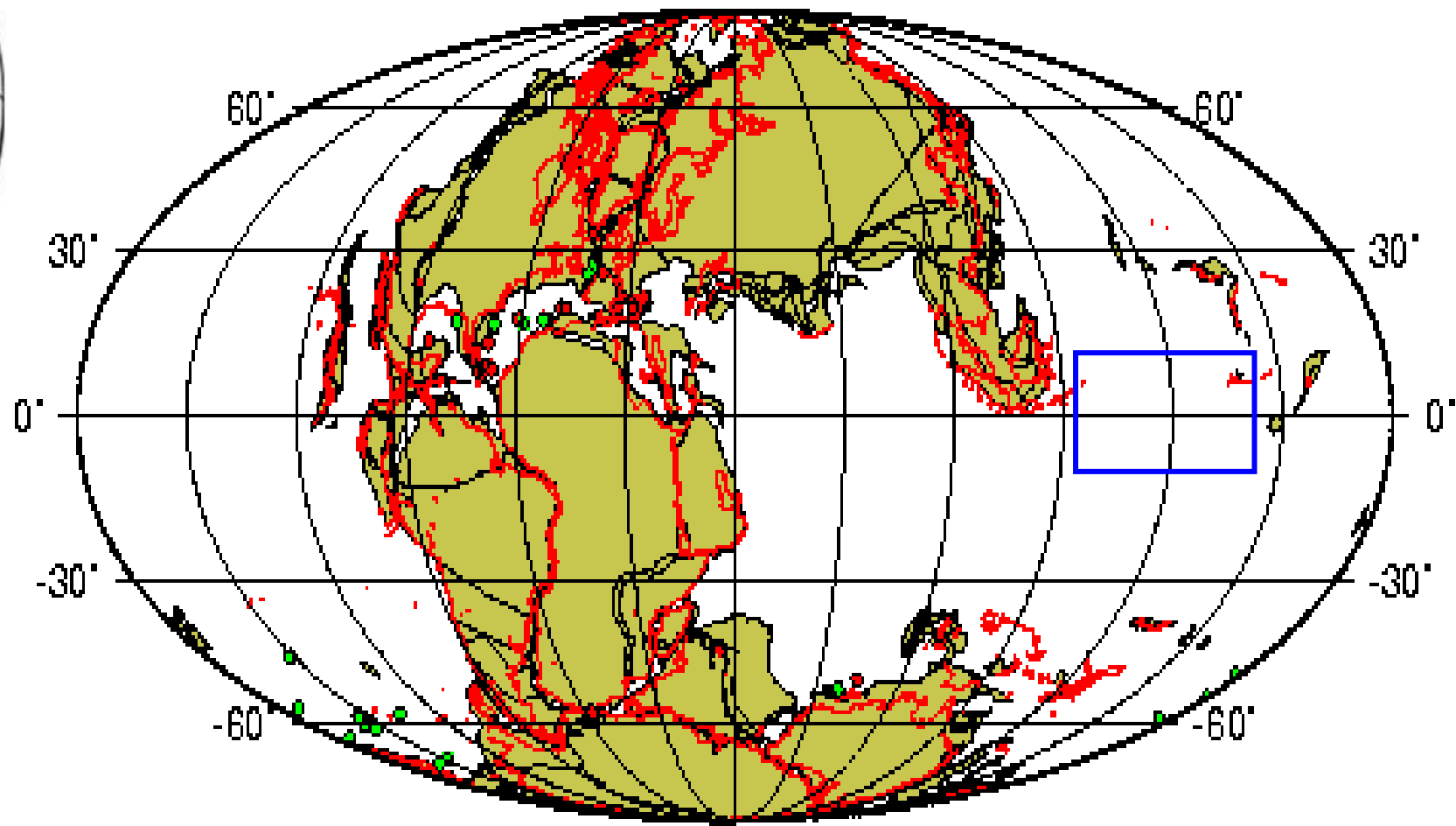
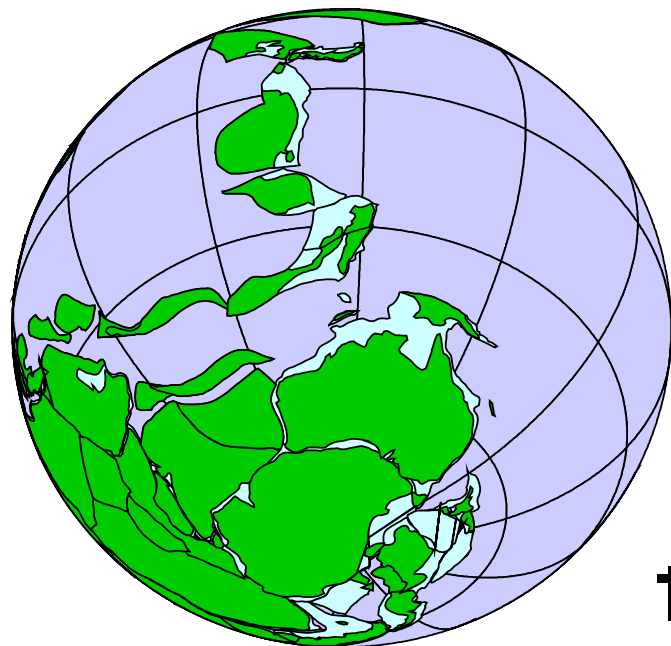
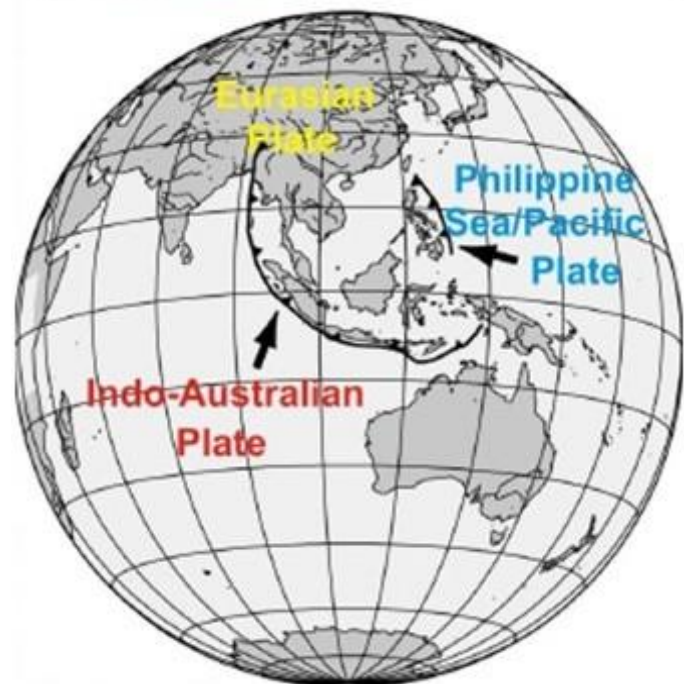
INDONESIA



Waktu Geologi dalam Sejarah Bumi

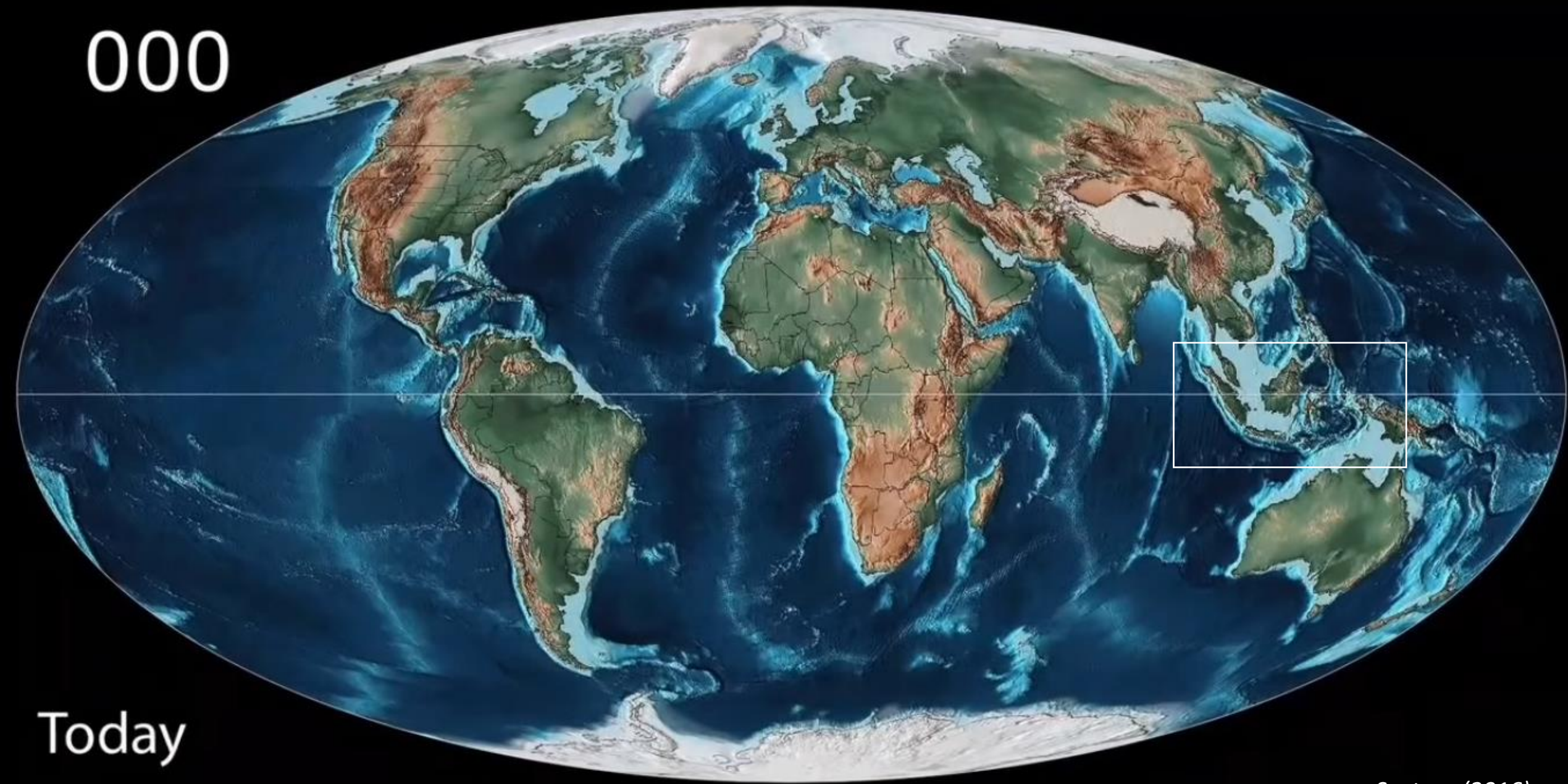


Rekonstruksi Pembentukan Kepulauan Indonesia



150 My Reconstruction

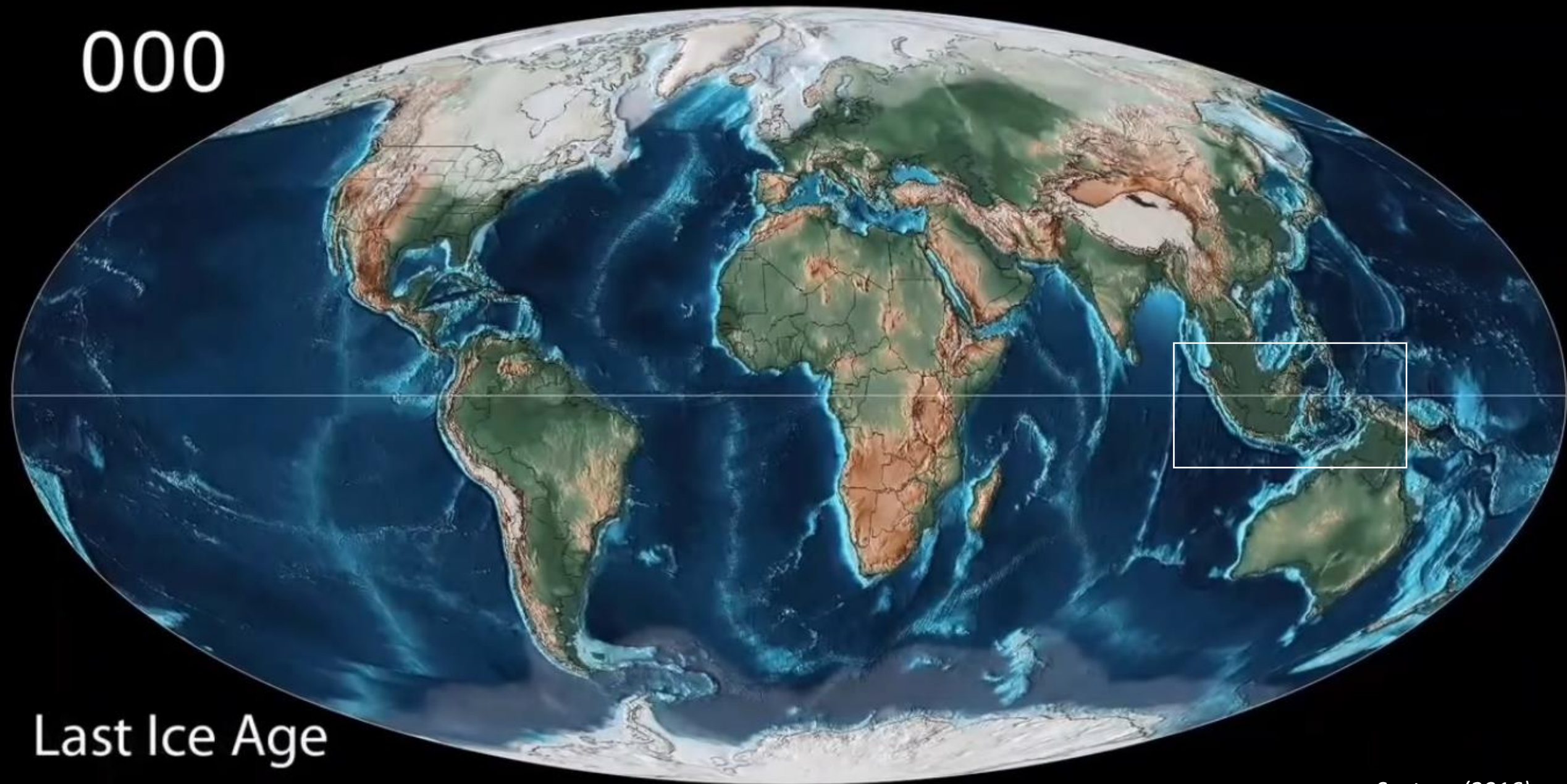
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Today

Scotese (2016)

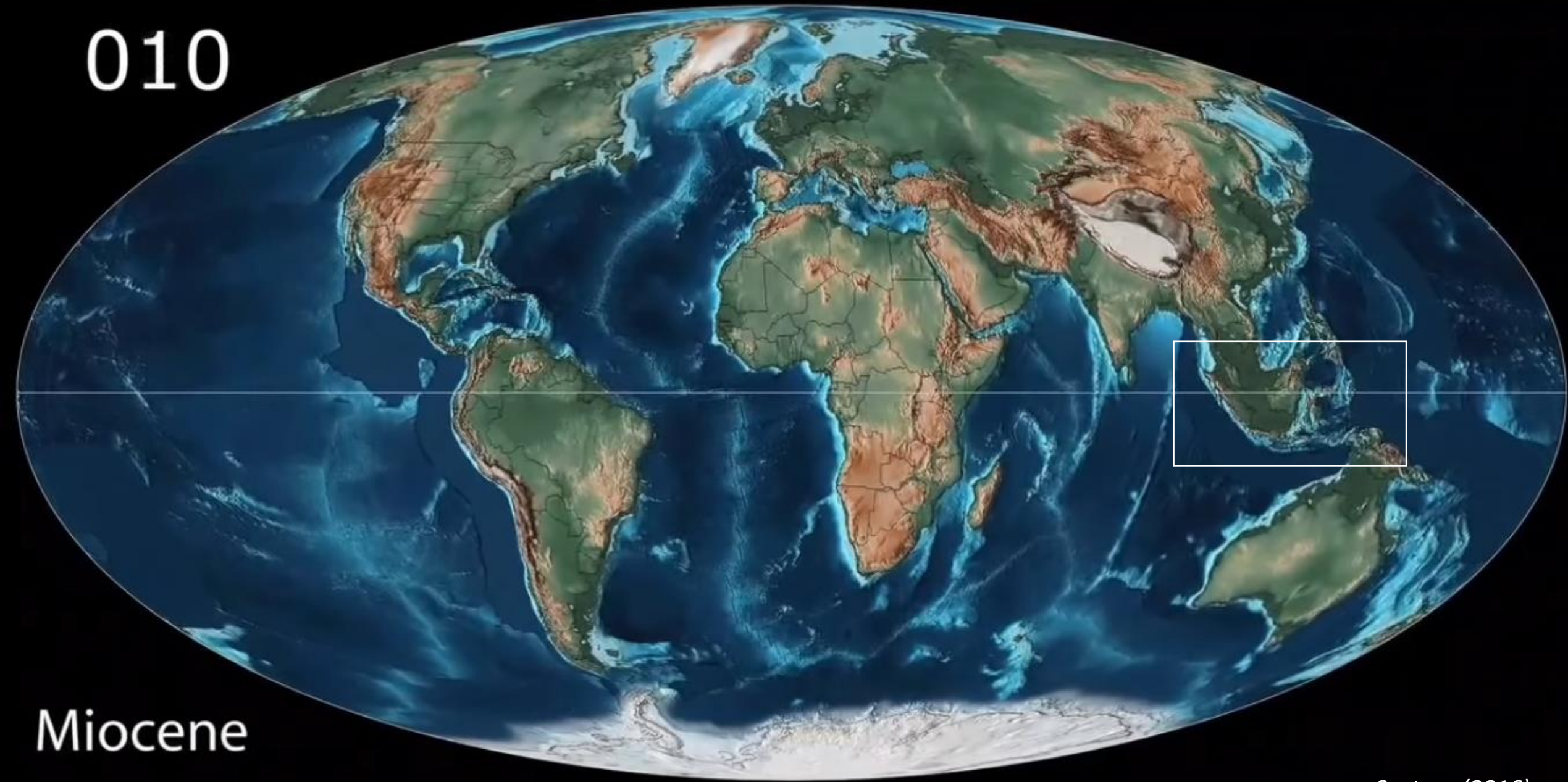
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Last Ice Age

Scotese (2016)

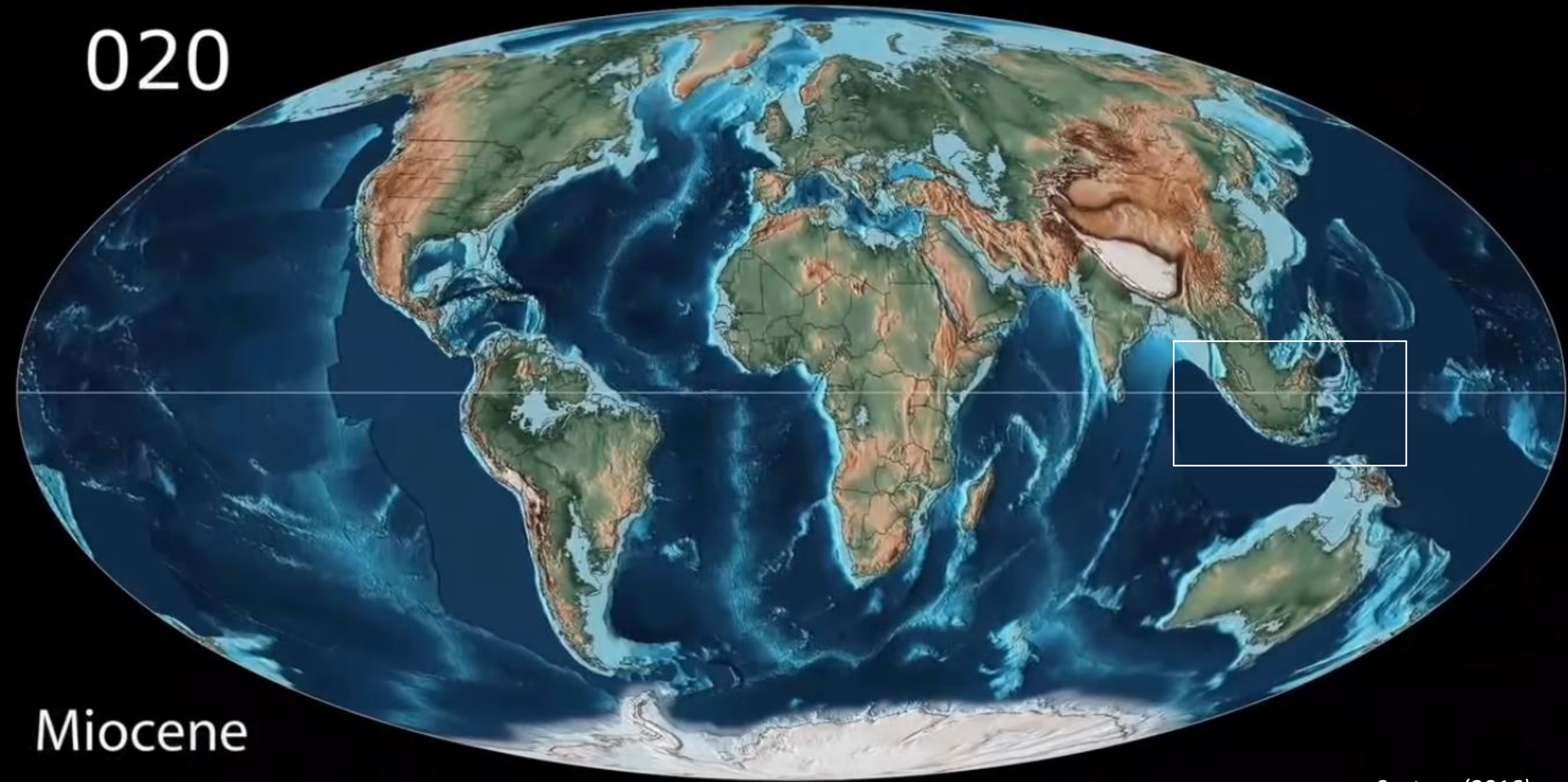
010



Miocene

Scotese (2016)

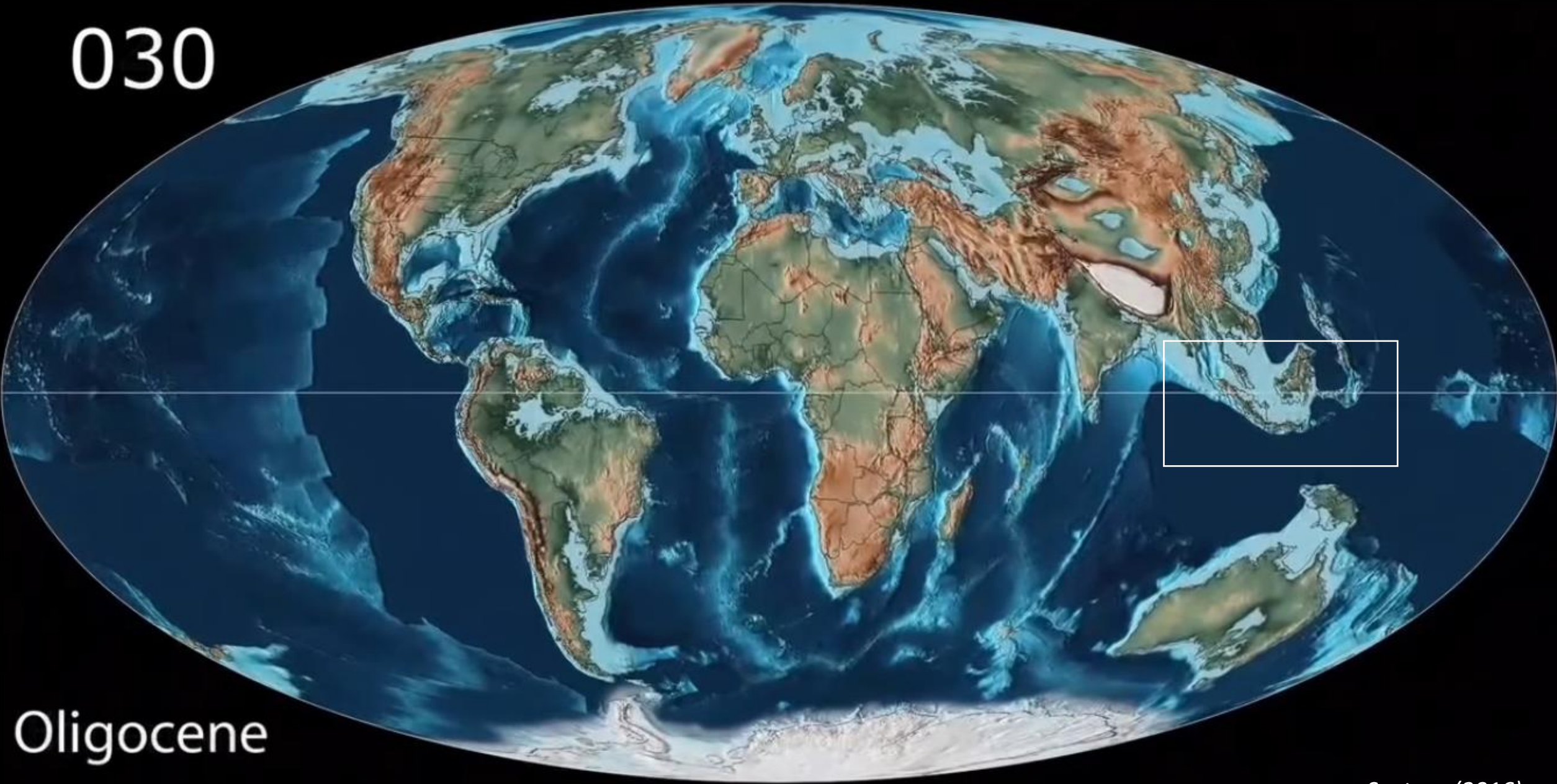
020



Miocene

Scotese (2016)

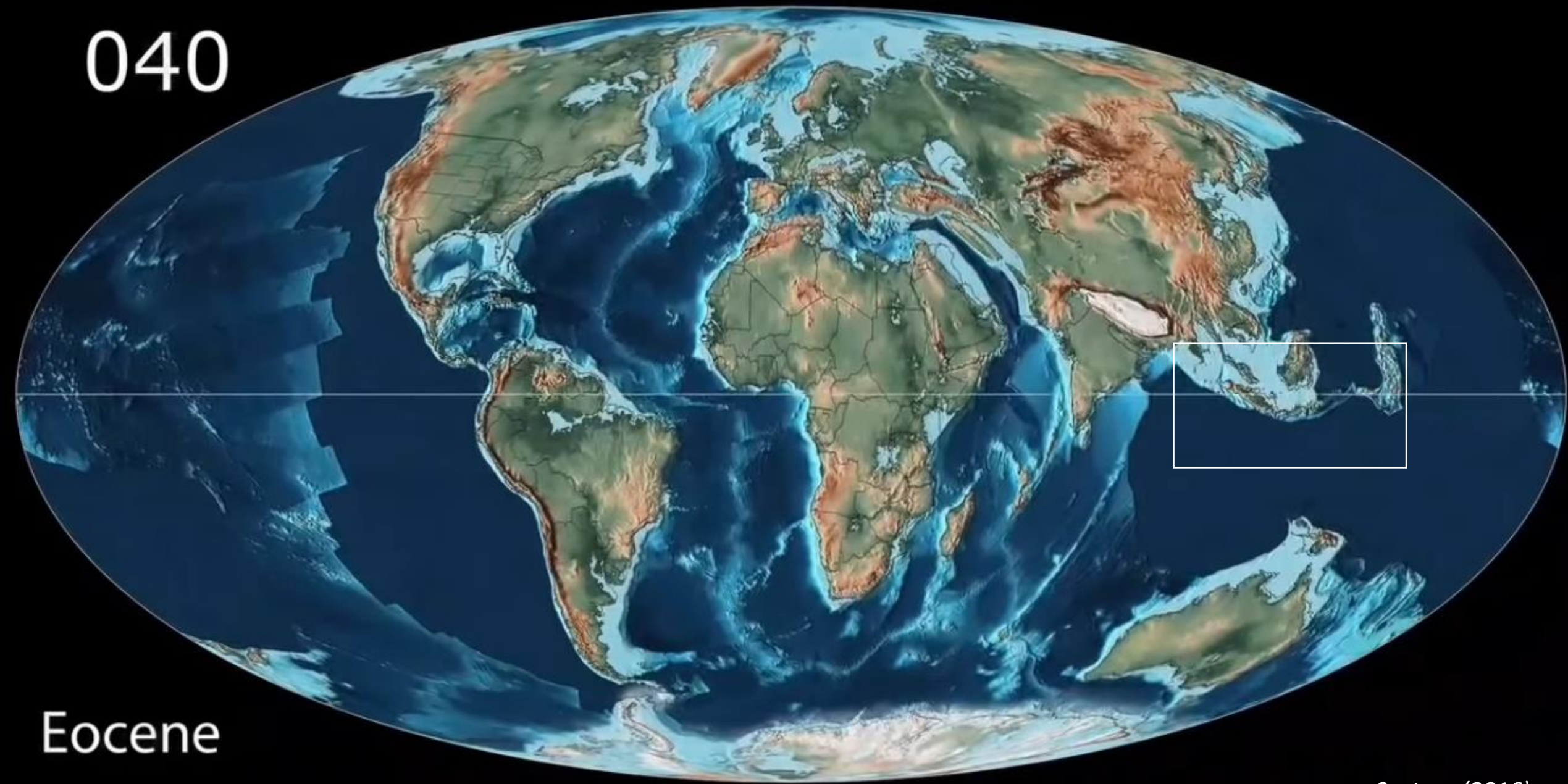
030



Oligocene

Scotese (2016)

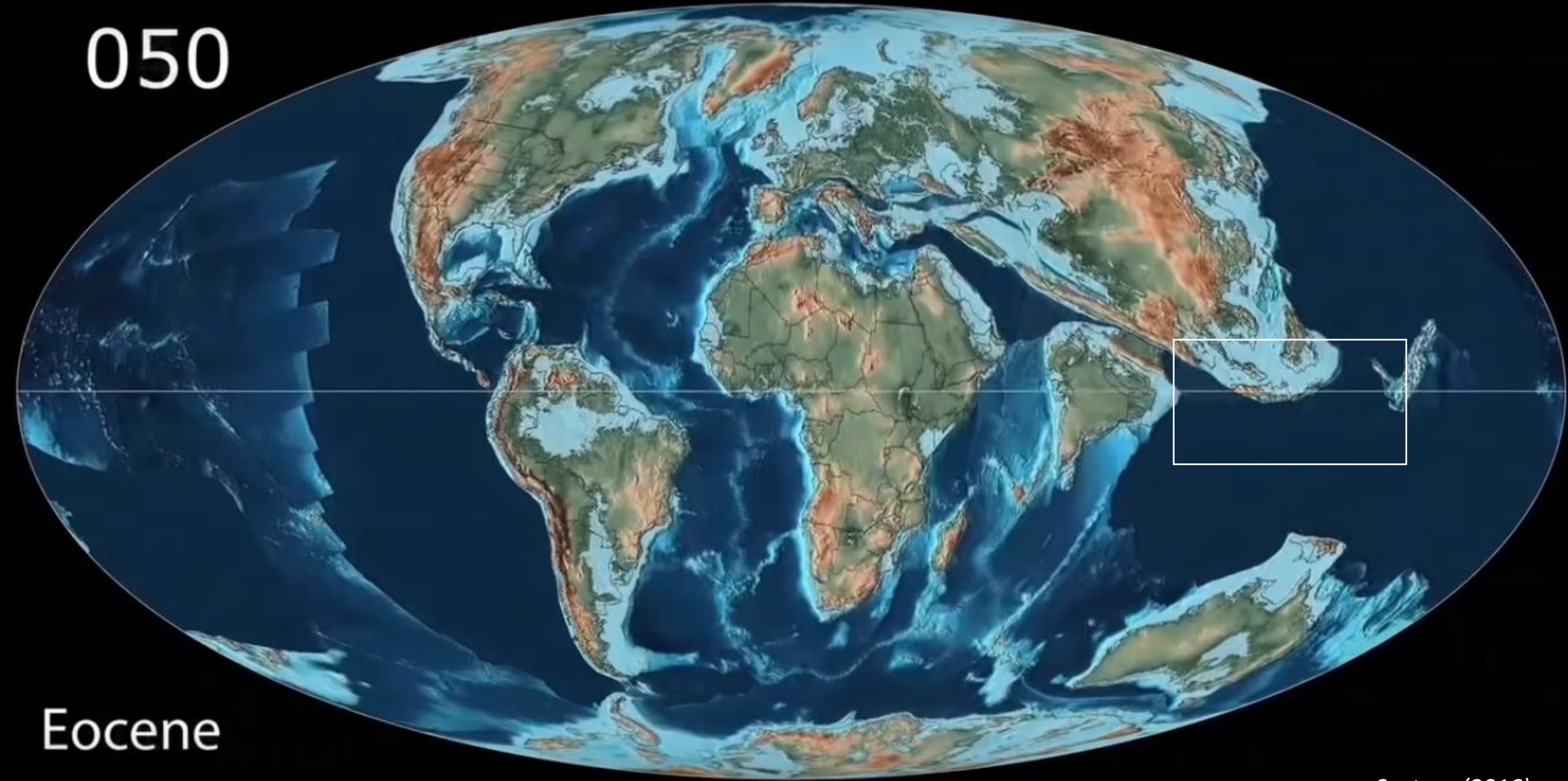
040



Eocene

Scotese (2016)

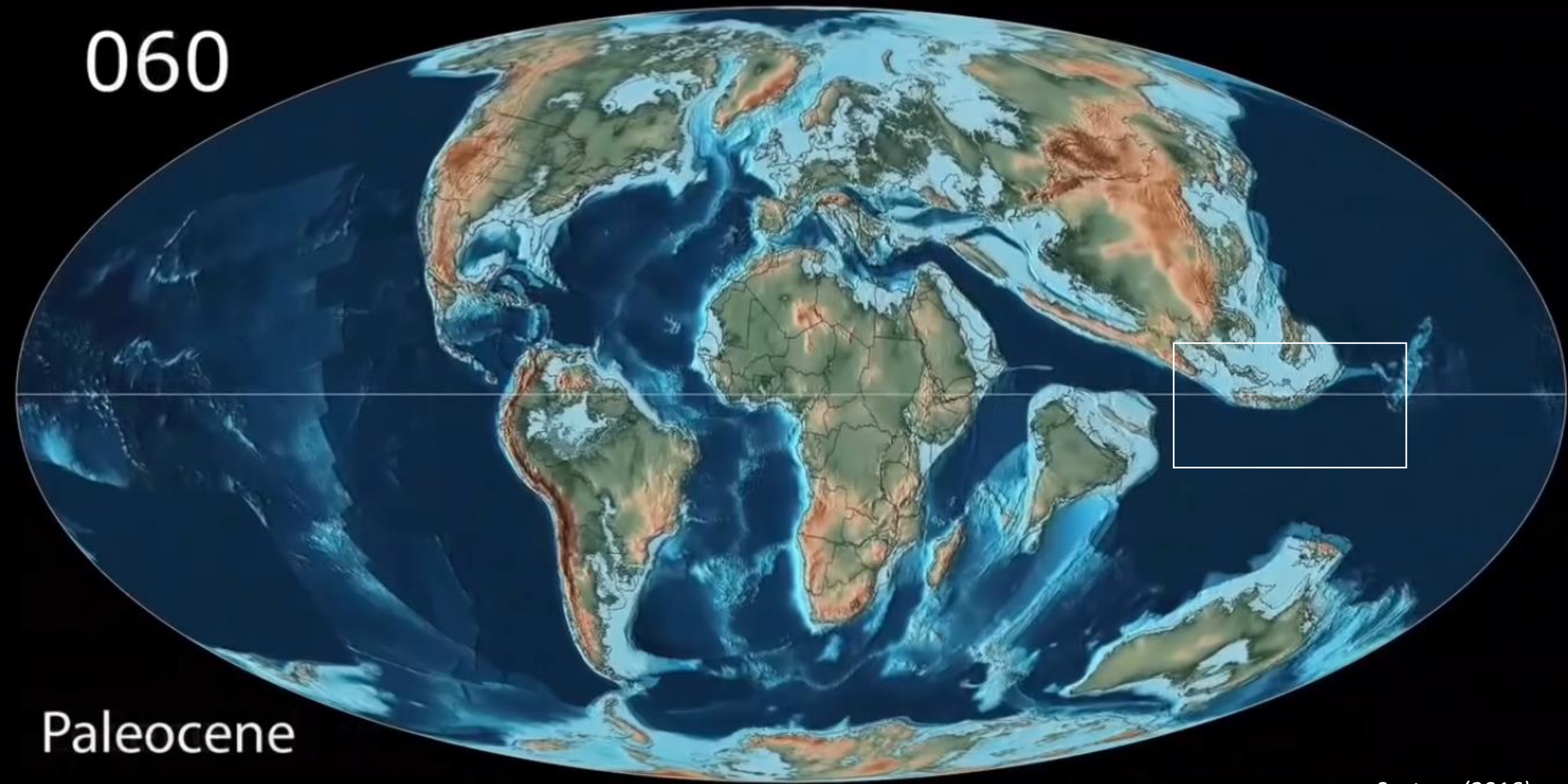
050



Eocene

Scotese (2016)

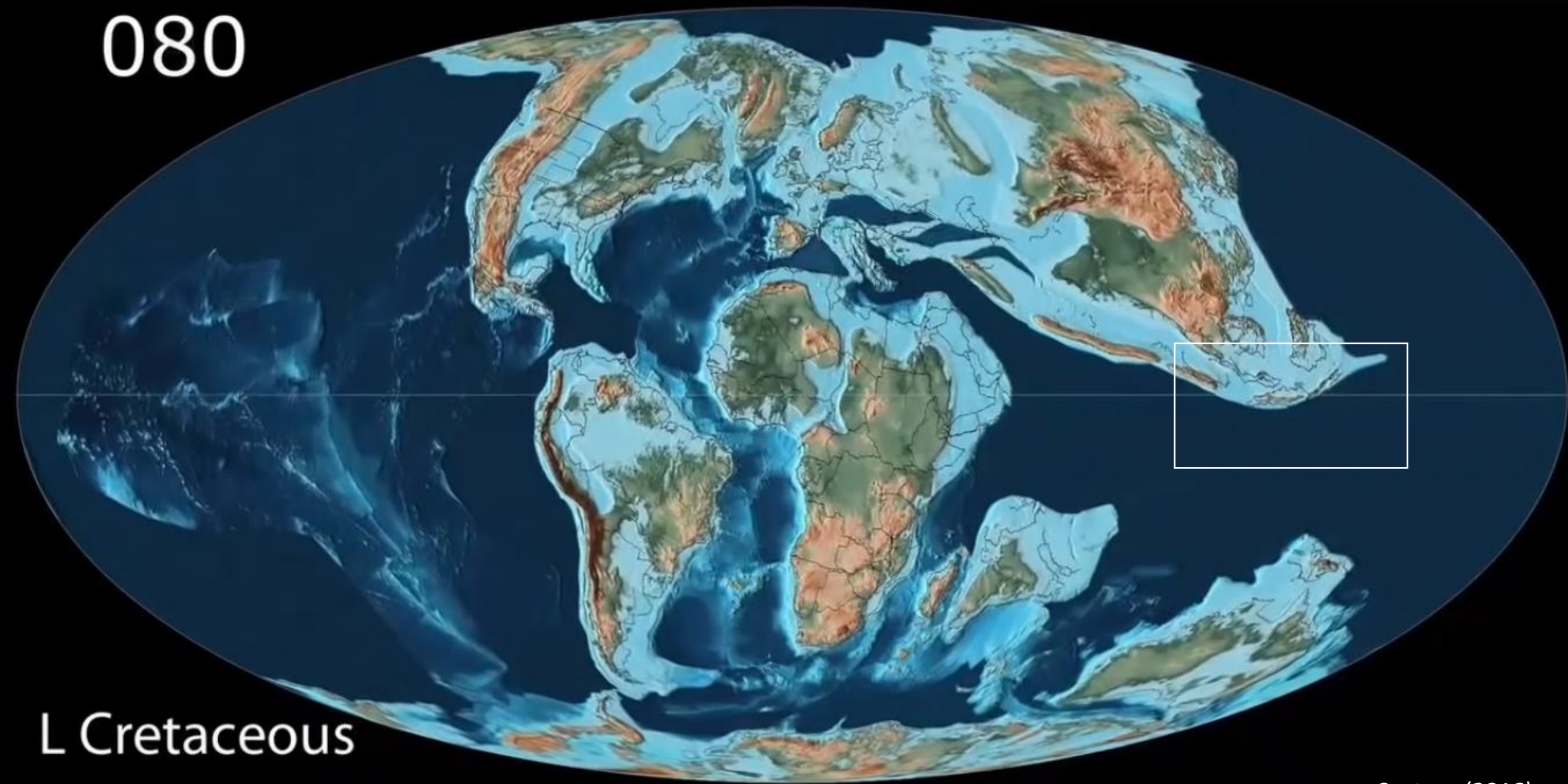
060



Paleocene

Scotese (2016)

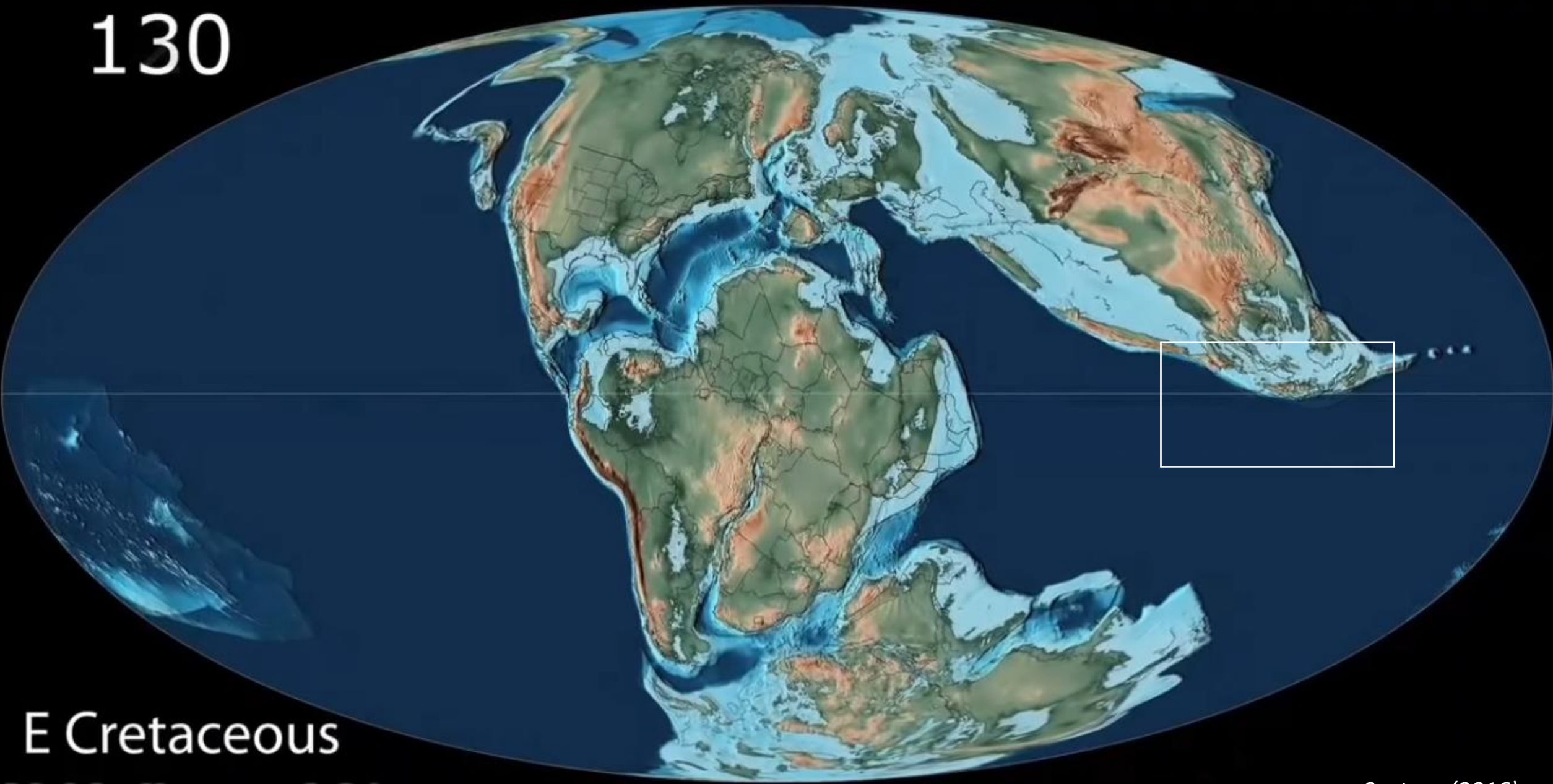
080



L Cretaceous

Scotese (2016)

130

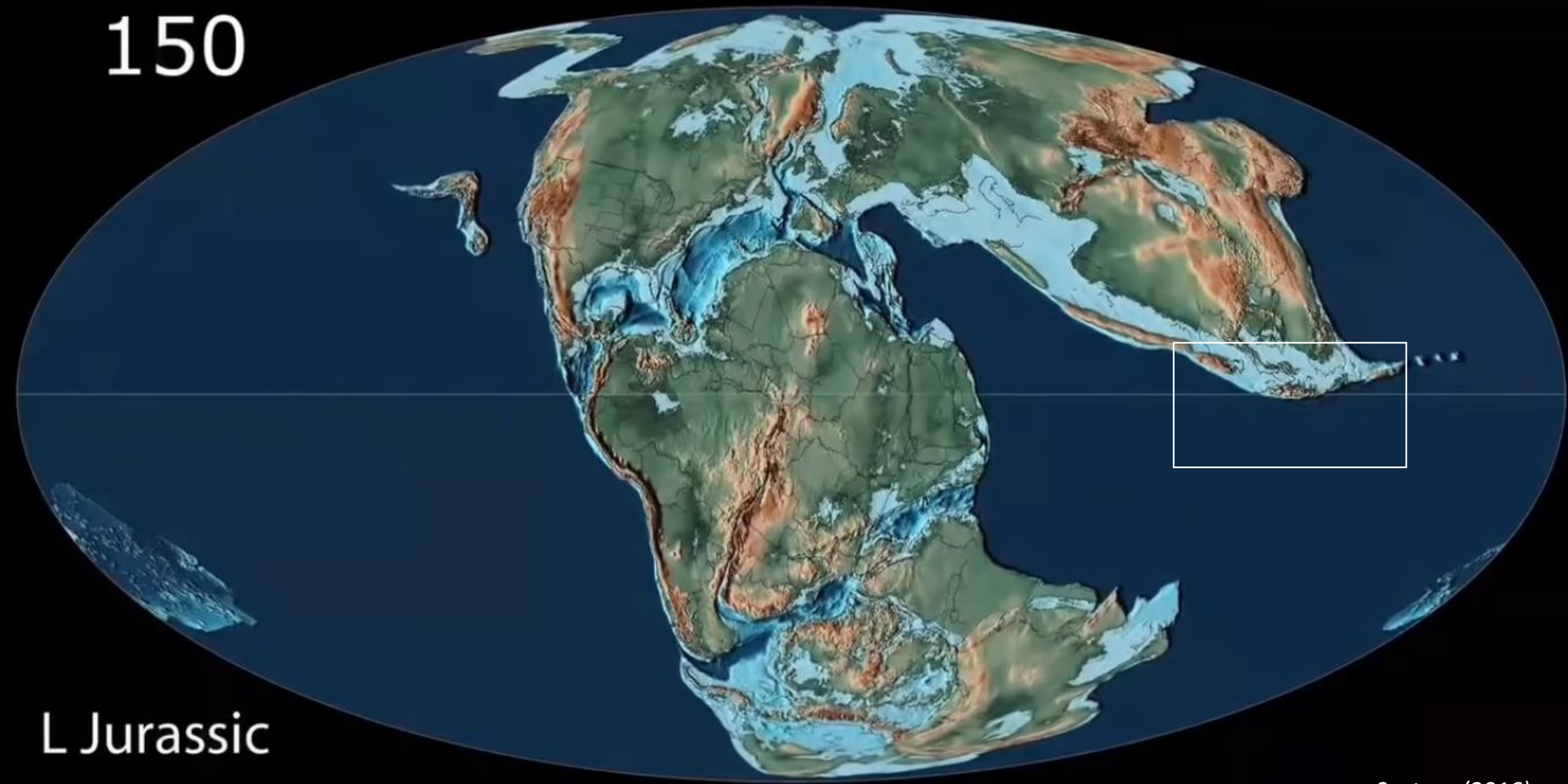


E Cretaceous

Scotese (2016)

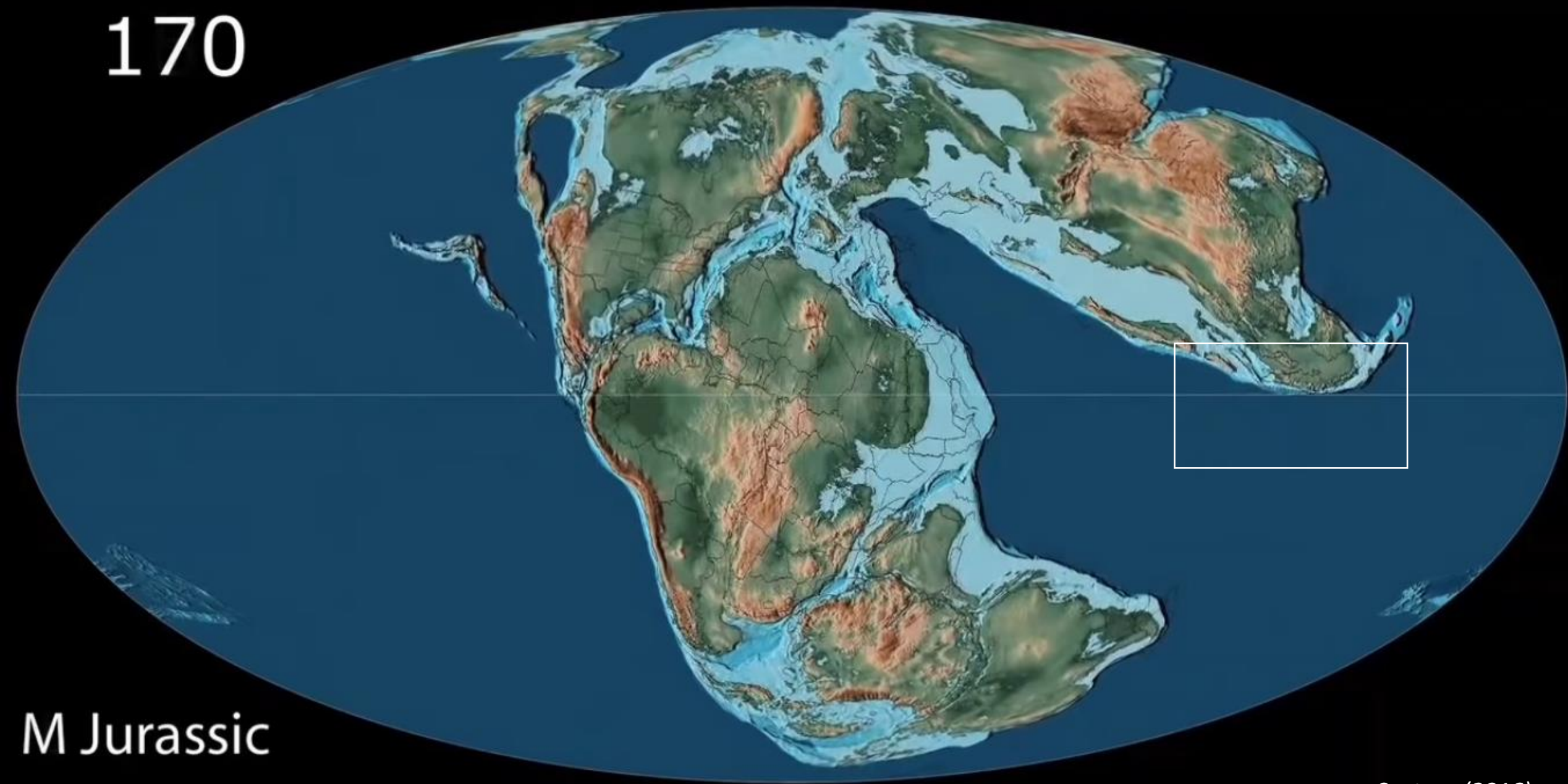
150

L Jurassic



Scotese (2016)

170

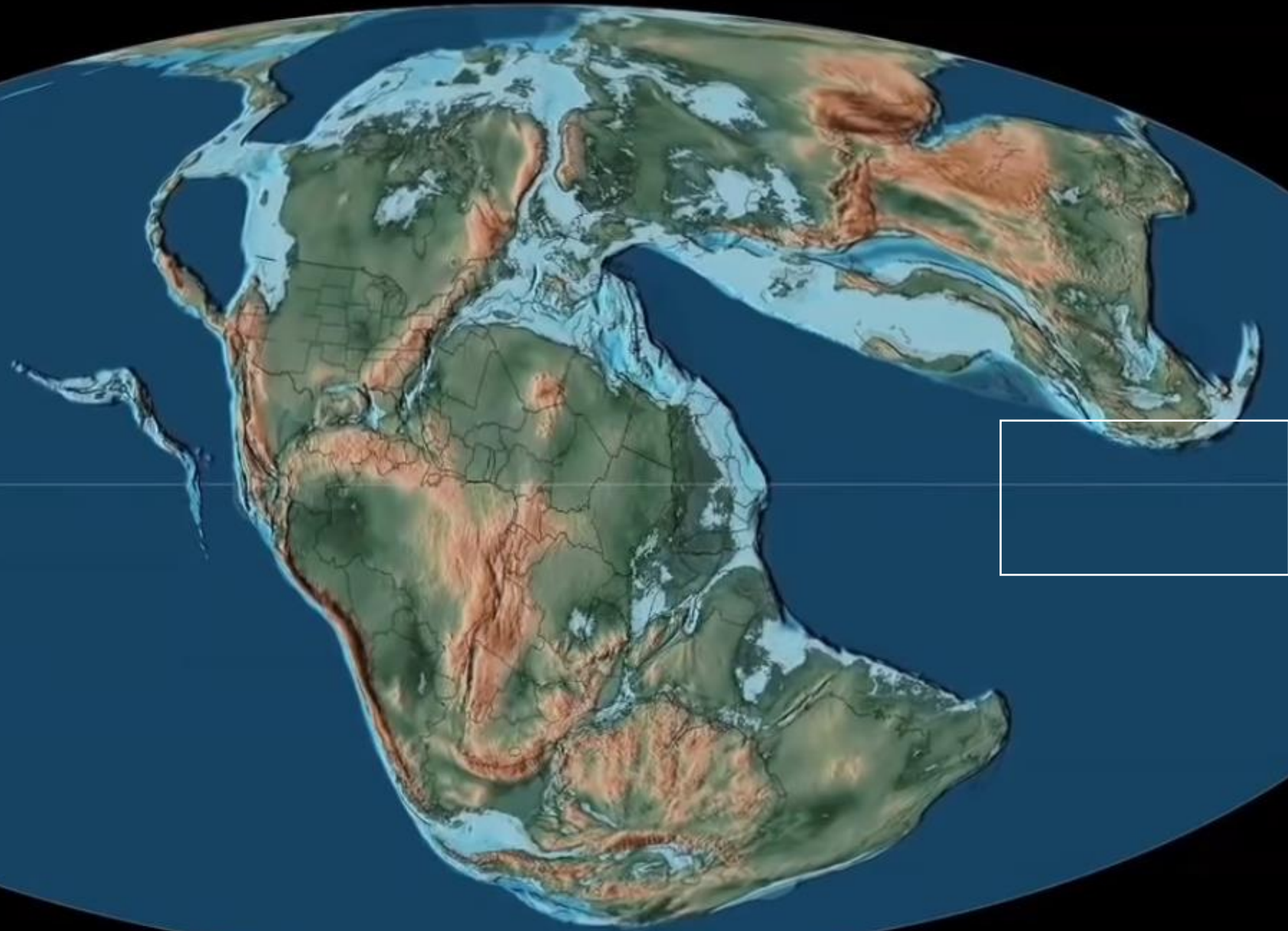


M Jurassic

Scotese (2016)

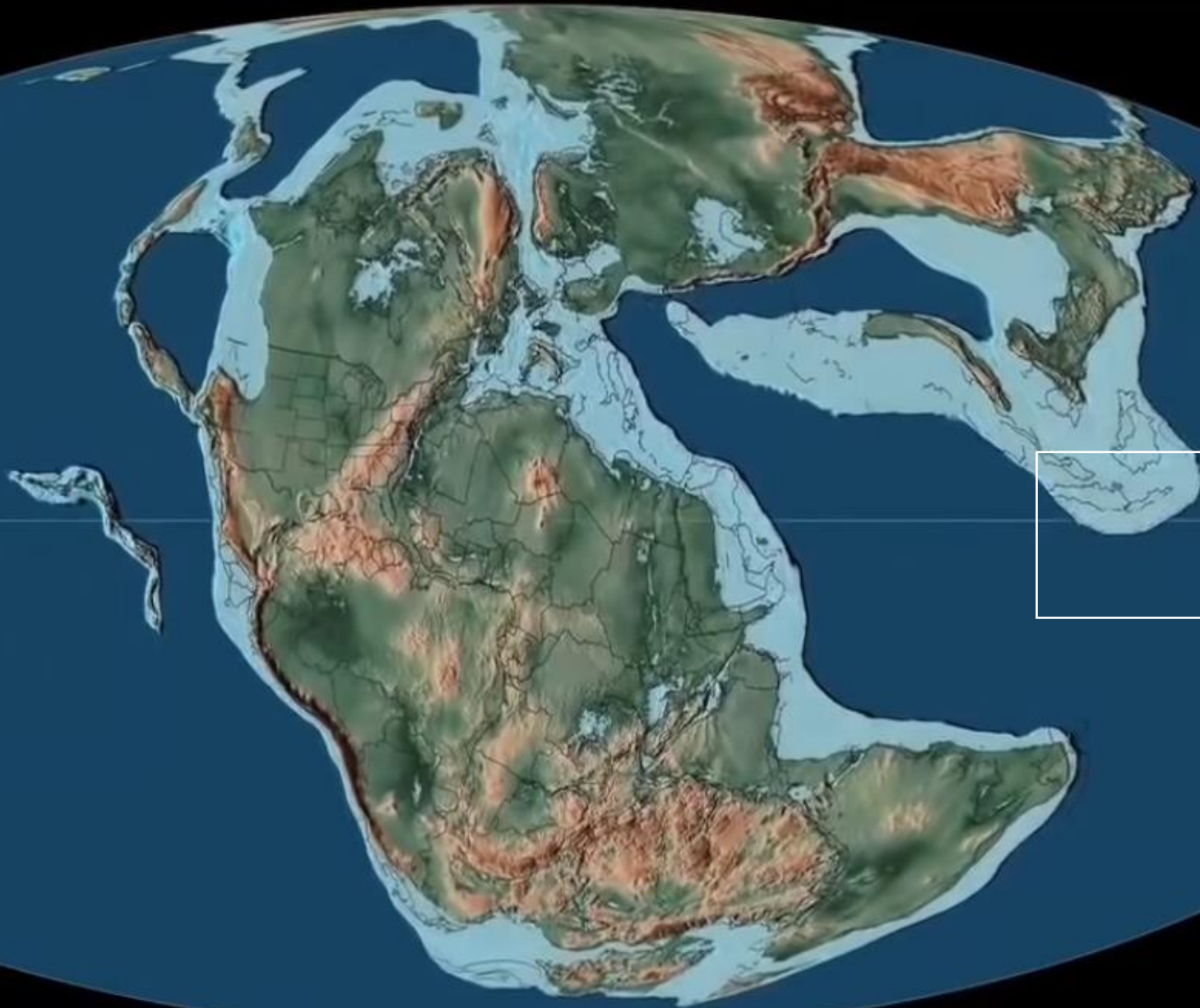
190

E Jurassic



220

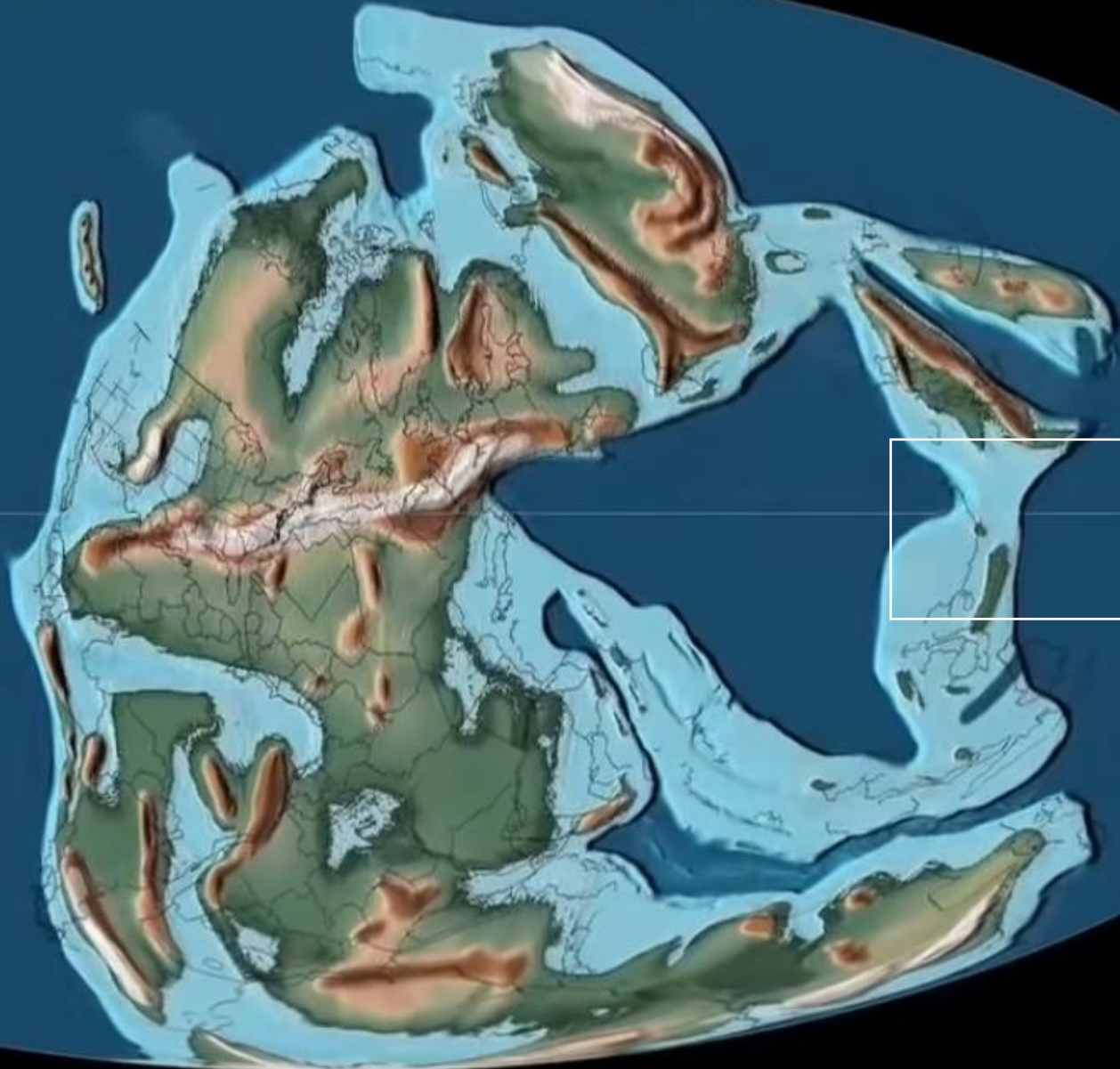
Triassic



Scotese (2016)

280

Permian



Scotese (2016)

Diskusi

1. Kepentingan Pariwisata Indonesia
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4. Berkah Geowisata Indonesia



Latar Belakang

Tempat pertemuan 3 lempeng tektonik besar, yaitu lempeng **Indo-Australia, Eurasia** dan **Lempeng Pasifik**



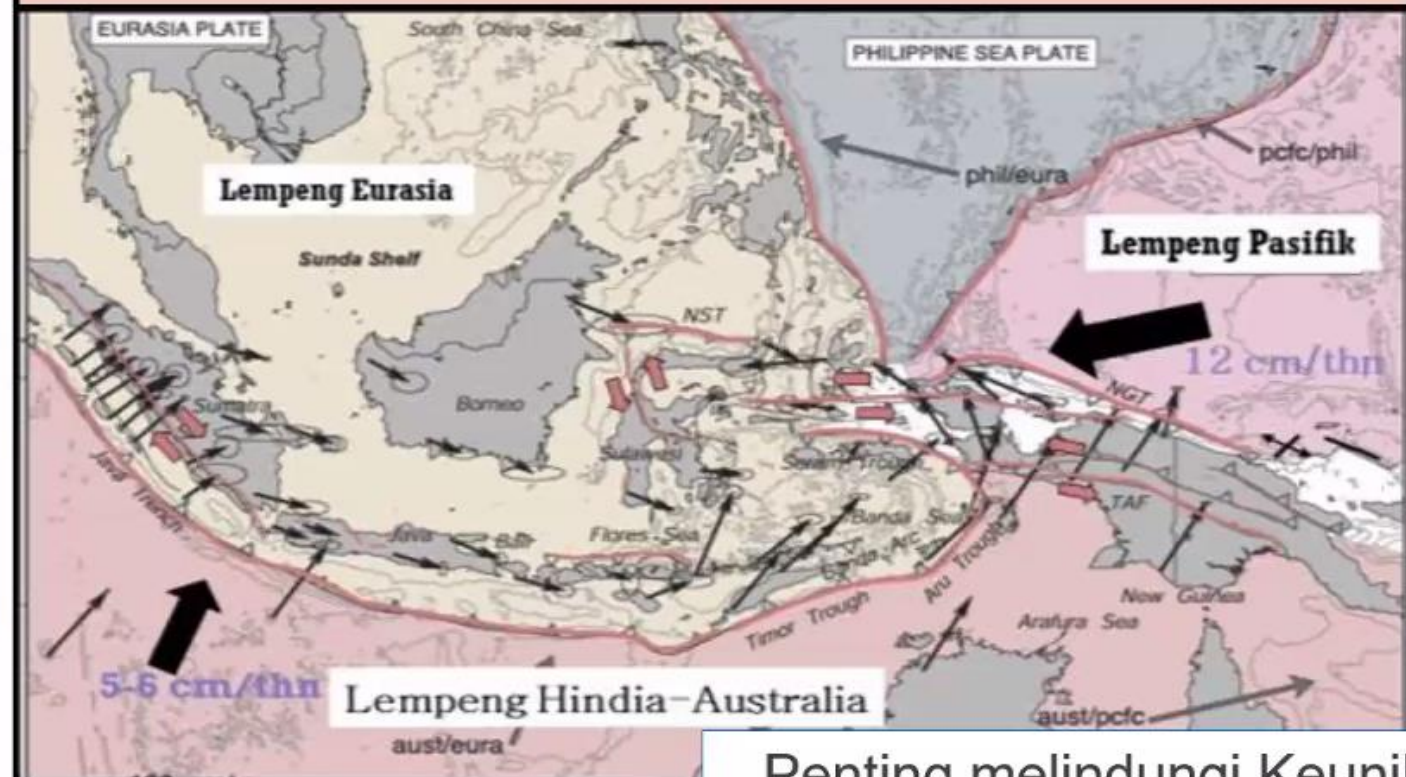
Kondisi tektonik menimbulkan **keragaman dan keunikan serta nilai kelangkaan dan keindahan objek geologi**, yang bermanfaat sebagai:

- Pengembangan ilmu kebumihian
- Pengembangan pariwisata



Penting melindungi Keunikan Geologi yang menjadi bukti pembentukan Planet Bumi
Penetapan KCAG adalah solusinya

INDONESIA : Laboratorium Alam



Pengklasifikasian Warisan Geologi



Nilai Ilmiah



Nilai Edukasi



Nilai Pariwisata

Nilai Ilmiah

nilai – nilai keilmuan khususnya pada suatu situs warisan geologi yang dapat menjelaskan fitur dan proses geologi.

Terdapat 4 (empat) kriteria dalam penilaian *scientific* yaitu:

1. suatu situs warisan geologi yang dapat mewakili topik geologi, proses, unsur, dan kerangka geologi;
2. hubungan status konservasi suatu lokasi situs warisan geologi;
3. suatu unsur geologi yang tidak dapat ditemukan di lokasi lain; dan
4. keterdapat data *scientific* yang telah terpublikasi mengenai lokasi situs warisan geologi tersebut

Nilai Edukasi

nilai – nilai pendidikan yang terkandung dalam suatu situs warisan geologi sehingga dapat menjadi pembelajaran pada setiap jenjang pendidikan. Nilai-nilai pendidikan tersebut didasarkan pada 4 (empat) kriteria yaitu:

1. kapasitas suatu unsur geologi yang dapat dimengerti oleh siswa dengan berbagai tingkat pendidikan,
2. jumlah keragaman suatu unsur geologi yang dapat dijadikan pembelajaran,
3. akses untuk sampai ke lokasi situs warisan geologi, dan
4. keamanan bagi para siswa saat melakukan pembelajaran di lokasi situs warisan geologi.

Nilai Pariwisata

nilai – nilai pariwisata yang terkandung dalam suatu situs warisan geologi yang dapat memberikan nilai tambah pendapatan suatu daerah. Nilai-nilai pariwisata tersebut didasarkan pada 4 (empat) kriteria yaitu:

1. berhubungan dengan keindahan suatu pemandangan geologi untuk dapat dilihat dari berbagai arah,
2. kemudahan untuk dapat dimengerti oleh orang awam,
3. kemudahan akses bagi para pengunjung umum, dan
4. keamanan bagi para wisatawan.



Suatu wilayah geografis tunggal



Memiliki Situs Warisan Geologi (Geosite) dan bentang alam yang bernilai (Nasional/Internasional)



Memiliki keterkaitan antara aspek geo, bio dan culture

Pengertian Geopark

Kegiatan Konservasi, edukasi, dan pembangunan perekonomian masyarakat



Dikelola secara berkelanjutan dengan keterlibatan aktif dari masyarakat



Menumbuhkan pemahaman dan kepedulian masyarakat terhadap bumi dan lingkungan



Asep Permana – Badan Geologi (2022)



Geology for Protection and Public Prosperity

www.geologi.esdm.go.id

[@kabargeologi](https://twitter.com/kabargeologi)

Badan Geologi

Badan Geologi

[@kabargeologi](https://www.instagram.com/kabargeologi)

UNESCO GLOBAL GEOPARK

1. Batur
2. Gunung Sewu
3. Ciletuh-Palabuhanratu
4. Rinjani-Lombok
5. Kaldera Toba
6. Belitong
7. Maros Pangkep
8. Merangin Jambi
9. Ijen
10. Raja Ampat

NATIONAL GEOPARK

1. Tambora
2. Bojonegoro
3. Pongkor
4. Natuna
5. Karangsambung-Karangbolong
6. Sawahlunto
7. Ngaraisianok-Maninjau
8. Silokek
9. Meratus

Geopark Indonesia

Indonesian Geopark





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English



Our Expertise ▾

Our Impact ▾

Ideas & Data ▾

Get Involved ▾



International Geoscience and Geoparks Programme

International Geoscience and Geoparks Programme

Indonesia

- [Batur UNESCO Global Geopark](#)
- [Belitong UNESCO Global Geopark](#)
- [Ciletuh - Palabuhanratu UNESCO Global Geopark](#)
- [Gunung Sewu UNESCO Global Geopark](#)
- [Ijen UNESCO Global Geopark](#)
- [Maros Pangkep UNESCO Global Geopark](#)
- [Merangin Jambi UNESCO Global Geopark](#)
- [Raja Ampat UNESCO Global Geopark](#)
- [Rinjani-Lombok UNESCO Global Geopark](#)
- [Toba Caldera UNESCO Global Geopark](#)

List of UNESCO Global Geoparks and Regional Networks

A UNESCO Global Geopark uses its geological heritage, in connection with all other aspects of the area's natural and cultural heritage, to enhance awareness and understanding of key issues facing society, such as using our earth's resources sustainably, mitigating the effects of climate change and reducing natural hazard-related risks. At present, 195 geoparks are found in 48 countries.

Last update: 25 May 2023

<https://www.unesco.org/en/igpp/geoparks?hub=67817>

Selamat datang Unesco Global Geopark terbaru di Indonesia (Mei 2023).

Geopark Maros-Pangkep



Geopark Raja Ampat



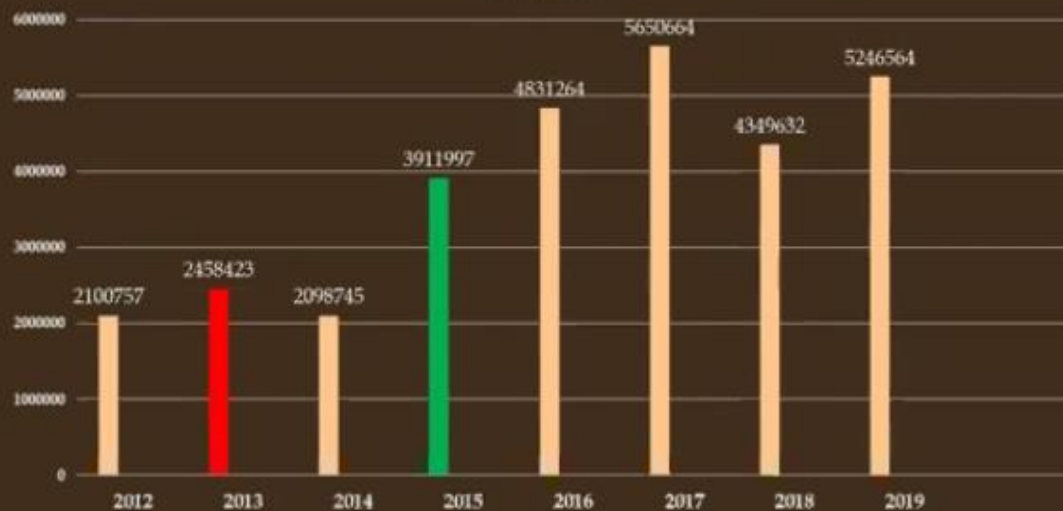
Geopark Ijen



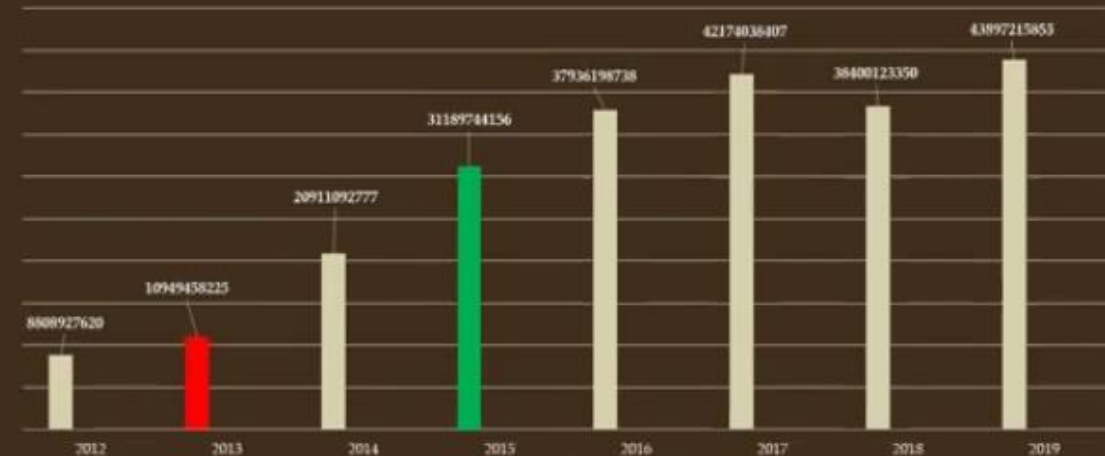
Geopark Merangin Jambi



TREND PERKEMBANGAN KUNJUNGAN WISATAWAN DI KAWASAN GUNUNG SEWU 2012-2019



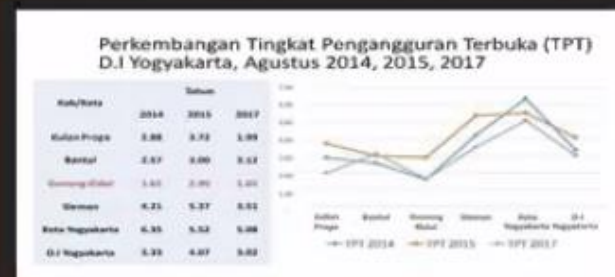
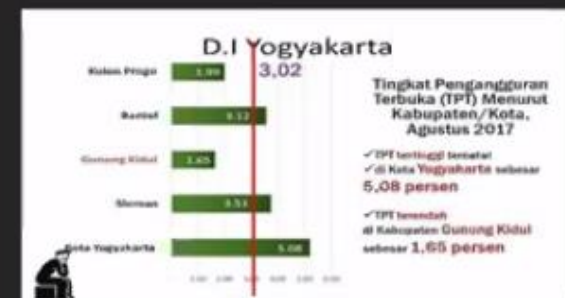
TREND PERKEMBANGAN PENDAPATAN ASLI DAERAH DI KAWASAN GUNUNG SEWU 2012-2019



TREND PERKEMBANGAN ANGKA KEMISKINAN DI KAWASAN GUNUNG SEWU 2012-2019



PENGANGGURAN





**PENGELOLA
GEOSITE**

**PENGELOLA
HOMESTAY**

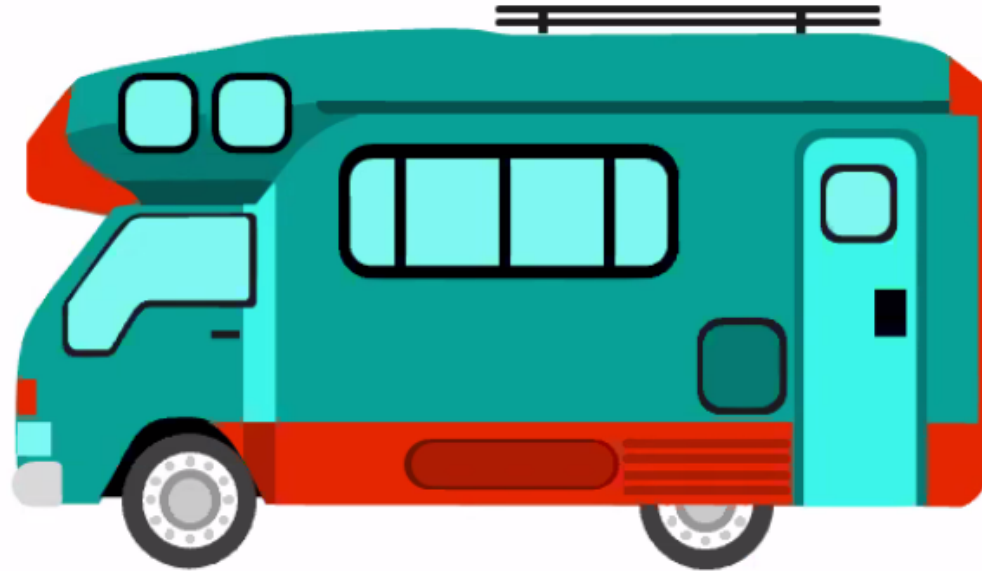
**PENGELOLA
GEOPRODUK**

**PENGELOLA
ATRAKSI**

**PENGELOLA
SAMPAH**



Konsep Geowisata



- Pendidikan Geologi
- Penelitian Geologi
- Konservasi Geologi
 - Regulasi Geologi
- Eksploitasi dan Eksplorasi Geologi

- Perencanaan dan Pengembangan
- Marketing
- Promosi
- Pembangunan Sarana Prasarana
- Pembangunan Berkelanjutan



Daya Tarik Geologi

Keunikan mineral dan batuan
Keunikan Fosil
Keunikan Struktur Geologi
Bentang Alam

Geowisata

Wisata alam berbasis
geologi dengan
mengedepankan prinsip
konservasi dan
berkelanjutan



Pariwisata

Wisata Alam
Wisata Alam Minat Khusus
Wisata Budaya
Special Event

Aspek Positif Geowisata



Diskusi

1. Kepentingan Pariwisata Indonesia
2. Geologi Indonesia
3. Warisan Geologi, Geopark, Geowisata
- 4. Berkah Geowisata Indonesia**



Potensi Warisan Geologi (KESDM, 2019)

110 POTENSI WARISAN GEOLOGI NUSANTARA

KALIMANTAN (10)

72. Bukit Kelam, Sintang, Kalbar
73. Danau Rawa Sentarum, Kalbar
74. Geantiklin Schwaner, Kalteng
75. Pegunungan Vulkanik Tua, Kalteng
76. Intan Martapura, Kalsel
77. Pegunungan Meratus, Kalsel
78. Delta Mahakam, Kaltim
79. Karst Sangkayang-Mangkalihat, Kaltim
80. Gunung Makita (Longnawan), Kaltara
81. Kubah Garam Krayan, Kaltara

SULAWESI (14)

82. Karst Maros-Pangkep, Sulsel
83. Melange Bantimala, Sulsel
84. Plato Toraja, Sulsel
85. Kompleks Danau Matili, Sulsel
86. Danau Tektonik Poso, Sulteng
87. Lembah Palu, Sulteng
88. Anjakan Batui, Sulteng
89. Danau Tektonik Umboto, Gorontalo
90. Plato Minahasa, Sulut
91. Air Terjun Maremo, Sultra
92. Aspal Buton, Sultra
93. Karst Muna, Sultra
94. Terumbu Karang Wakatobi, Sultra
95. Travertin Konawe, Sultra

MALUKU (5)

96. Karst Pulau Morotai, Maluku
97. Busur Vulkanik Halmahera, Maluku
98. Lava Bantal Bacan, Maluku
99. Metamorf Pulau Seram
100. Kompleks Gunungapi Banda Neira, Maluku

PAPUA (10)

101. Karst Rajaampat, Pabar
102. Sedimen Laut Dalam Misool, Pabar
103. Karst Ayamaru Sorong, Pabar
104. Kompleks Danau Anggi, Pabar
105. Kompleks Danau Paniai, Pabar
106. Puncak Newangkawi, Jayawijaya, Papua
107. Lembah Baliem, Wamena, Papua
108. Danau Habbema, Wamena, Papua
109. Danau Sentani, Jayapura, Papua
110. Sabana & Rawa Wasur, Merauke, Papua

SUMATRA (22)

1. Vulkanik Pulau Weh, NAD
2. Tsunami Aceh Besar, NAD
3. Tektono Laut Tawar, NAD
4. Kaldera Danau Tobo, Sumut
5. Bono Sungai Kampar, Riau
6. MetaSedimen Natuna, Kepri
7. Lembah Harau, Sumbar
8. Maninjau-Ngarai Sianok, Sumbar
9. Karst Kamang Mudiak, Sumbar
10. Danau Singkarak, Sumbar
11. Tambang Sawahlunto, Sumbar
12. Danau Kembar Solok, Sumbar
13. Gunung Kerinci, Sumbar-Jambi
14. Graben Sungaienuh, Jambi
15. Paleoflora Merangin, Jambi
16. Emas Lebong Tandil, Bengkulu
17. Endokarst Padanghindu, Sumsel
18. Danau Kaldera Rantau, Sumsel
19. Kompleks Kaldera Suoh, Lampung
20. Diabas Permian Bangka, Babel
21. Lava Bantal Belitang, Babel
22. Kompleks Krakatau, Lampung

34. Panabumi Plato Garut, Jabar
35. Bukit Sepuluhribo Galunggung, Jabar
36. Cukangtaneuh Pangandaran, Jabar
37. Laguna Segara-anakan Gilacap, Jateng
38. Karst Karaholong, Jate

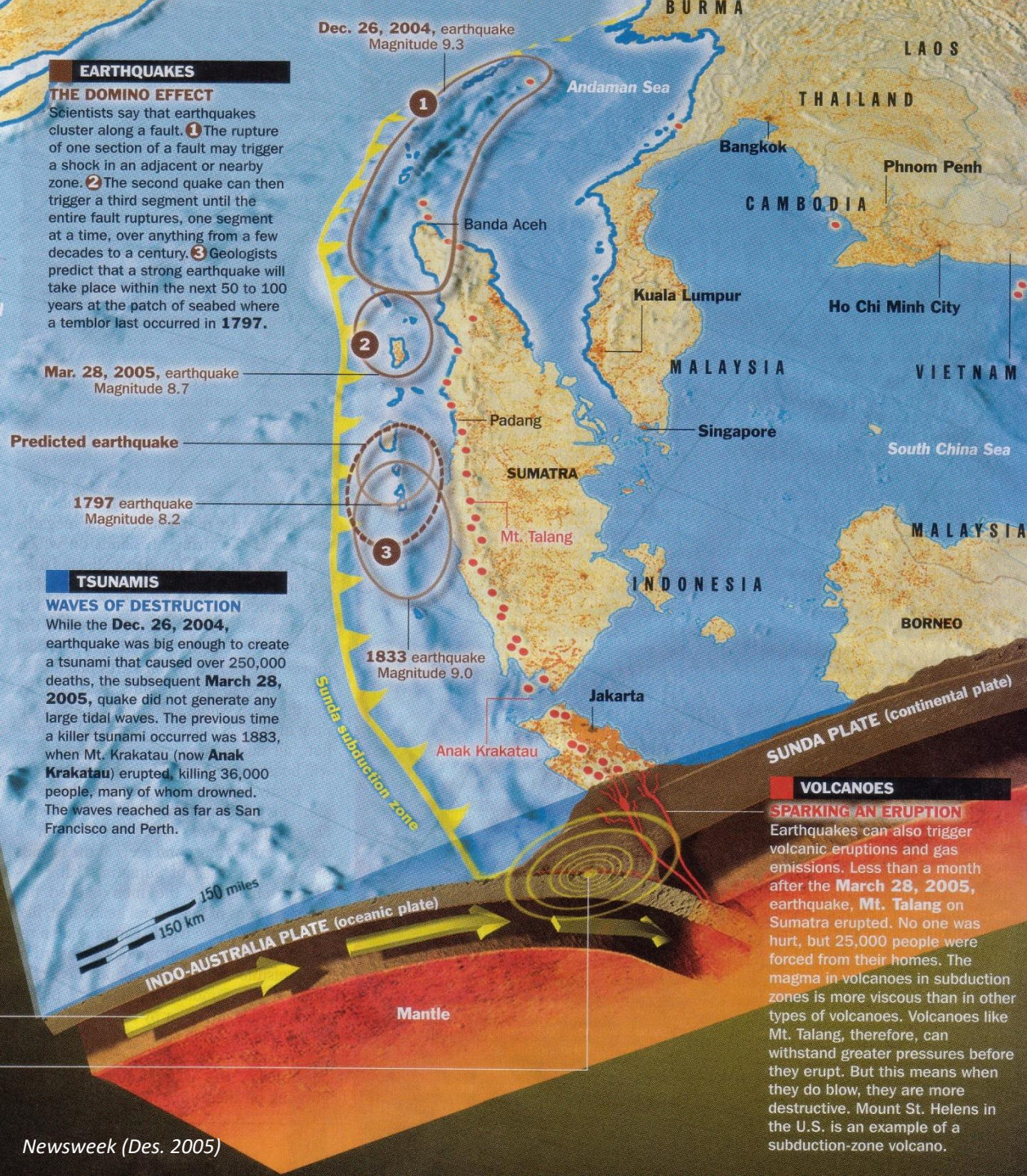
47. Situs Fosil Gajah Blora, Jateng
48. Geologi Migas Bojonegoro, Jatim
49. Gunungapi Purba Bawean, Jatim
50. Gunungapi Lumpur Sidoarjo, Jatim

JAWA-MADURA (33)

23. Kaldera Rawa Danau, Banten
24. Gunungapi Tua Ujungkulon, Banten
25. Bayah Dome, Banten
26. Kepulauan Seribu, DKI Jakarta
27. Muara Sungai Citarum, Jabar
28. Bekas Tambang Emas Pongkor, Jabar
29. Geyser Cisolok, Sukabumi, Jabar
30. Melange Ciletuh, Sukabumi, Jabar
31. Karst Rajamandala, Jabar
32. Gunung Sunda Tua, Jabar
33. Cekungan Bandung, Jabar
39. Melange Karangsambung, Kebumen, Jateng
40. Plato Vulkanik Dieng, Jateng
41. Vulkano Merapi-Merbabu, Jateng
42. Telaga Purba Borobudur, Jateng
43. Gumuk Pasir Parangtritis, Yogyakarta
44. Karst Pegunungan Sewu, Jateng-Jatim
45. Situs Manusia Purba Dome Sangiran, Jateng
46. Kepulauan Karimunjawa, Jateng
51. Antiklinorium Pulau Madura, Jatim
52. Kompleks Bromo-Tangger, Jatim
53. Kompleks Vulkano Semeru, Jatim
54. Kompleks Vulkano Ijen, Jatim
55. Sabana Baluran, Jatim

BALI-NUSA TENGGARA (16)

56. Danau Kaldera Buyan-Bratan, Bali
57. Kompleks Kaldera Batur, Bali
58. Semenanjung Jimbaran, Bali
59. Karst Nusa Penida, Bali
60. Kompleks Kaldera Rinjani, Lombok, NTB
61. Vulkanik Tua Bawah Laut, Lombok, NTB
62. Bekas Tambang Emas Batuhijau, NTB
63. Gunung Tambora, Sumbawa, NTB
64. Danau Vulkanik Tua Satornda, NTB
65. Vulkanik Tua Kep.Komodo, Flores, NTT
66. Danau Kaldera Sanonggoang, Flores, NTT
67. Situs Fosil Purba Cekungan Soa, Flores, NTT
68. Gunung Kelimutu, Flores, NTT
69. Mikrokontinen Sumba, NTT
70. Geantiklin Pulau Sawu, NTT
71. Clay Melange Timor, NTT



Tsunami Aceh, 26 Des. 2004

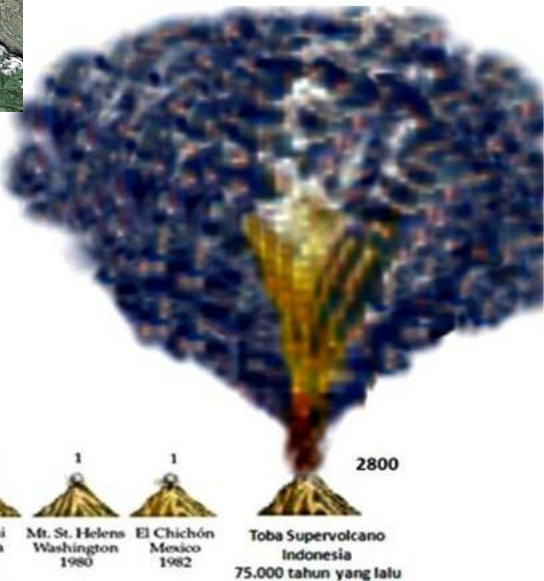
- Awang Satyana, June 2021



Danau Toba, Erupsi Katastrofik 74 Ka - Awang Satyana, June 2021



Bowen (2012)



Merdeka.com

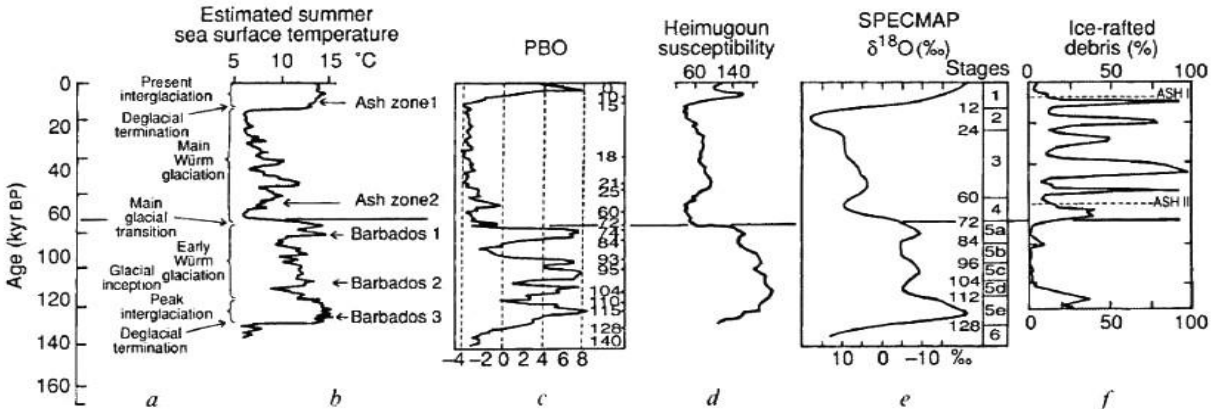
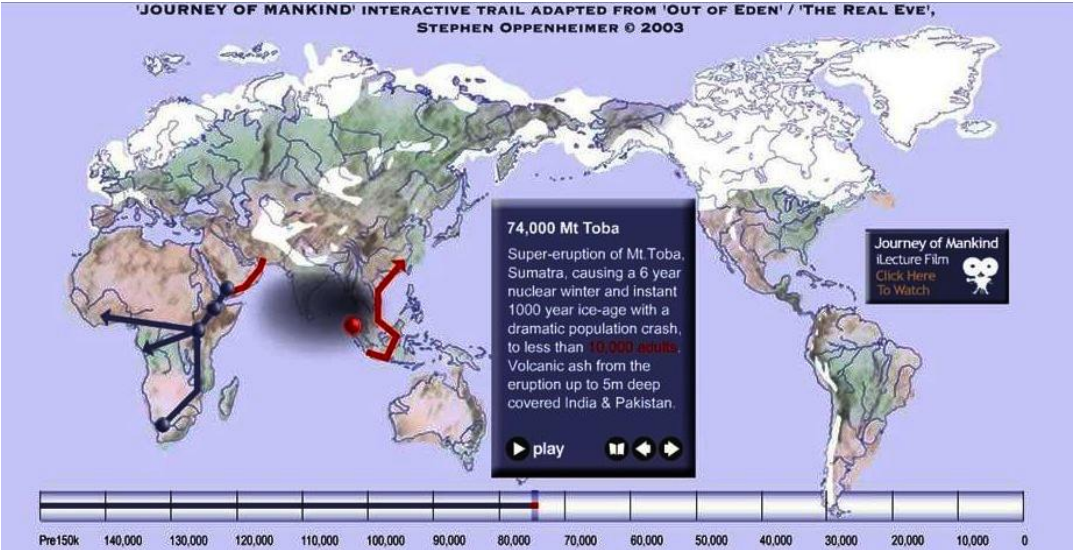


FIG. 1 Climate indicators for the past 140 kyr. a, Climatic states³³. b, Reconstructed summer SST (planktonic foraminiferal assemblage data), deep-sea core V23-82, North Atlantic¹⁵. Dates: Ash Zone 1 (9.5 kyr), Ash Zone 2 (65 kyr), Barbados 1 Terrace (~85 kyr), Barbados 2 (~110 kyr) and Barbados 3 (~125 kyr). c, Palaeobioclimatic operator (PBO), a measure of the 'best possible' climate profile based on multivariate statistical analysis of Les Echets, France pollen records. Higher PBO indicates warmer climate.

The vertical scale is nonlinear⁴⁵. d, Magnetic susceptibility, Heimugoun loess section, Central China. Loess in palaeosols formed in warm intervals has higher susceptibility than loess deposited in cold intervals⁴⁶. e, SPECMAP δ¹⁸O scale. Stages and dates of boundaries shown at right³. δ¹⁸O = [(¹⁸O/¹⁶O)_{sample}/(¹⁸O/¹⁶O)_{standard}] - 1, where standard is PDB (cretaceous belemnite carbonate). f, Percentage of ice-rafted detritus in North Atlantic deep-sea core Me69-17. Depth in metres¹⁴.

Rampino & Self (1992)



Oppenheimer (2003)

Pulau Natuna

- Awang Satyana, June 2021



Tempo.co



Kastara.id



minanews.net



tagar.id

Tokongbelayar, Granit Anambas, 80-70 juta tahun, pulau terluar teritorial



foto: Johannes Karundeng

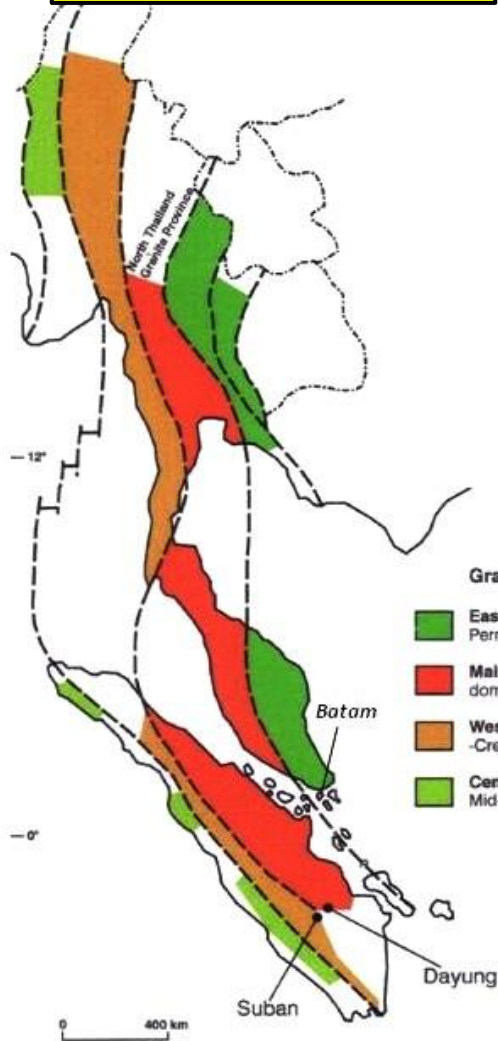
Granit Natuna (100-70 juta tahun)



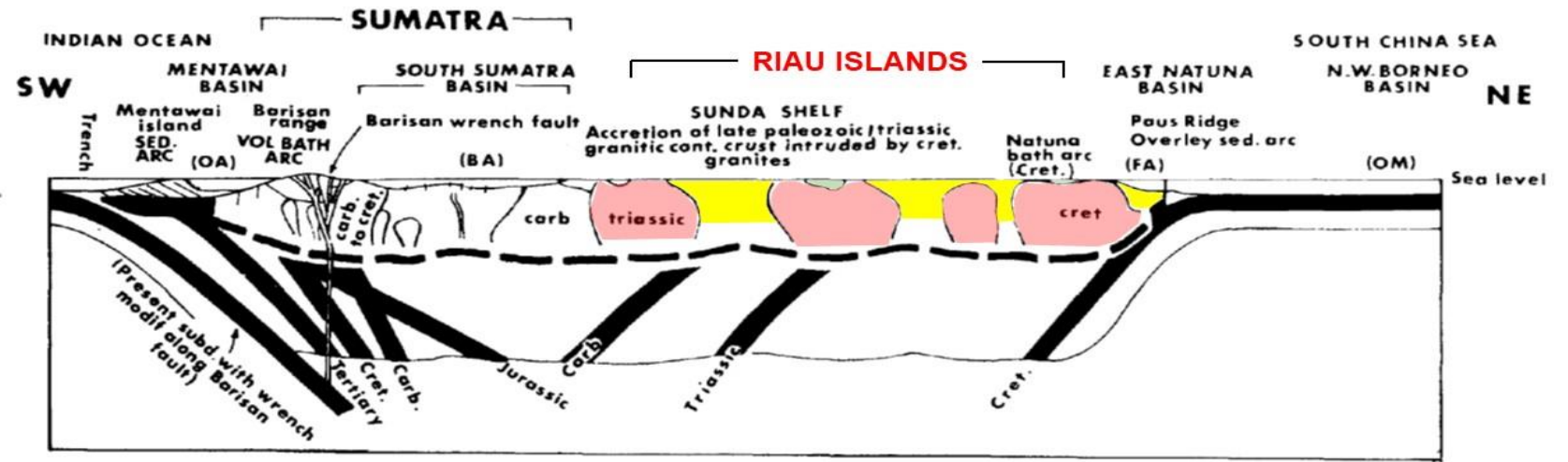
foto: Johannes Karundeng

Further Research!

On the Origins of Sumatran to Riau Islands Granites: Petrotectonic Study – Awang Satyana & Johannes Karundeng



Cobbing et al. (1992)



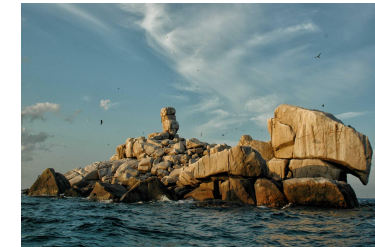
Gage & Wing (1980), Katili (1980), Pulunggono (1985)



Karimun



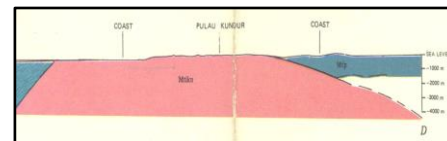
Batam



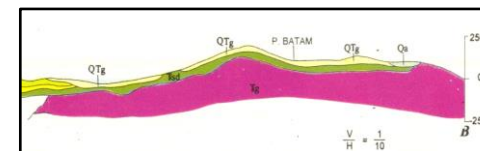
Anambas



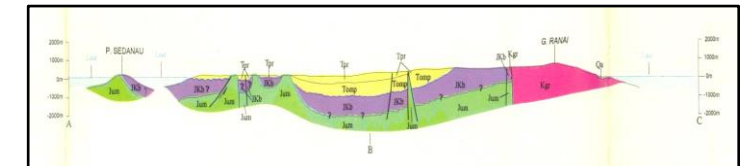
Natuna



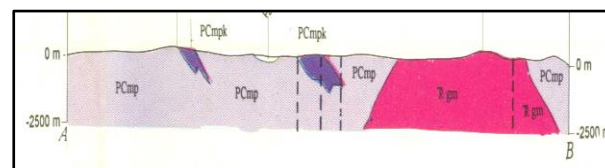
Karimun - Cameron et al. (1982)



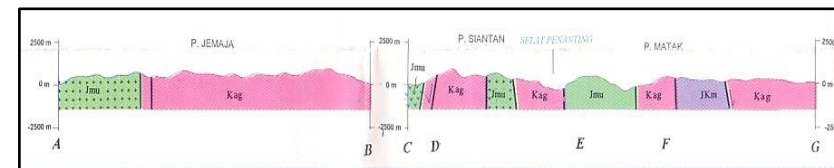
Batam - Kusnana et al. (1994)



Natuna - Hakim & Suryono (1994)

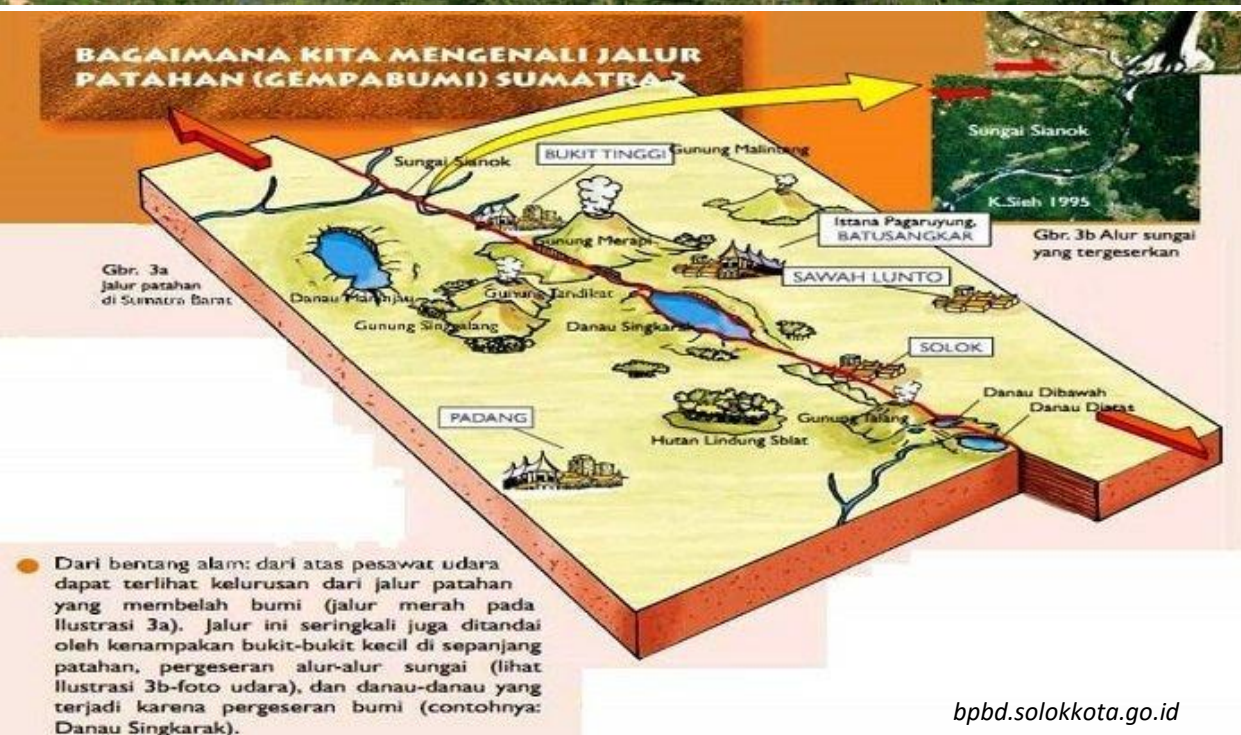


Singkep - Sutisna et al. (1994)



Anambas - Samodra (1995)

Topografi Sesar Sumatra - Awang Satyana, June 2021



Merangin Jambi, fosil flora 300-275 Ma - Awang Satyana, June 2021



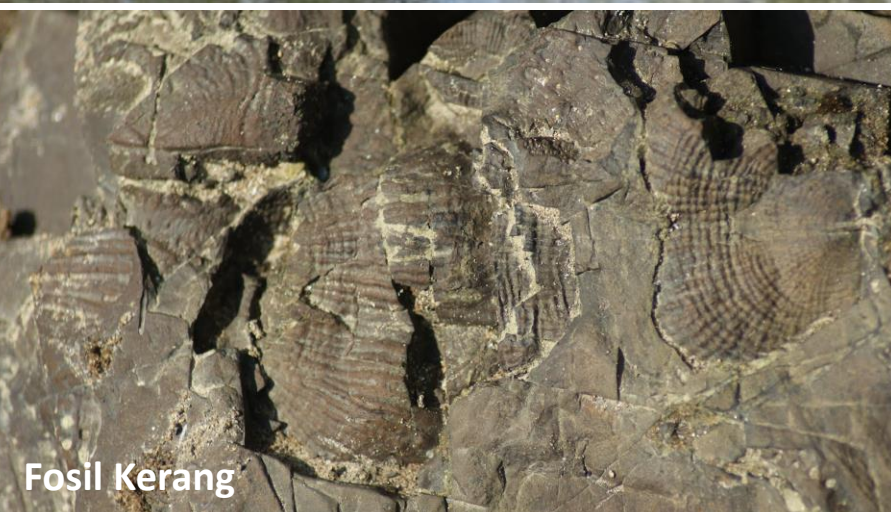
youtube

Fosil Pakis



youtube

Fosil Pandan



Fosil Kerang



indephedia.com



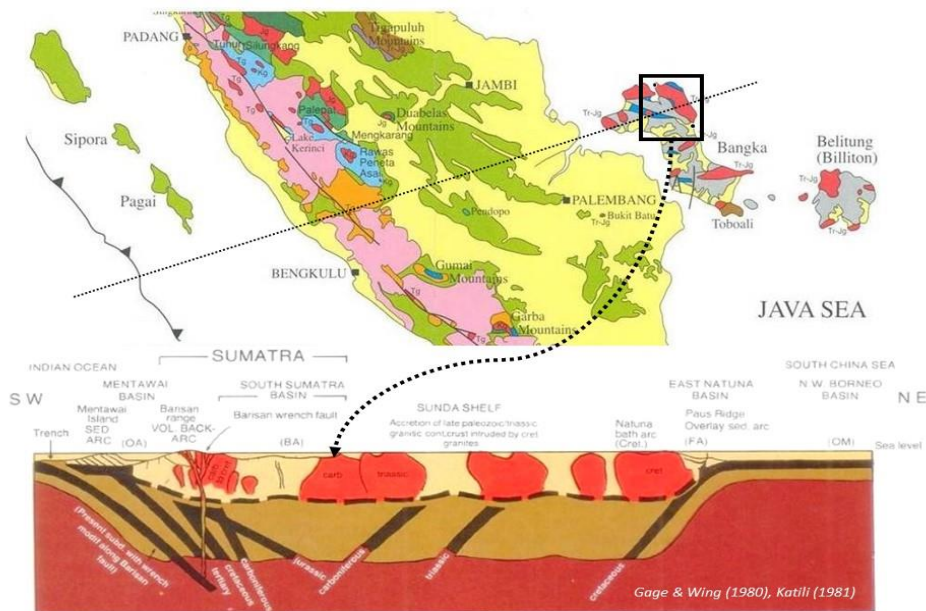
youtube

Fosil Pohon

Belitung



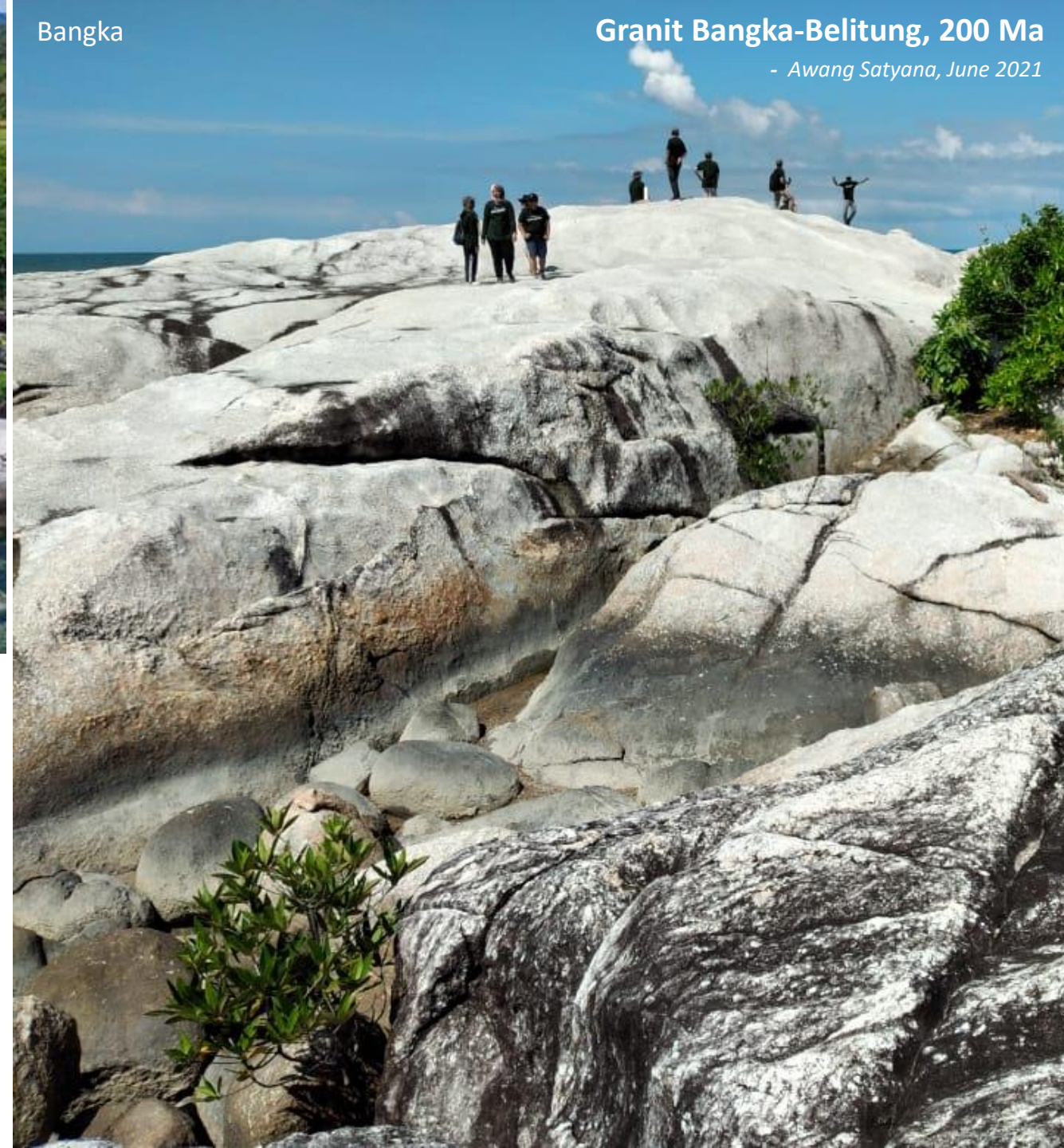
Travel Kompas



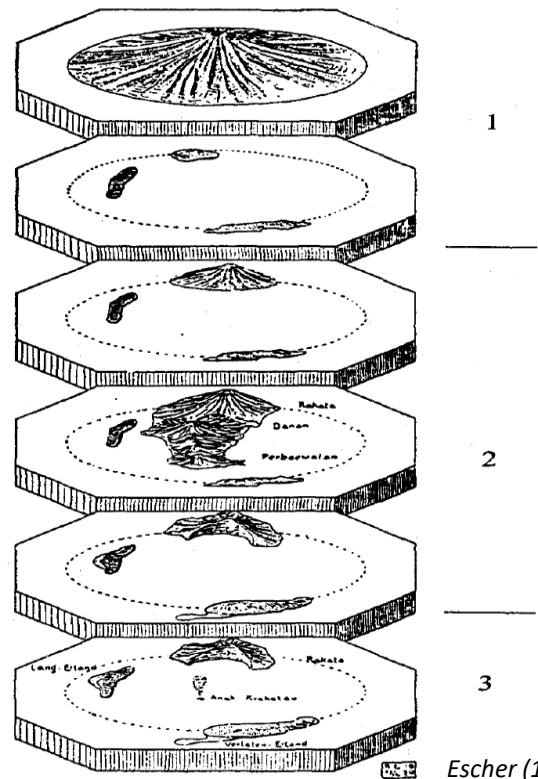
Bangka

Granit Bangka-Belitung, 200 Ma

- Awang Satyana, June 2021



Gn. Krakatau - Awang Satyana, June 2021



Ferry Yustiana

Gn. Anak Krakatau (Juli 2018)

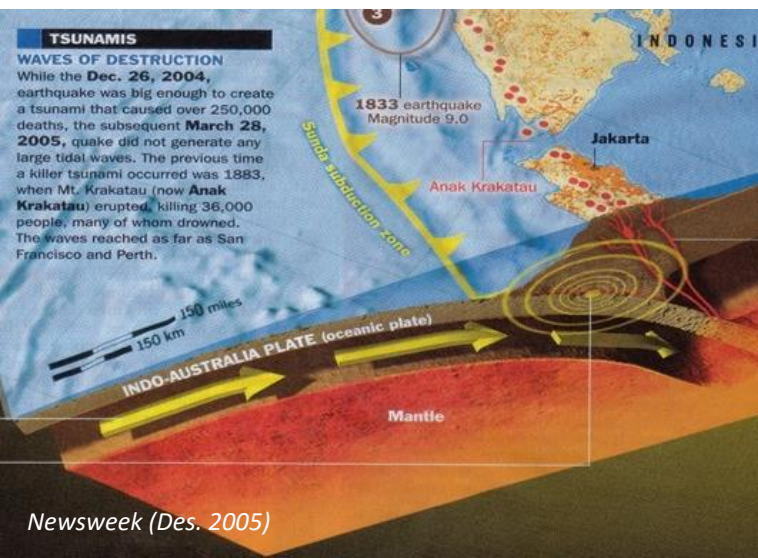
Gn. Anak Krakatau (Juli 2018)



Gn. Anak Krakatau (Juli 2018)



Ferry Yustiana

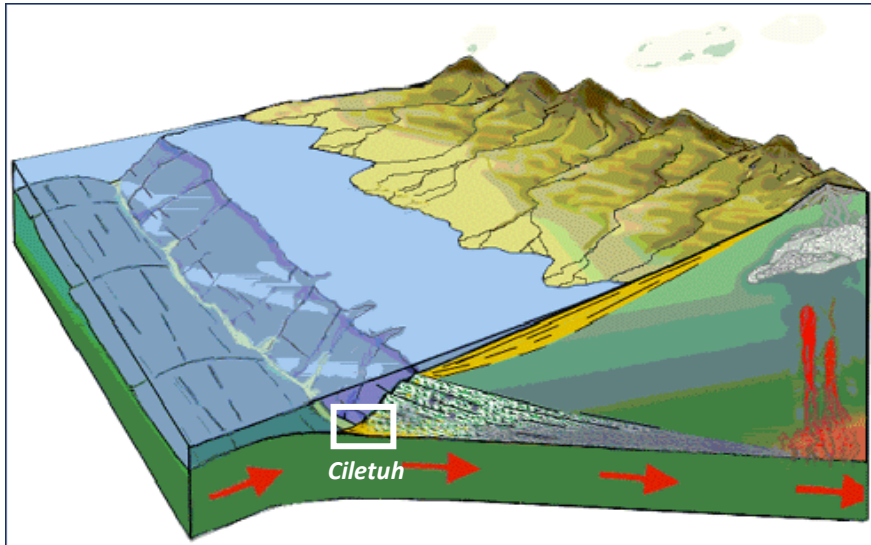


Gn. Anak Krakatau (Jan. 2019)



Kompleks Subduksi Purba Ciletuh, Sukabumi

- Awang Satyana, June 2021



Amfiteater Ciletuh



Lava Bantal



Gabro

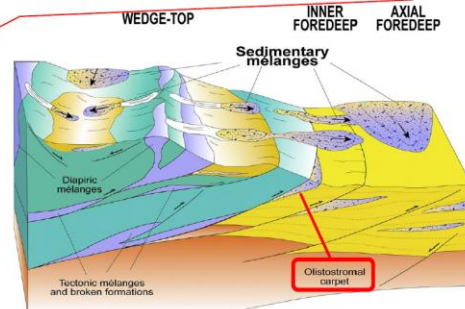


OLISTOSTROM



P. KUNTI

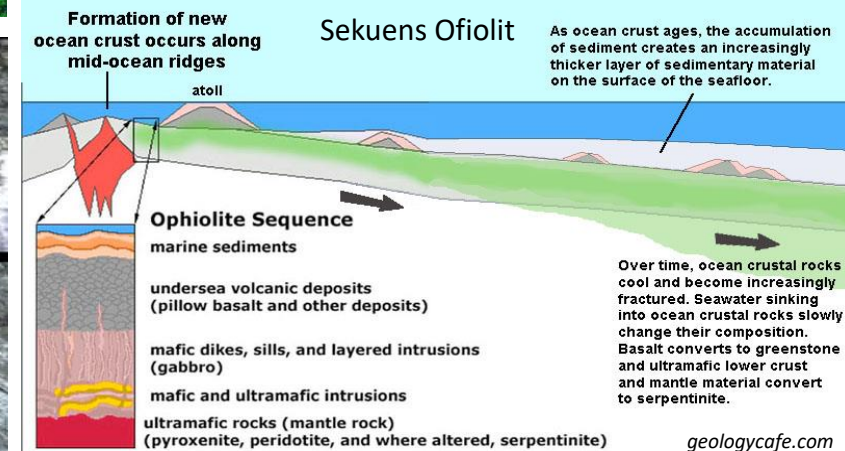
Geotrek Indonesia



An olistostrome is a sedimentary deposit composed of a chaotic mass of heterogeneous material, such as blocks and mud, known as olistoliths, that accumulates as a semifluid body by submarine gravity sliding or slumping of the unconsolidated sediments. (WIKIPEDIA)

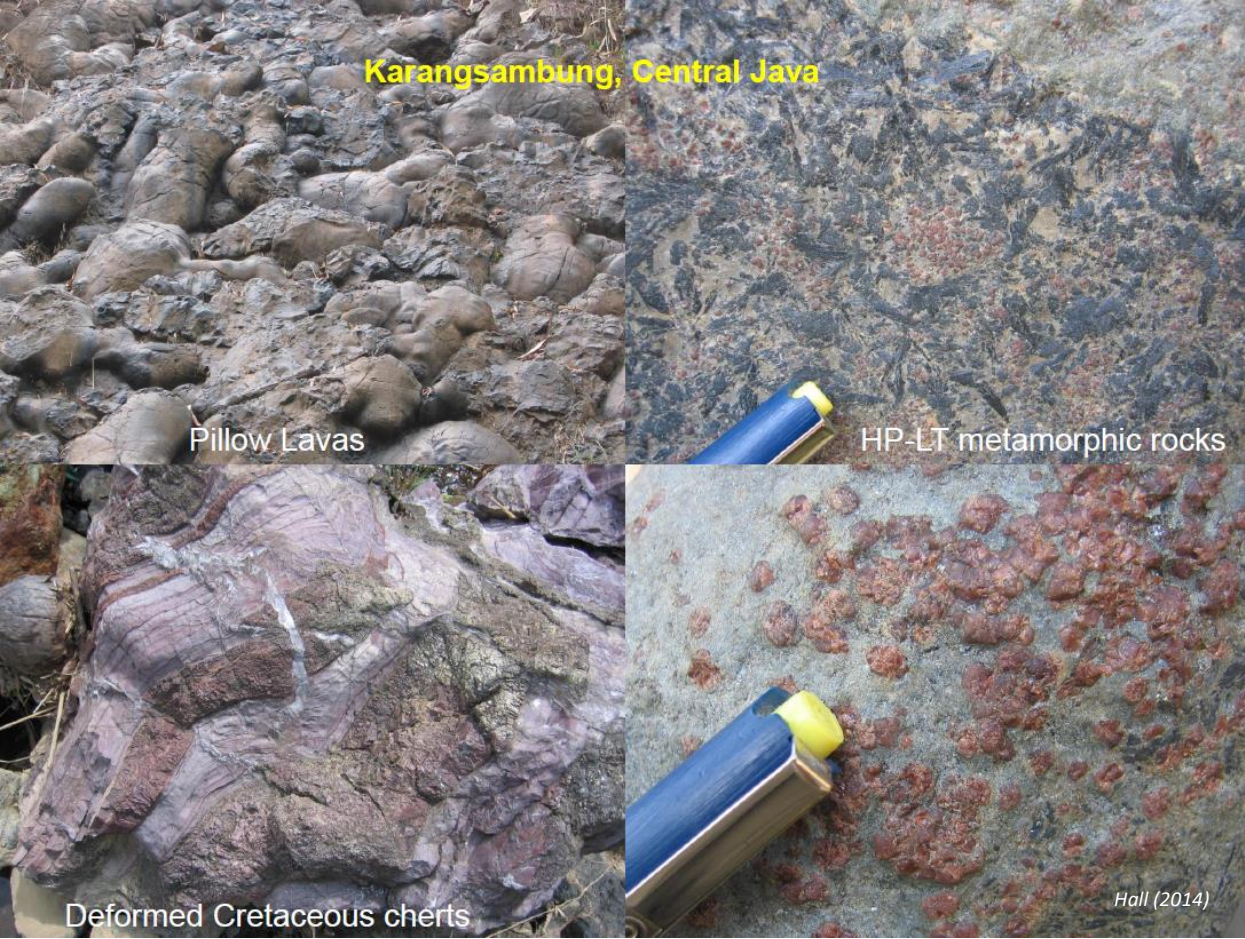
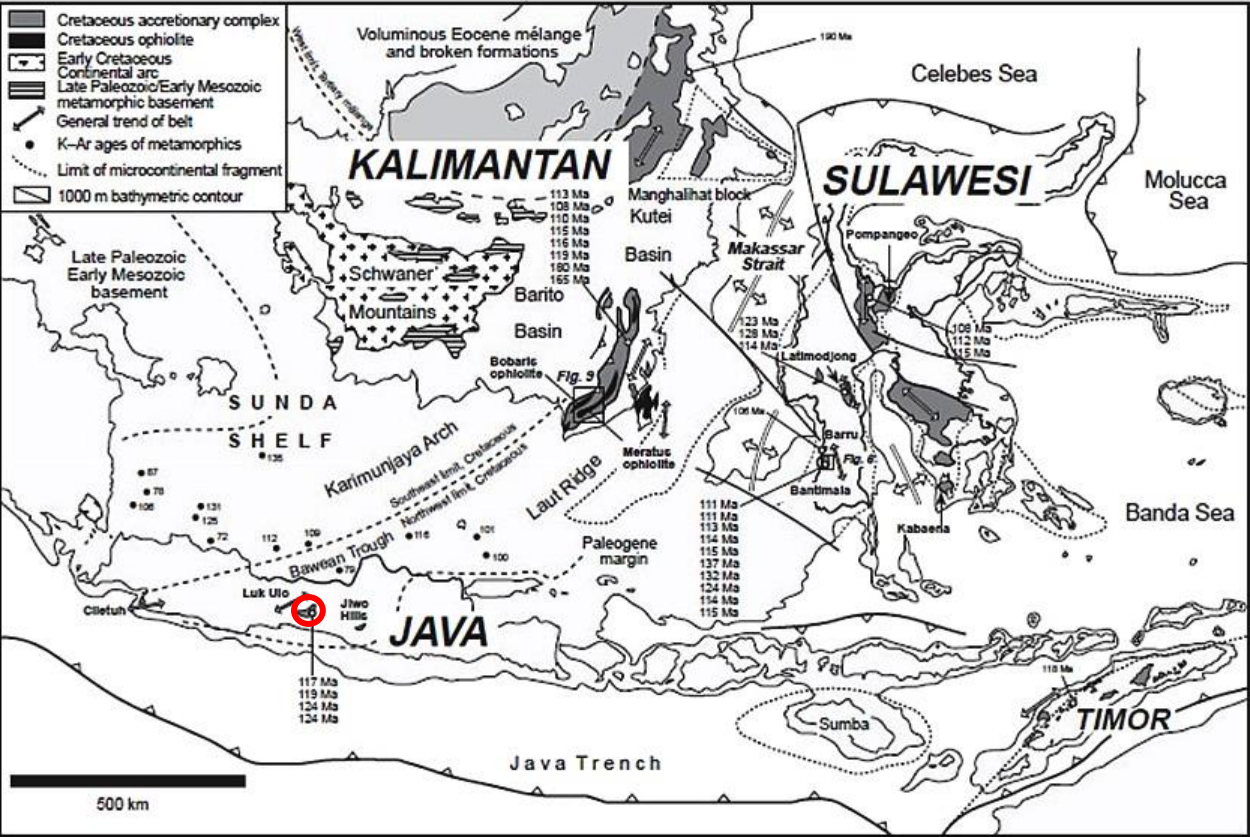


Sekis Hijau

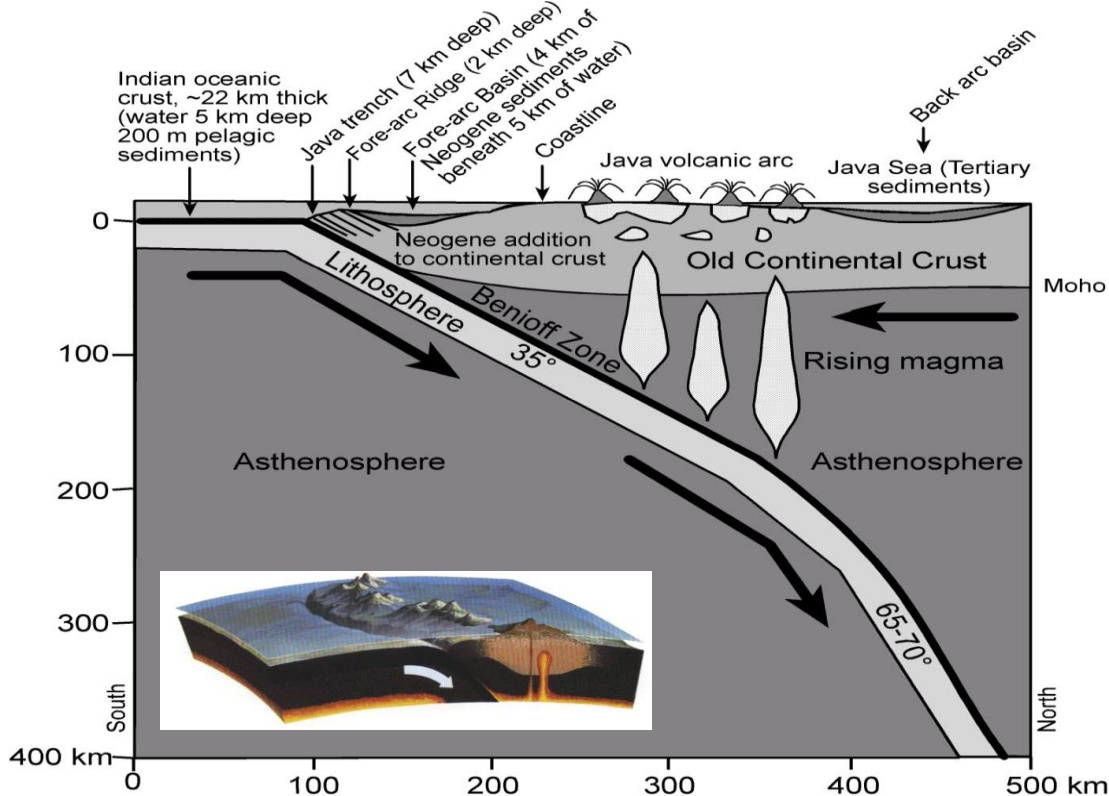
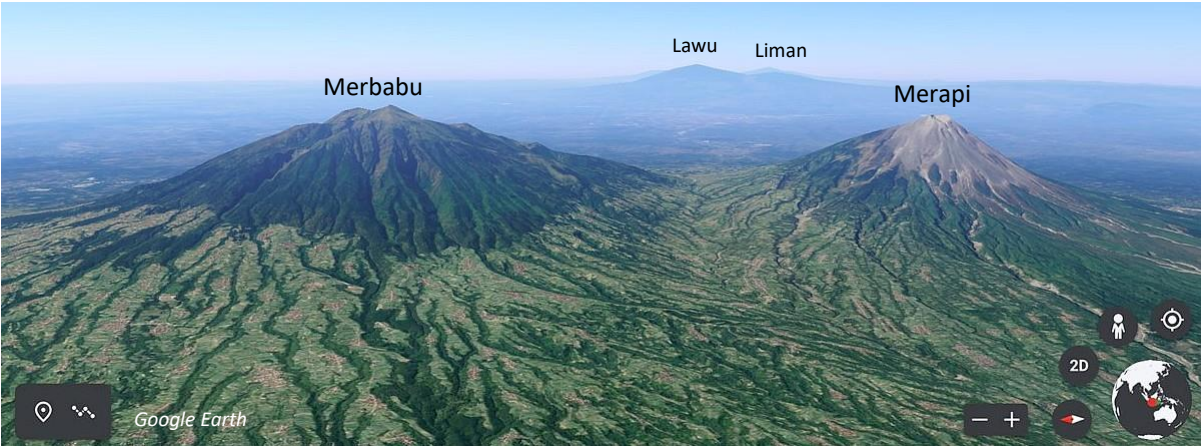
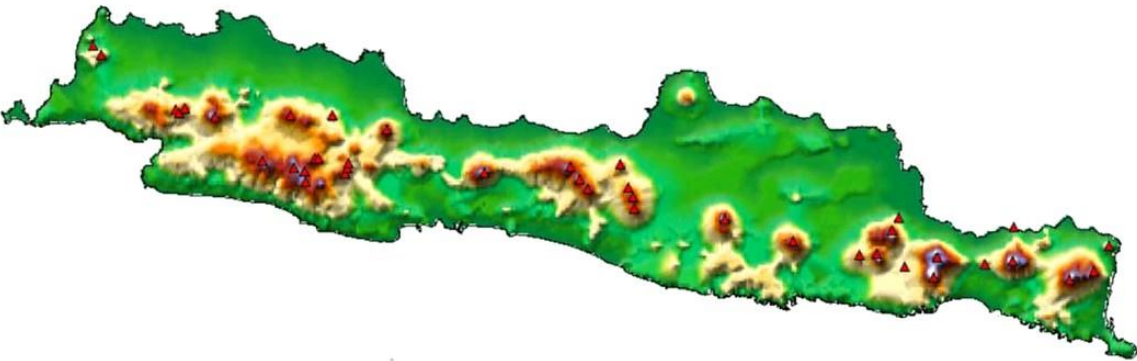


Kompleks Subduksi Kapur Bawah Luk Ulo/Karangsambung

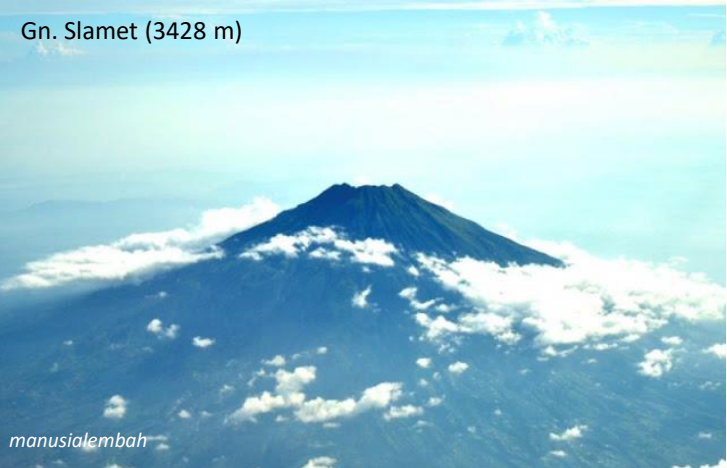
- Awang Satyana, June 2021



Jalur Gunungapi Kwartir Jawa - Awang Satyana, June 2021



A generalised cross section depicting the relationship of the tectonic and magmatic zones to the Benioff Zone in central Java along the 111° meridian (adapted from Hatherton and Dickinson, 1969; Katili, 1972; 1975; Hamilton, 1973; 1979; Tjia, 1978; Hutchison, 1989; SEATAR, 1981; Koesoemadinata *et al.*, 1985).



Kaldera Bromo-Tengger - Awang Satyana, June 2021



www.wikiwand.co

Gn. Bromo



www.wikiwand.com

Erupsi Bromo 22 Januari 2011



www.wikiwand.com

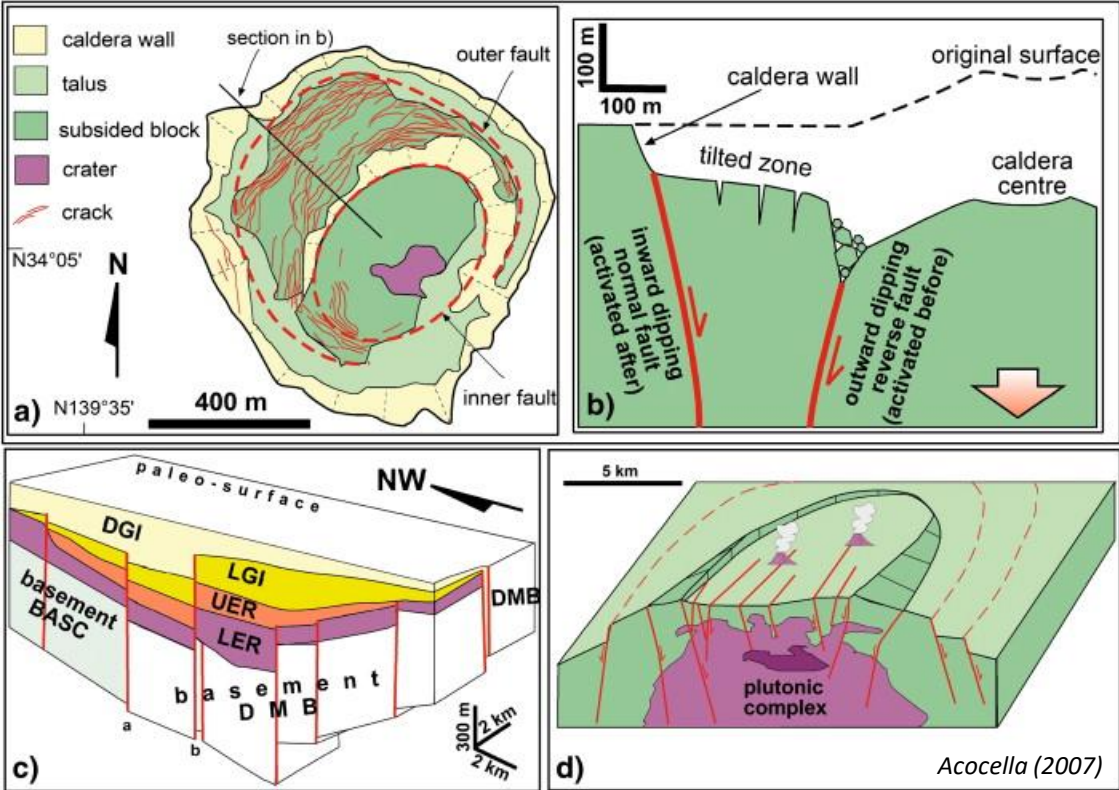
Yadya Kasada di Gunung Bromo



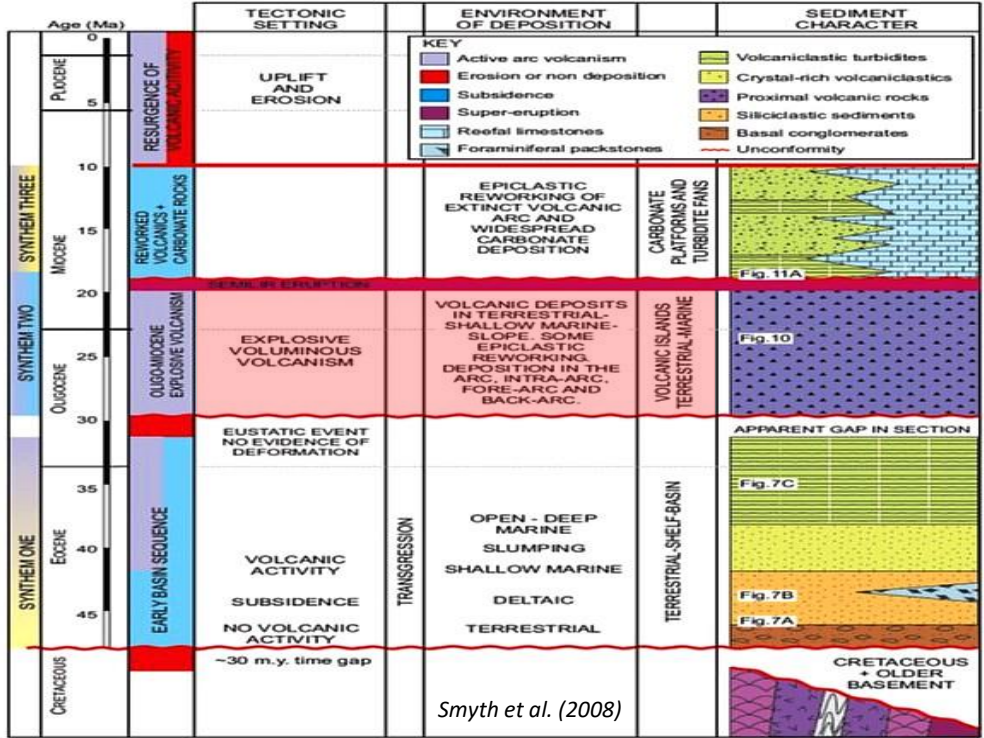
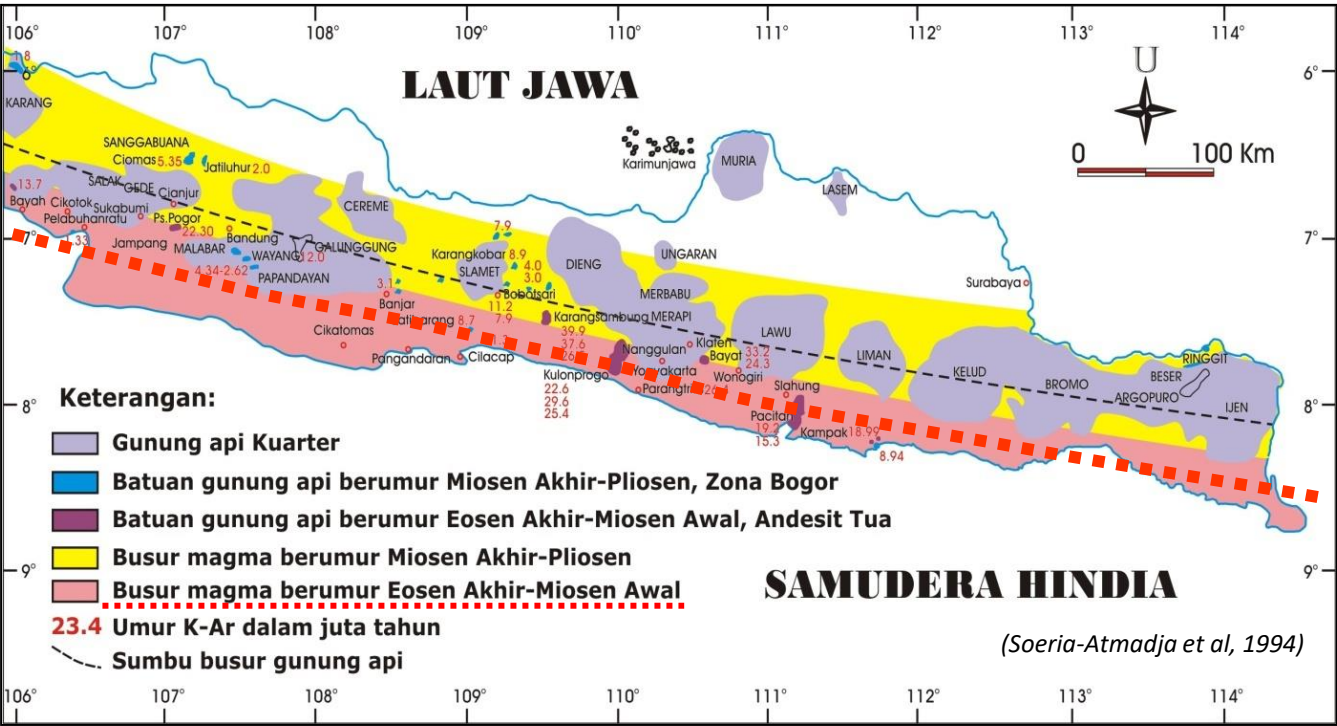
jatininow.com



EXPLOREBROMO.COM



Jalur Gunungapi Purba Jawa (Pegunungan Selatan), 30-20 Ma - Awang Satyana, Juli 2021



JAWA BARAT



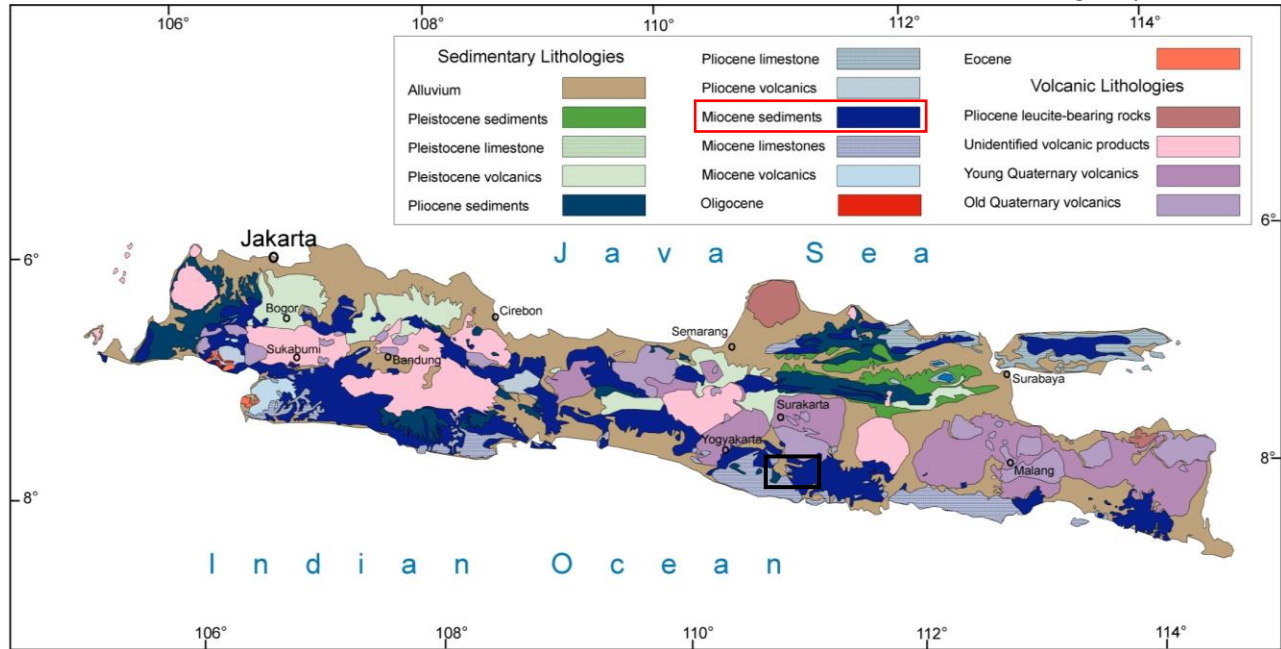
YOGYAKARTA



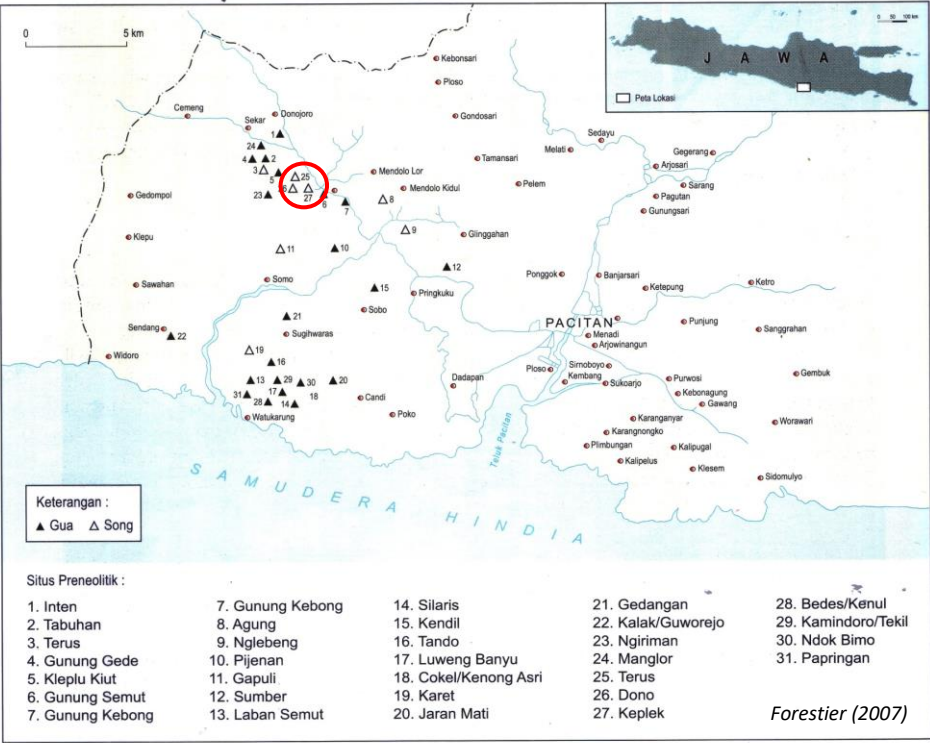
JAWA TIMUR

Batugamping Miosen Pegunungan Selatan Jawa dan Hunian Manusia Purba

- Awang Satyana, June 2021



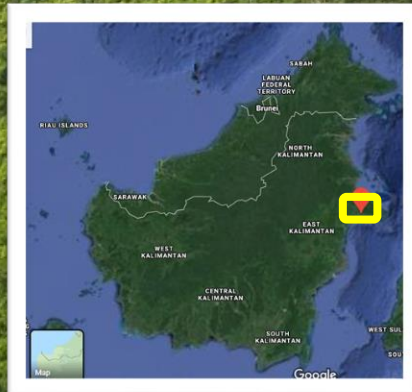
Simplified geological map of Java and Madura adapted from the 1:2,000,000 scale map of Java and Madura (Geological Survey of Indonesia, 1977).



Kars Sangkulirang, Mangkalihat – Hunian Purba- *Awang Satyana, June 2021*

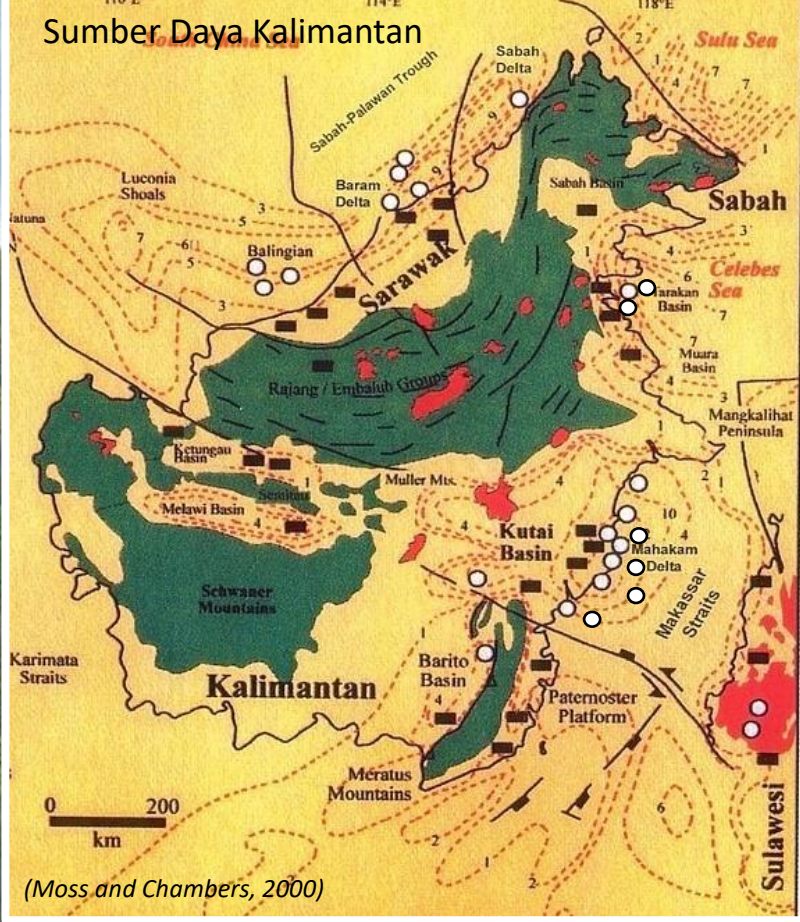
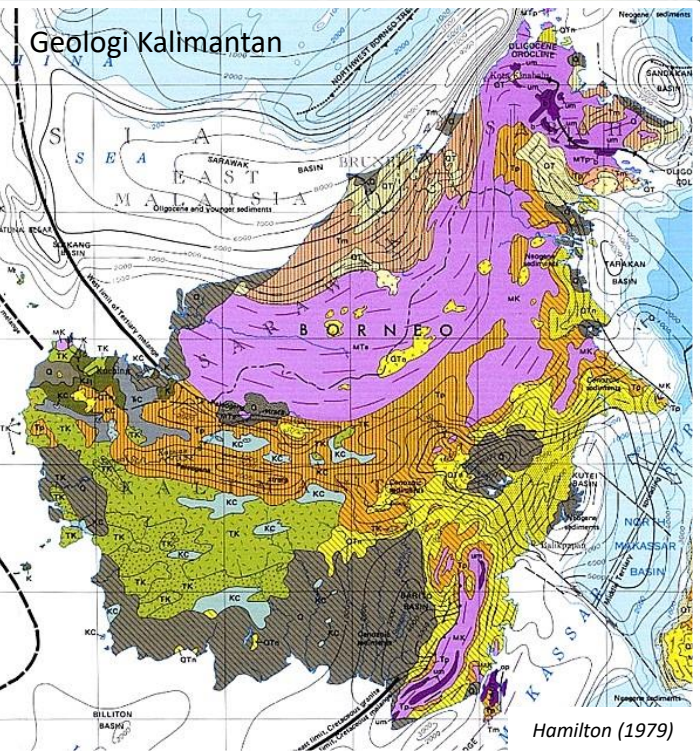
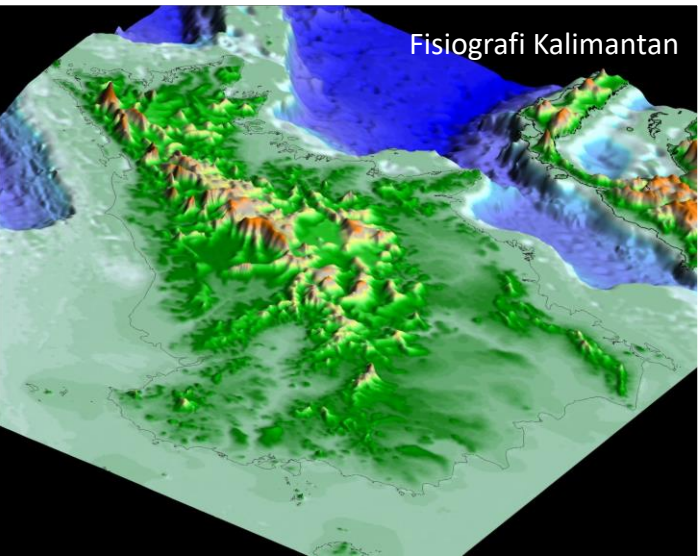
- Umur gambar cadas: 40 ribu tahun yl.
- Mengindikasi aktivitas masyarakat purba.
- Jenjang perubahan iklim:
 1. Iklim benua: ketika paparan Sunda masih daratan (40.000-21.000 SM),
 2. iklim sabana tropis dan kepulauan (12.000- 7.000 SM),
 3. Iklim hutan hujan tropis (1.000 SM).
- Secara korelatif, interpretasi geologi menunjukkan perubahan tutupan lahan.
- Perubahan mempengaruhi cara hidup purba; dari berburu sampai meramu.

Alam (2020)



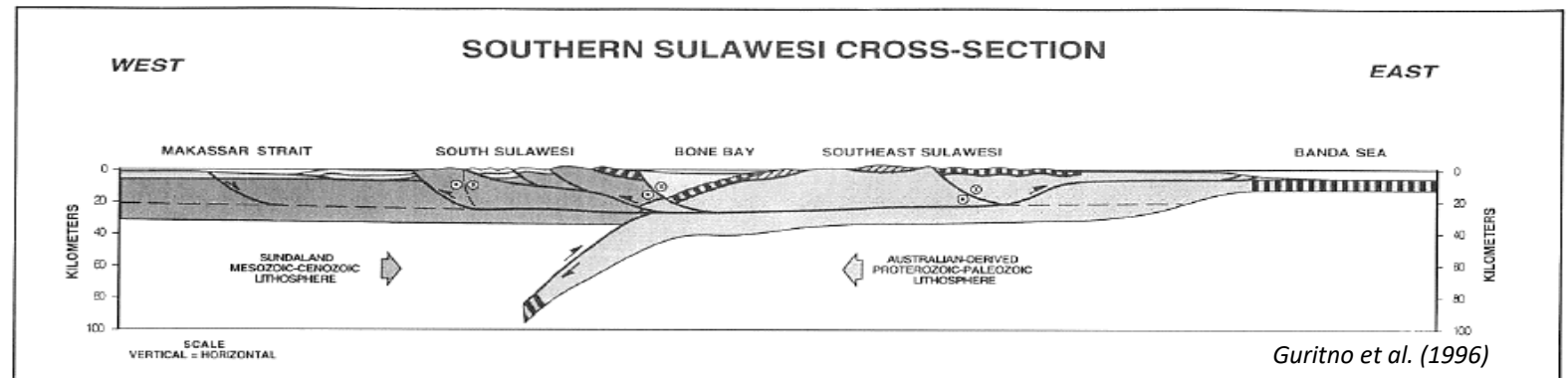
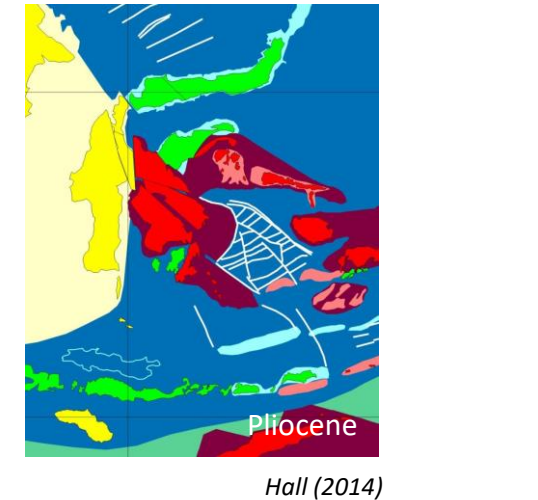
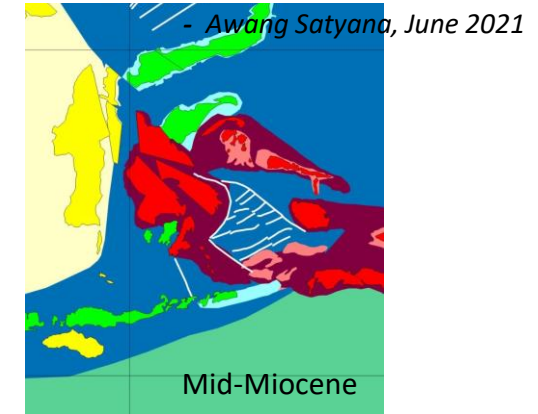
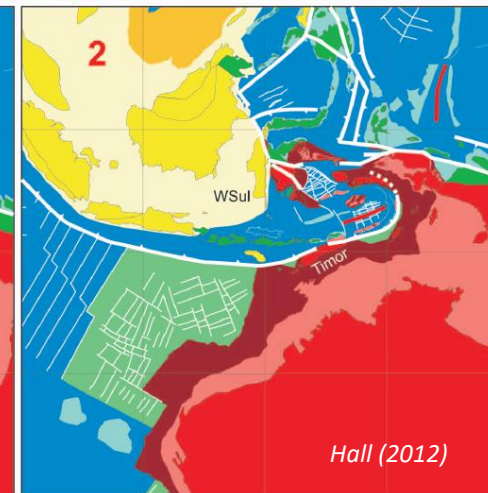
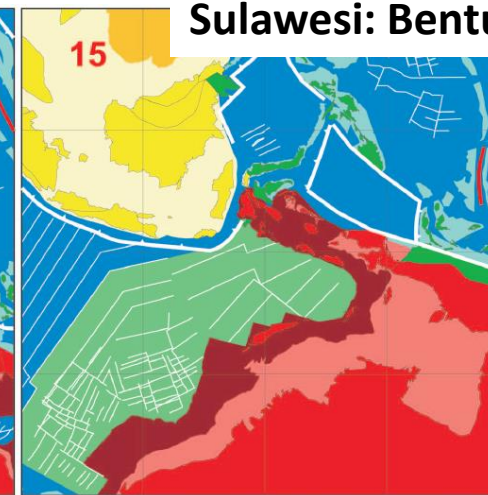
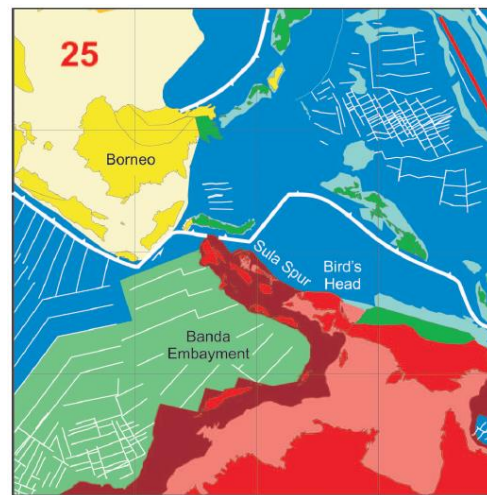
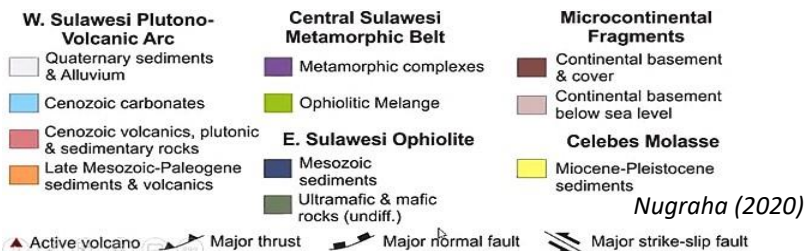
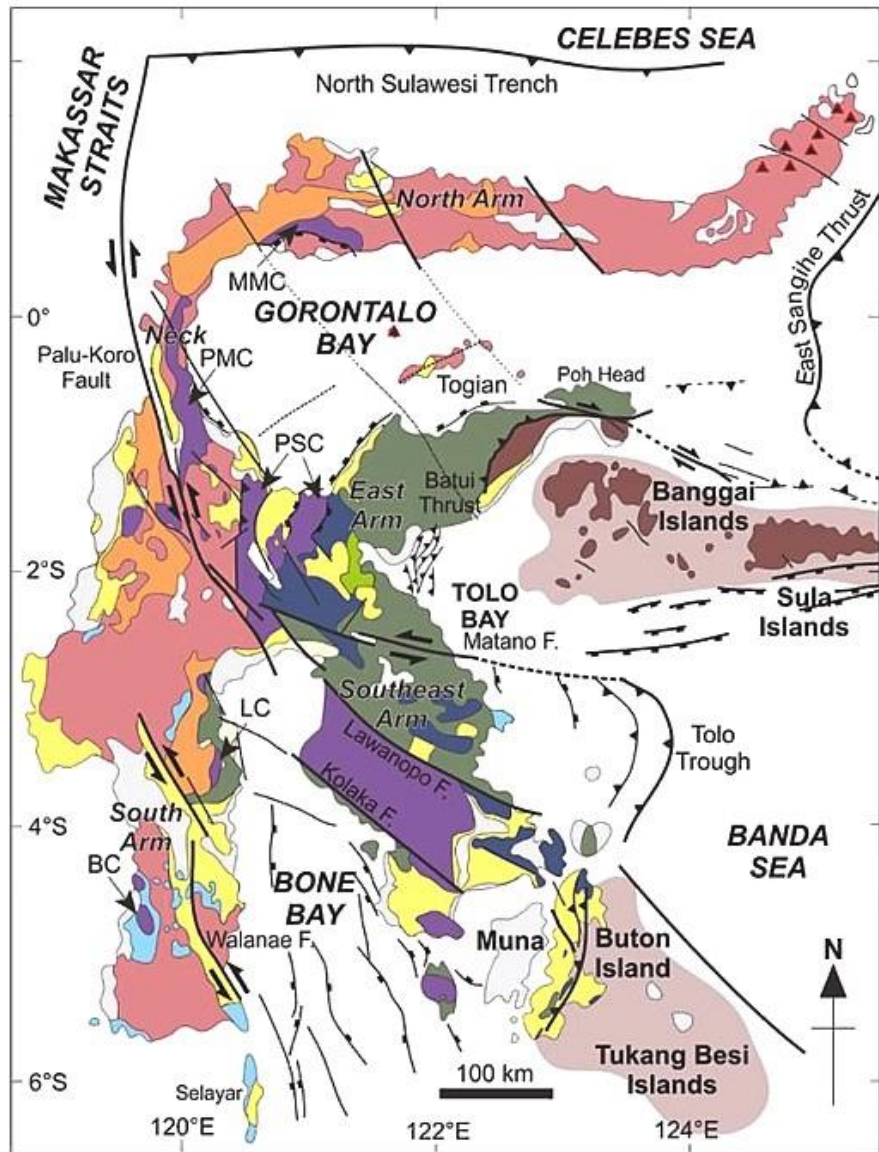
Prabowo (2020)

Kalimantan, Pulau Besar dan Kaya - Awang Satyana, June 2021



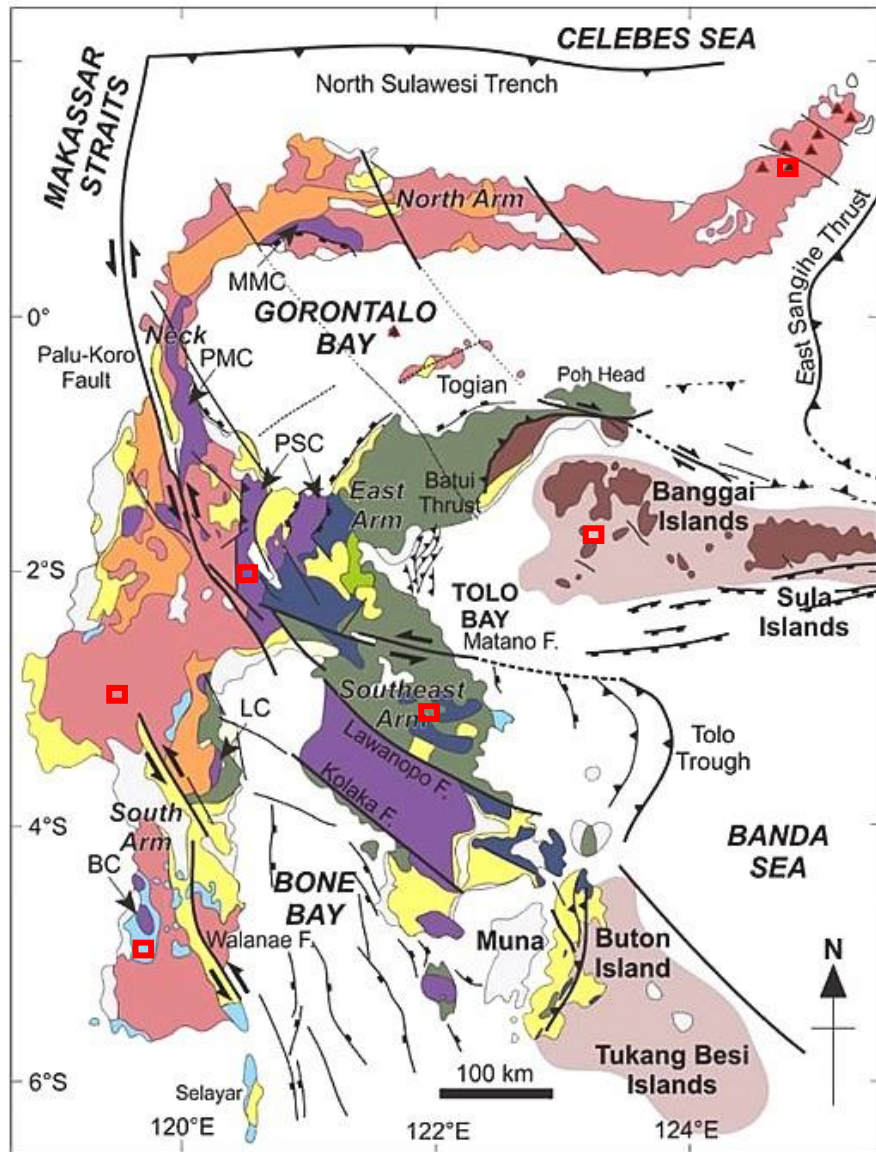
- K E Y**
- Cenozoic sedimentary lithologies (undifferentiated)
 - Cenozoic volcanics and associated intrusives
 - Pre-Tertiary and early Tertiary rock units
 - Coal & peat deposits
 - Hydrocarbon accumulations, both oil and gas
 - Marginal oceanic basin
 - Isopachs in Tertiary sedimentary basins; in thousands of metres
 - Strike-slip faults
 - Normal faults





Sulawesi: Aneka Topografi dan Batuan

- Awang Satyana, June 2021



Gunung Soputan



Kep. Banggai



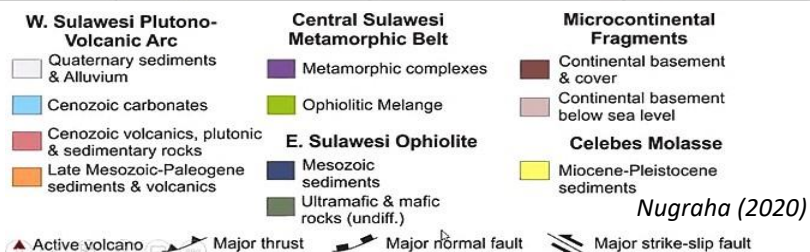
Perbukitan vulkanik Enrekang



Kars Tonasa Maros



Dataran Poso

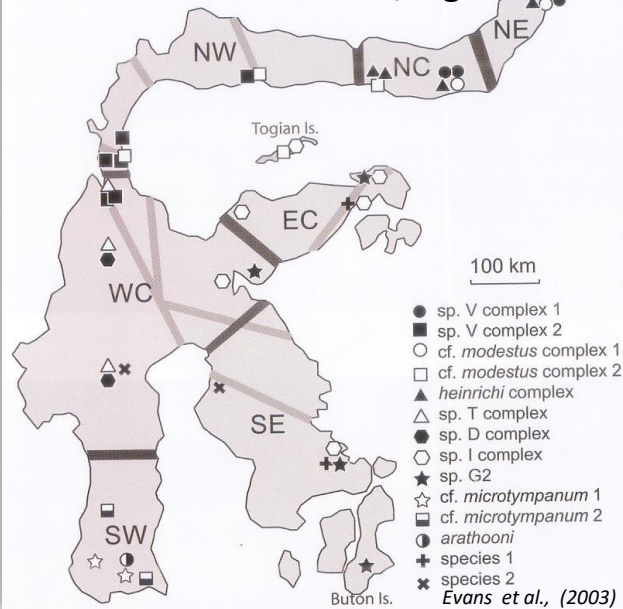


Nugraha (2020)

topindonesiaholidays

Nugraha (2020)

Pattern of faunal blocks/regions



Distribution areas of monkeys, frogs and tree geckos in Sulawesi, once lived in separated islands, now due to island collision assembling Sulawesi, live in together in island of Sulawesi.

1. Sulawesi macaque (*Macaca nigra*)
2. Sulawesi rail (*Aramidopsis plateni*)
3. Lowland anoa (*Bubalus depressicornis*)
4. Maleo bird (*Macrocephalon maleo*)
5. Pigafetta palm (*Pigafetta filaris*)
6. Orchid (*Dendrobium macrophyllum*)
7. Bear cuscus (*Phalanger ursinus*)
8. Tonkean macaque (*Macaca tonkeana*)
9. Ancient stone megalith, tandulako
10. Ancient stone water urns, kalamba
11. Spectral tarsier (*Tarsius spectrum*)
12. Highland anoa (*Bubalus quarlesi*)
13. Babirusa (*Babirusa babirusa*)
14. Lesser cuscus (*Phalanger celebensis*)
15. Kingfisher (*Cittura cyanotis*)
16. Sulawesi giant civet (*Macrogalidia musschenbroekii*)
17. Bee eater (*Meropogon forsteri*)
18. Vanda orchid (*Vanda celebica*)
19. Dugong (*Dugong dugong*)
20. Moor macaque (*Macaca maura*)
21. Sulawesi hornbill (*Rhyticeros cassida*)
22. & 23. Swallowtail butterflies (*Papilio iswara*, (*Papilio peranthus*))

Faunal distribution of Sulawesi Island



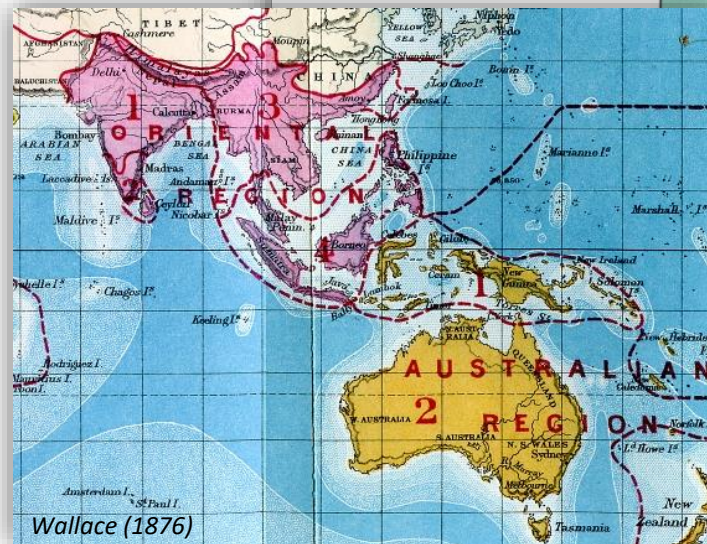
MacKinnon (1992)

Kontrol Geologi atas Fauna Sulawesi

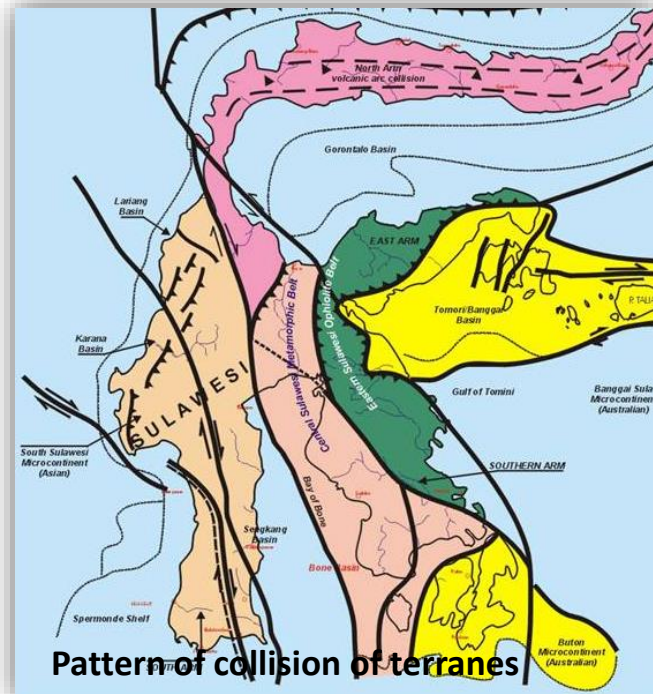
- Awang Satyana, June 2021

Ape/ monkey macaque came from Kalimantan/Java. Hornbill bird is western Indonesia large bird with specialized development in Sumatra, Jawa and Kalimantan islands. Anoa is dwarf buffalo of western Indonesia due to island dwarfism. Cuscus is typical fauna of eastern Indonesia and Papua

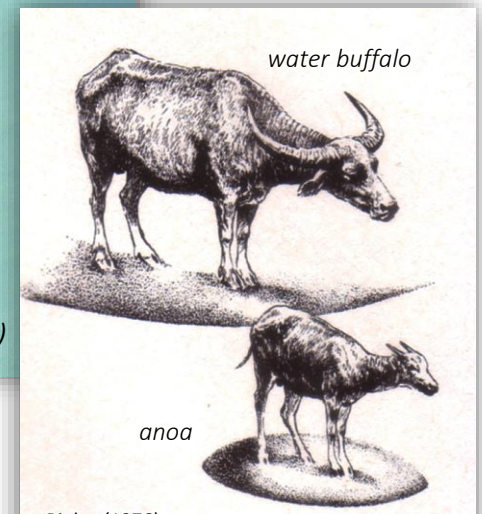
Zoogeographical Regions of Indonesia

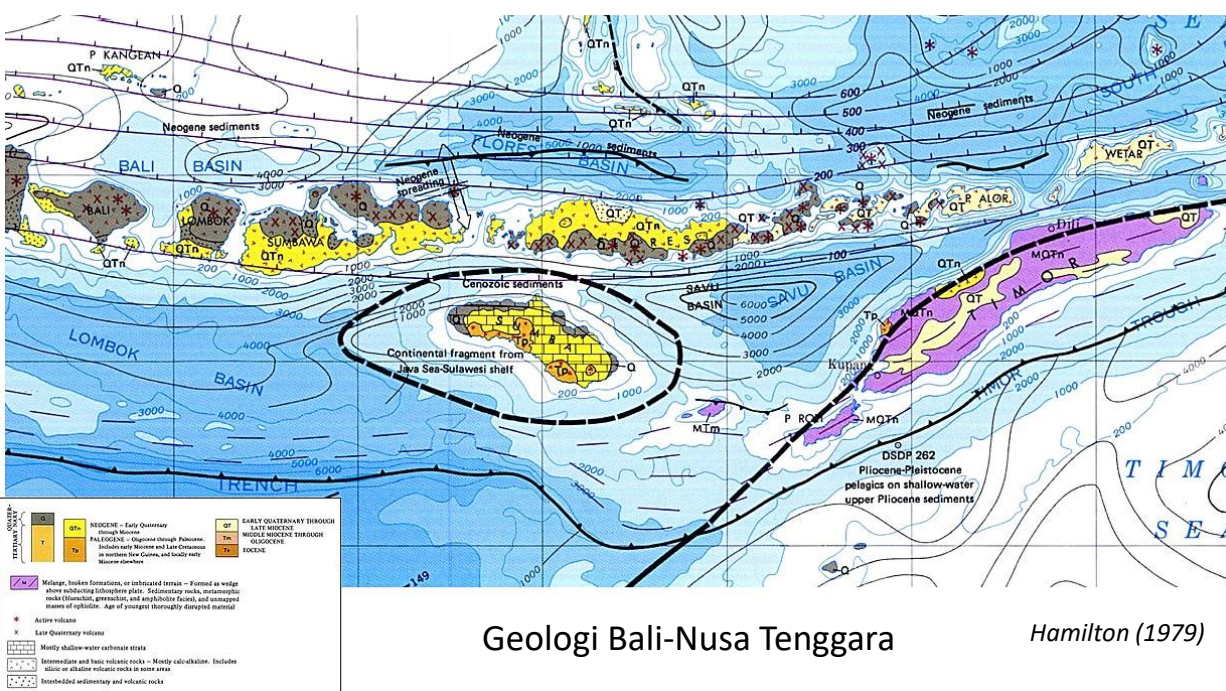


Pattern of collision of terranes



Island dwarfism





Bali-Nusa Tenggara, gunungapi purba dan gunungapi Kuartar

- Awang Satyana, June 2021



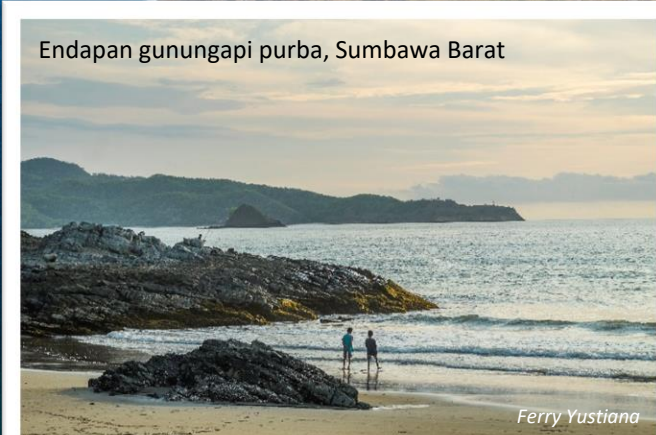
Gn. Rinjani dan kalderannya, Lombok



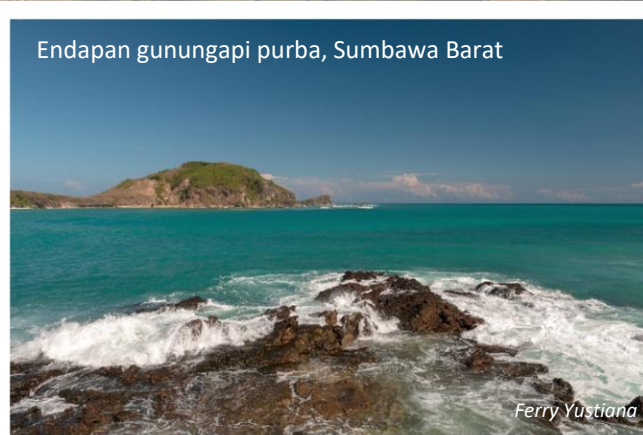
Kaldera Gn. Tambora, Sumbawa



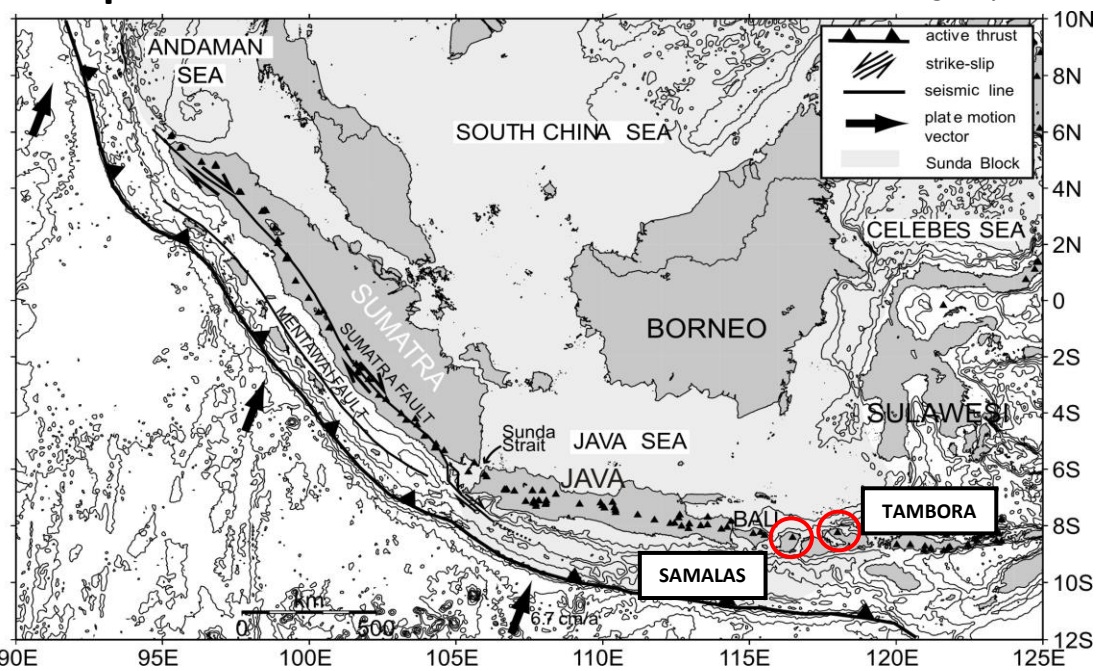
Endapan gunungapi purba, Sumbawa Barat



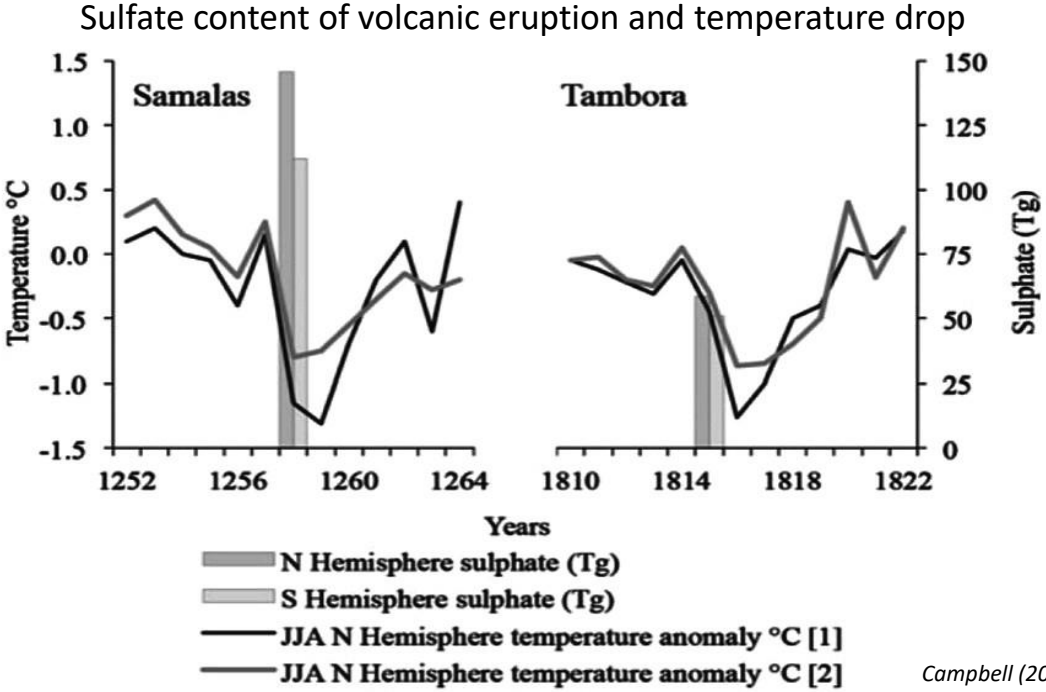
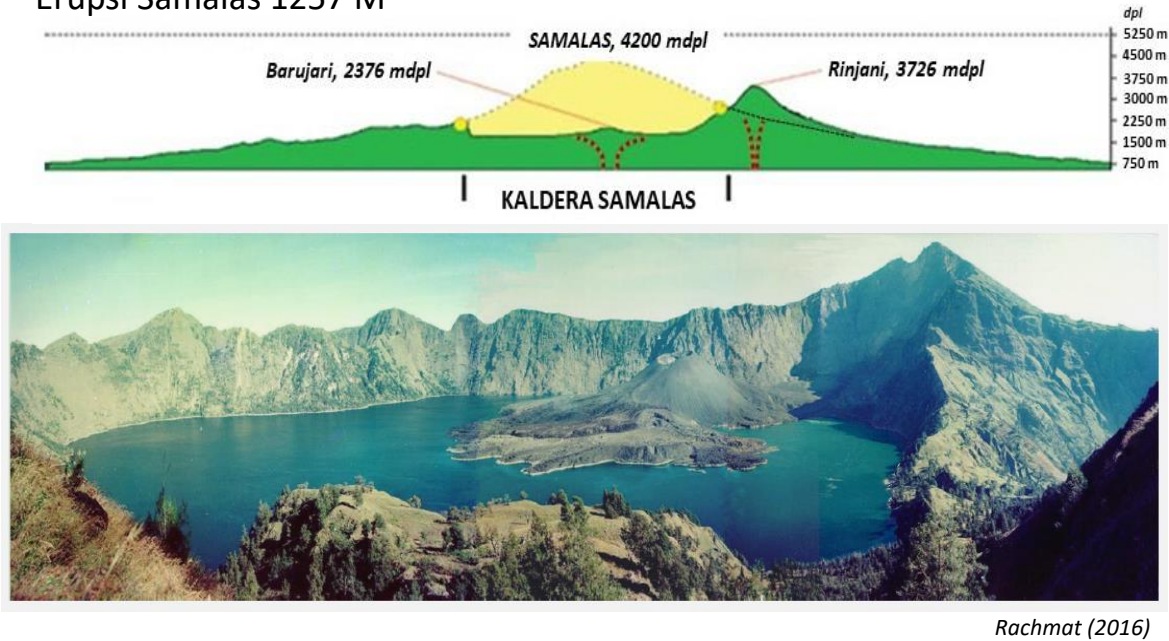
Endapan gunungapi purba, Sumbawa Barat



Erupsi Katastropik Samalas dan Tambora - Awang Satyana, June 2021

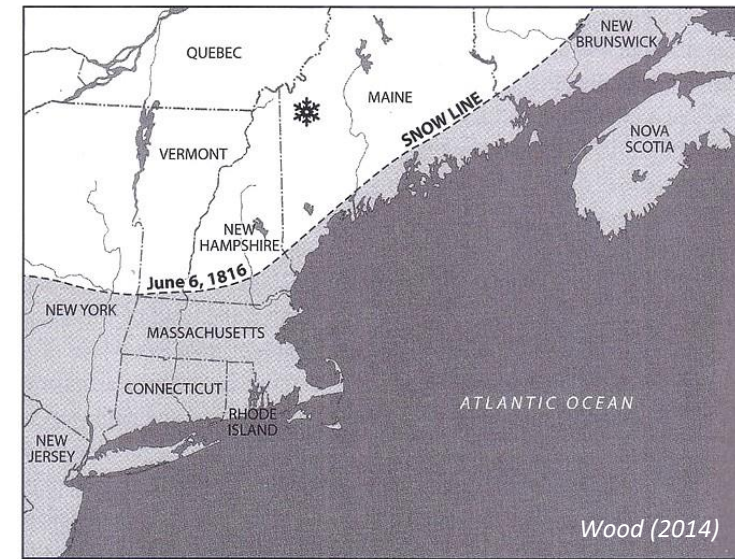
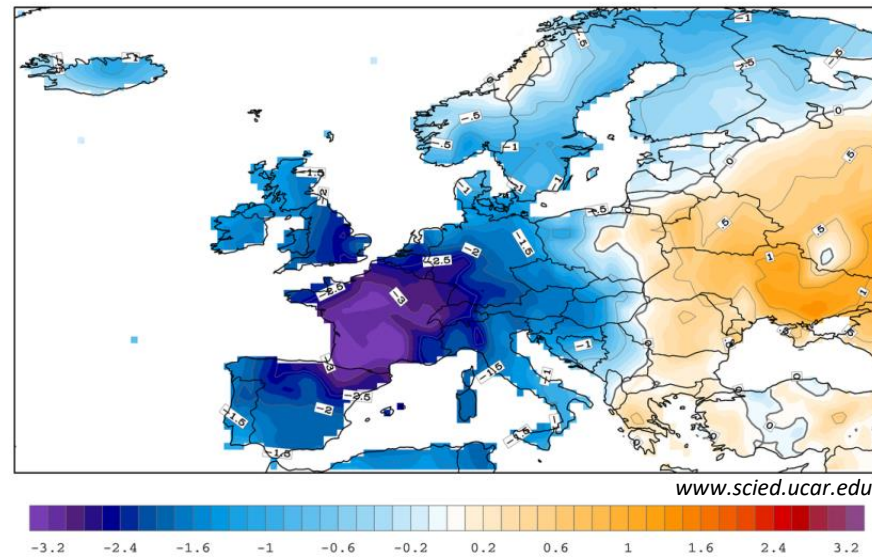


Erupsi Samalas 1257 M

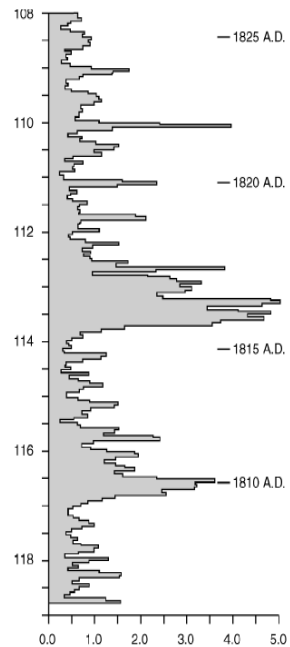




1816 Summer temperature anomaly

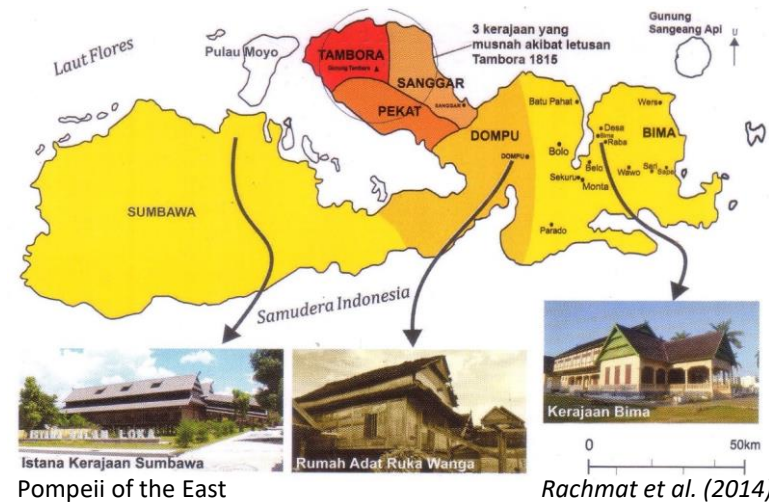
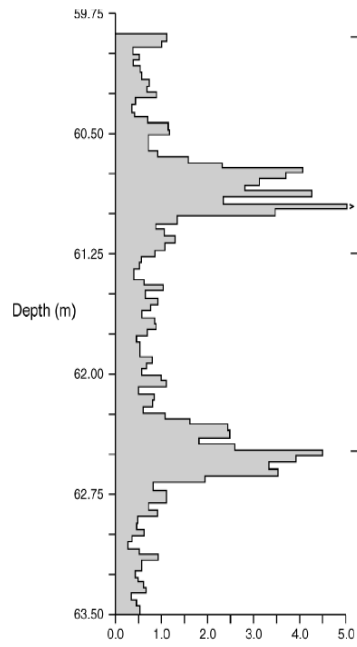


Antarctica

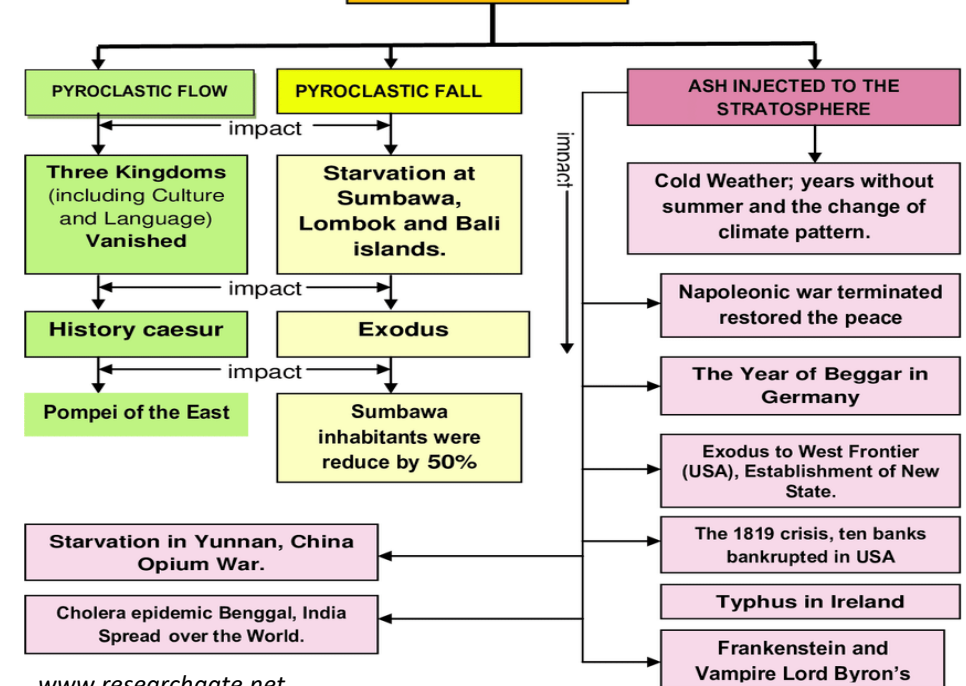


Oppenheimer (2003)

Greenland



TYPE OF TAMBORA ERUPTION PRODUCTS



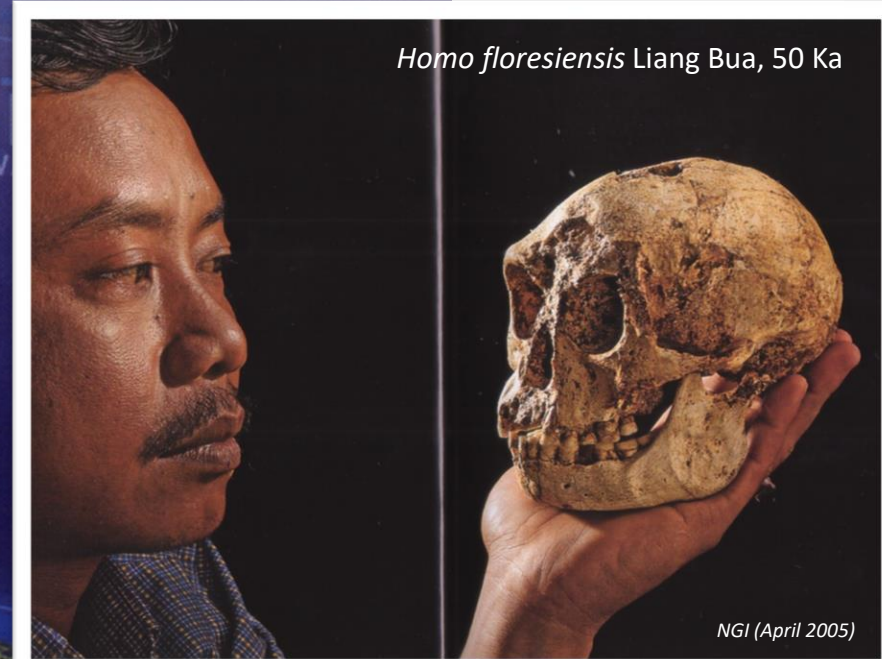


Varanus komodoensis

Luxurylunches

Flores, NTT: Land of Gigantism & Dwarfism

- Awang Satyana, June 2021



Homo floresiensis Liang Bua, 50 Ka

NGI (April 2005)



Stegodon Lembah Soa

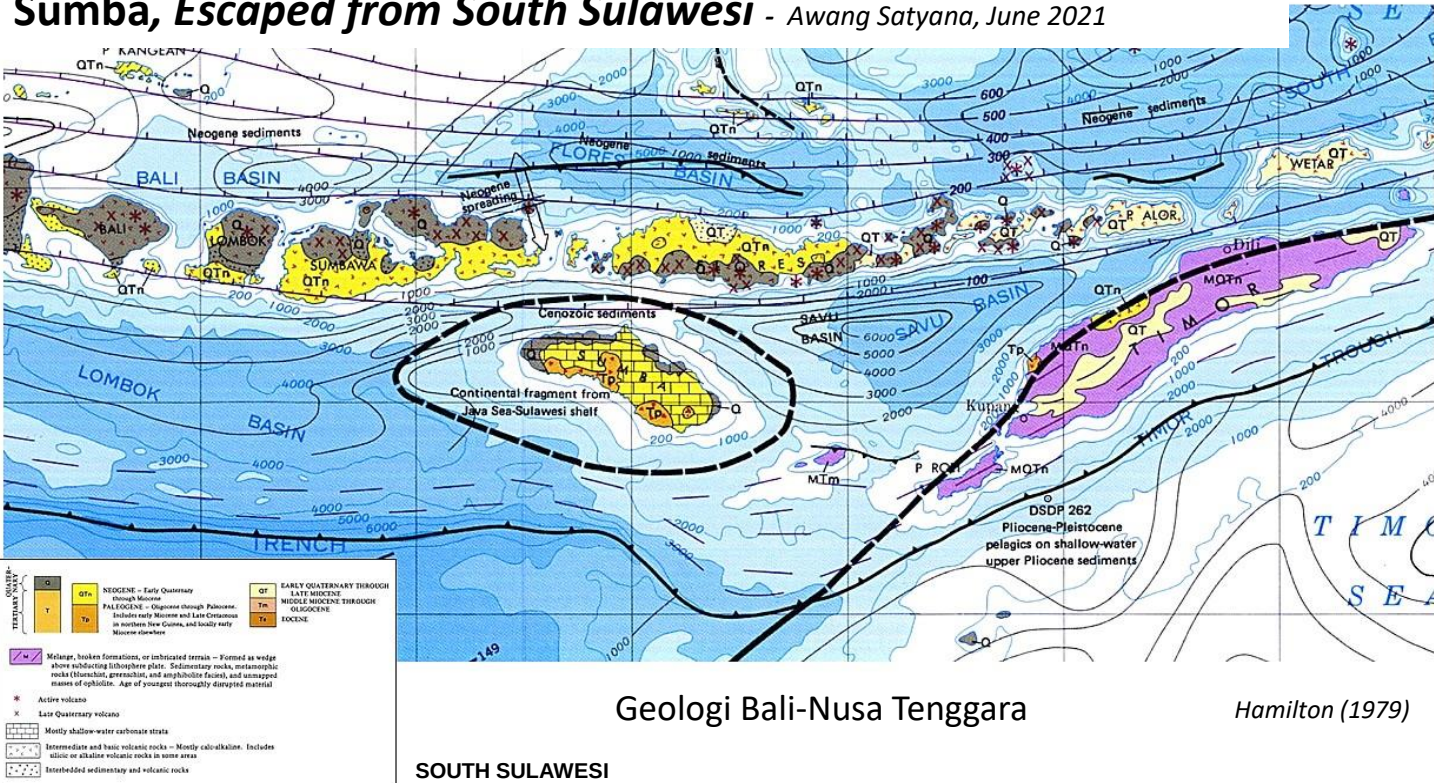
Tikus coklat dan
Tikus raksasa Flores

Gajah Asia dan
stegodon Liang Bua

Biawak air dan
Komodo

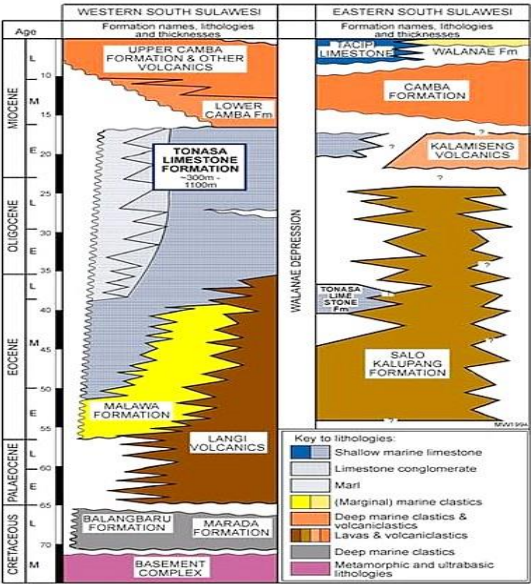
NGI (April 2005)

Sumba, Escaped from South Sulawesi - Awang Satyana, June 2021

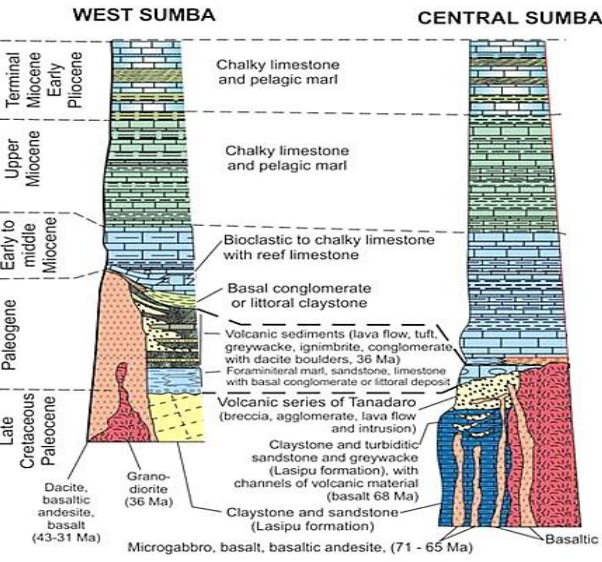


Geologi Bali-Nusa Tenggara *Hamilton (1979)*

SOUTH SULAWESI



Wilson et al. (1996)



Abdullah (1994)

Wairinding, hilly savanna of Pliocene carbonates



Pinterest

Waimarang, Upper Miocene carbonates



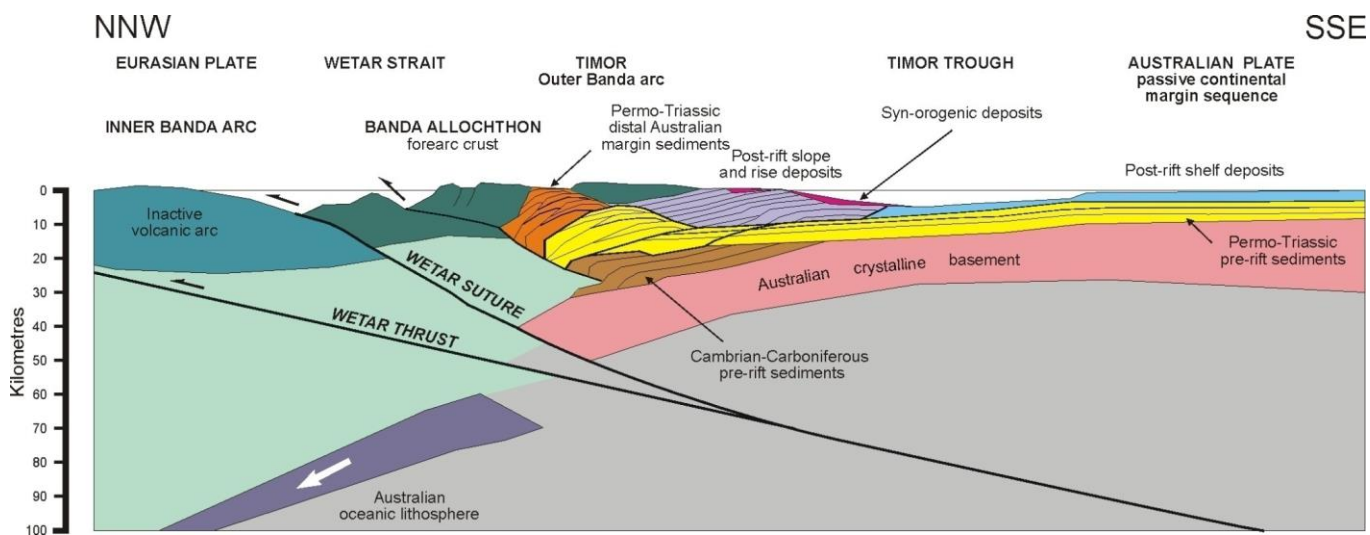
Ferry Yustiana

Watuparunu, Pliocene mass transport complex



Ferry Yustiana

Timor, Collision in the Making, since 5 Ma - Awang Satyana, June 2021

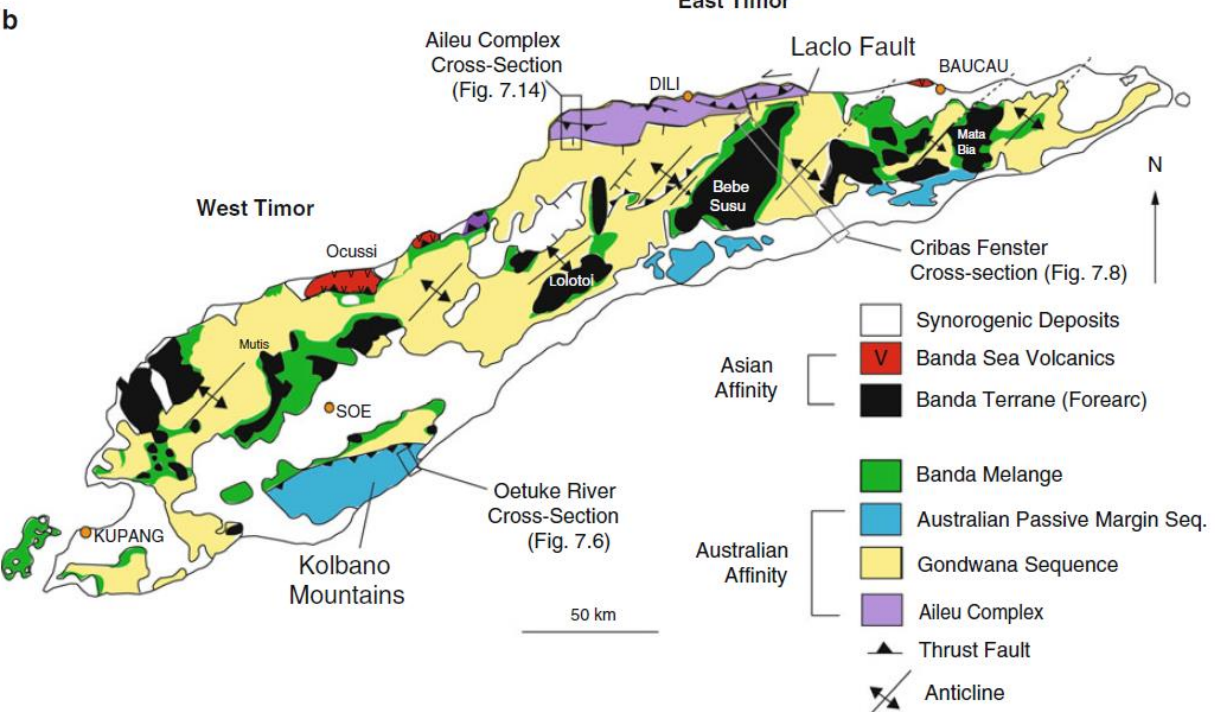


Model of collision of Timor & Australia

Hall and Wilson (2000)



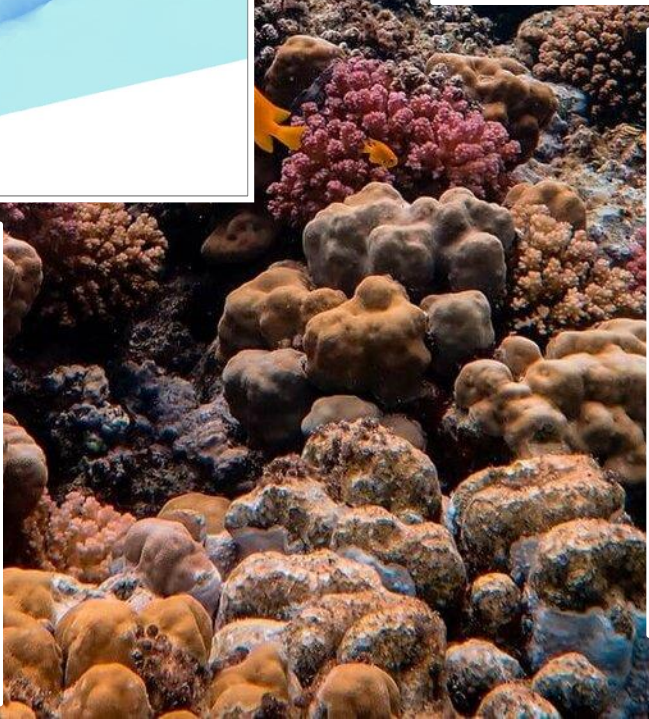
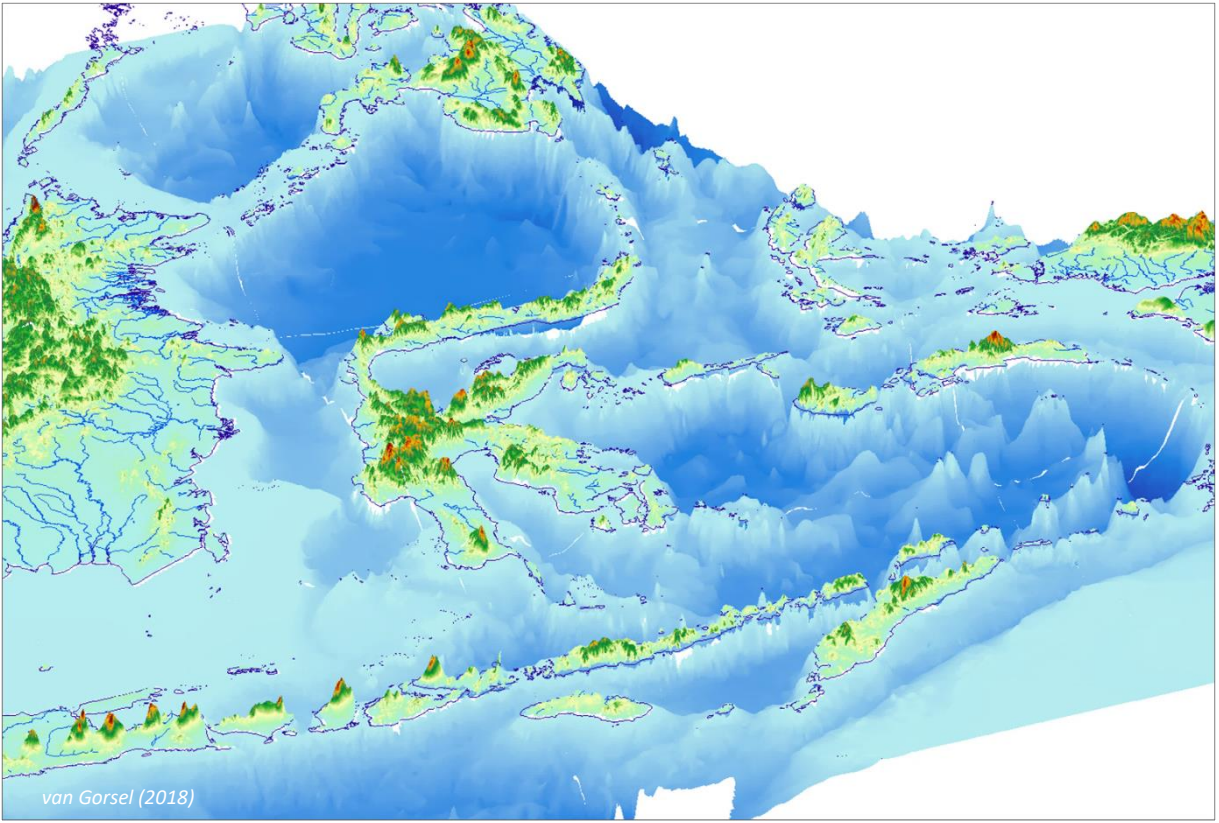
Steeply dipping Triassic Aitutu outer shelf limestones, north of Soe.



POTENSI WISATA BAHARI



Coral Triangle Ecoregions: East Indonesia - Awang Satyana, June 2021



Rainforest Cruises

DERAWAN



indonesiatraveler. id



TOGIAN

Kadidiri Paradise

RAJA AMPAT



detikTravel



BANDA

Tidakapa'pa

SPERMONDE

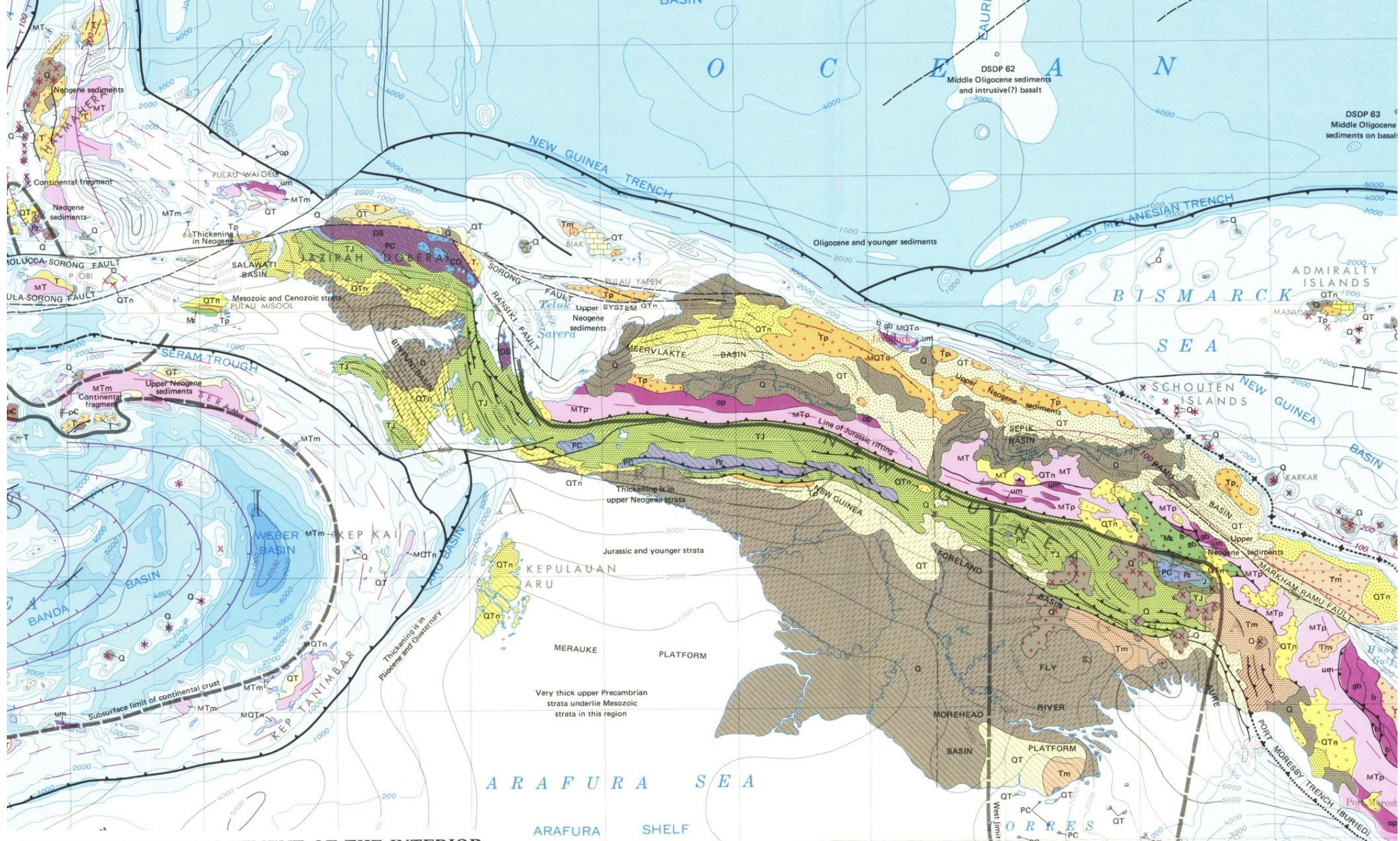


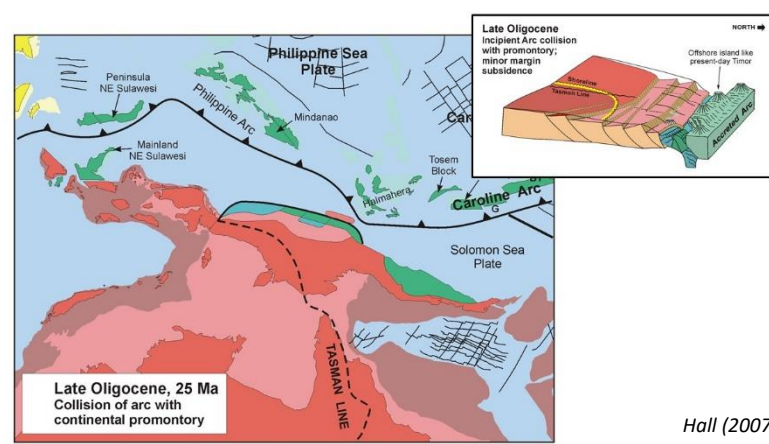
ARSY Tours & Travel



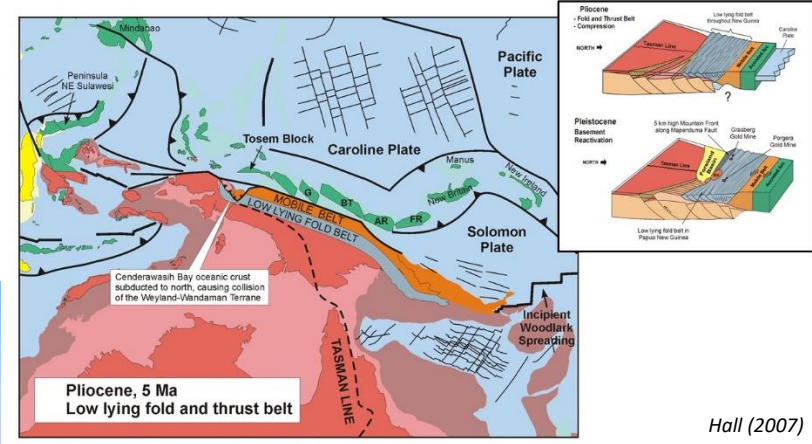
WAKATOBI

Okezone Travel

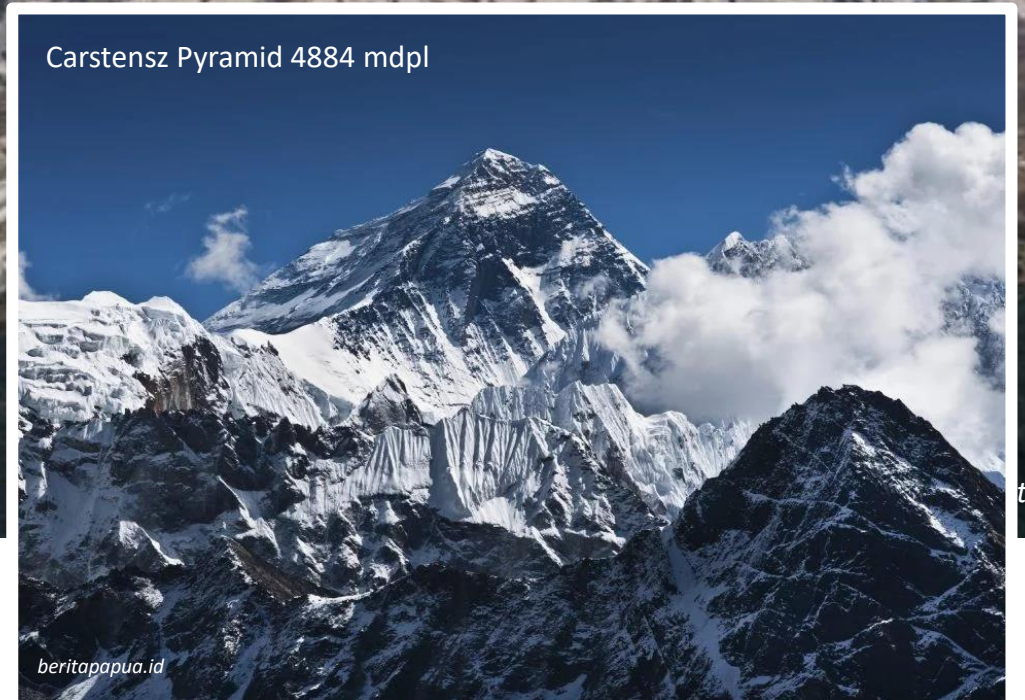
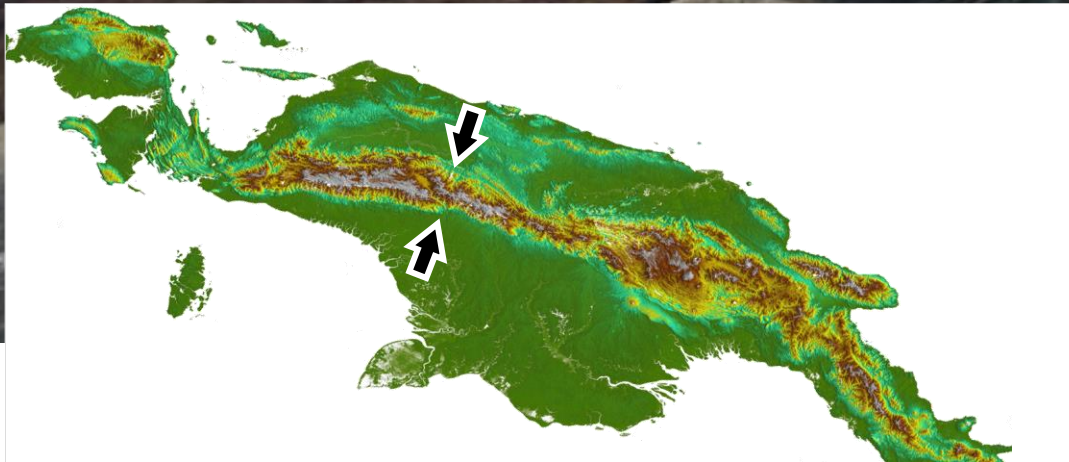




Hall (2007)



Hall (2007)



Pegunungan Tengah Papua: Benturan Australia vs. Pasifik - Awang Satyana, June 2021

Pegunungan di tepi Lembah Baliem, batugamping dolomitan.



foto: Johannes Karundeng

Wamena, perkampungan.



foto: Johannes Karundeng

Wamena, perang.



foto: Johannes Karundeng

Terima kasih atas perhatian Anda.



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