Webinar “TERIMA KASIH GUNUNGAPI”, Sabtu 8 Januari 2022

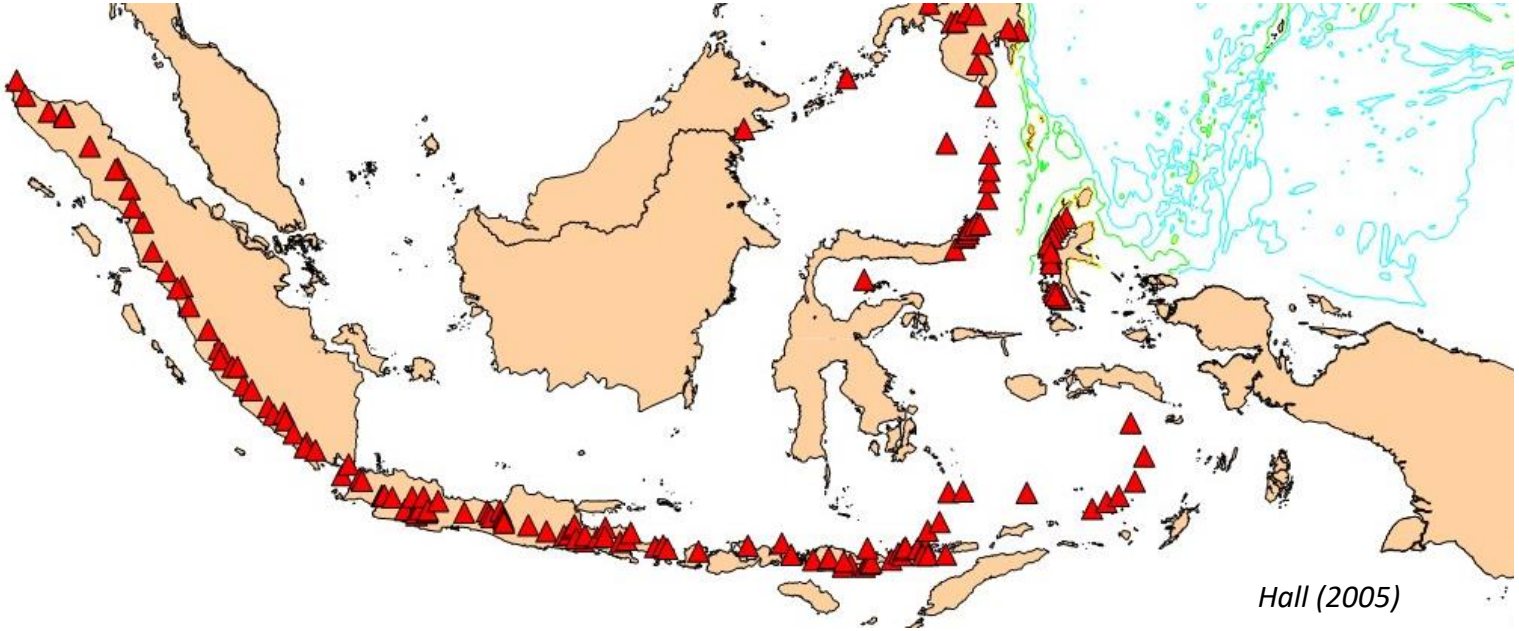
Gunungapi Penyedia Sumber Daya

Awang Harun Satyana
Geolog Independen

Diskusi

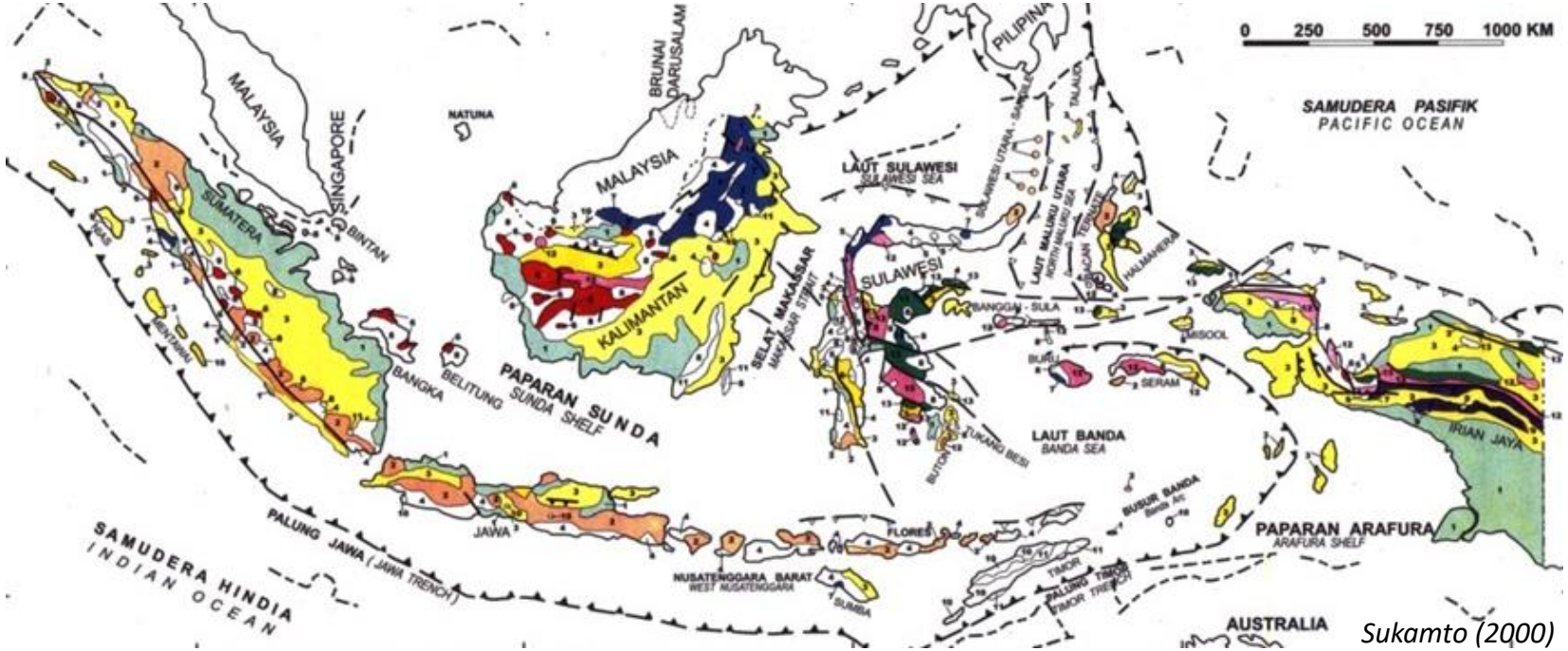
1. Gunungapi Kuarter dan Tersier Indonesia
2. Gunungapi Penyedia Pasir dan Batu
3. Gunungapi Penyedia Emas, Perak, Tembaga
4. Gunungapi Penyedia Energi Panas bumi
5. Gunungapi Penyedia Energi Minyak dan Gas Bumi

Gunungapi Kuarter dan Tersier Indonesia



Hall (2005)

▲ *gunungapi Kuarter*



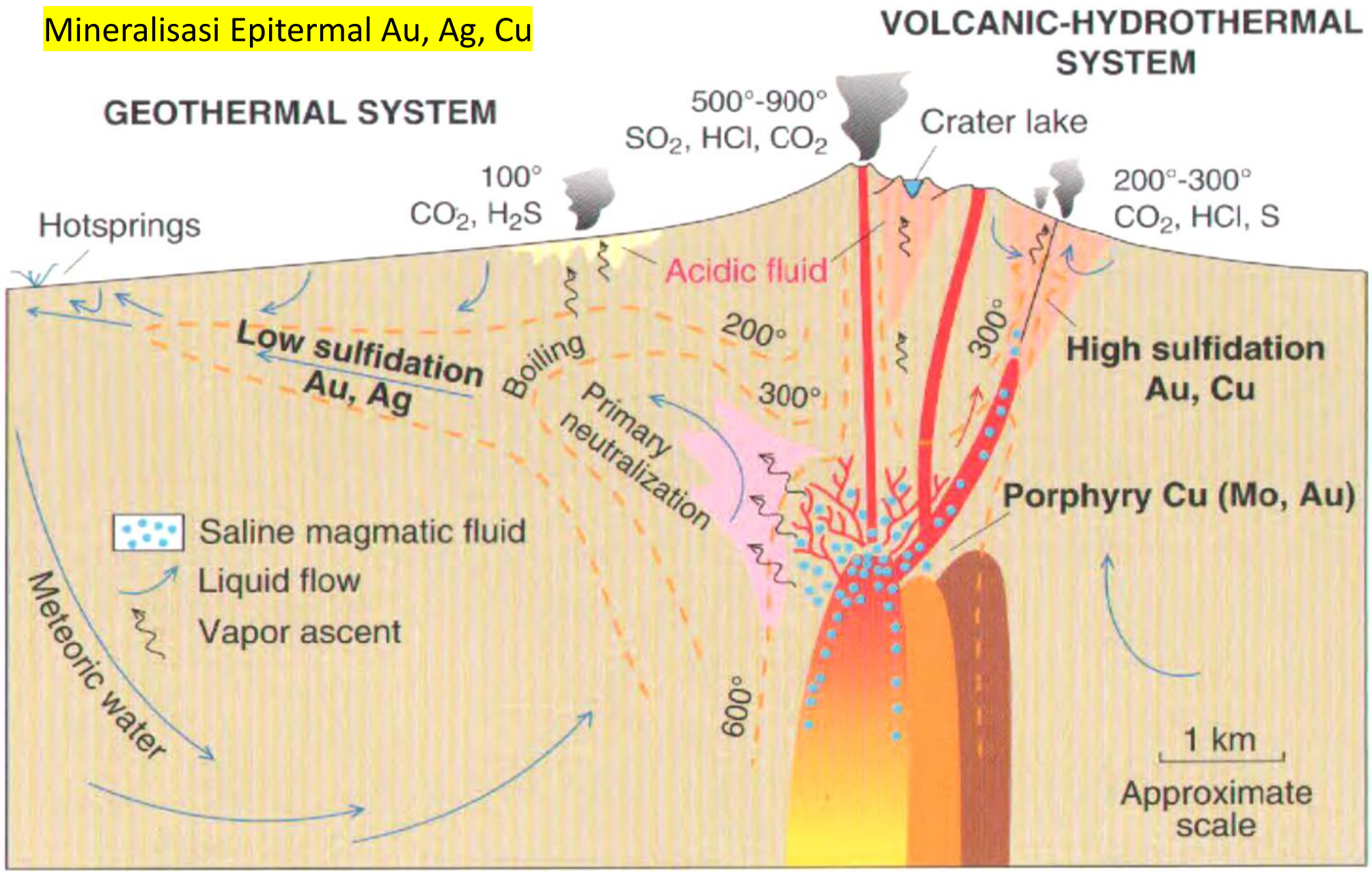
Sukamto (2000)

Gunungapi Penyedia Sumber Daya

Bahan Galian Pasir dan Batu

Gunungapi Penyedia Sumber Daya

Mineralisasi Epitermal Au, Ag, Cu



Deposit bijih epitermal terbentuk di tempat dangkal dari permukaan sampai kedalaman 1-2 km, pada kisaran temperatur <150 - 300°C. Dua tipe deposit terbentuk dari fluida yang secara kimia komposisinya berbeda di lingkungan volkanik. Bijih deposit *high sulfidation* (HS) terjadi di batuan silikat yang berasosiasi dengan fluida asam di lingkungan hidrotermal volkanik. Sementara fluida untuk pembentukan urat-urat bijih *low sulfidation* (LS) adalah fluida dengan pH netral yang sama dengan sistem geothermal.

Hedenquist et al. (1996)

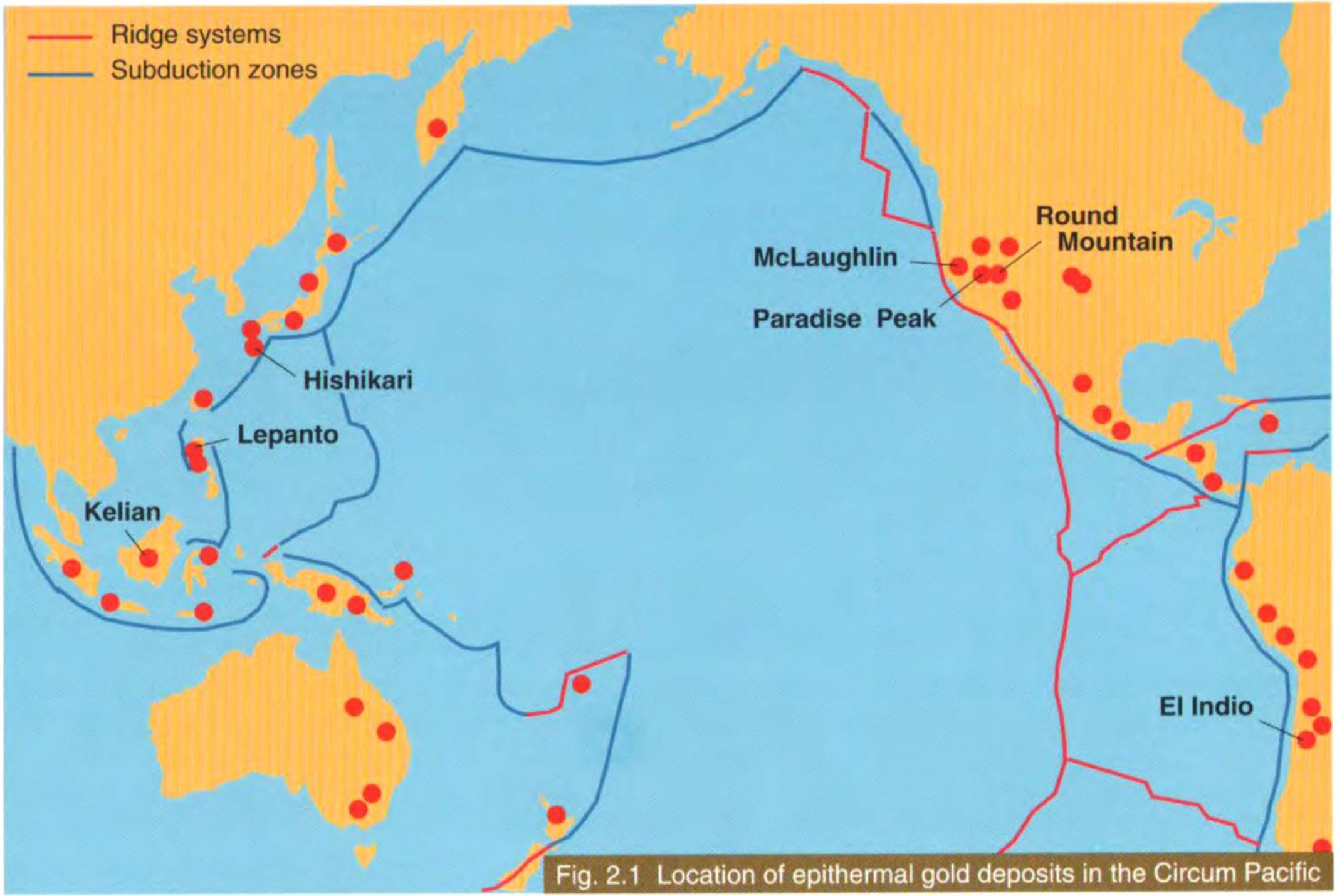
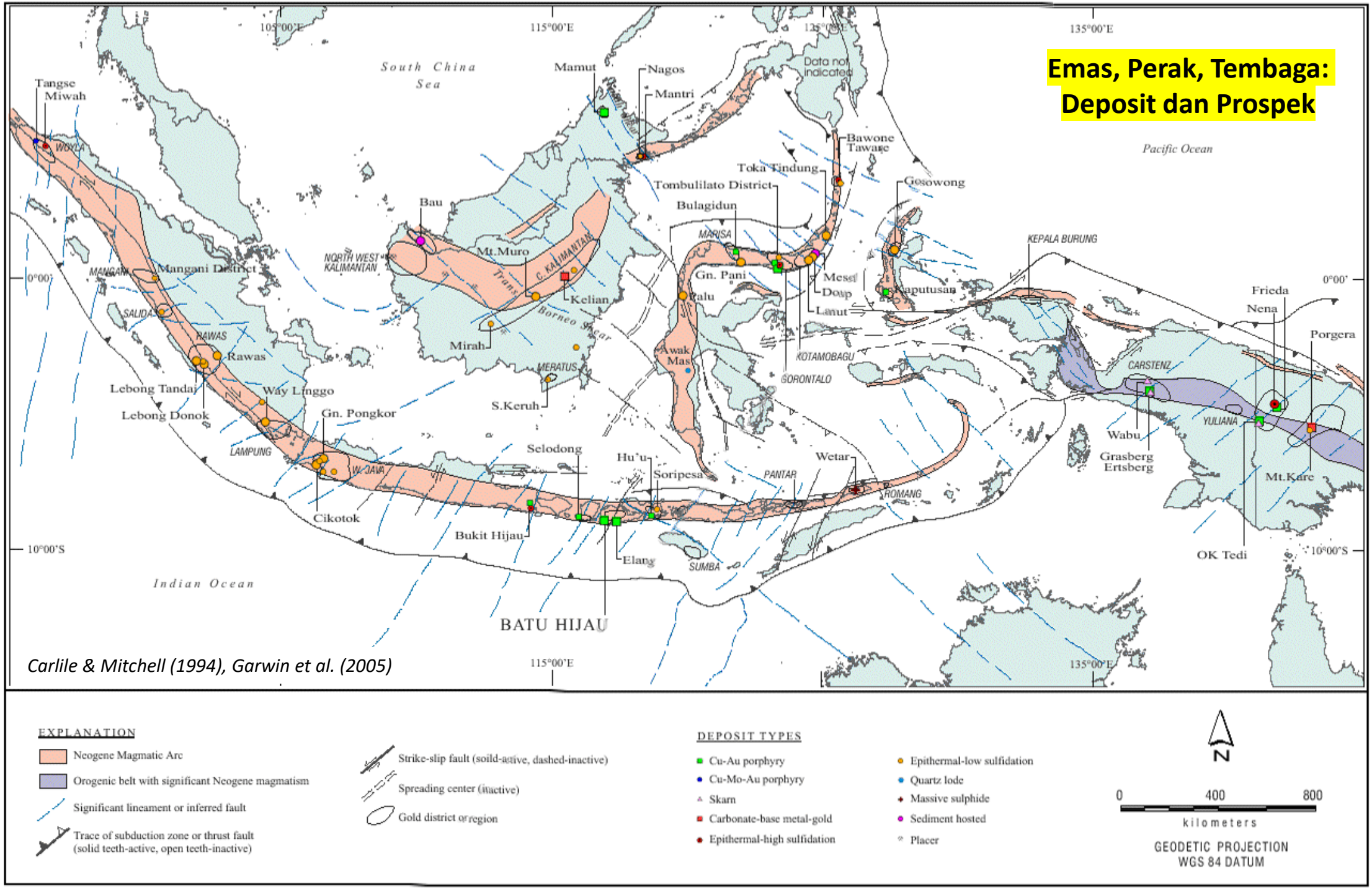


Fig. 2.1 Location of epithermal gold deposits in the Circum Pacific

Deposit emas epitermal sebagian besar terjadi di busur volkanik-plutonik (busur kepulauan dan busur benua) yang berasosiasi dengan zona-zona subduksi. Aktivitas hidrotermal dan mineralisasi emas terjadi sekitar 0,5 juta tahun setelah volkanisme terjadi. Batuan pengandung deposit emas terutama batuan volkanik dan batuan sedimen-volkanik yang seumur.

Hedenquist et al. (1996)

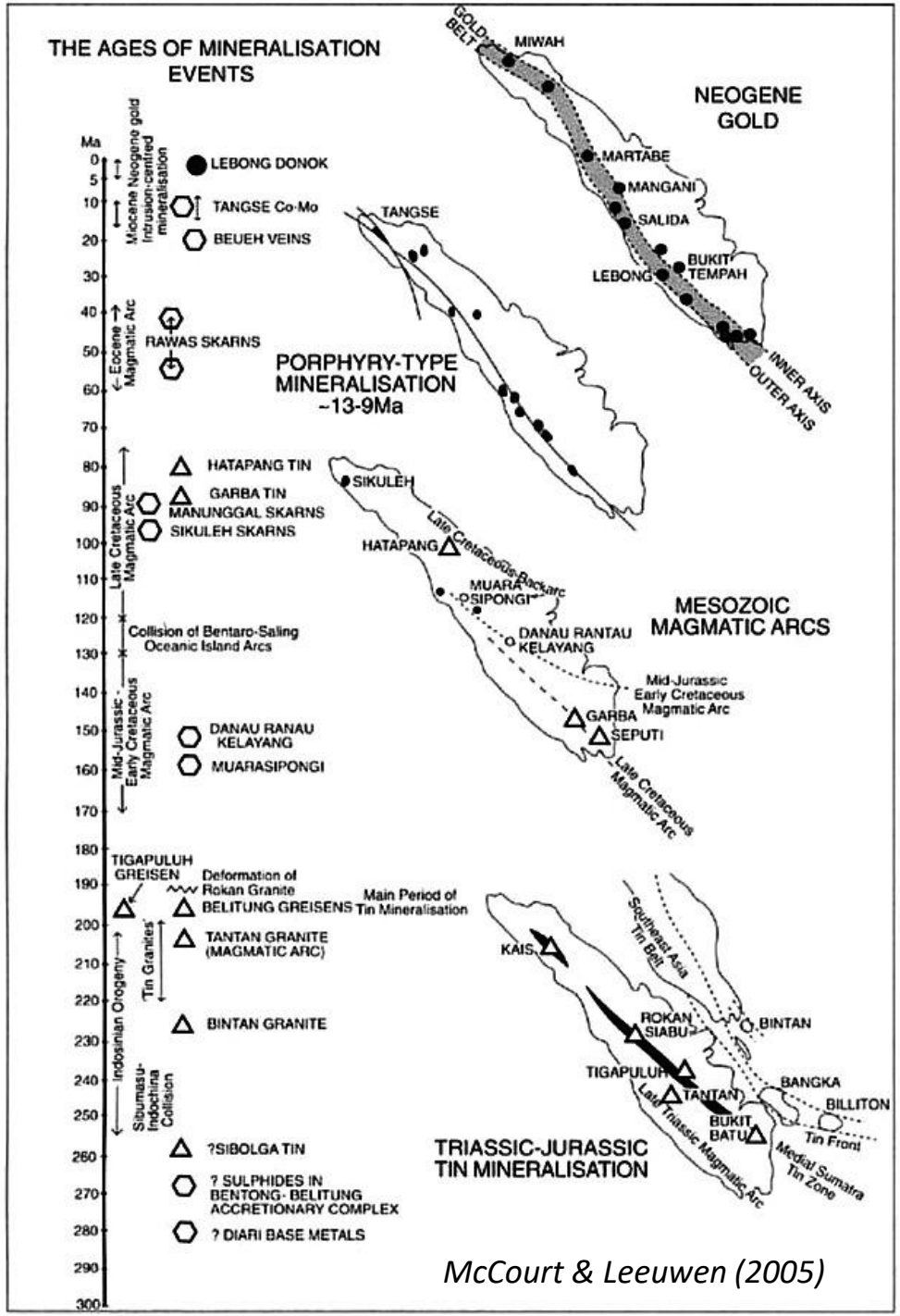
Emas, Perak, Tembaga: Deposit dan Prospek



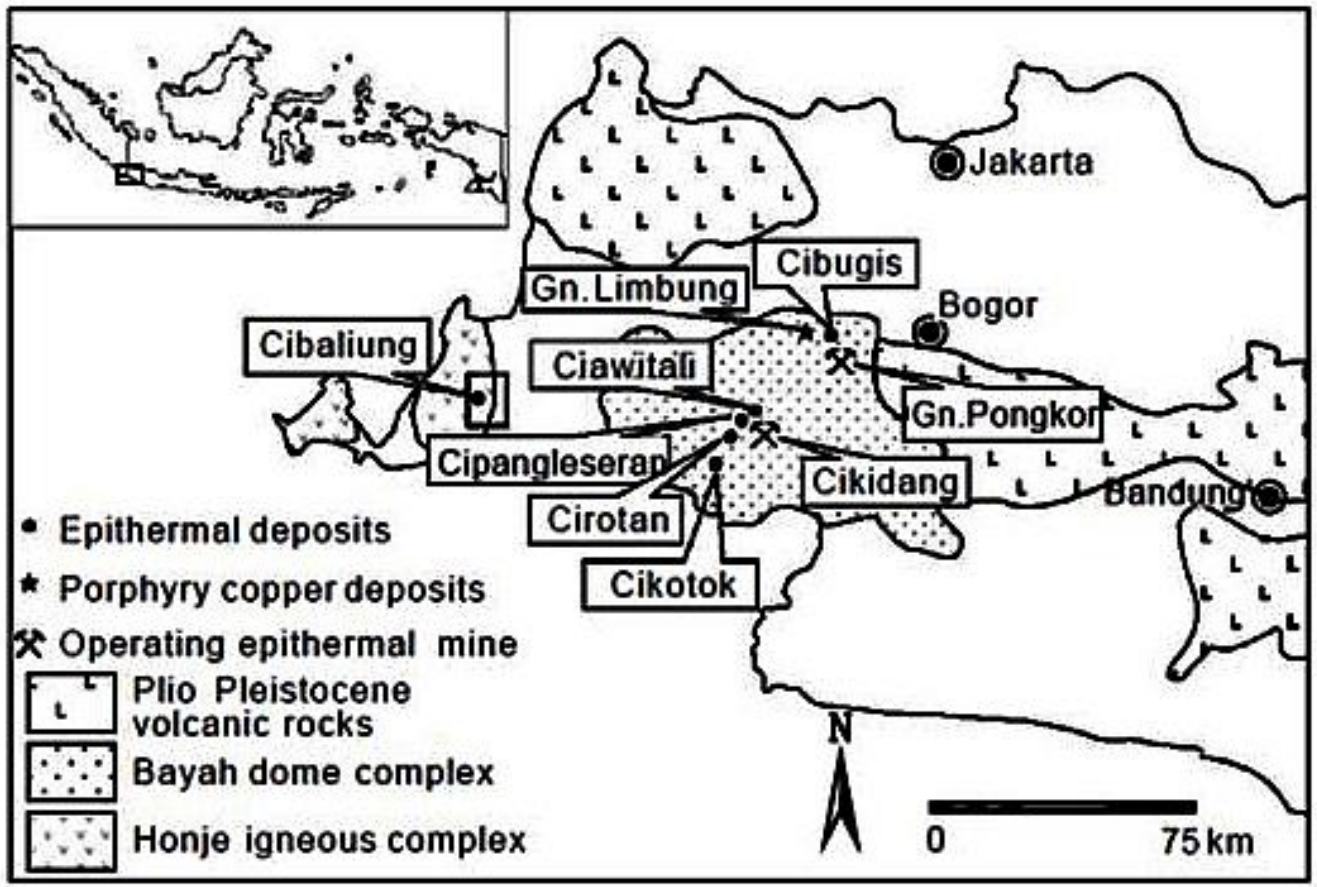
Carlile & Mitchell (1994), Garwin et al. (2005)

Mineralisasi Emas Jalur Volkanik-Magmatik

Sumatra | **Jawa Barat**



McCourt & Leeuwen (2005)



Harijoko et al. (2004)

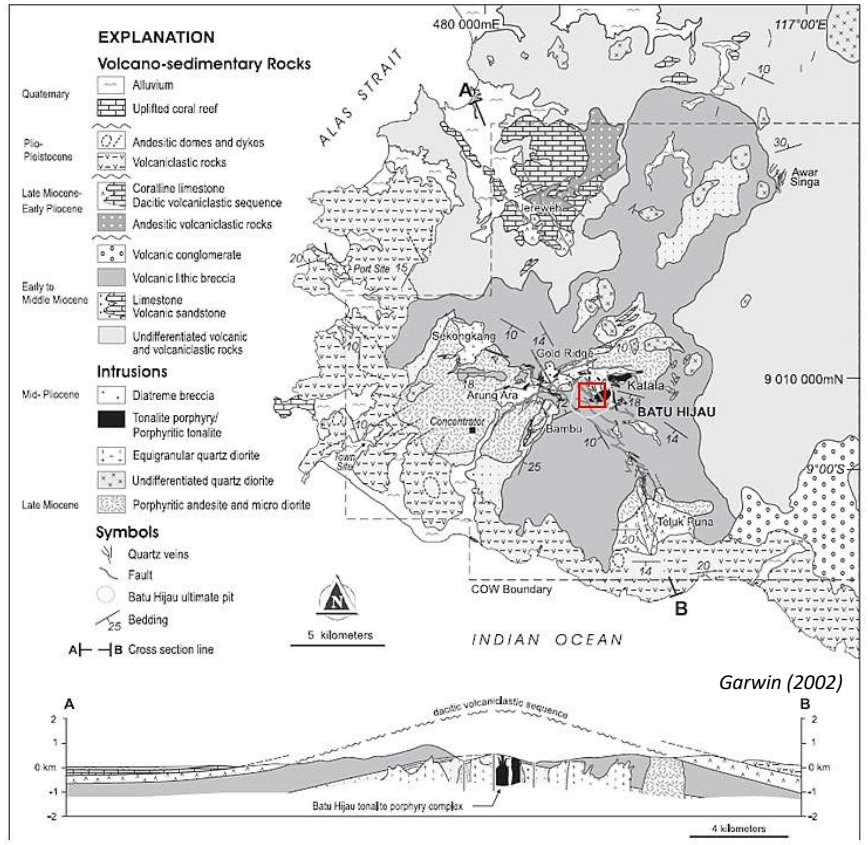
The main gold and gold-copper mineralization across the island from the northern to the southern parts of Sumatra are very young and formed during discrete time periods of 1 to 4 Ma or during the Pliocene-Pleistocene period (Maryono et al., 2014)

The most fertile magmatic-volcanic event in Western Java – Southern Sumatera is the Mio-Pliocene group/ zone. Most of the known mineralizations/ deposits fall within this magmatic-volcanic group (Rosana, 2014).

Awang Satyana, Webinar 26 Juni 2020

Batu Hijau mining site, Sumbawa:
porphyry deposits, mid-Pliocene
tonalite intruded submarine volcanics,
20 Moz of gold and 7.2 Mt of copper.

https://newswantara.com/fokus/menggali-potensi-pertambangan-kabupaten-sumbawa-barat



Garwin (2002)

http://www.medcoenergi.com/id/our-operation/nr/ajax_load_node/149

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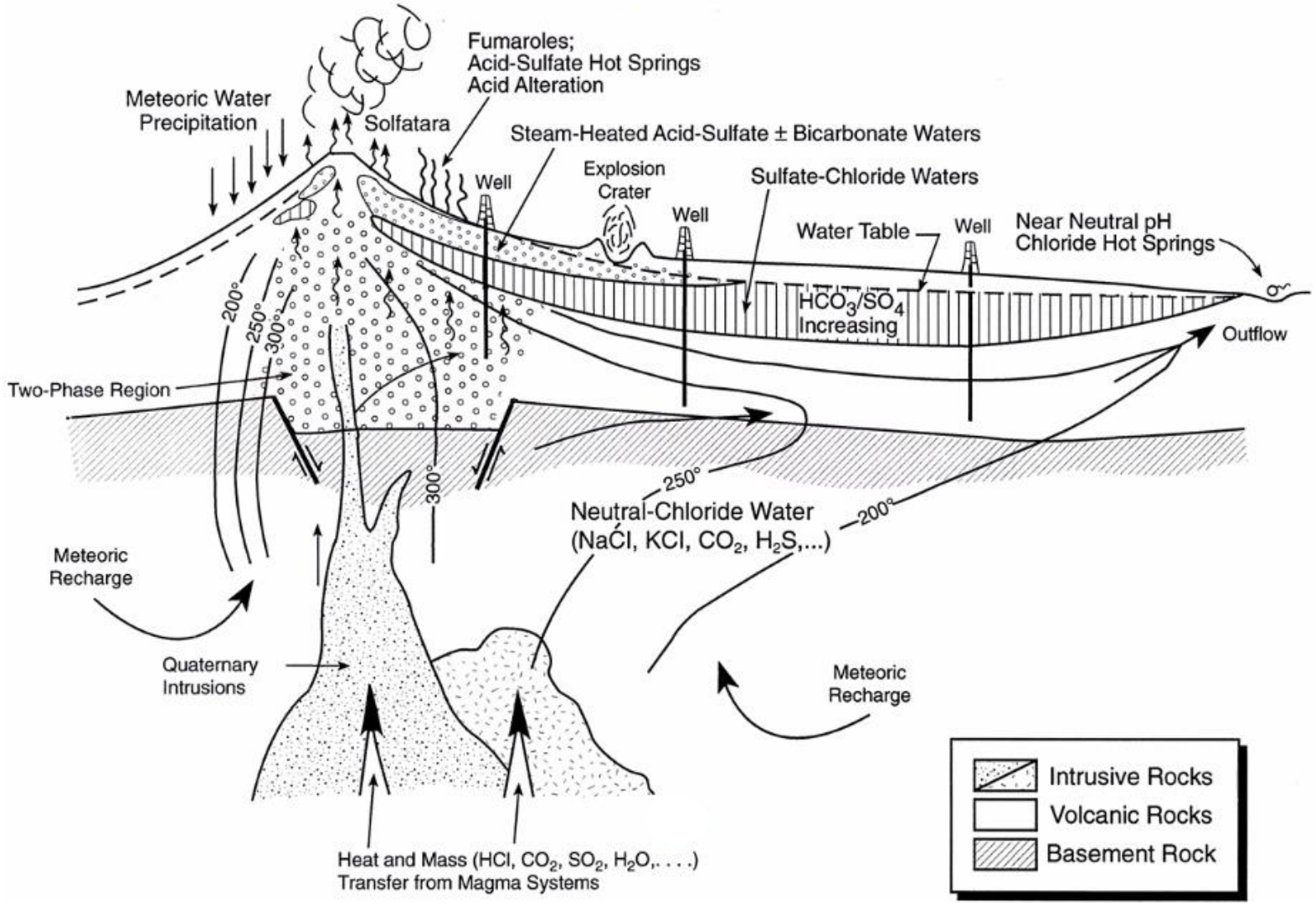
Gunungapi Penyedia Energi Panas Bumi

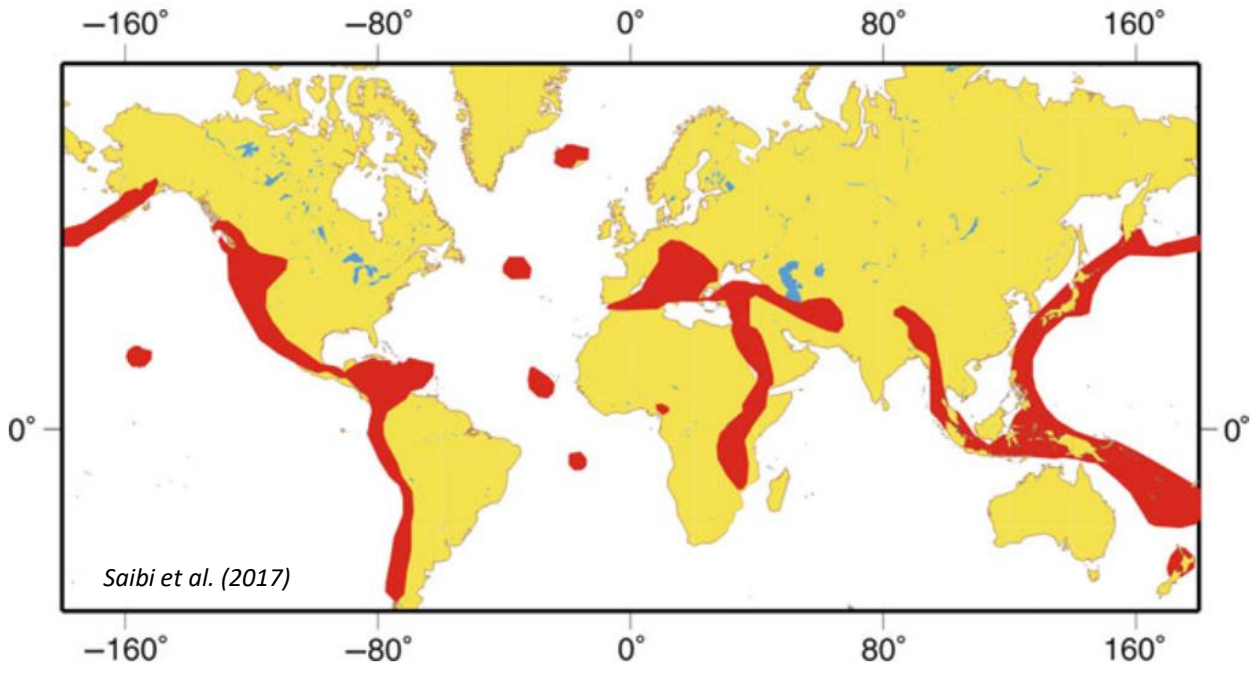
Model sistem panas bumi



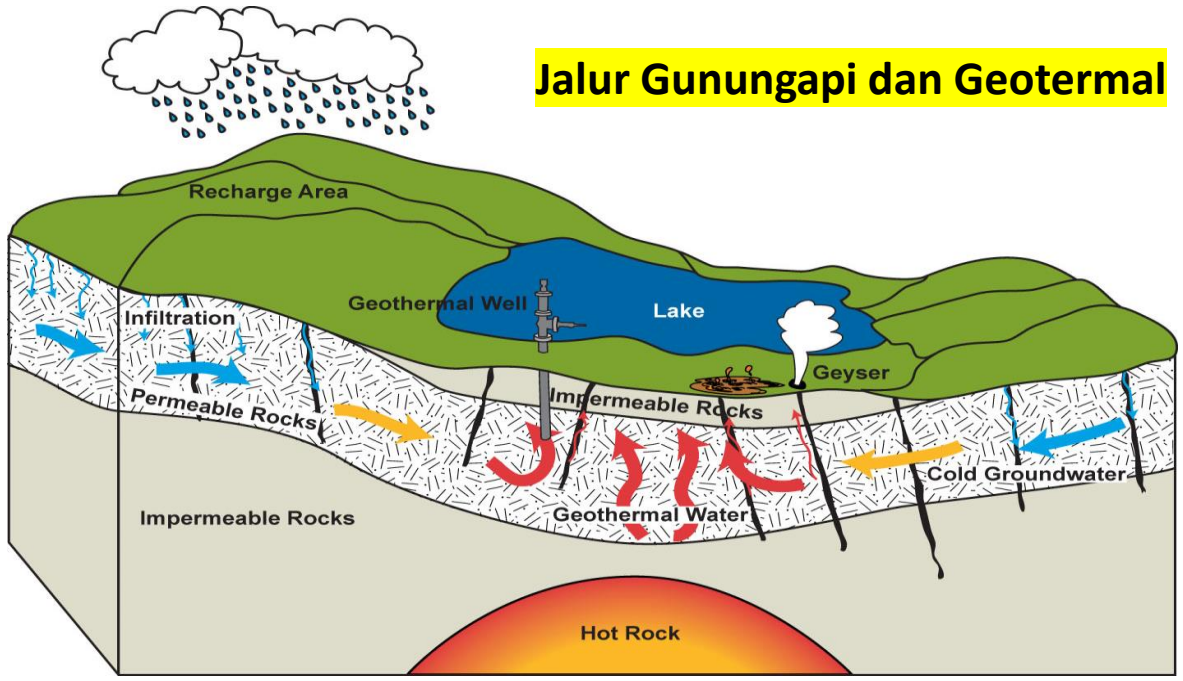
- Komponen penyususn system pans bumi:
  - Heat source
  - Zona permeabel (zona patahan, batas batuan dll) → Sirkulasi air
  - Batuan permeabel sebagai reservoir
  - Batuan penudung → biasanya terbentuk karena proses alterasi yang membentuk zona kaya mineral lempung

Agung Harijoko, Webinar 11 Sep 2021

Jalur Gunungapi dan Geotermal

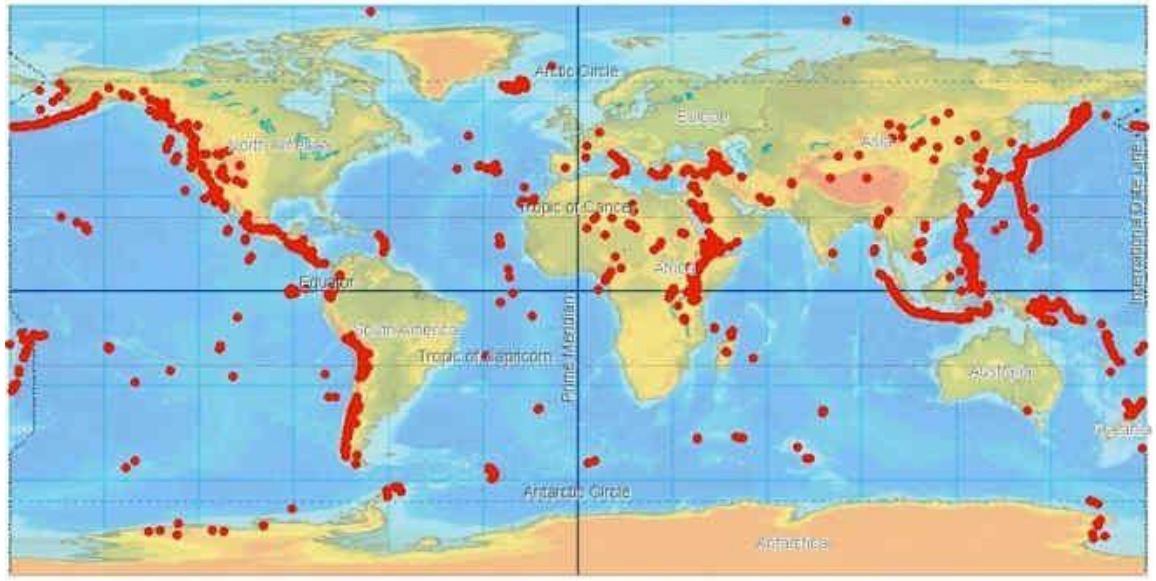


Geothermal regions in the world (in *red*)



www.boprc.govt.nzenvironment

Geothermal system



pinterest.com

Volcanoes in the world

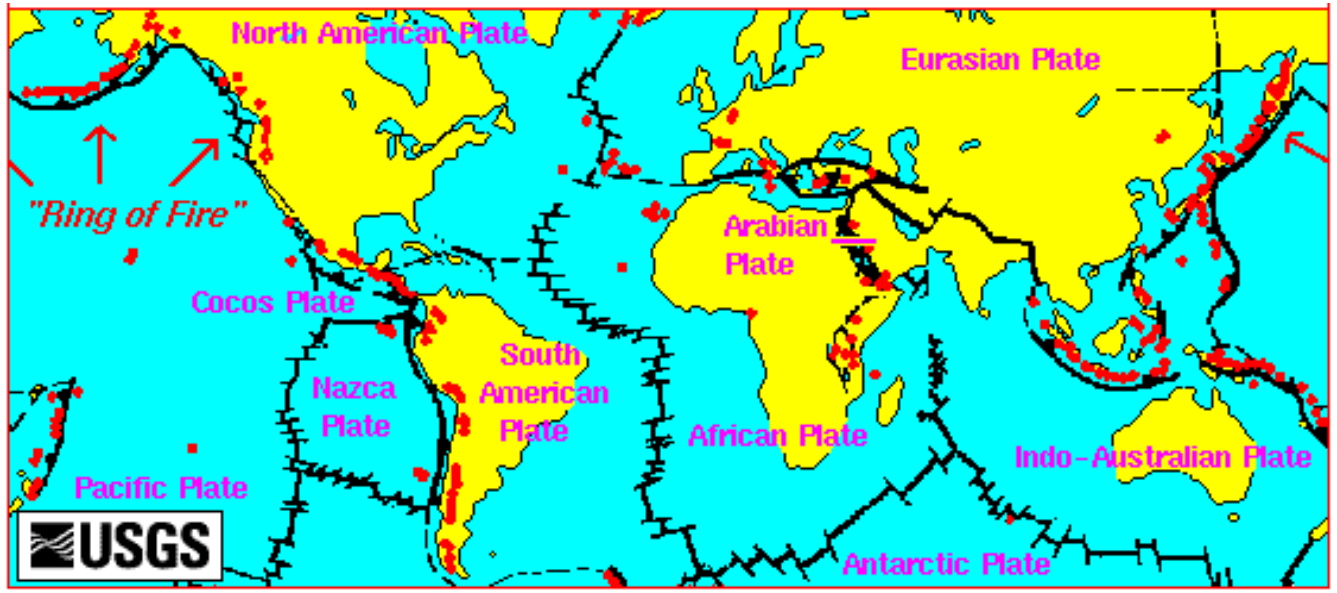


Plate tectonic setting of volcanoes in the world

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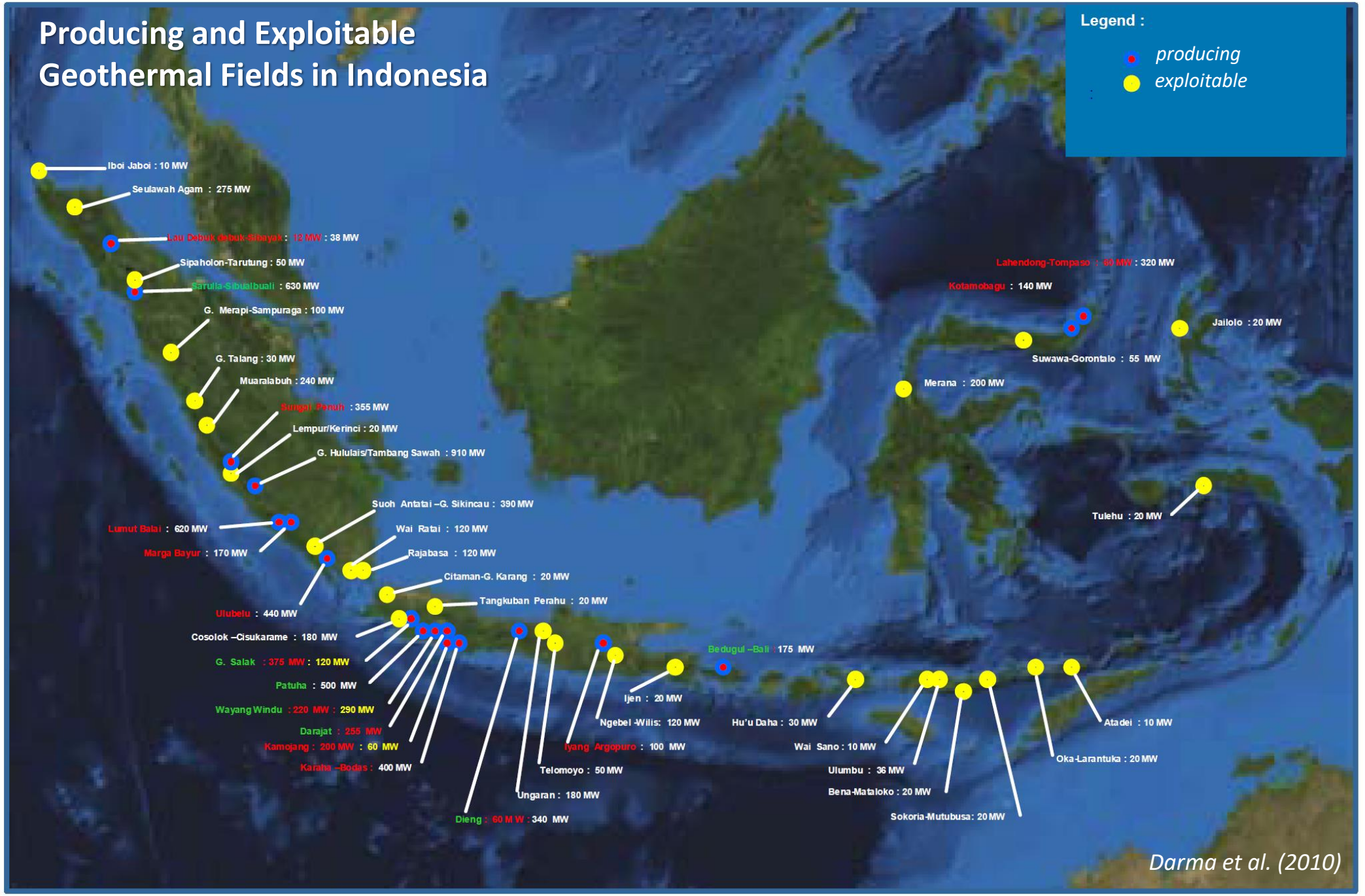
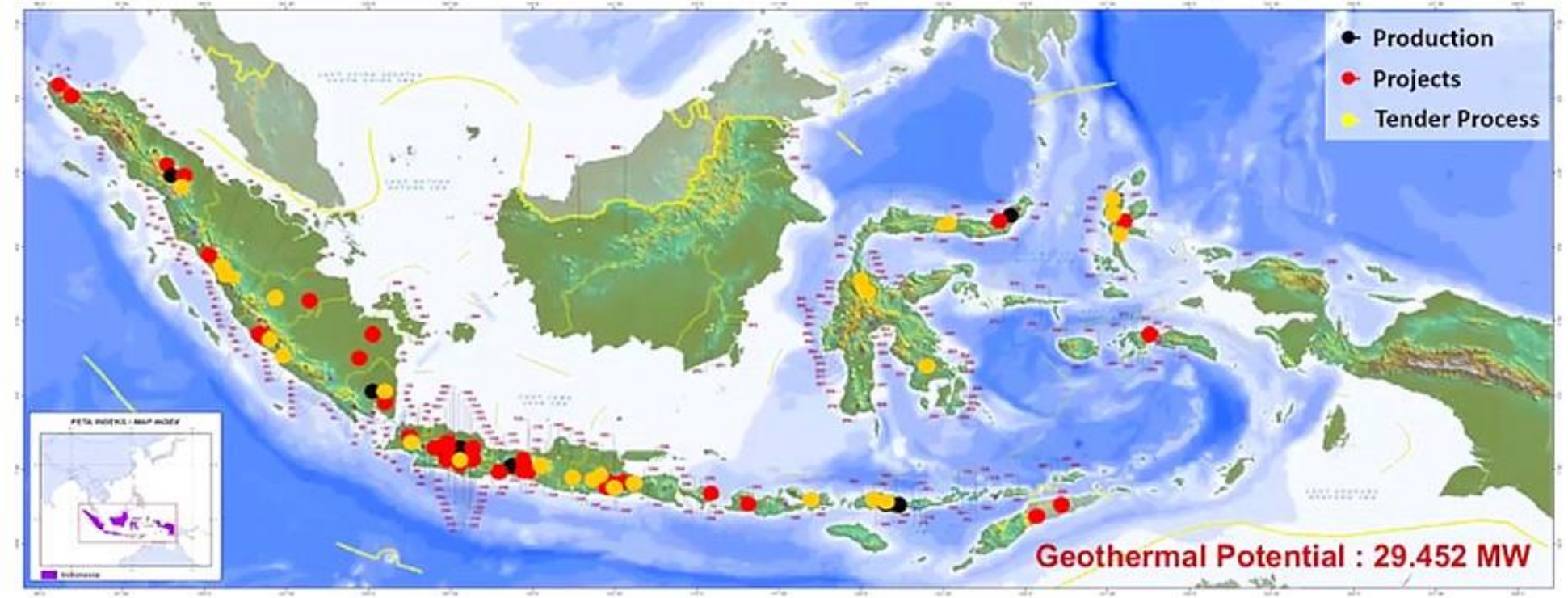

Producing and Exploitable
Geothermal Fields in Indonesia
Legend :
producing
exploitable
Iboi Jaboi : 10 MW
Seulawah Agam : 275 MW
Lau Debuk debuk-Sibayak : 12 MW : 38 MW
Sipaholon-Tarutung : 50 MW
Sarulla-Sibualbuali : 630 MW
G. Merapi-Sampuraga : 100 MW
G. Talang : 30 MW
Muaralabuh : 240 MW
Sungai Penuh : 355 MW
Lempur/Kerinci : 20 MW
G. Hululais/Tambang Sawah : 910 MW
Suoh Antatai –G. Sikincau : 390 MW
Lumut Balai : 620 MW
Wai Ratai : 120 MW
Marga Bayur : 170 MW
Rajabasa : 120 MW
Citaman-G. Karang : 20 MW
Tangkuban Perahu : 20 MW
Ulubelu : 440 MW
Cosolok –Cisukarame : 180 MW
G. Salak : 375 MW : 120 MW
Patuha : 500 MW
Wayang Windu : 220 MW : 290 MW
Darajat : 255 MW
Kamojang : 200 MW : 60 MW
Karaha –Bodas : 400 MW
Dieng : 60 MW : 340 MW
Ungaran : 180 MW
Telomoyo : 50 MW
Iyang Argopuro : 100 MW
Ngebel -Wilis: 120 MW
Ijen : 20 MW
Bedugul –Bali : 175 MW
Hu'u Daha : 30 MW
Wai Sano : 10 MW
Ulumbu : 36 MW
Bena-Mataloko : 20 MW
Sokoria-Mutubusa: 20 MW
Oka-Larantuka : 20 MW
Atadei : 10 MW
Lahendong-Tompaso : 60 MW : 320 MW
Kotamobagu : 140 MW
Suwawa-Gorontalo : 55 MW
Jailolo : 20 MW
Merana : 200 MW
Tulehu : 20 MW
Darma et al. (2010)

Indonesia Geothermal Potential



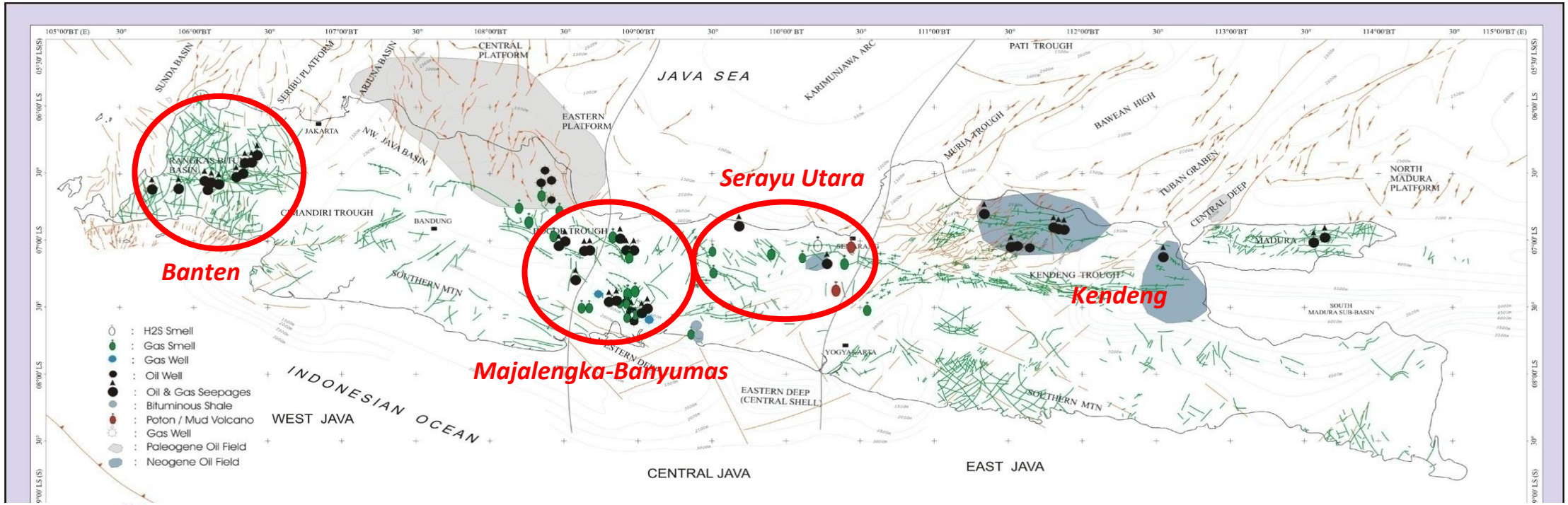
No	Indonesia Island	Geoth. Area	Total* (MWe)	Installed** (MW)
1	Sumatera	93	12.895	617
2	Jawa	73	9.795	1.255
3	Bali-Nusa Tenggara	33	1.907,5	13
4	Kalimantan	14	162.5	-
5	Sulawesi	76	3.229	120
6	Maluku	32	1.388	-
7	Papua	3	75	-
Total		324	29.452	2005

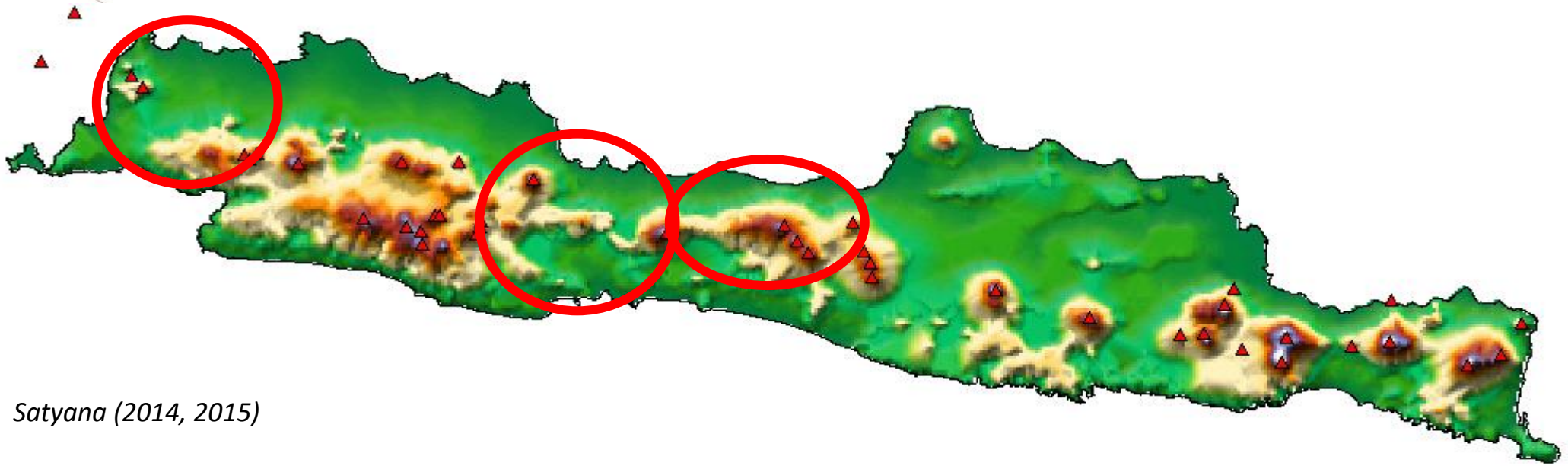
Pertamina (2020)

Source :
** Badan Geologi Kementerian ESDM*
*** EBTKE ESDM*

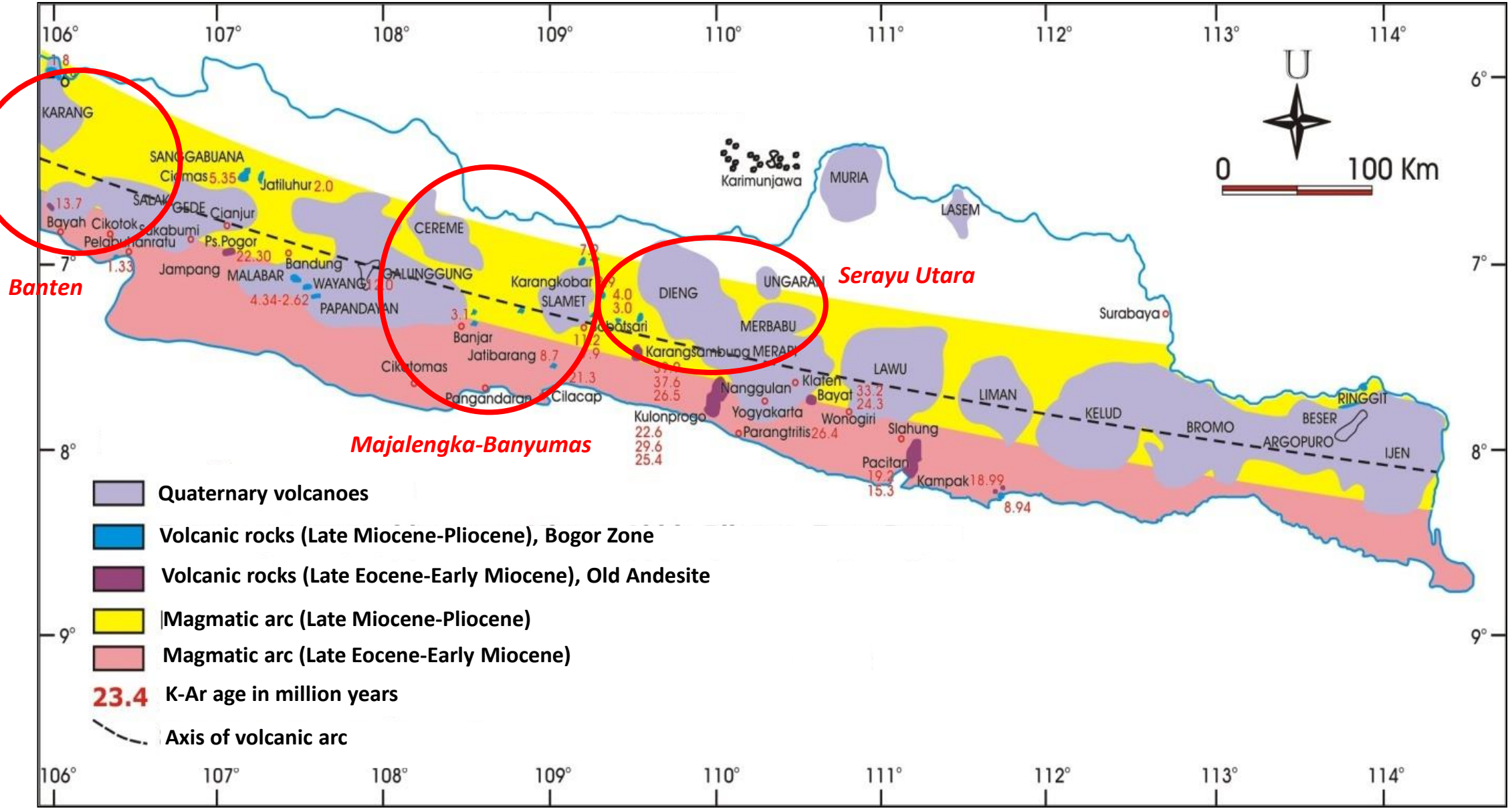
www.pertamina.com

Rembesan Minyak di Daerah Gunungapi





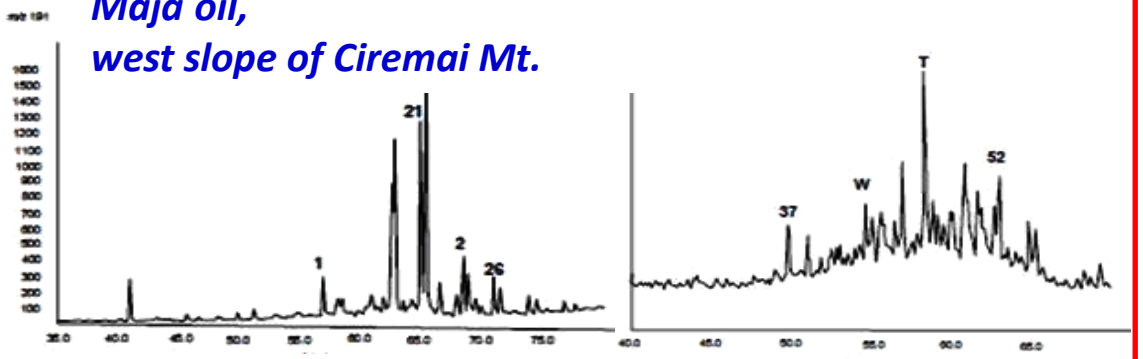
Satyana (2014, 2015)



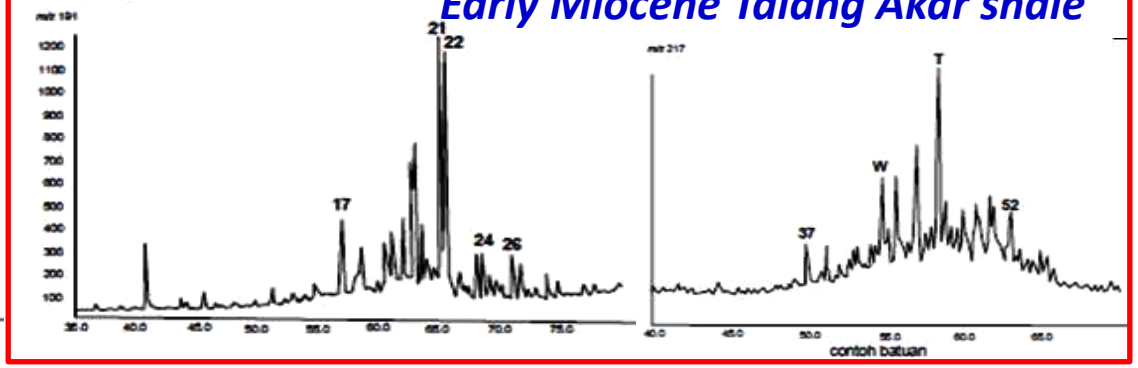
Jalur Volkanik-Magmatik Pulau Jawa

Soeria-Atmadja et al. (1994)

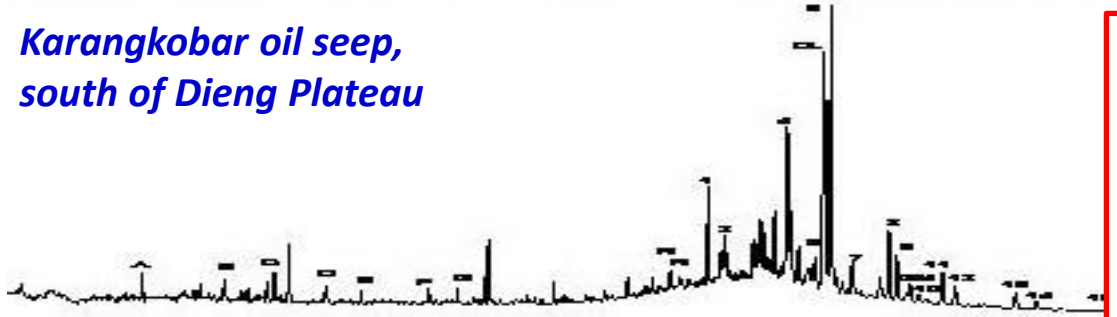
Maja oil,
west slope of Ciremai Mt.



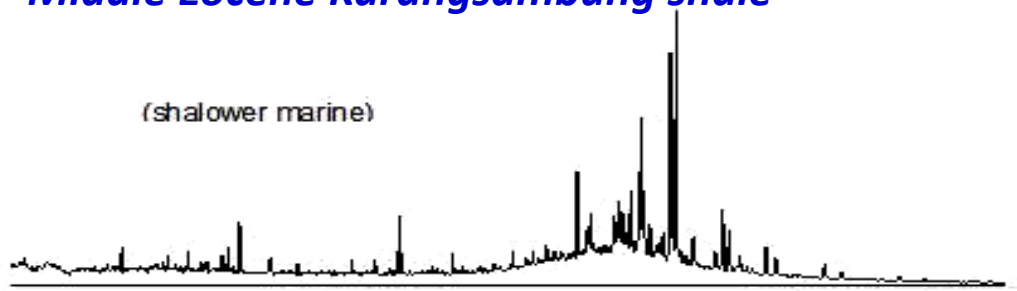
Early Miocene Talang Akar shale



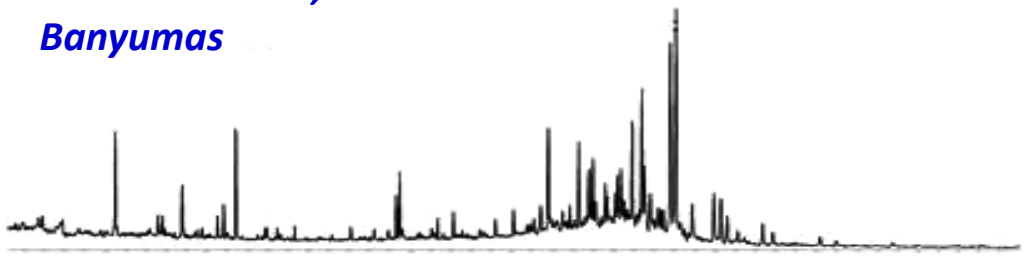
Karangkobar oil seep,
south of Dieng Plateau



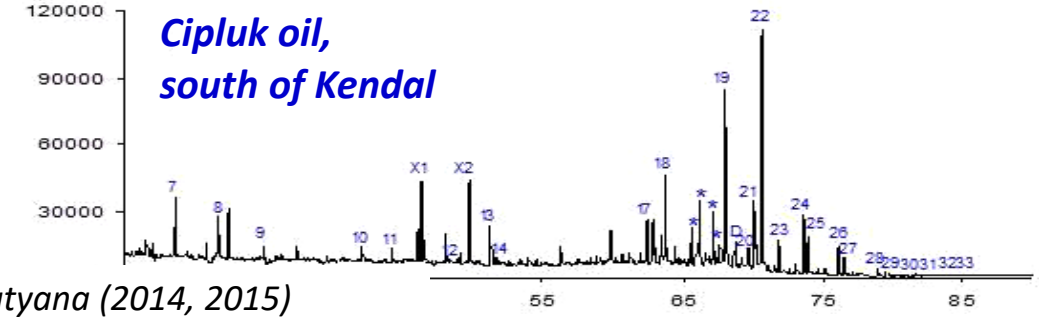
Middle Eocene Karangsambung shale



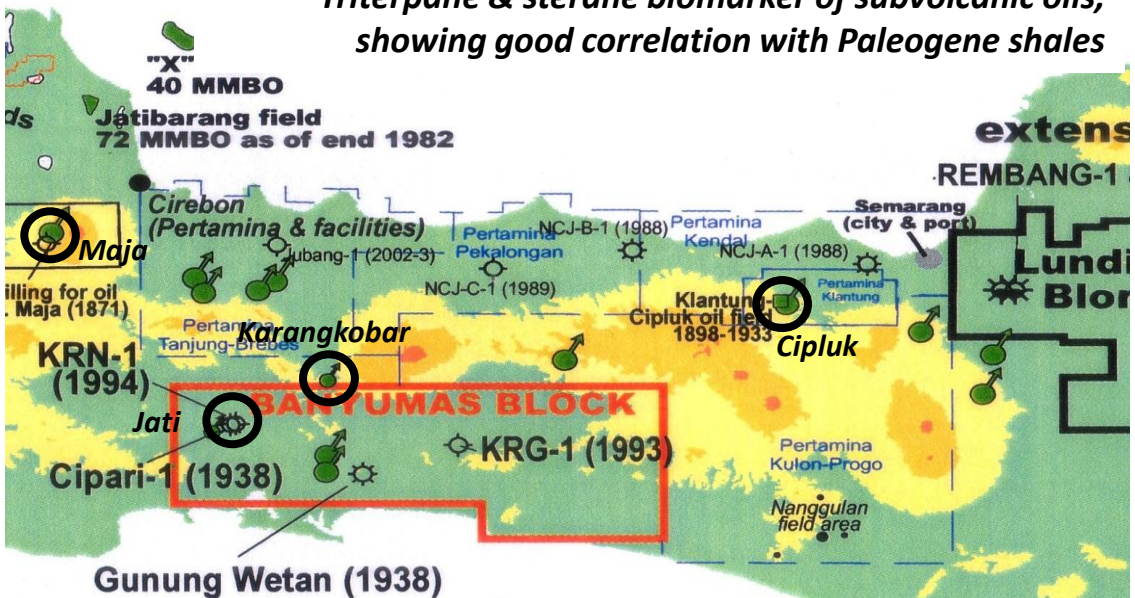
Jati condensate,
Banyumas



Cipluk oil,
south of Kendal

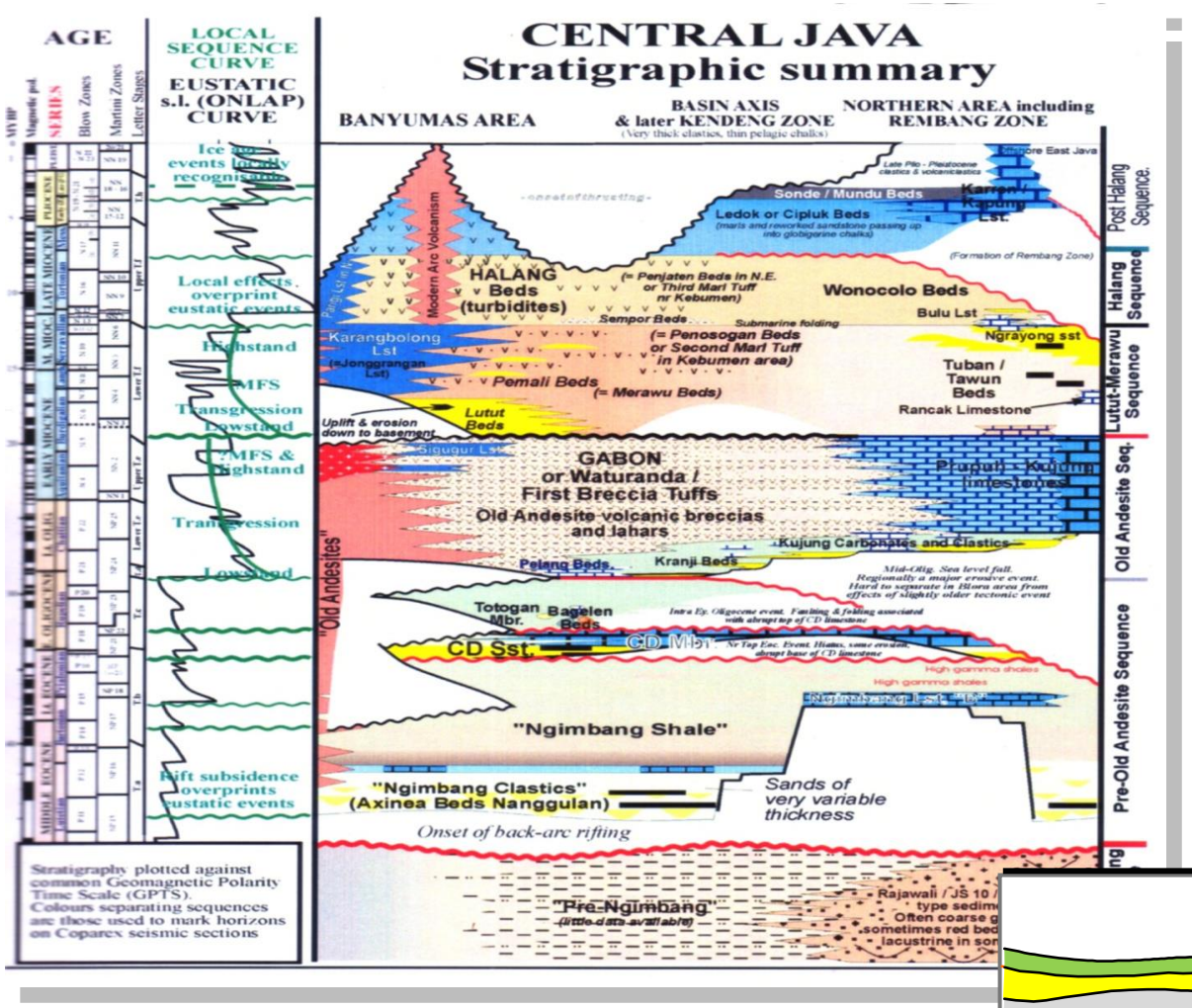


Triterpane & sterane biomarker of subvolcanic oils, showing good correlation with Paleogene shales



Satyana (2014, 2015)

Endapan Gunungapi sebagai Elemen Sistem Petroleum

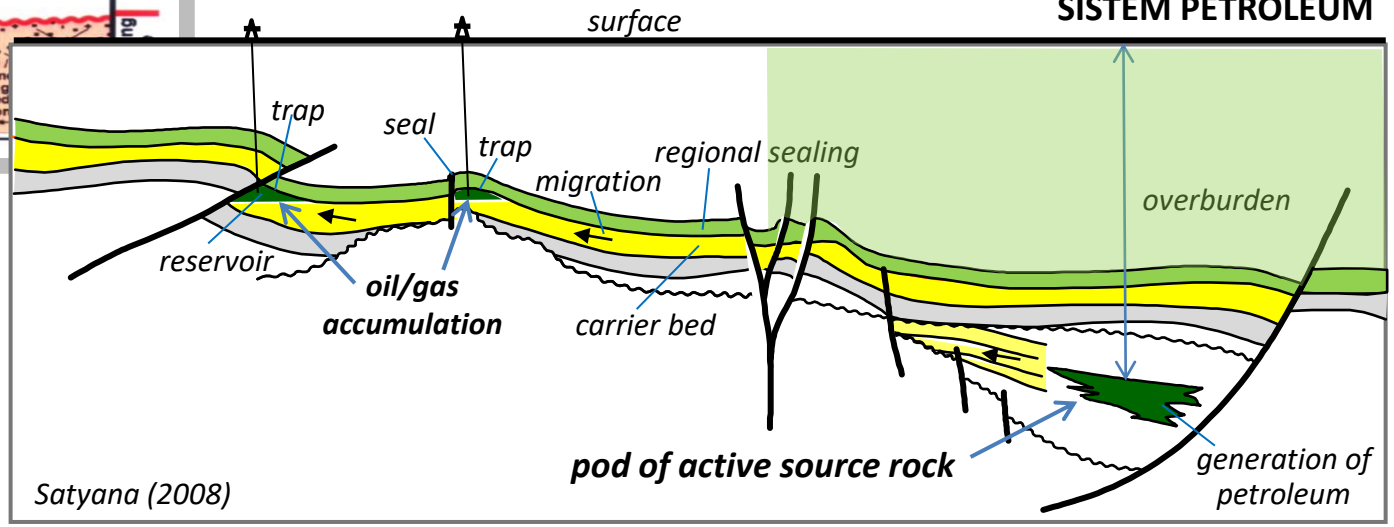


mod. after Lunt (2003)

volcanism:
overburden
reservoirs

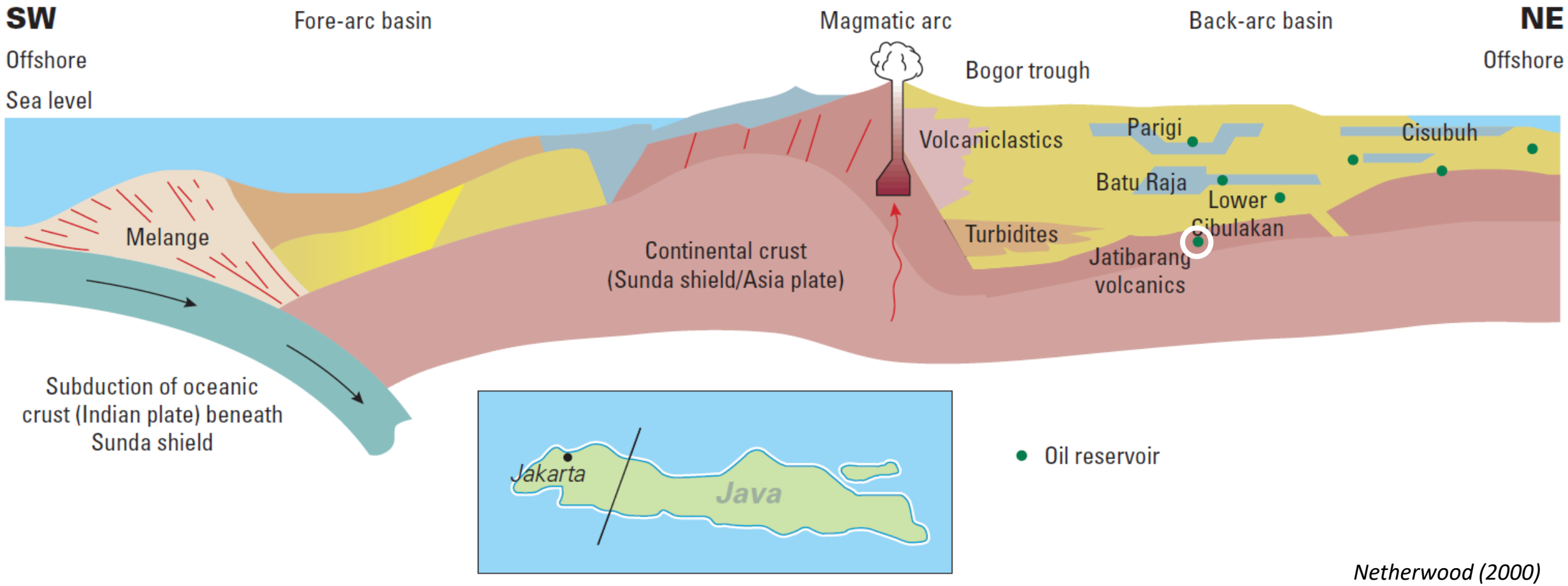
reservoirs
sources

SISTEM PETROLEUM

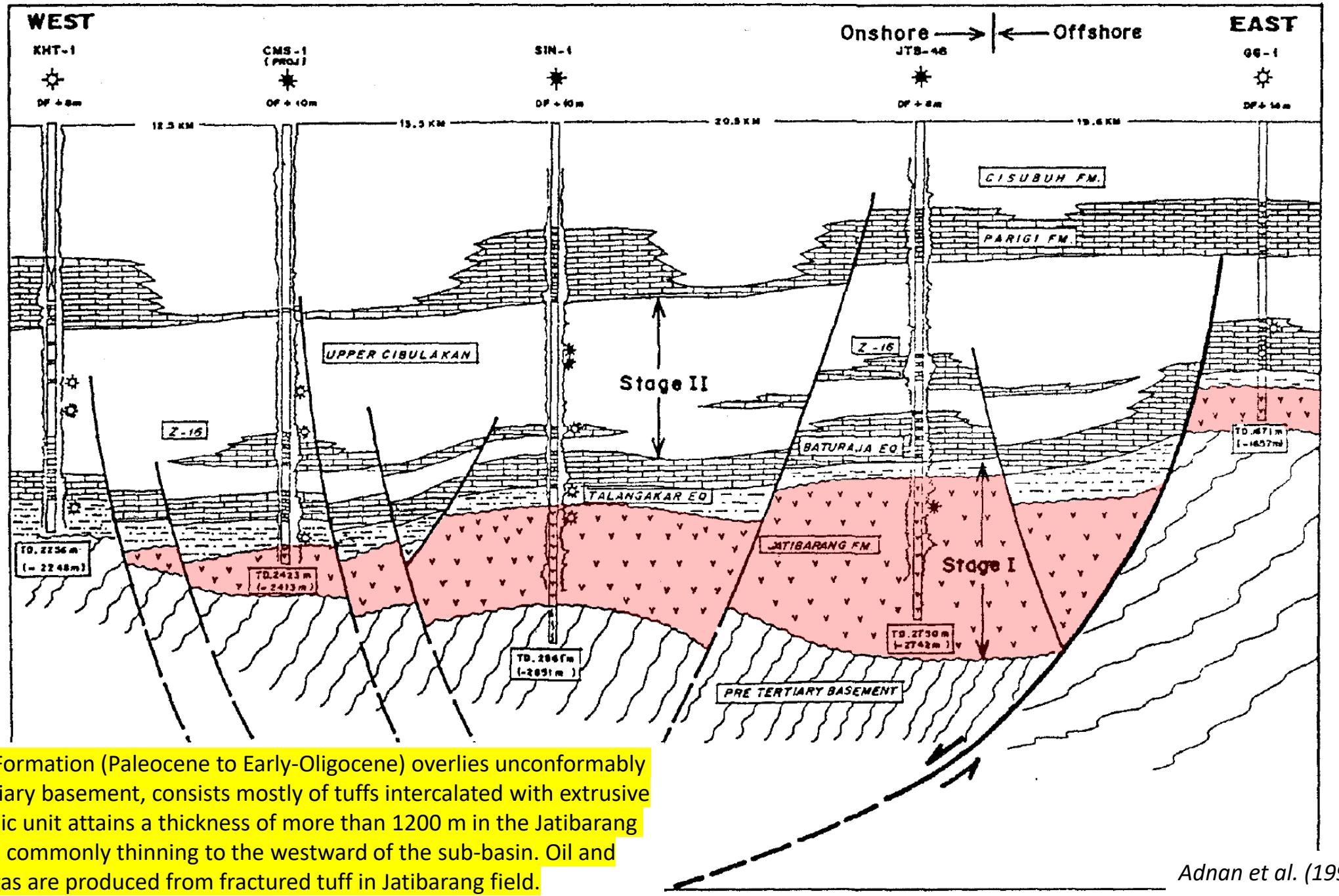


Satyana (2008)

Volkanik Jatibarang sebagai reservoir migas

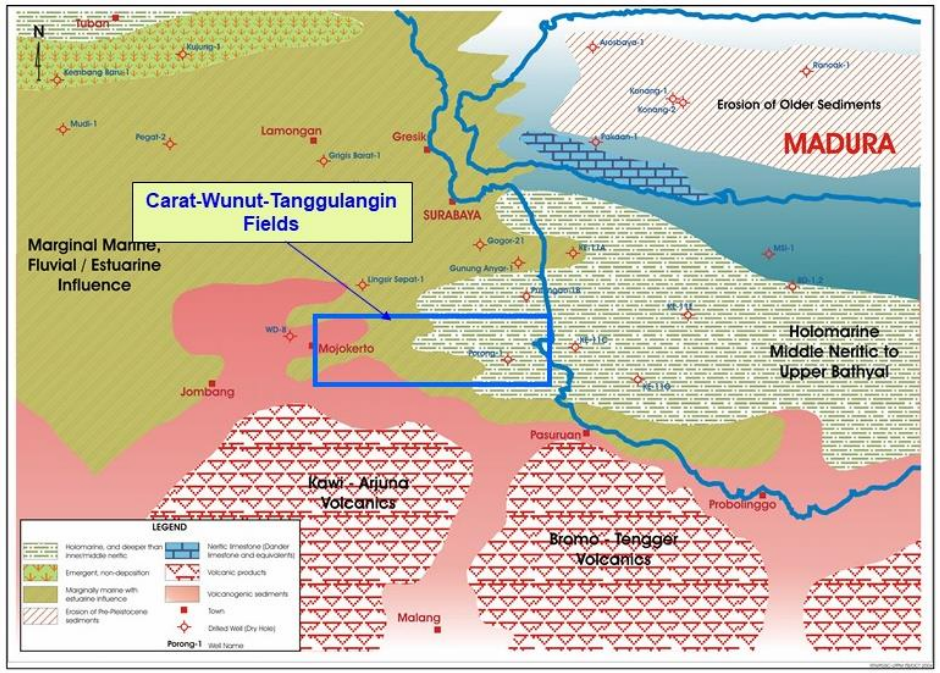


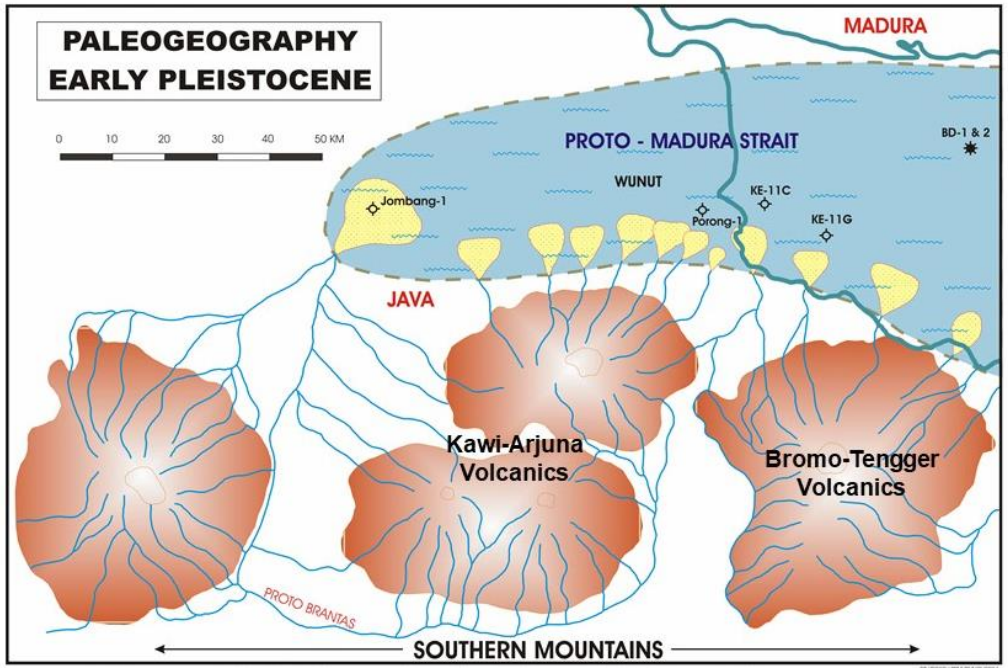
Netherwood (2000)



Jatibarang Formation (Paleocene to Early-Oligocene) overlies unconformably the Pre-Tertiary basement, consists mostly of tuffs intercalated with extrusive stratigraphic unit attains a thickness of more than 1200 m in the Jatibarang field and commonly thinning to the westward of the sub-basin. Oil and gas are produced from fractured tuff in Jatibarang field.

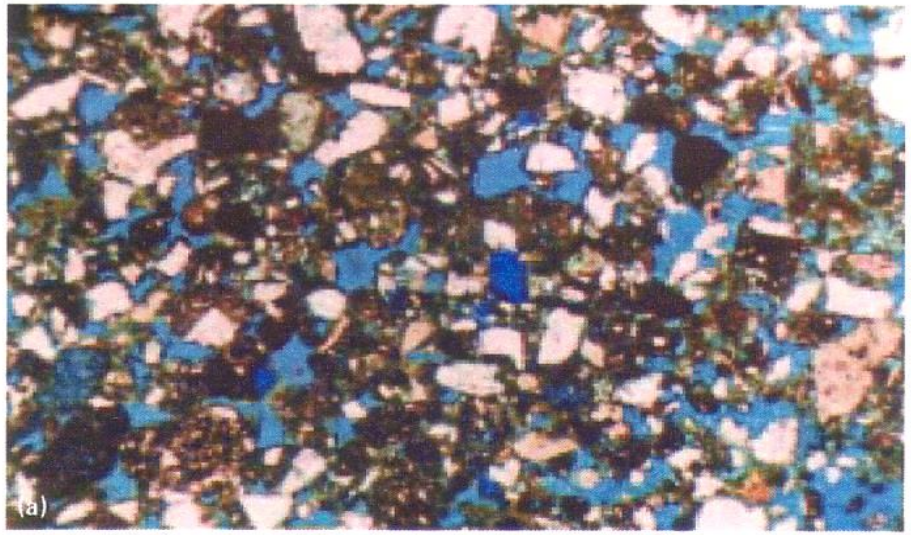
Adnan et al. (1991)





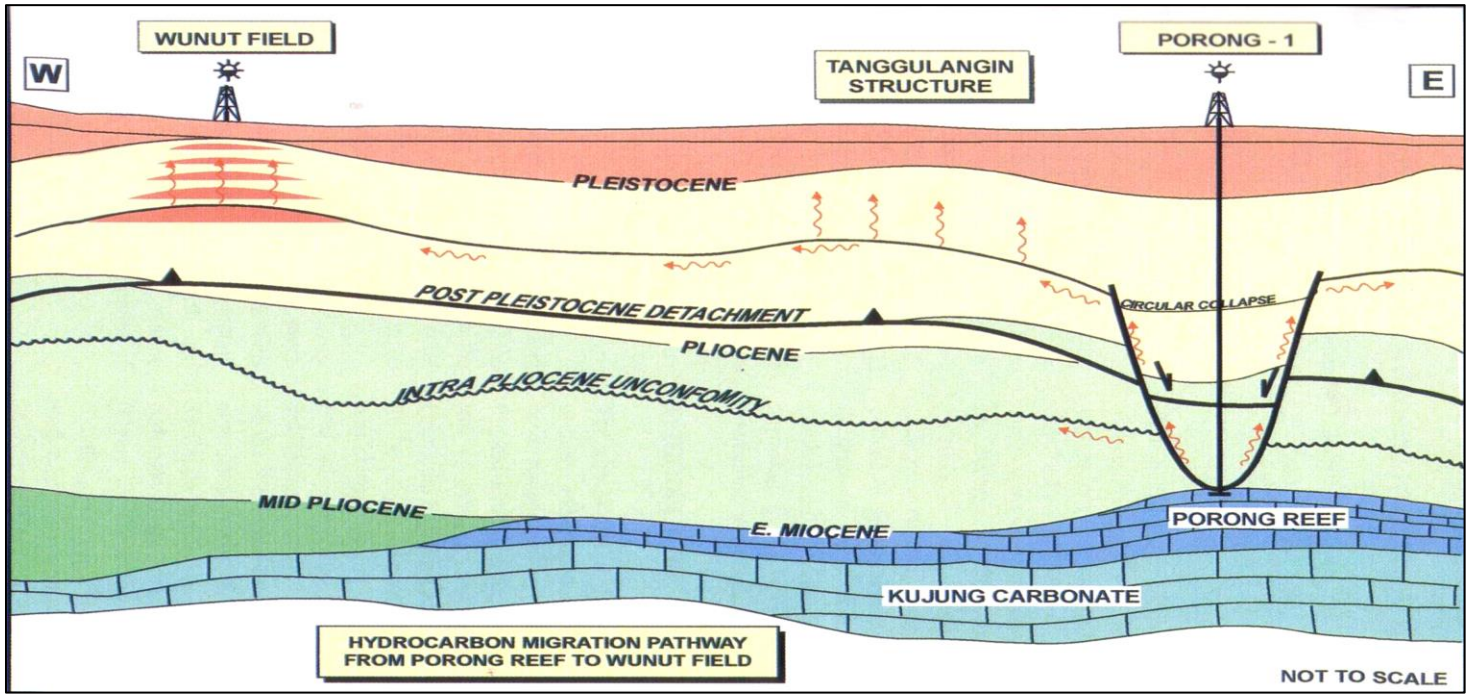
Reservoir Volkaniklastik Formasi Pucangan (Plistosen), Lapangan Gas dan Minyak Wunut, Tanggungangin, Carat (Lapindo Brantas)

Huffco Brantas (1993)



Netherwood (2000)

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).



Kusumastuti et al. (2000)

Terima kasih atas perhatian Anda.

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