香港地質概述
HONG KONG GEOLOGY – An Overview

Candy Cho

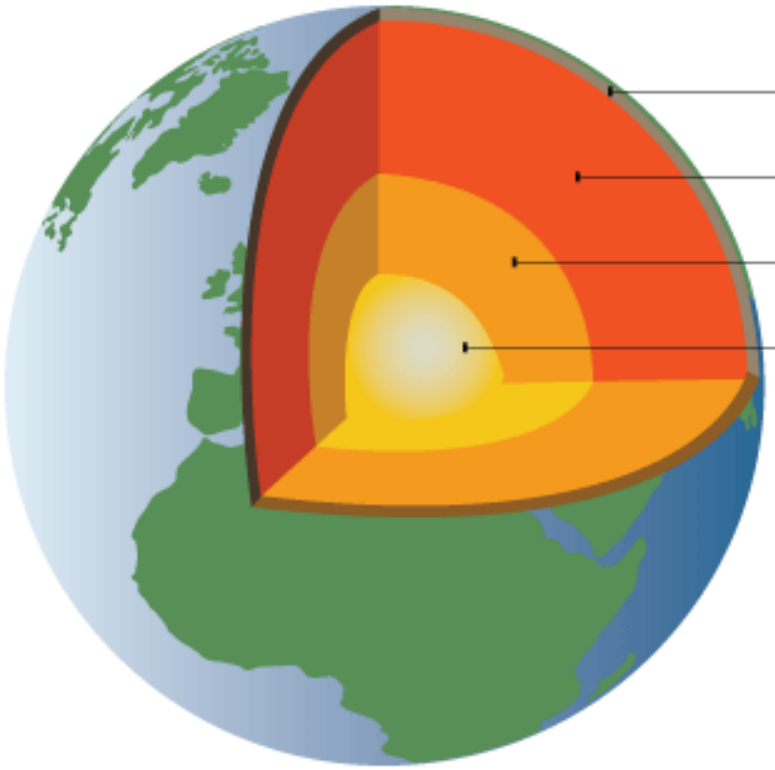
12.01.2016

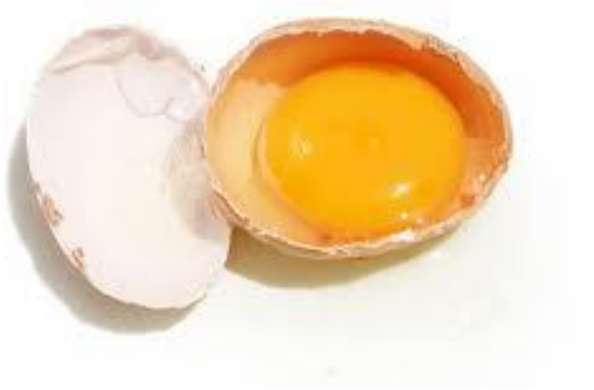
土力工程處 Geotechnical Engineering Office
土木工程拓展署 Civil Engineering and Development Department

大綱 Outline

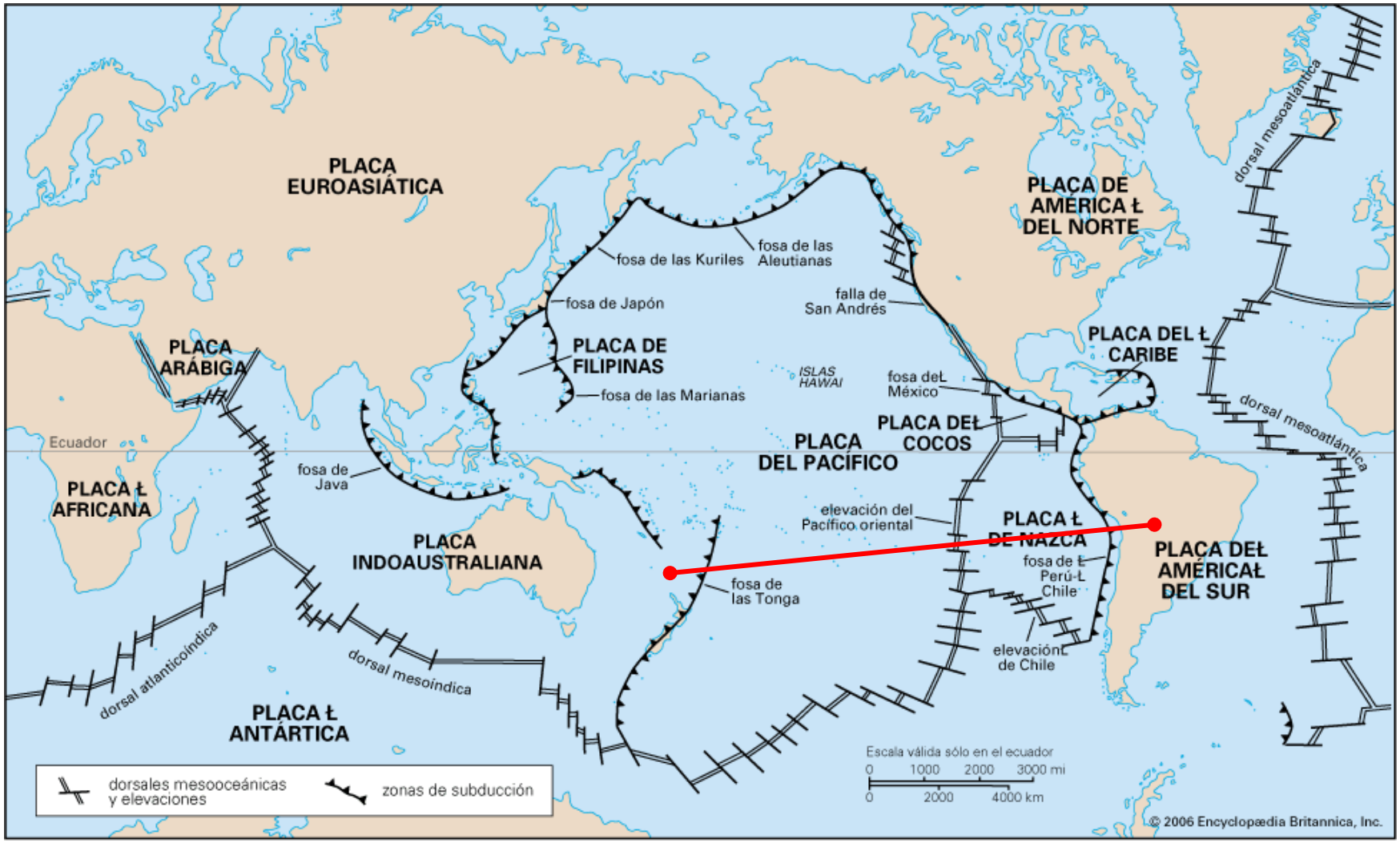
- 基本資料
  Basics
- 香港地質歷史
  Hong Kong Geological History
- 地質作用與地貌
  Geomorphological processes & landscapes

地球結構 Earth's Internal Structure



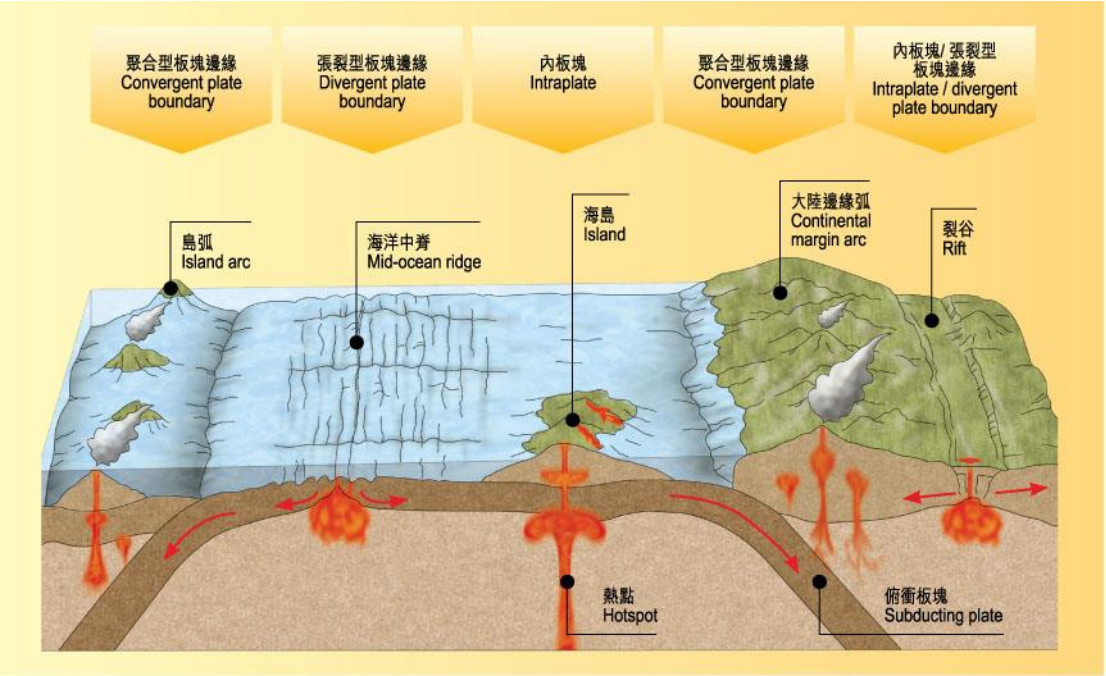


板塊運動 Plate Tectonic

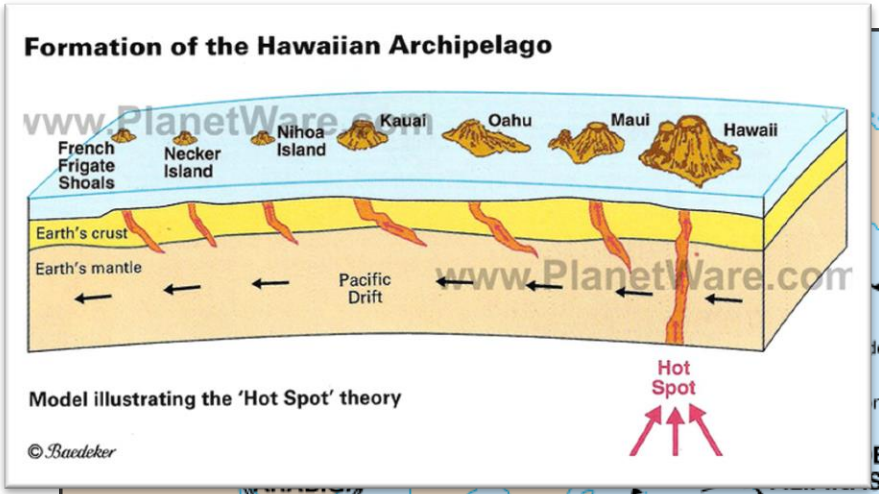


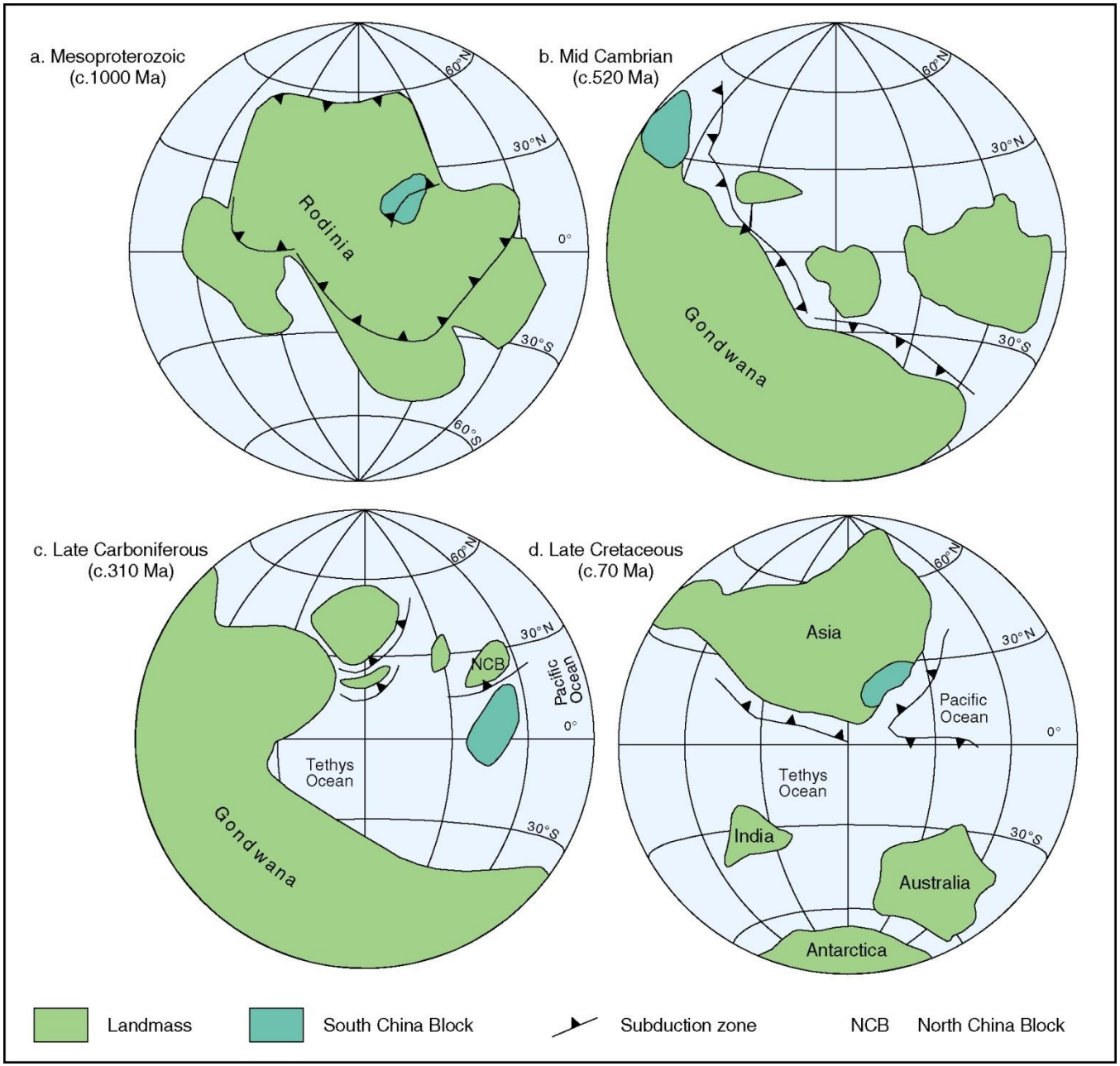
板塊運動 Plate Tectonic

- 板塊運動是現代地質學原理，解釋海洋盆地和山脈的形成，以及相關的地震和火山活動。



板塊運動 Plate Tectonic





Modified after Metcalfe (1996) and Li (1998)

PRINCIPLE OF UNIFORMITARIANISM

"The present is the key to the past"

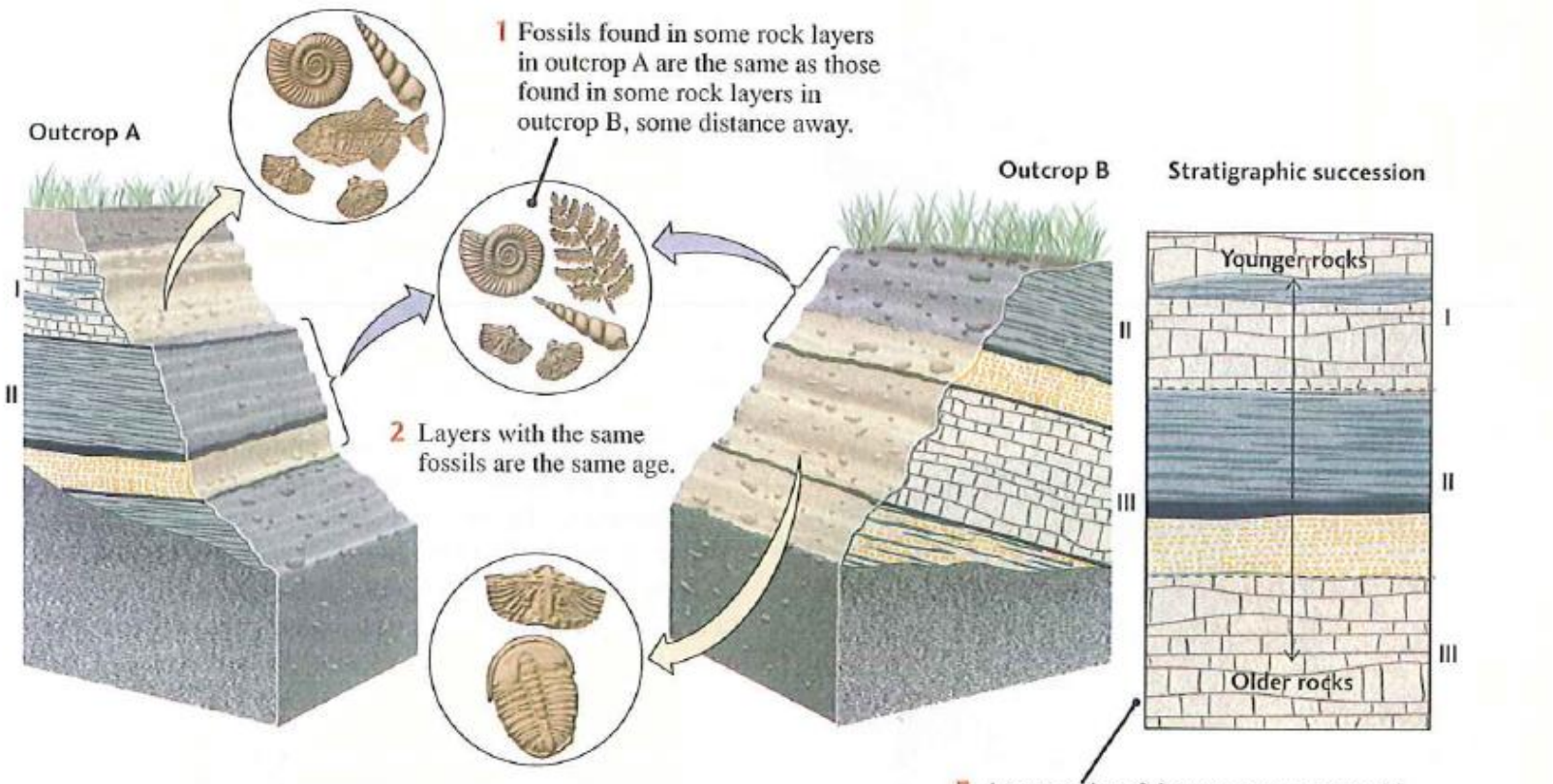
Geological processes taking place in the present operated similarly in the past and can therefore be used to explain past geologic events.

地層學原理
Stratigraphic Principles

化石層序規律
Law of Fossil Assemblages

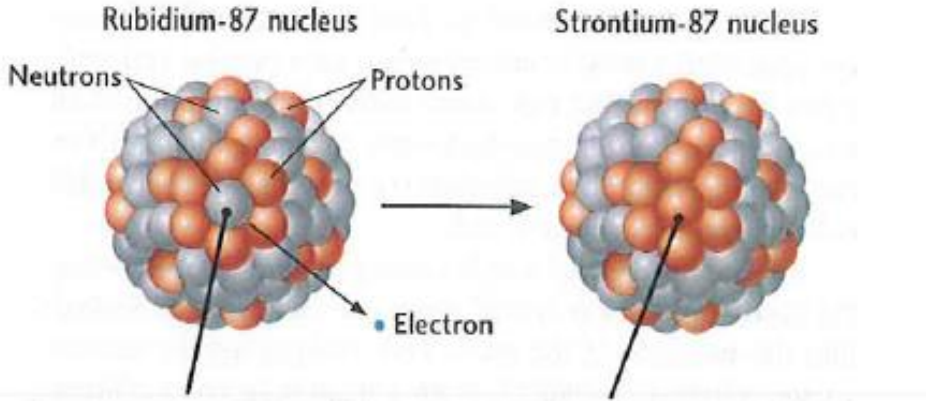
岩層層序
Chronological Order of Rock Strata

相對年齡
Relative Age



放射性同位素測年
Radioisotope Dating

絕對年齡
Absolute Age



Parent isotope Daughter isotope

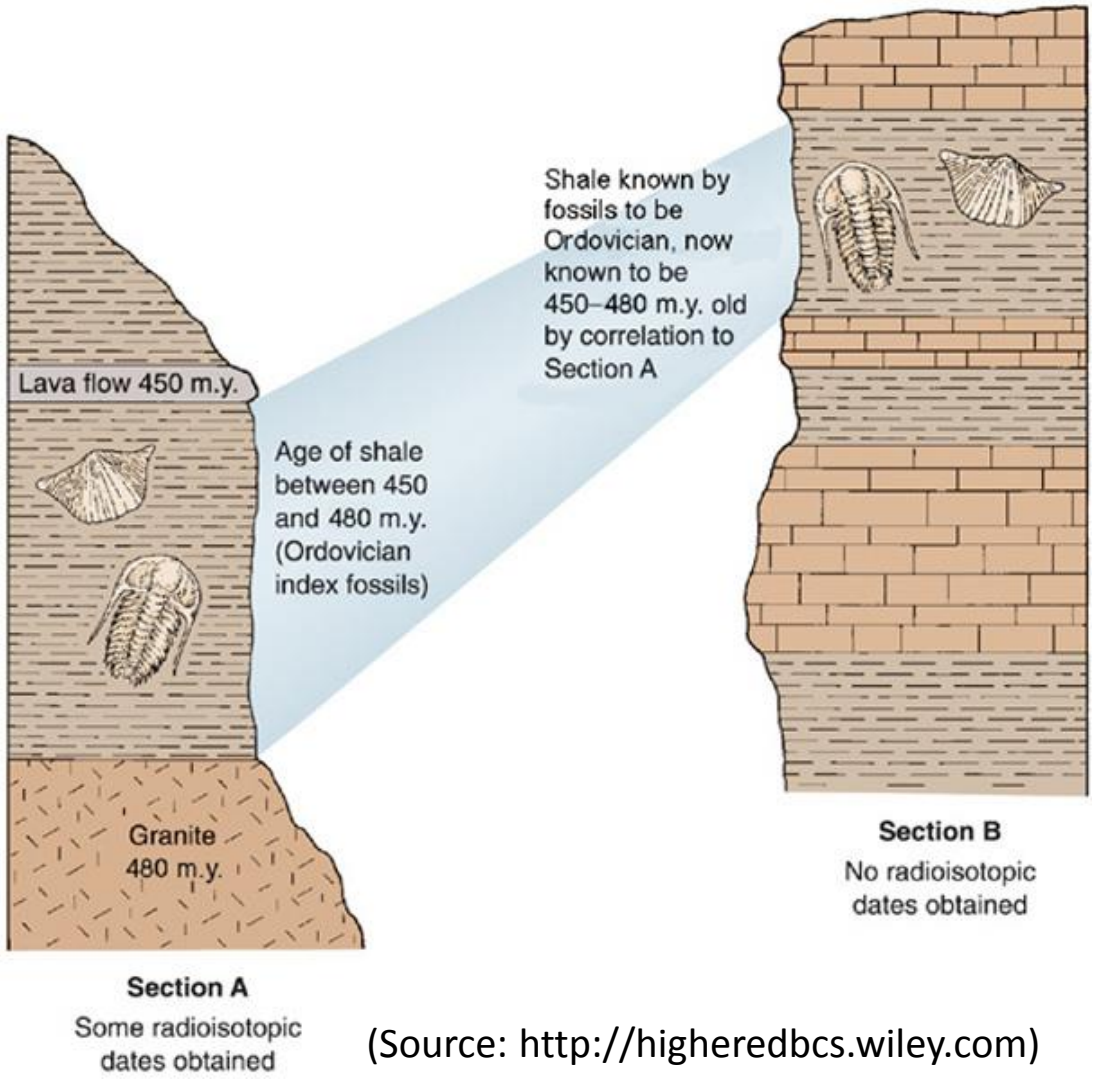
Common dating methods

- U-Pb dating
- Rb-Sr dating
- K-Ar dating
- Radiocarbon dating
- OSL dating …..

相對年齡 Relative Age

+

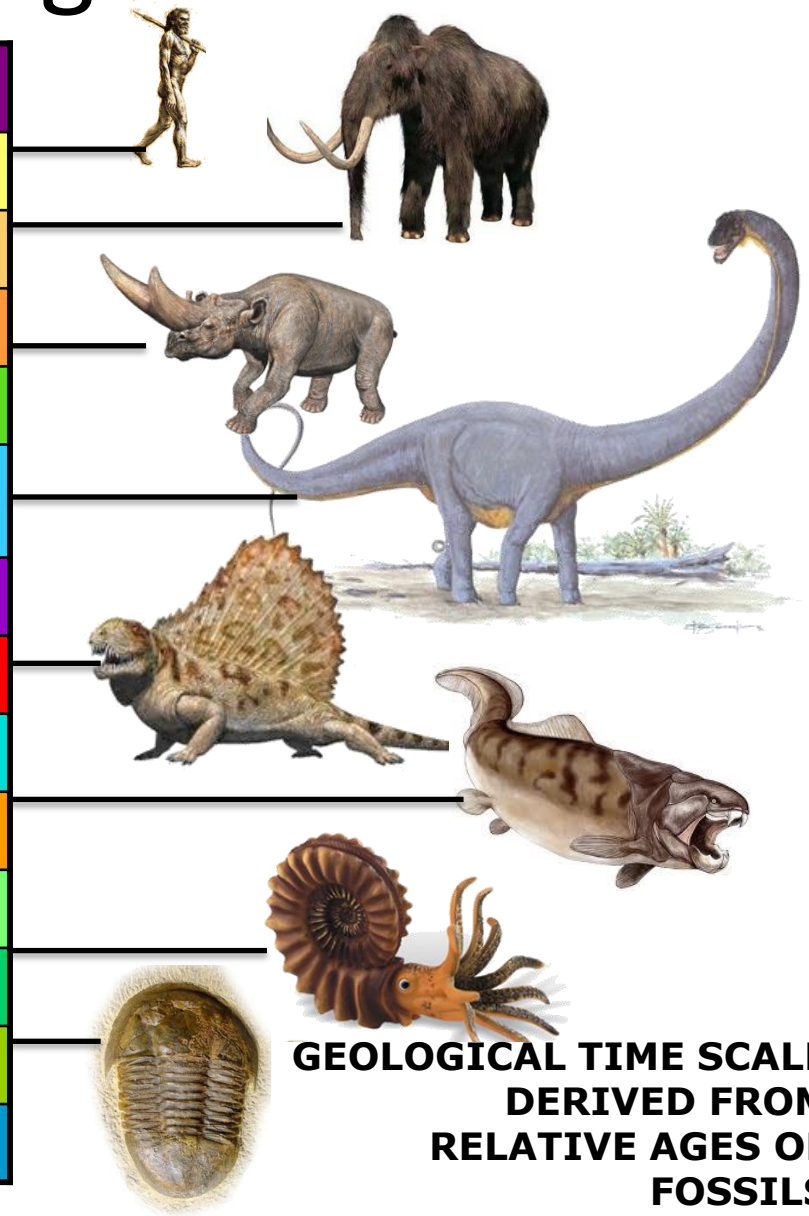
絕對年齡 Absolute Age



(Source: http://higheredbcs.wiley.com)

地質年代 Geological Time

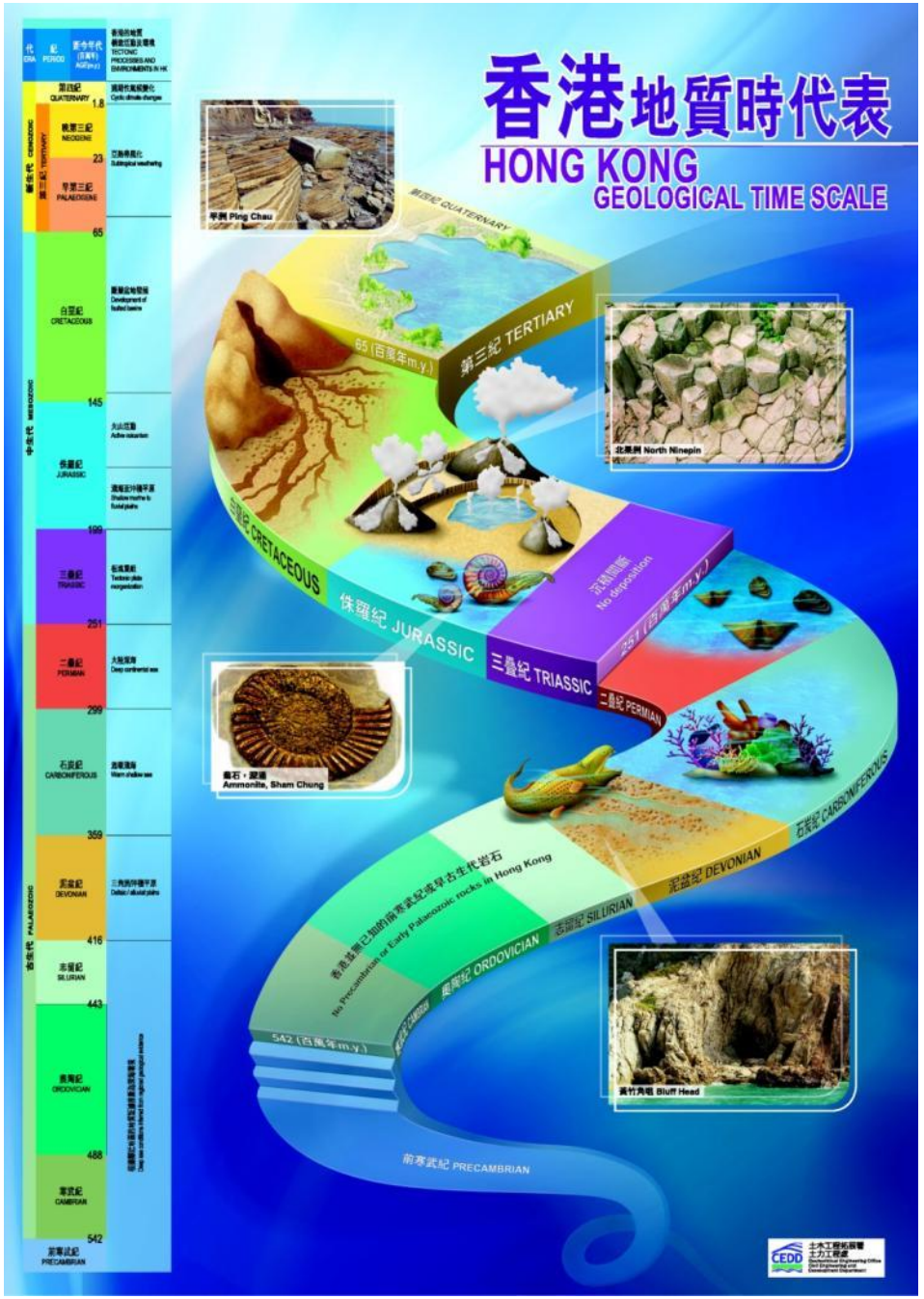
ERA 代	PERIOD 時期
新生代 CENOZOIC	QUATERNARY 第四紀
	NEOGENE 新近紀
	PALAEOCENE 古近紀
中生代 MESOZOIC	CRETACEOUS 白堊紀
	JURASSIC 侏羅紀
	TRIASSIC 三疊紀
古生代 PALAEOZOIC	PERMIAN 二疊紀
	CARBONIFEROUS 石炭紀
	DEVONIAN 泥盆紀
	SILURIAN 志留紀
	ORDOVICIAN 奧陶紀
	CAMBRIAN 寒武紀
PRECAMBRIAN 前寒武紀	



GEOLOGICAL TIME SCALE DERIVED FROM RELATIVE AGES OF FOSSILS

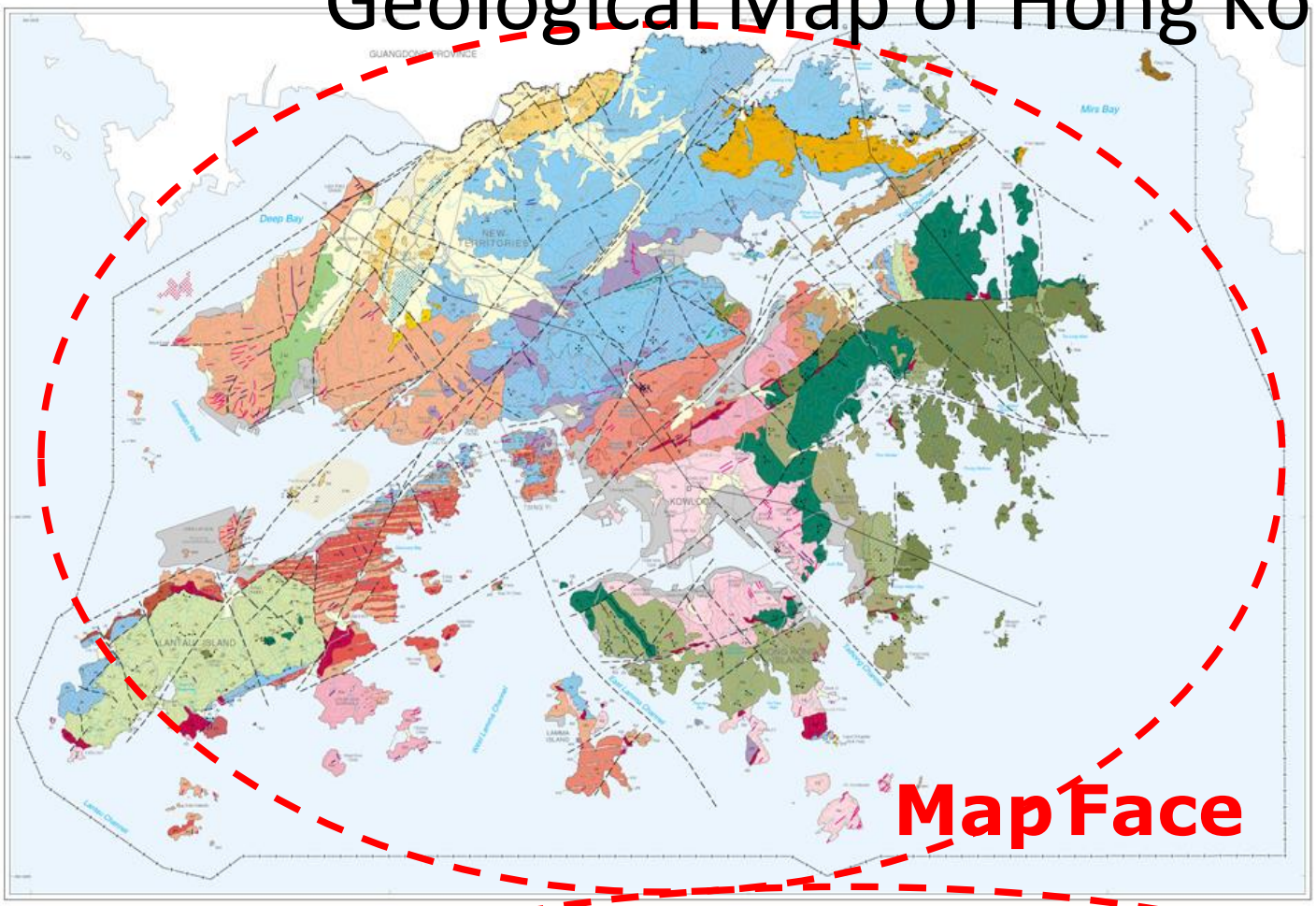
香港地質歷史
Hong Kong Geological History

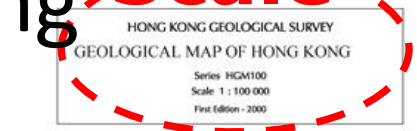
- More than 400 million years of geological history since the Devonian
- 四億年的旅程



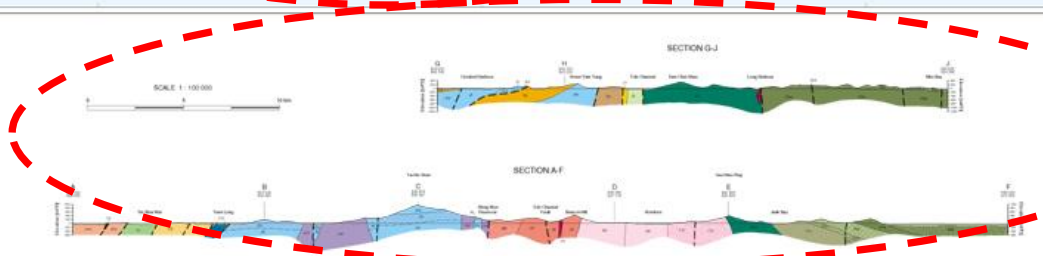
香港地質圖

Geological Map of Hong Kong





Regional Geological Map



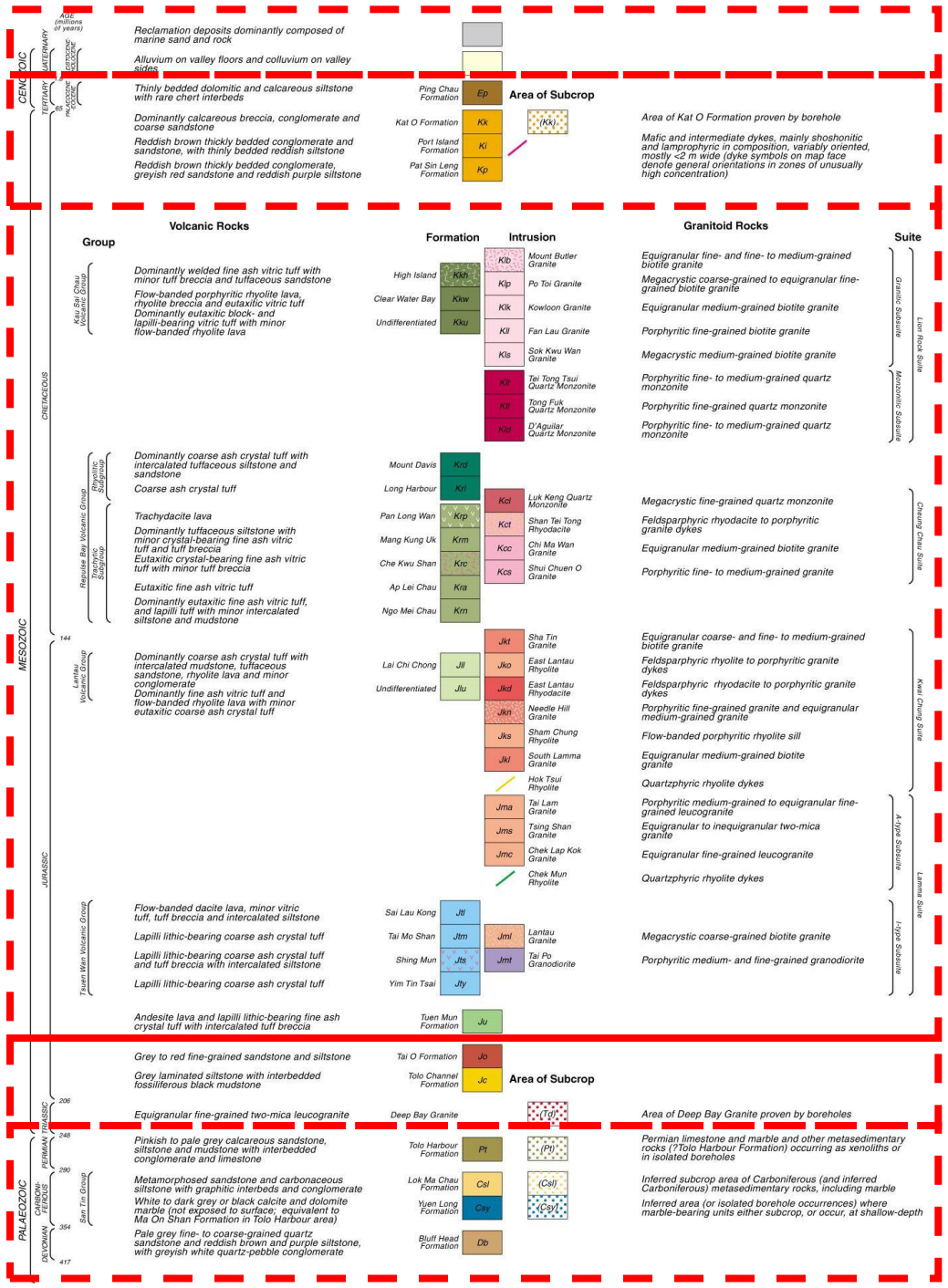
Quaternary Superficial Deposits

Late Mesozoic to Early Cenozoic Sedimentary (Post-volcanism)

Mesozoic Volcanic and Associated Granitic Rocks

Early Mesozoic Sedimentary (Pre-volcanism)

Late Palaeozoic Sedimentary



香港岩石 Rocks in Hong Kong

10%

- Igneous Rocks 火成岩 (75%)
  - Intrusive plutons and dykes
  - Extrusive volcanic rocks
- Sedimentary Rocks 沉積岩
  - Clastic sedimentary rocks
  - Biological sedimentary rocks
  - Chemical sedimentary rocks
- Metamorphic Rocks 變質岩
  - Foliated metamorphic rocks
  - Non-foliated metamorphic rocks
- Quaternary Superficial Deposits 第四紀表土沉積 (15%)
  - Onshore
  - Marine
  - Intertidal

火成岩 Volcanic

侵入性火成岩 Intrusive igneous

花崗岩 Granite

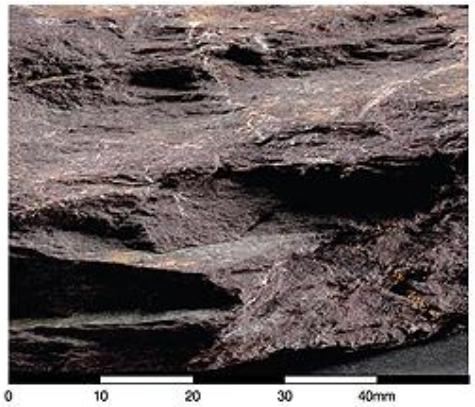
噴出性火成岩 Extrusive volcanic

凝灰岩 Tuff

沉積岩 Sedimentary

碎屑沉積岩 Clastic sedimentry

礫岩 Conglomerate



粉砂岩 Siltstone

變質岩 Metamorphic

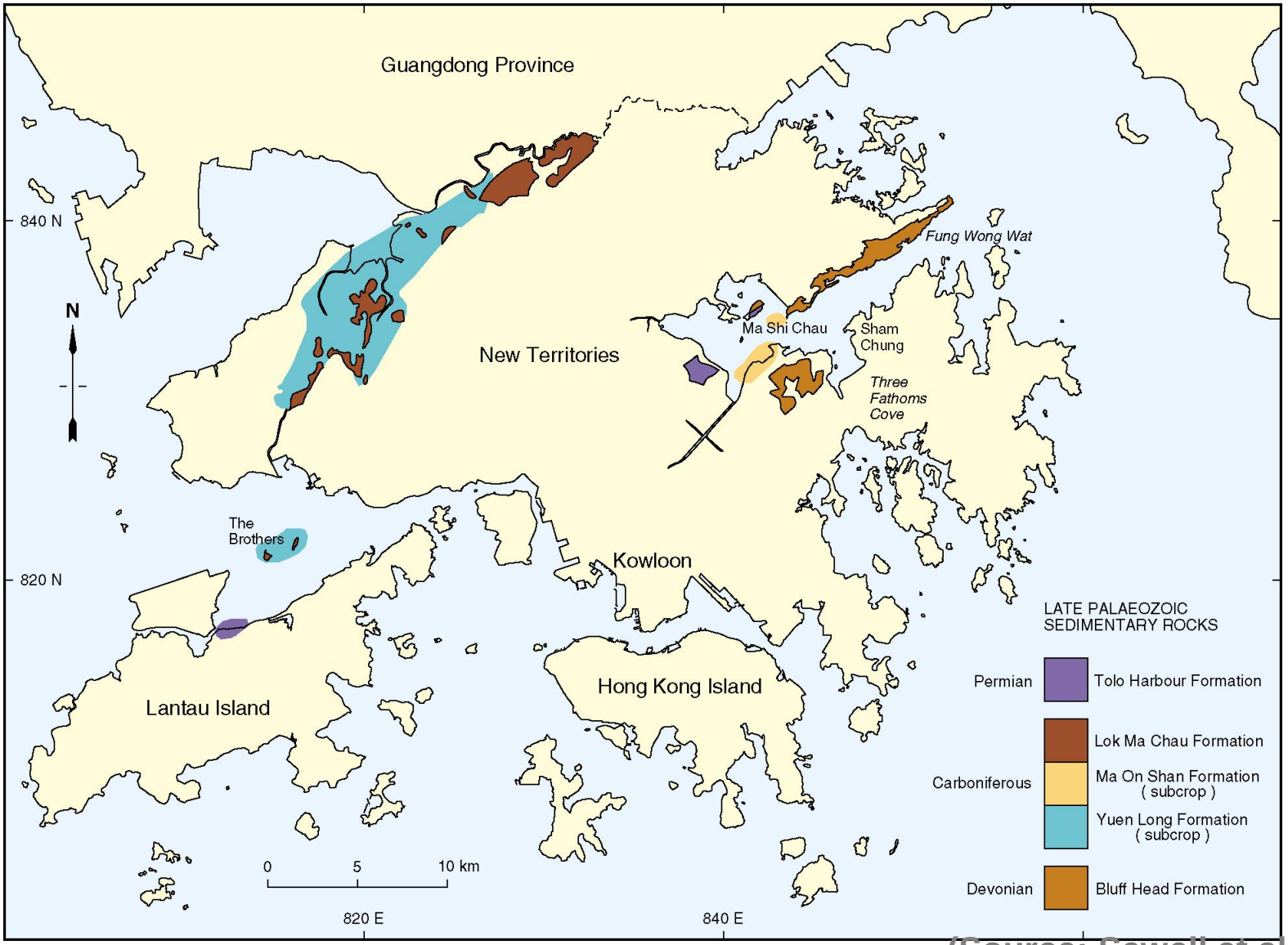
葉理變質岩 Foliated metamorphic

片岩 Schist

非葉理變質岩 Non-foliated metamorphic

大理岩 (雲石) Marble

晚古生代沉積岩
Late Palaeozoic Sedimentary Rocks



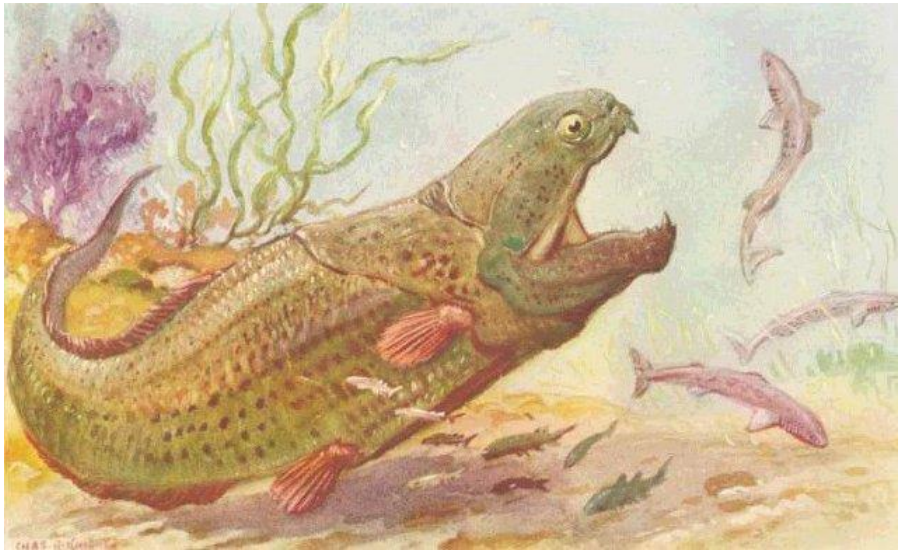
(Source: Sewell et al., 2000)


古生代 PALAEOZOIC
侏羅紀 JURASSIC
199
三疊紀 TRIASSIC
251
二疊紀 PERMIAN
299
石炭紀 CARBONIFEROUS
359
泥盆紀 DEVONIAN
416
志留紀 SILURIAN
443
奧陶紀 ORDOVICIAN
白堊紀 CRETACEOUS
侏羅紀 JURASSIC
三疊紀 TRIASSIC
二疊紀 PERMIAN
石炭紀 CARBONIFEROUS
泥盆紀 DEVONIAN
志留紀 SILURIAN
奧陶紀 ORDOVICIAN
沉積間斷
No deposition
251 (百萬年 m.y.)
香港並無已知的前寒武紀或早古生代岩石
No Precambrian or Early Palaeozoic rocks in Hong Kong
542 (百萬年 m.y.)
北秀洲 North Ninepin
菊石，深涌
Ammonite, Sham Chung
長竹角咀 Bluff Head

泥盆紀
DEVONIAN PERIOD

在香港出露最老的岩層 Oldest rock formation exposed in Hong Kong

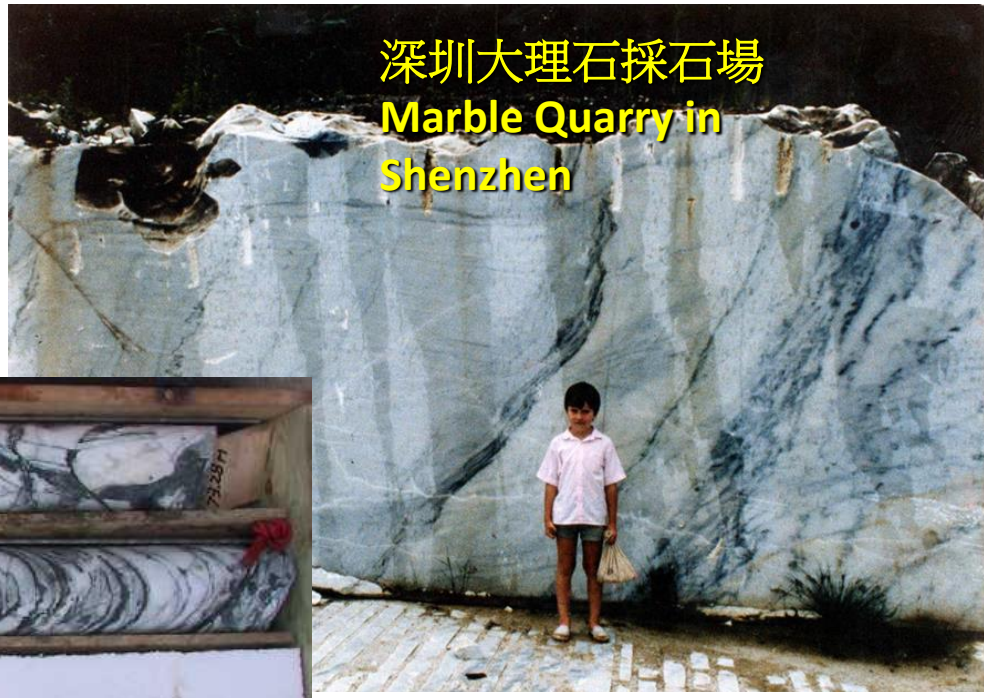
盾皮魚 Placoderm – Armored Fish



泥盆紀 DEVONIAN PERIOD


中生代 MESOZOIC
古生代 PALAEOZOIC
侏羅紀 JURASSIC
199
三疊紀 TRIASSIC
251
二疊紀 PERMIAN
299
石炭紀 CARBONIFEROUS
359
泥盆紀 DEVONIAN
416
志留紀 SILURIAN
443
奧陶紀 ORDOVICIAN
Active volcanism
Shallow marine to fluvial plains
Tectonic plate reorganization
Deep continental sea
Warm shallow sea
Deltaic / alluvial plains
白堊紀 CRETACEOUS
侏羅紀 JURASSIC
三疊紀 TRIASSIC
二疊紀 PERMIAN
石炭紀 CARBONIFEROUS
泥盆紀 DEVONIAN
志留紀 SILURIAN
奧陶紀 ORDOVICIAN
沉積間斷
No deposition
251 (百萬年 m.y.)
542 (百萬年 m.y.)
香港並無已知的前寒武紀或早古生代岩石
No Precambrian or Early Palaeozoic rocks in Hong Kong
北秤洲 North Ninepin
Ammonite, Sham Chung
Bluff Head

早石炭紀
EARLY CARBONIFEROUS PERIOD (360-320 Ma)

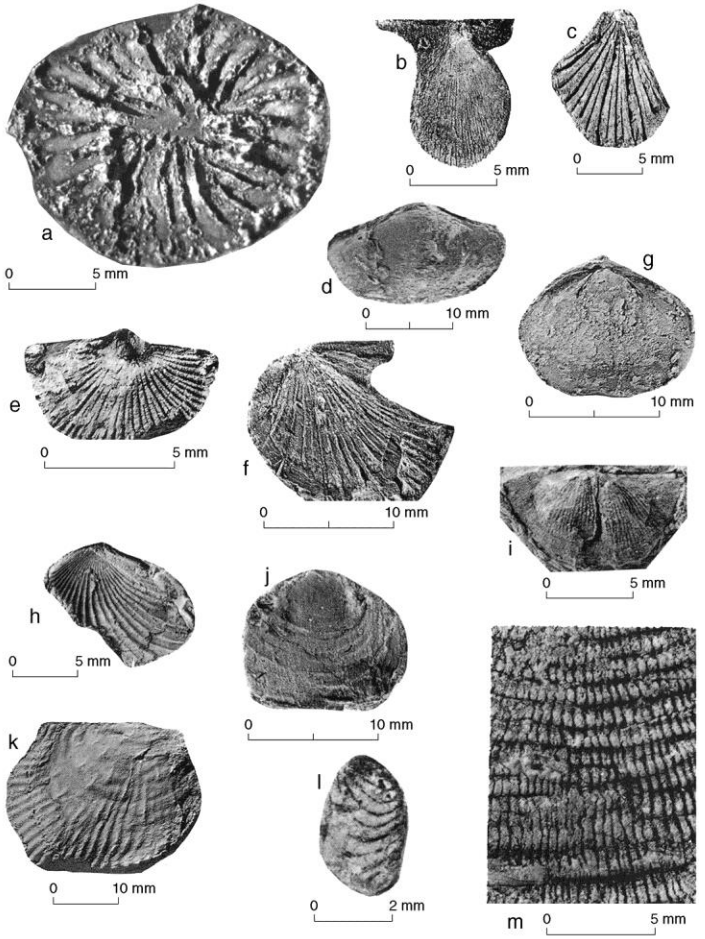


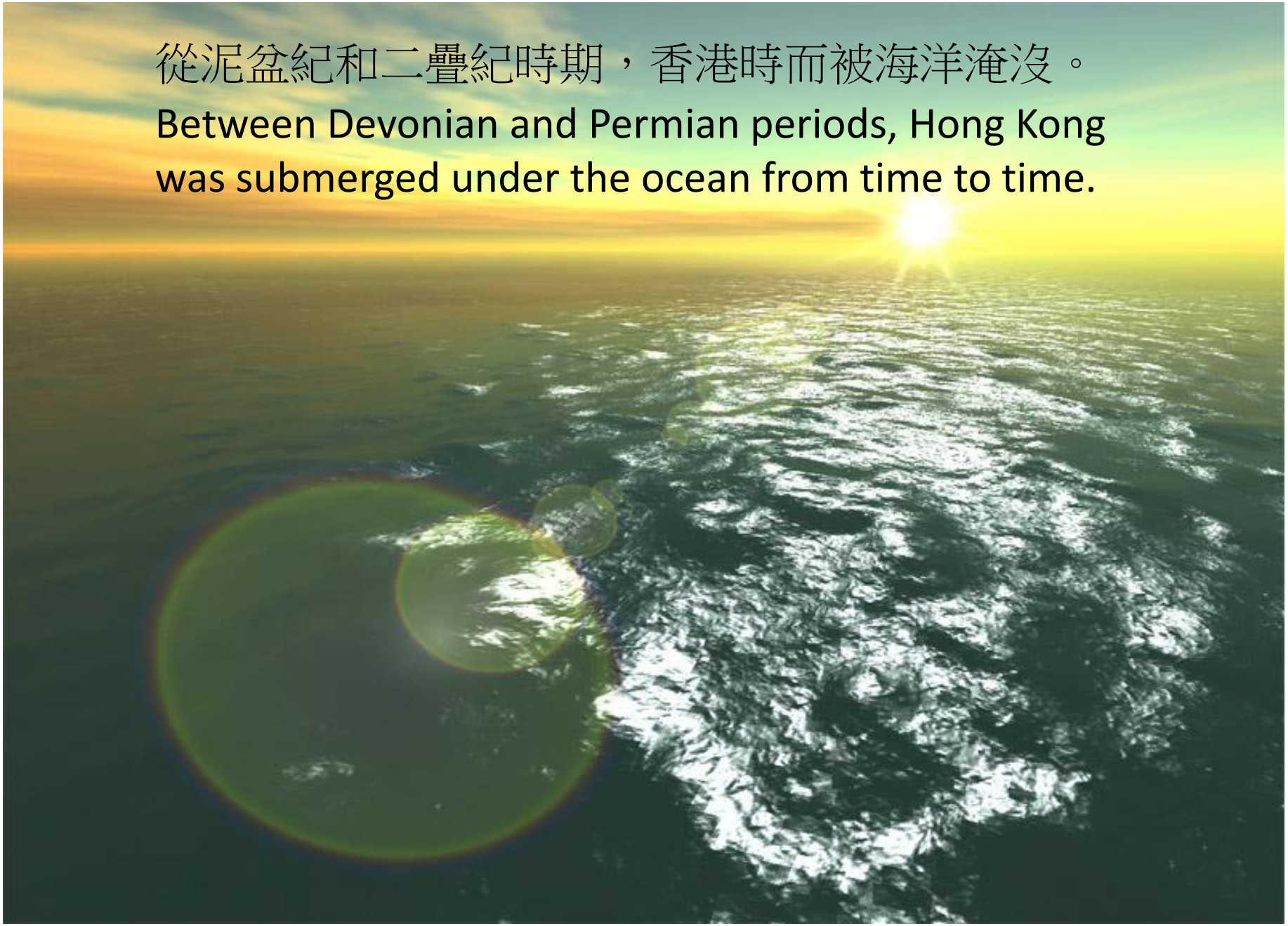
元朗大理岩岩芯
Yuen Long marble drill cores

早石炭紀
EARLY CARBONIFEROUS PERIOD (360-320Ma)


中生代 MESOZOIC
古生代 PALAEOZOIC
侏羅紀 JURASSIC
199
三疊紀 TRIASSIC
251
二疊紀 PERMIAN
299
石炭紀 CARBONIFEROUS
359
泥盆紀 DEVONIAN
416
志留紀 SILURIAN
443
奧陶紀 ORDOVICIAN
542 (百萬年 m.y.)
白堊紀 CRETACEOUS
侏羅紀 JURASSIC
三疊紀 TRIASSIC
二疊紀 PERMIAN
石炭紀 CARBONIFEROUS
泥盆紀 DEVONIAN
志留紀 SILURIAN
奧陶紀 ORDOVICIAN
沉積間斷
No deposition
251 (百萬年 m.y.)
北葵涌 North Ninepin
菊石，深涌
Ammonite, Sham Chung
香港並無已知的前寒武紀或早古生代岩石
No Precambrian or Early Palaeozoic rocks in Hong Kong
長竹角咀 Bluff Head

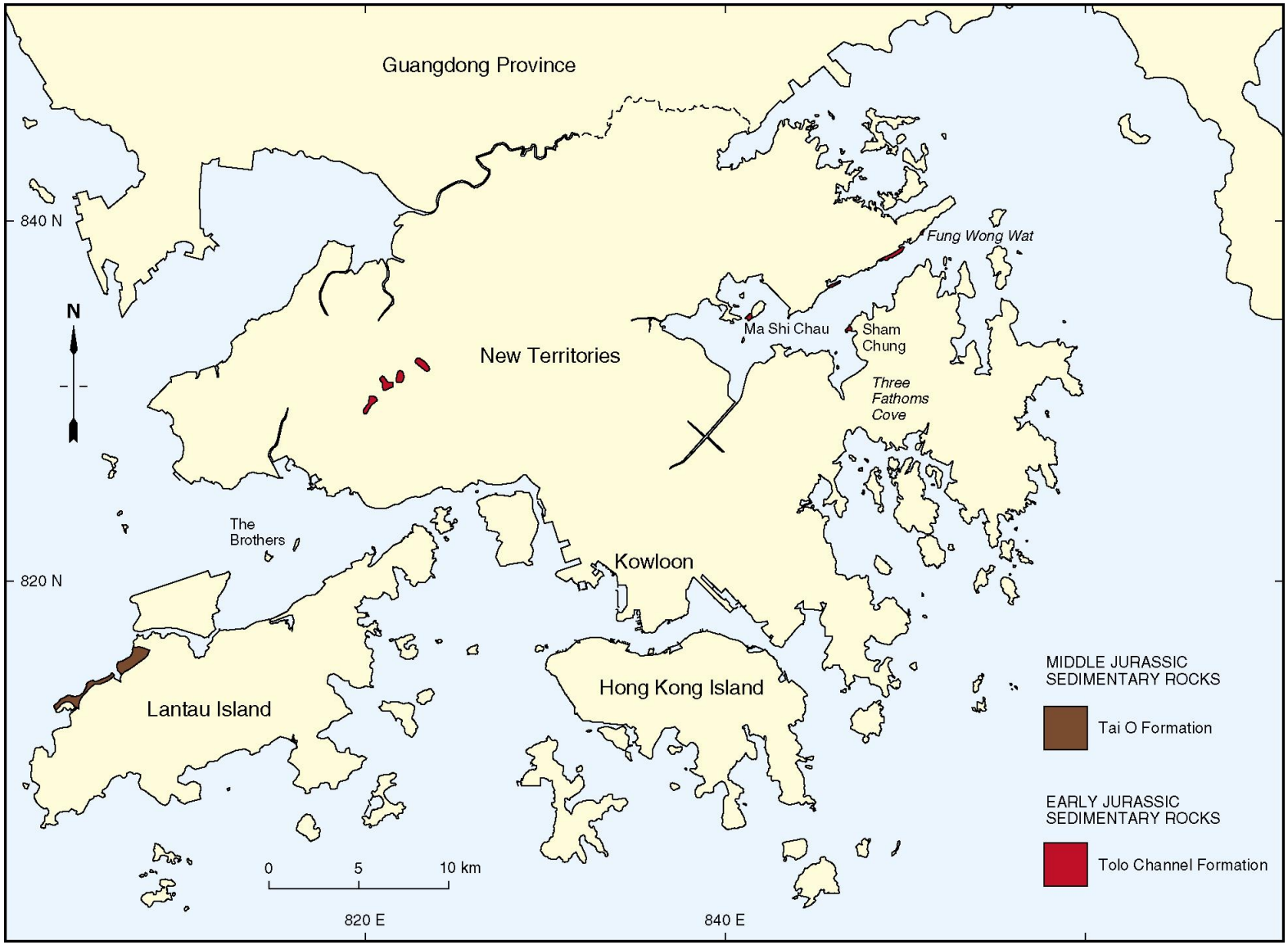
二疊紀 PERMIAN PERIOD (300-250Ma)




從泥盆紀和二疊紀時期，香港時而被海洋淹沒。
Between Devonian and Permian periods, Hong Kong was submerged under the ocean from time to time.


古生代 PALAEOZOIC
侏羅紀 JURASSIC
199
三疊紀 TRIASSIC
251
二疊紀 PERMIAN
299
石炭紀 CARBONIFEROUS
359
泥盆紀 DEVONIAN
416
志留紀 SILURIAN
443
奧陶紀 ORDOVICIAN
白堊紀 CRETACEOUS
沉積間斷
No deposition
251 (百萬年m.y.)
香港並無已知的前寒武紀或早古生代岩石
No Precambrian or Early Palaeozoic rocks in Hong Kong
542 (百萬年m.y.)
北果洲 North Ninepin
鸚石，深涌
Ammonite, Sham Chung
Bluff Head

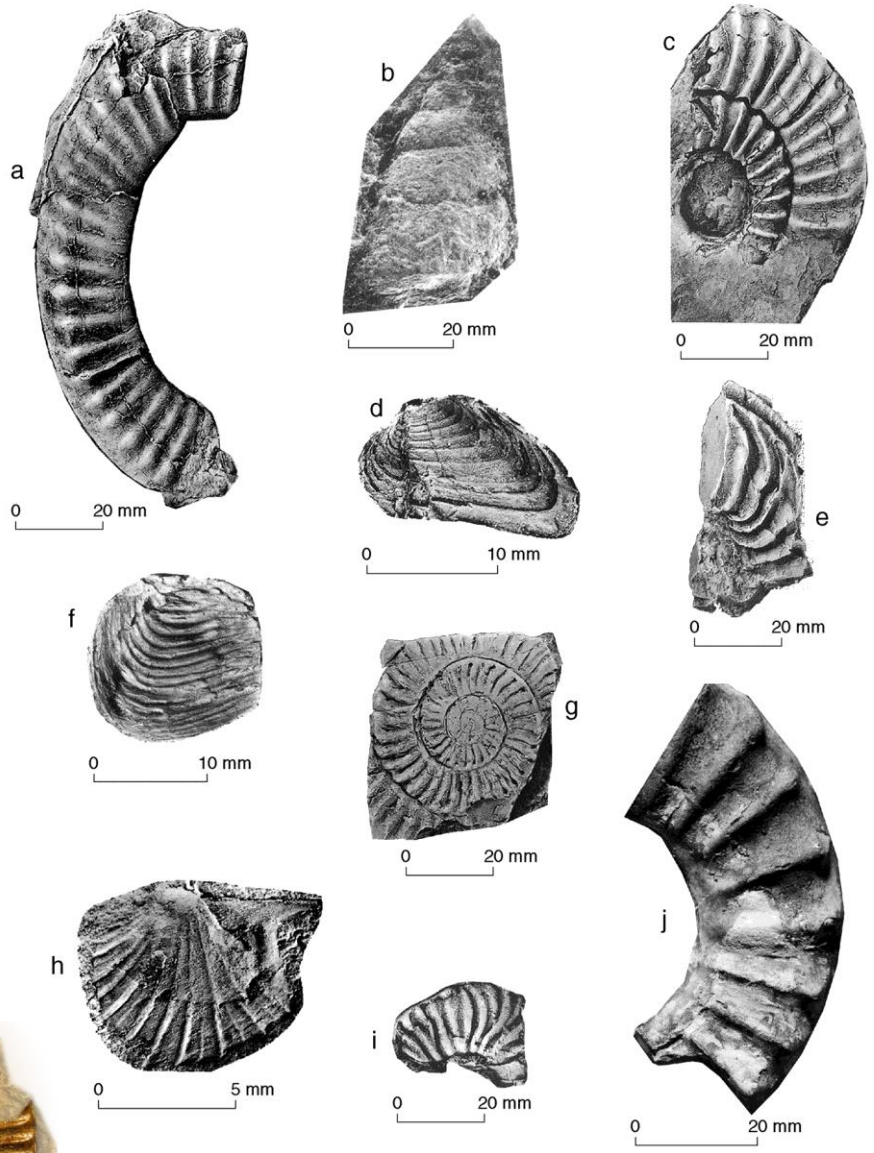
早中生代沉積岩（火山活動之前）
Early Mesozoic Sedimentary Rocks (Pre-volcanism)



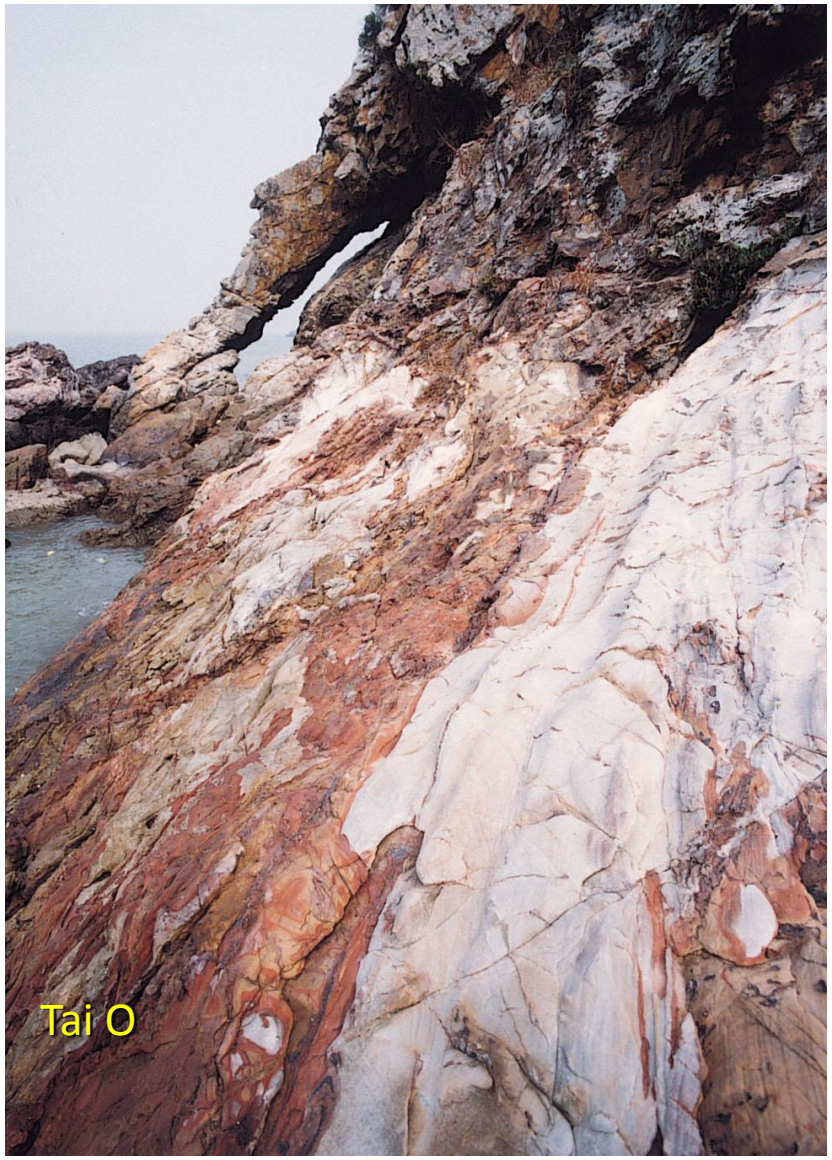
(Source: Sewell et al., 2000)


古生代 PALAEOZOIC
侏羅紀 JURASSIC
199
三疊紀 TRIASSIC
251
二疊紀 PERMIAN
299
石炭紀 CARBONIFEROUS
359
泥盆紀 DEVONIAN
416
志留紀 SILURIAN
443
奧陶紀 ORDOVICIAN
白堊紀 CRETACEOUS
沉積間斷
No deposition
251 (百萬年 m.y.)
北秀洲 North Ninepin
菊石，深涌
Ammonite, Sham Chung
香港並無已知的前寒武紀或早古生代岩石
No Precambrian or Early Palaeozoic rocks in Hong Kong
542 (百萬年 m.y.)
長竹角咀 Bluff Head

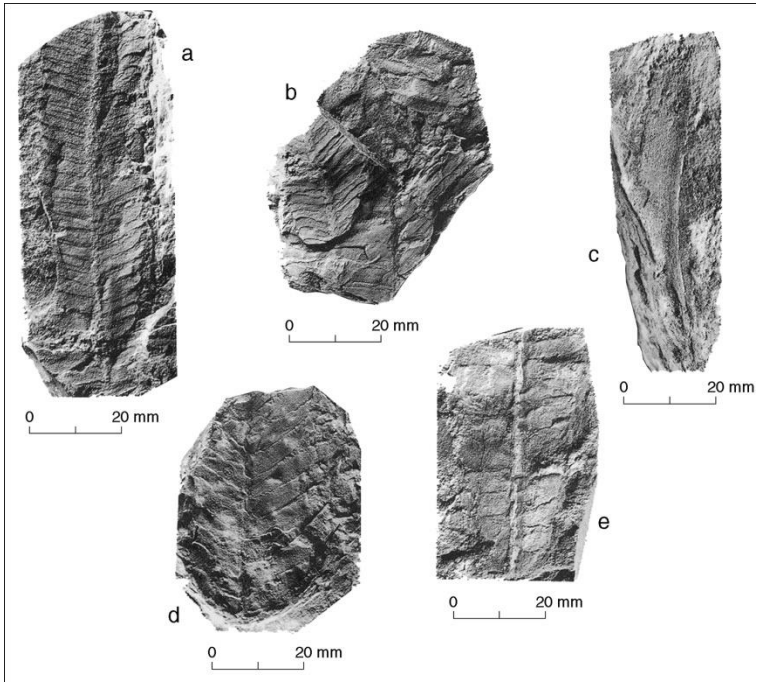
EARLY JURASSIC



(Source: Lee et al., 1997)

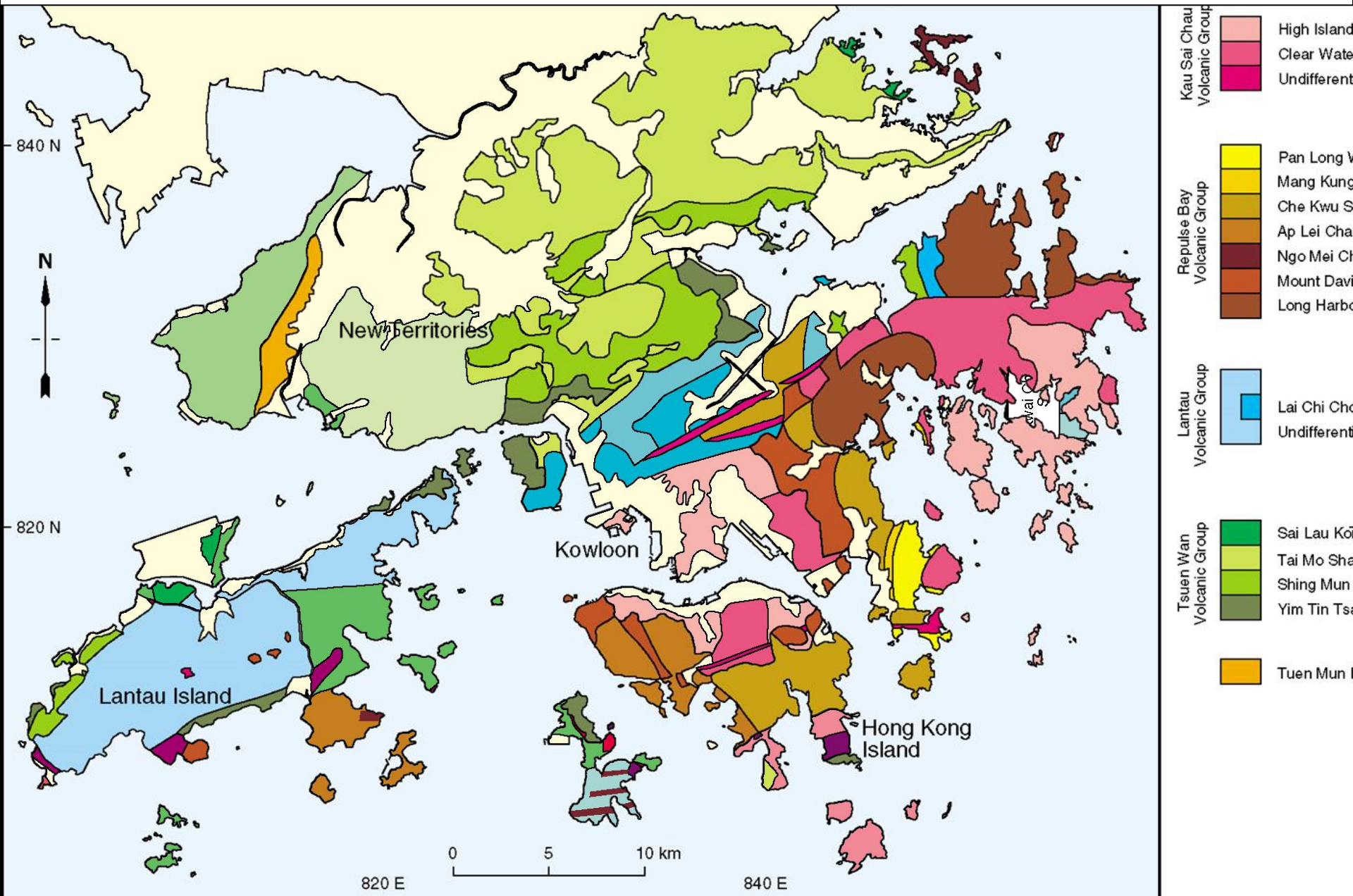


MIDDLE JURASSIC



(Source: Lee et al., 1997)

中生代火山岩及相關花崗質岩石
Mesozoic Volcanic and Associated Granitic Rocks

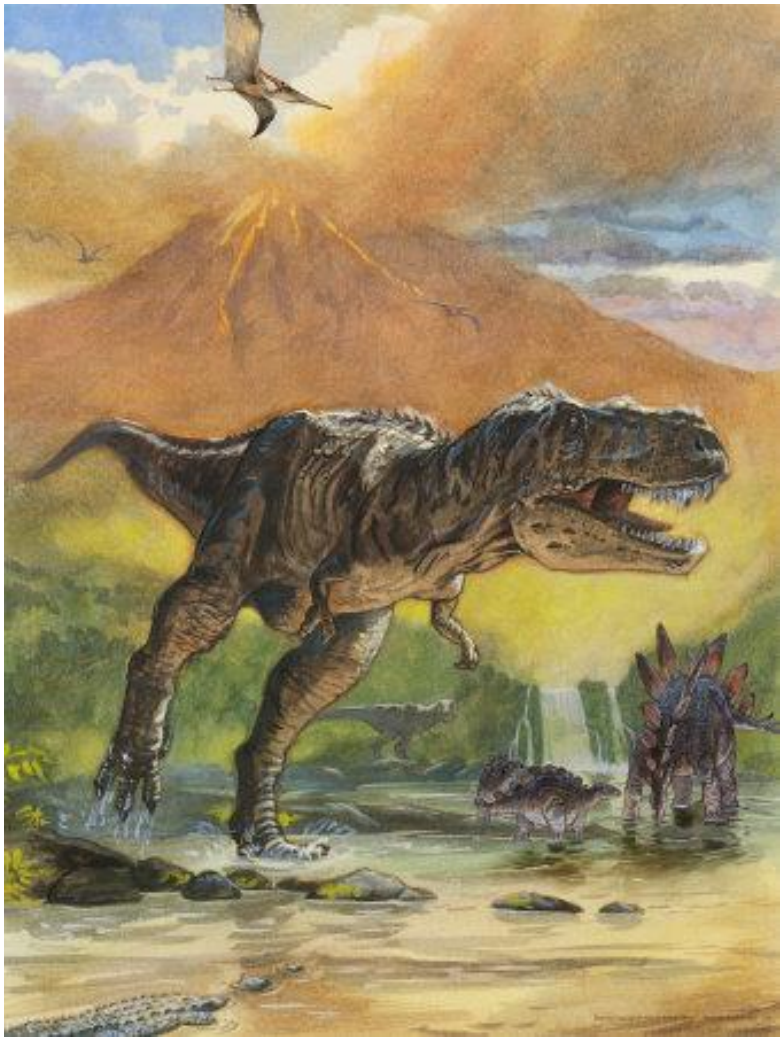


香港地質時代表

HONG KONG GEOLOGICAL TIME SCALE

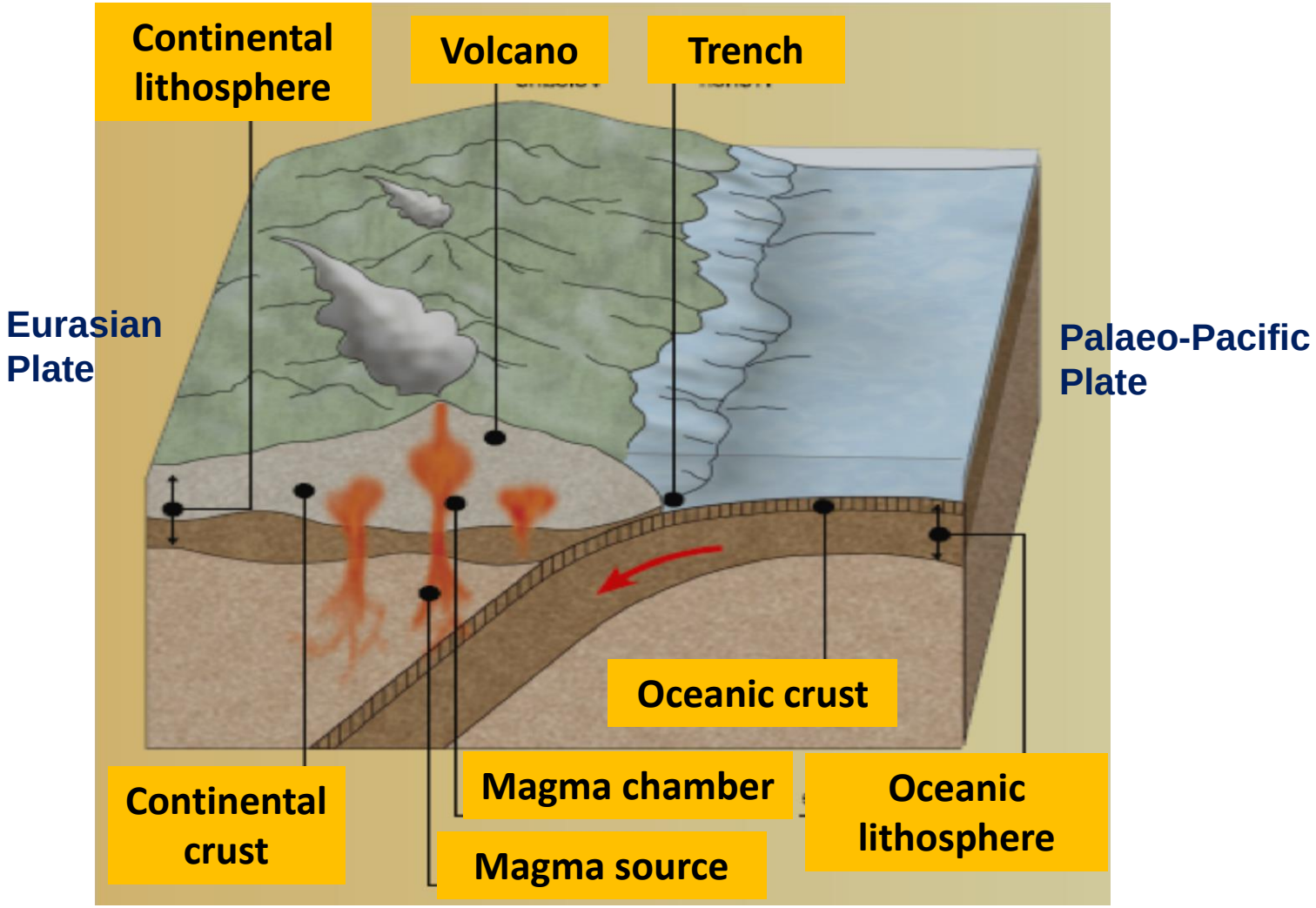
代 ERA	紀 PERIOD	距今年代 (百萬年) AGE (m.y.)	TECTONIC PROCESSES AND ENVIRONMENTS IN HK
新生代 CENOZOIC	第四紀 QUATERNARY	1.8	週期性氣候變化 Cyclic climate change
	第三紀 TERTIARY 新第三紀 NEOGENE	23	亞熱帶風化 Subtropical weathering
	第三紀 TERTIARY 早第三紀 PALAEOGENE	65	
中生代 MESOZOIC	白堊紀 CRETACEOUS	145	盆緣盆地發展 Development of faulted basins
	侏羅紀 JURASSIC	199	火山活動 Active volcanism 淺海至外陸平原 Shallow marine to fluvial plains
	三疊紀 TRIASSIC	251	板塊重組 Tectonic plate reorganization
	二疊紀 PERMIAN	299	大陸深海 Deep continental sea

中生代 - 恐龍時代
MESOZOIC – the era of dinosaurs



- In Hong Kong, volcanic activities, and the associated granite emplacements, occurred between 164 million years to 140 million years ago
- i.e. between Middle Jurassic and Early Cretaceous
  中侏羅紀至早白堊紀

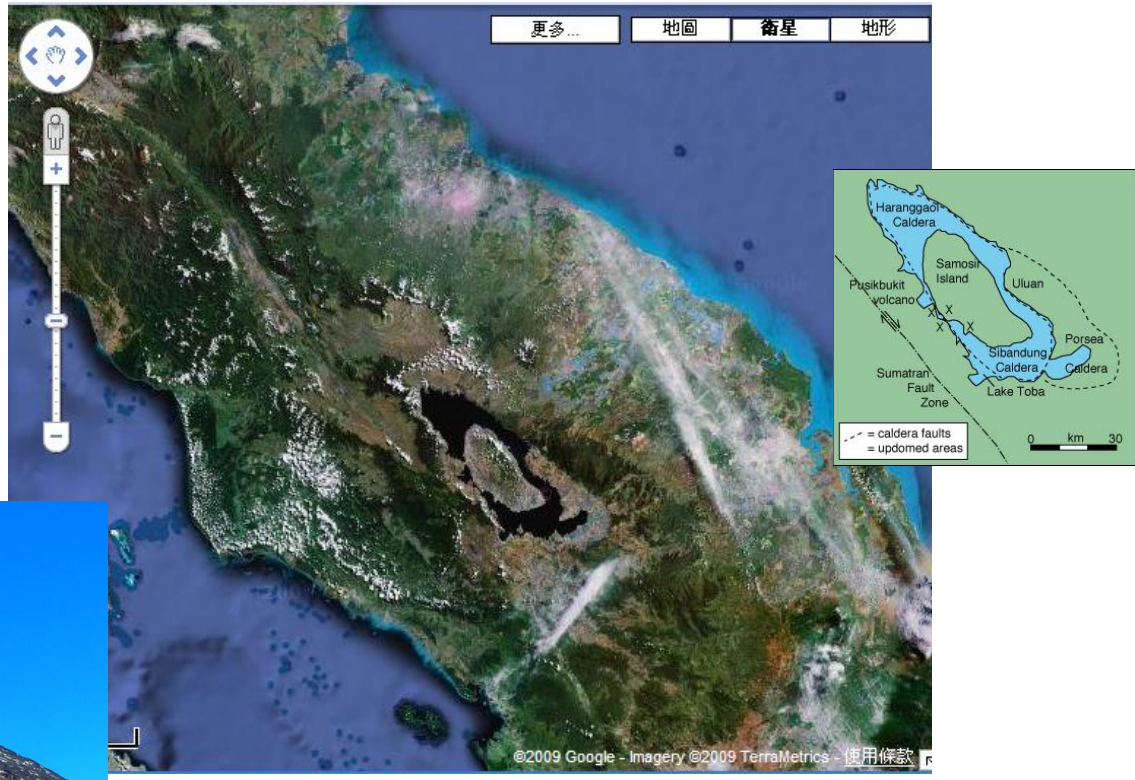
中侏羅紀至早白堊紀
Middle Jurassic to Early Cretaceous



Active Continental Margin

(Sewell et al., 2009)

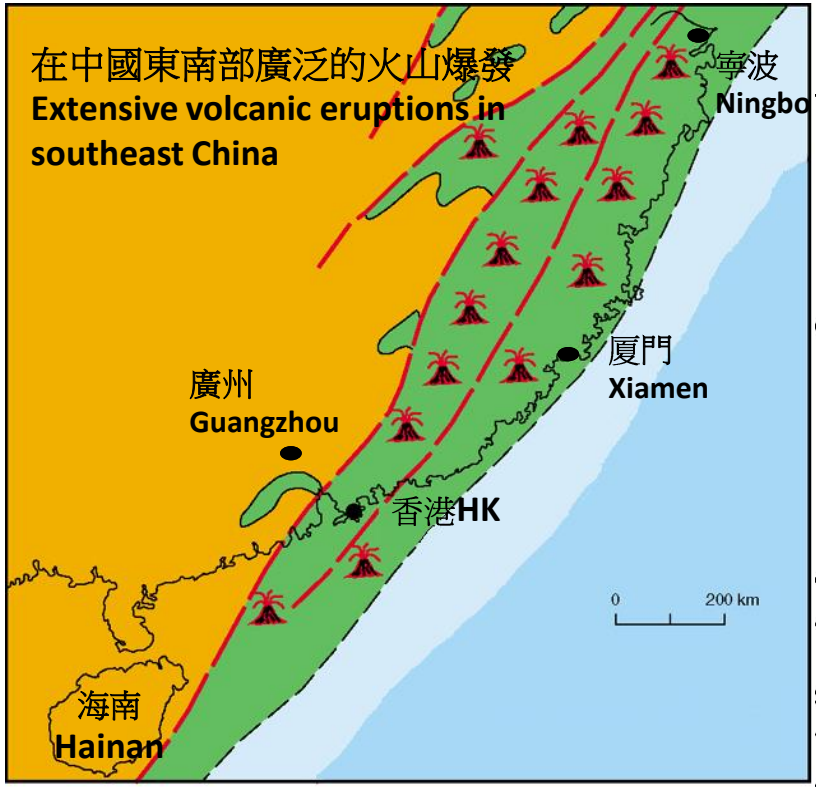
破火山口型火山Caldera-type volcanoes

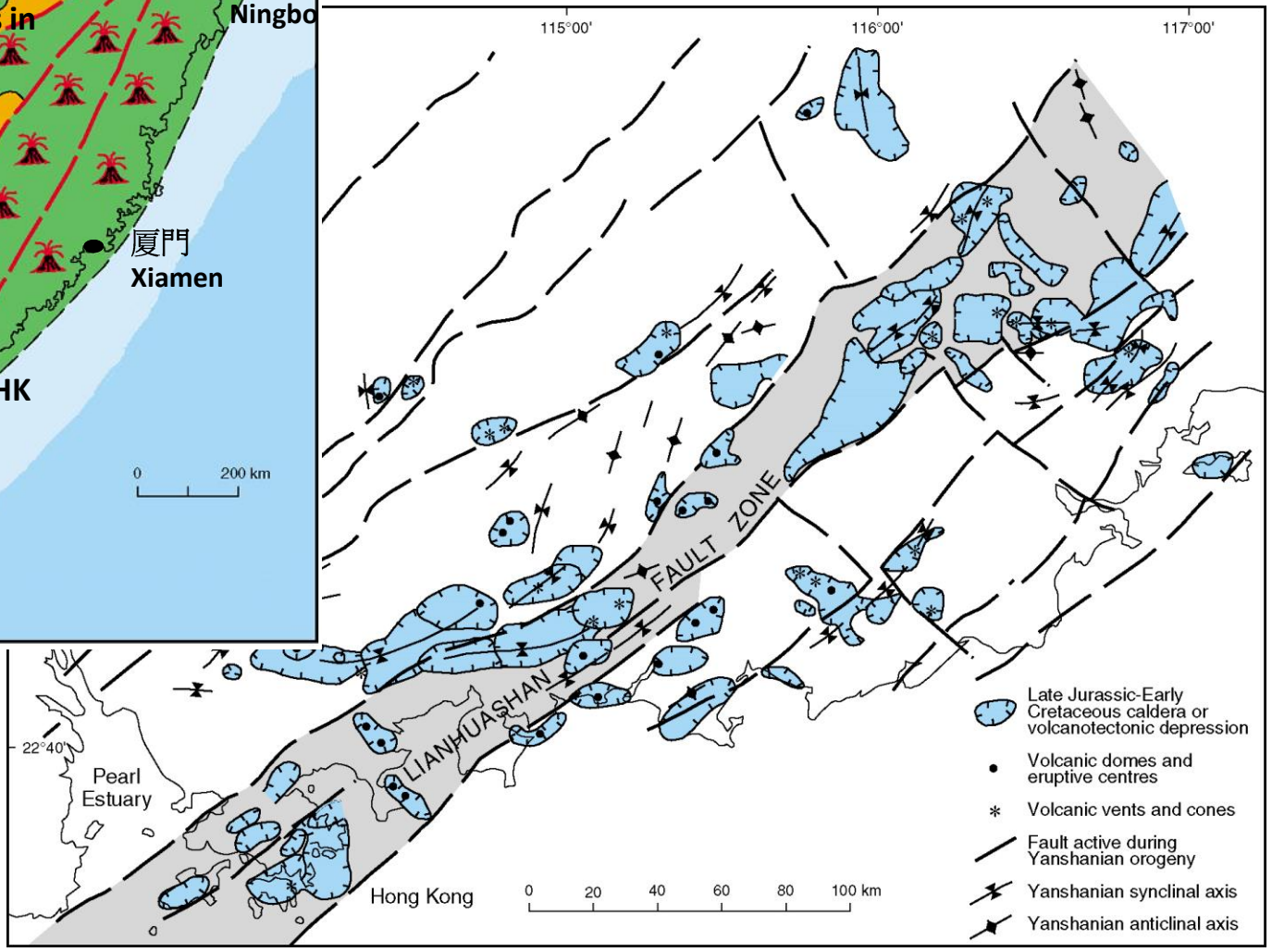


Lake Toba, Indonesia

Mount Ngauruhoe, New Zealand

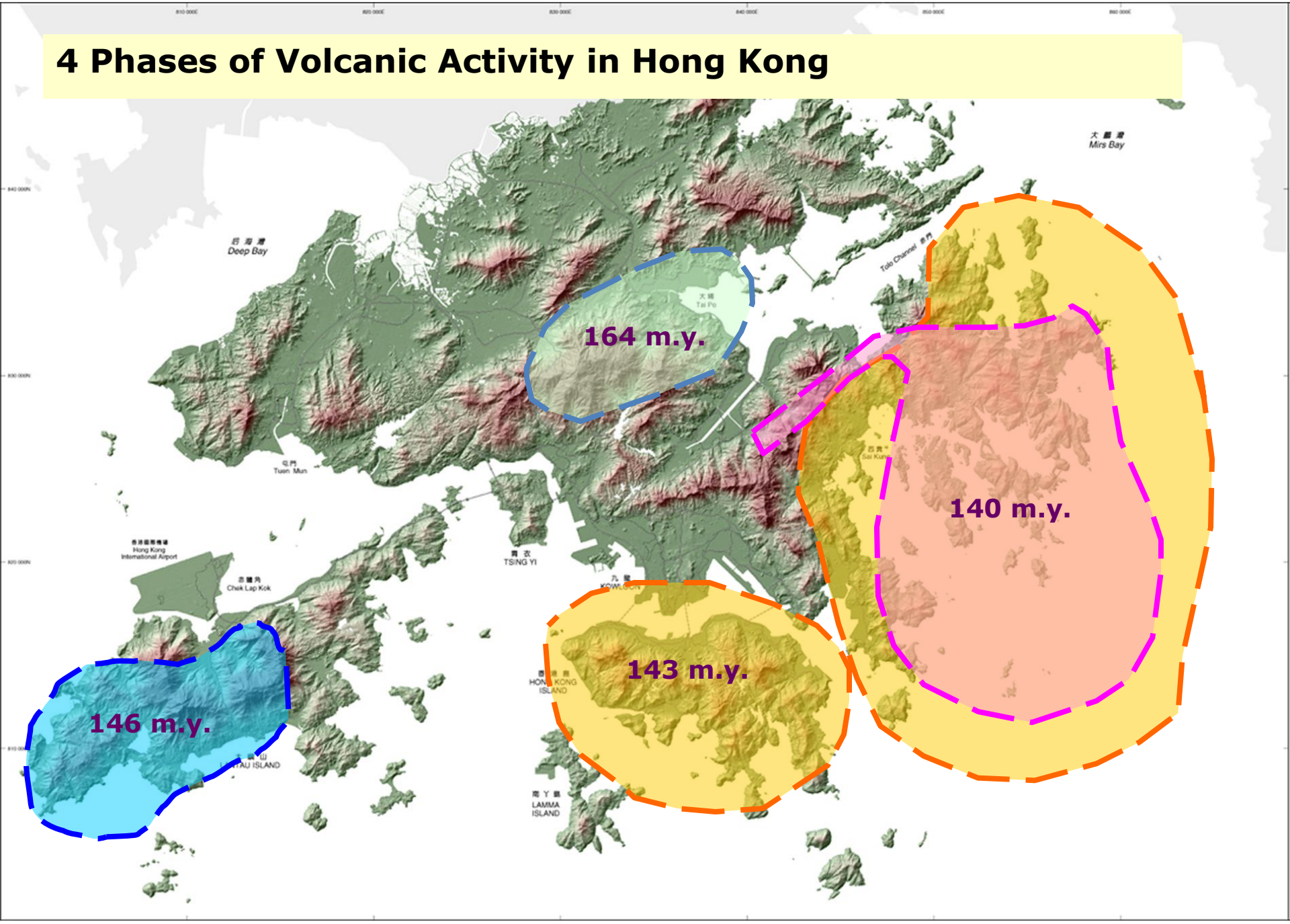
Southeast China Magmatic Belt





(Source: Sewell et al., 2000)

4 Phases of Volcanic Activity in Hong Kong



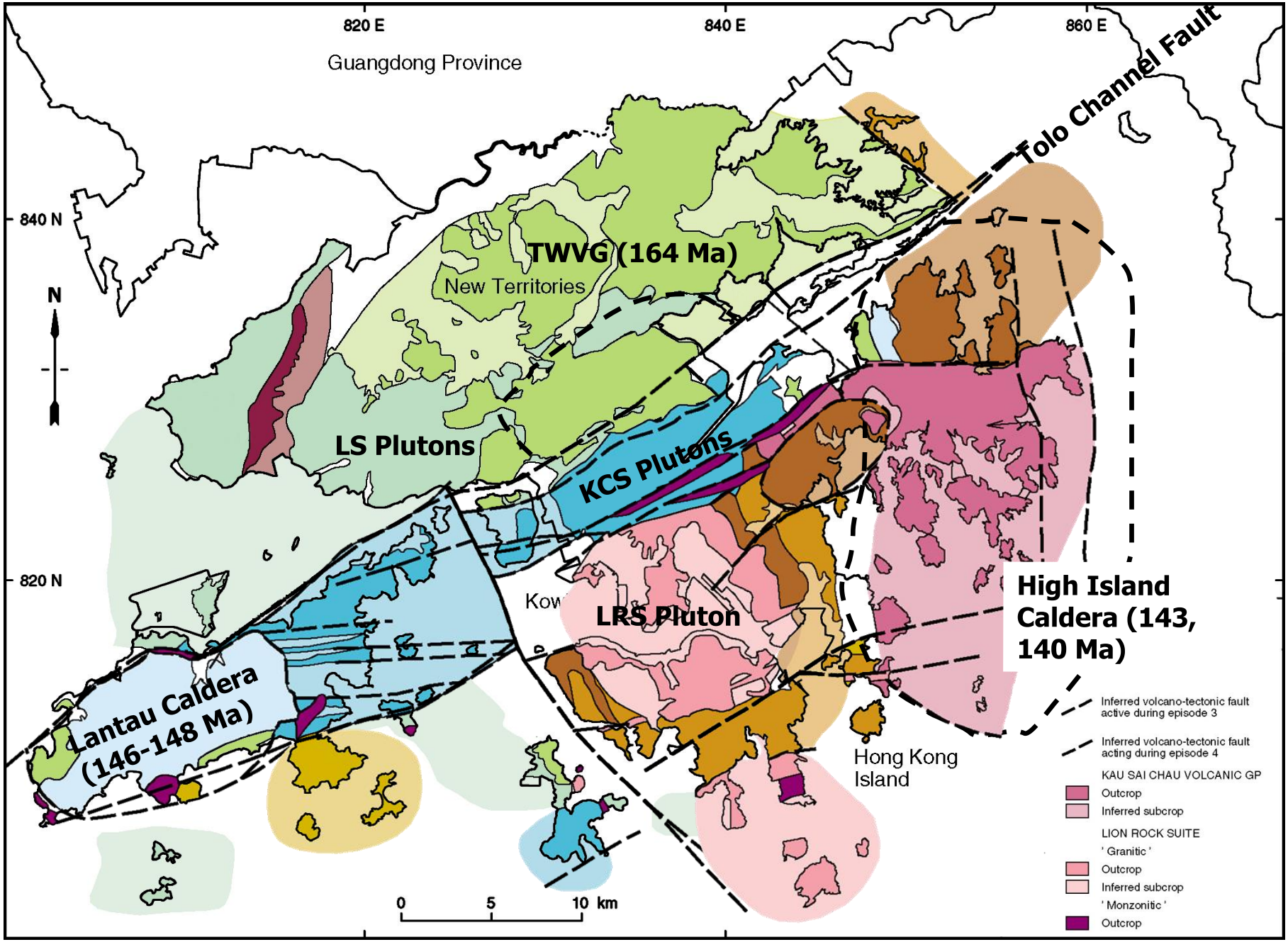
Volcanic Rocks

Group	Formation	Age (Ma)
Kau Sai Chau Volcanic Group	High Island	140.9 ± 0.2
	Clear Water Bay	140.7 ± 0.2
		140.9 ± 0.2
		141.1 ± 0.2
	Pang Long Wan	141.2 ± 0.3
Repulse Bay Volcanic Group	Mount Davis	142.8 ± 0.2
		143.0 ± 0.2
	Long Harbour	142.7 ± 0.2
		142.8 ± 0.2
	Mang Kung Uk	142.9 ± 0.2
	Che Kwu Shan	142.5 ± 0.3
	Ap Lei Chau	142.7 ± 0.2
	Ngo Mei Chau	<143.7 ± 0.1
Lantau Volcanic Group	Lai Chi Chong	146.6 ± 0.2
	Undifferentiated	146.6 ± 0.2
		147.5 ± 0.2
Tsuen Wan Volcanic Group	Sai Lau Kong	164.1 ± 0.2
	Tai Mo Shan	<164.6 ± 0.7
	Shing Mun	164.2 ± 0.3
		164.7 ± 0.3
	Yim Tin Tsai	164.5 ± 0.2

Granitoid Rocks

Suite	Intrusion	Age (Ma)	
Lion Rock Suite	Mount Bulter Granite		140
	Kowloon Granite	140.4 ± 0.2	
	Fan Lau Granite		
	Sok Kwu Wan Granite	140.6 ± 0.3	
	Tei Tong Tsui Qz Monzonite		
	Tong Fuk Qz Monzonite		
	D'Aguilar Qz Monzonite	140.4 ± 0.3	
		140.6 ± 0.3	
Cheung Chau Suite	Luk Keng Qz Monzonite		143
	Chi Ma Wan Granite	<143.7 ± 0.2	
	Shui Chuen O Granite	144.0 ± 0.3	
Kwai Chung Suite	Shatin Granite	146.2 ± 0.2	148 - 146
	East Lantau Ryholite	146.3 ± 0.3	
	East Lantau Ryhodacite	146.5 ± 0.2	
	Needle Hill Granite	146.4 ± 0.2	
	Sham Chung Rhyolite	146.4 ± 0.2	
	Po Toi Granite	146.5 ± 0.2	
	Shan Tei Tong Ryhodacite	147.3 ± 0.2	
	South Lamma Granite	148.1 ± 0.2	
Lamma Suite	Tai Lam Granite	159.3 ± 0.3	164 - 160
	Tsing Shan Granite	<159.6 ± 0.5	
	Chek Lap Kok Granite	160.4 ± 0.3	
	Chek Mun Rhyolite	160.8 ± 0.2	
	Lantau Granite	161.5 ± 0.2	
	Tai Po Granodiorite	<164.6 ± 0.2	

(Source: Davis et al., 1997; Campbell et al, 2007; Sewell et al., 2012)



MAGMATIC EVOLUTION OF HONG KONG

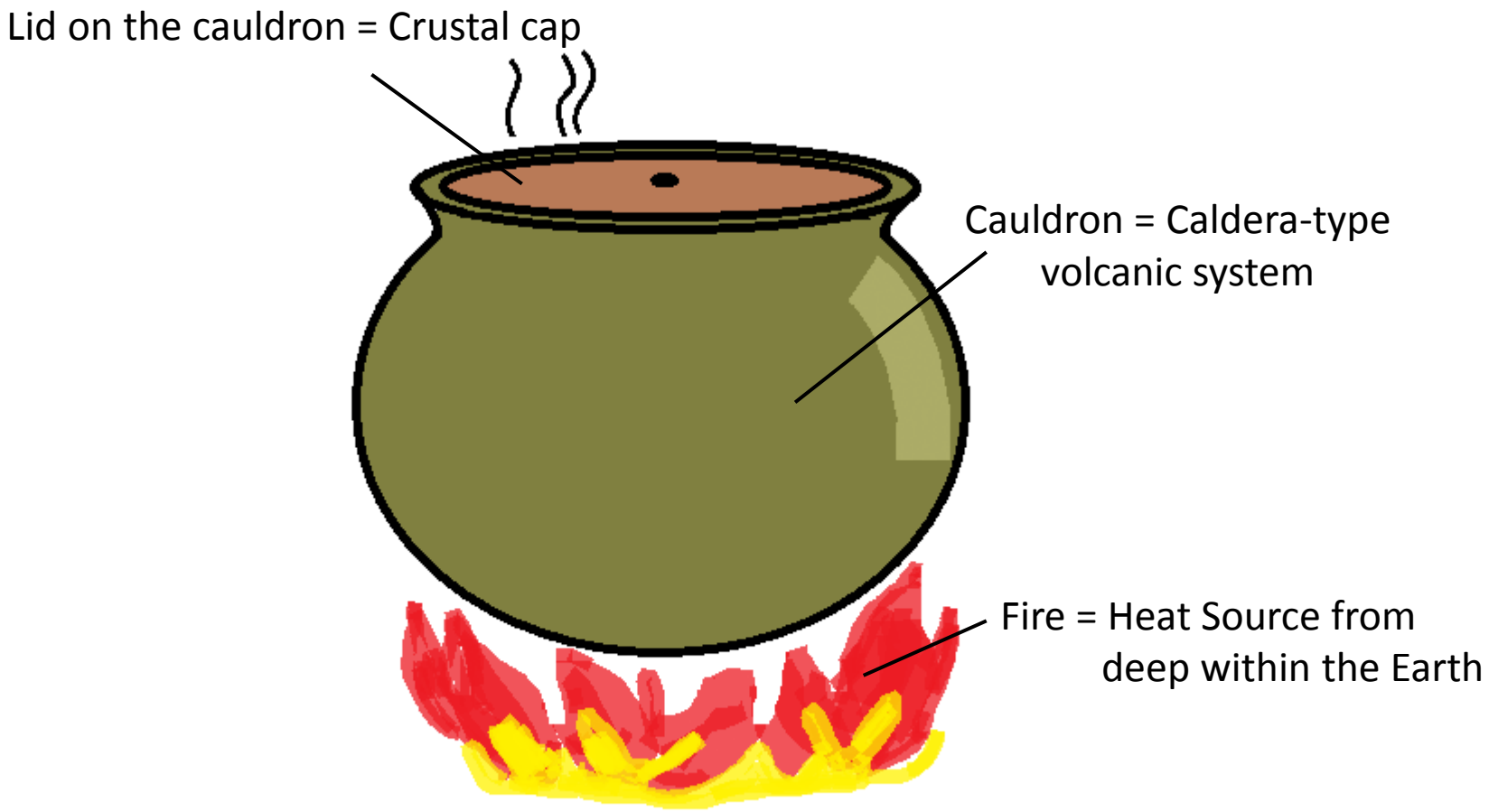
中侏羅紀至早白堊紀
MIDDLE JURASSIC TO EARLY CRETACEOUS

164-140 Ma

HOW DOES A CALDERA FORM?

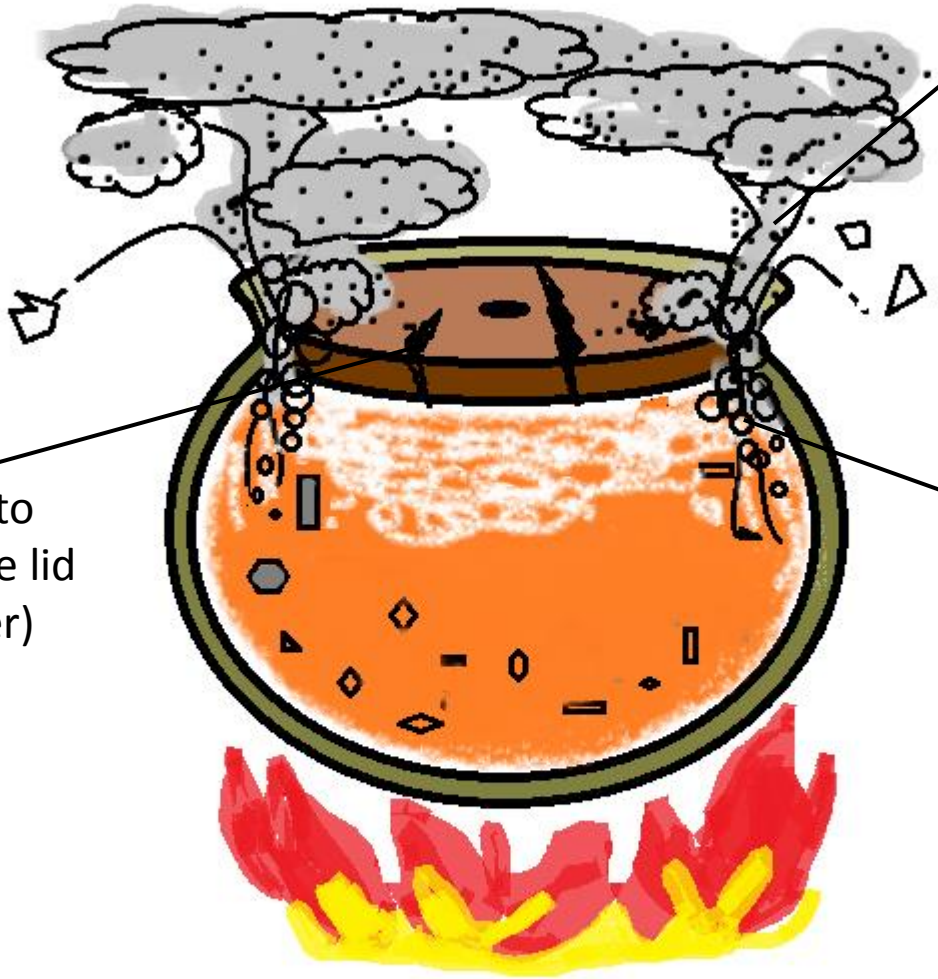
Using a cauldron of hot congee as an analogy.

Caldera-type Volcanic System



Inside the System

Eruption Begins

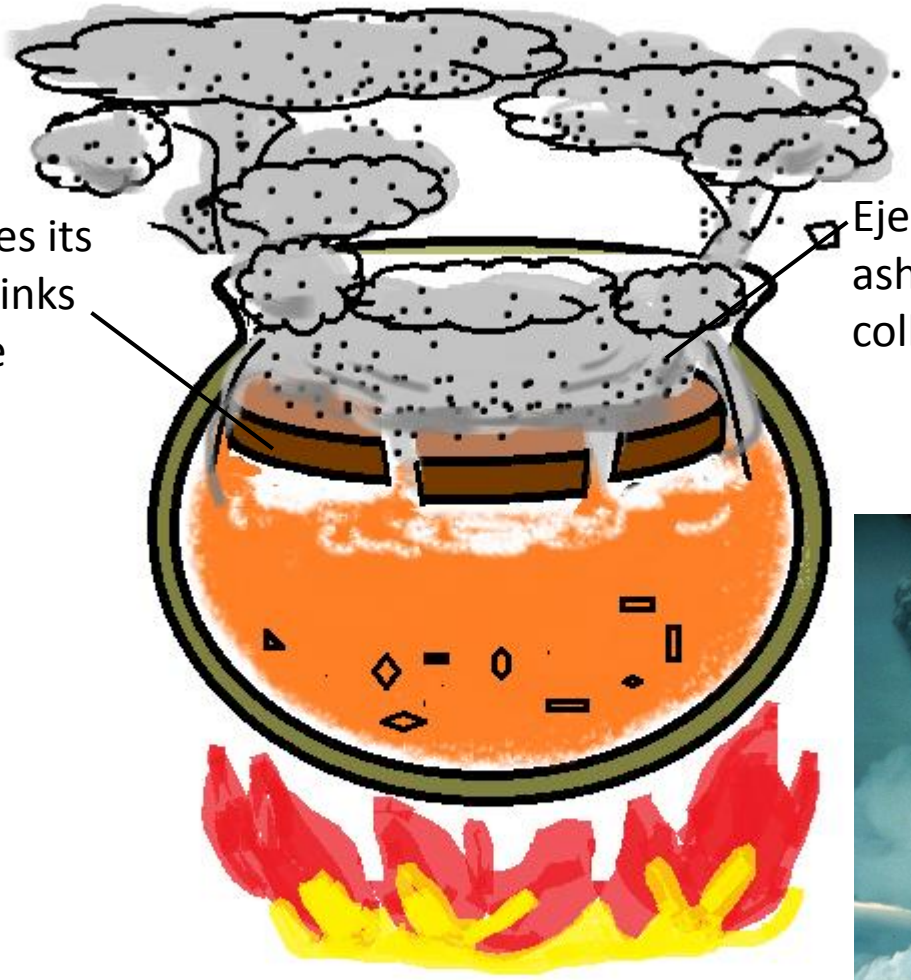


Ejected materials = Volcanic ash

Cracks start to appear in the lid (crustal cover)

Escaping gas bubbles

Caldera Collapses



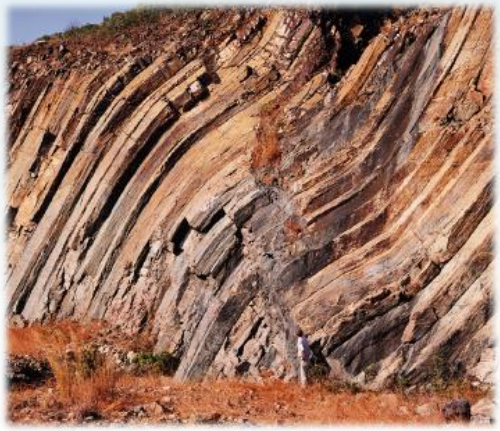
Broken lid loses its support and sinks down into the cauldron

Ejected materials (volcanic ash) falls back onto the collapsed lid

Last Eruption - High Island Supervolcano

基本事實 Key Facts

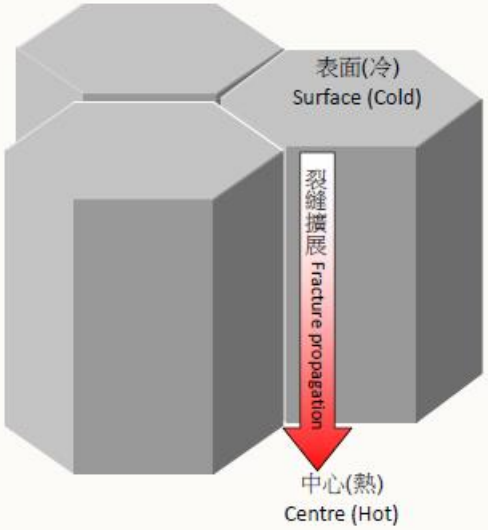
- 最後一次爆發在 1 億 4 千萬年前
  Last eruption at around 140 million years ago
- 在華南東部首次發現古代超級火山
  The first discovery of an ancient supervolcano in southeast China
- 破火山口直徑約 18 公里
  Caldera about 18 km in diameter



- 爆發噴出的火山物質估計超過 1.3 萬億立方米
  Erupted ash materials exceeded 1300 cubic kilometres
- 主要岩類為高矽質凝灰岩
  Main rock type is high-silica tuff
- 大型石柱(寬達兩米)
  Large columns (up to 2 m in size)
- 破火山口系統向東傾斜約 30 度
  Caldera system tilted to the east at ~30 °

岩柱怎麼形成？
HOW DO THE ROCK COLUMNS FORM?

- 火山灰厚層於破火山口盆地慢慢冷卻和收縮
  Thick volcanic ash layer slowly cools and contracts within the collapse caldera
- 引起的拉伸應力使火山灰層裂開
  The induced tensile stress causes the ash layer to crack
- 裂縫從較冷的表面向火山灰內部較熱的中心擴展
  Cracks propagate from the cold surface inward to the centre of hot volcanic ash
- 六邊形的形態是釋放拉伸應力的最有效的安排
  The hexagonal pattern is the most efficient arrangement for releasing tensile stress



岩柱形成的控制因素：
1. 均質火山灰
2. 厚厚的火山灰層
3. 局限在破火山口盆地內
4. 冷卻速度緩慢

Factors controlling the formation of rock columns:
1. Homogeneous volcanic ash
2. Thick ash layer
3. Confined within a caldera depression
4. Slow cooling

https://www.youtube.com/watch?v=qM94vbJ1HBI


綠野遊蹤

億年岩石古蹟 窺見遠古香港

糧船灣超級火山

旅行資訊

長征旅行隊

合線

雲影道

星藝旅行團

友誼之旅會

環球海洋輪服務

The High Island Caldera

Ejected materials (volcanic ash) cool and solidify slowly in the collapse caldera

The congee (magma) remaining in the cauldron also begins to cool.

Tilting

Due to tectonic forces, the cauldron gets tilted on its side.

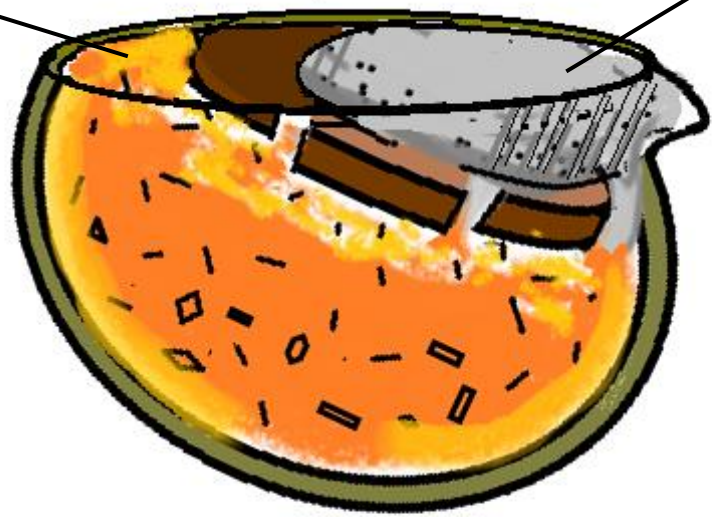
After Erosion and Uplift

Kowloon / N Hong Kong Is.

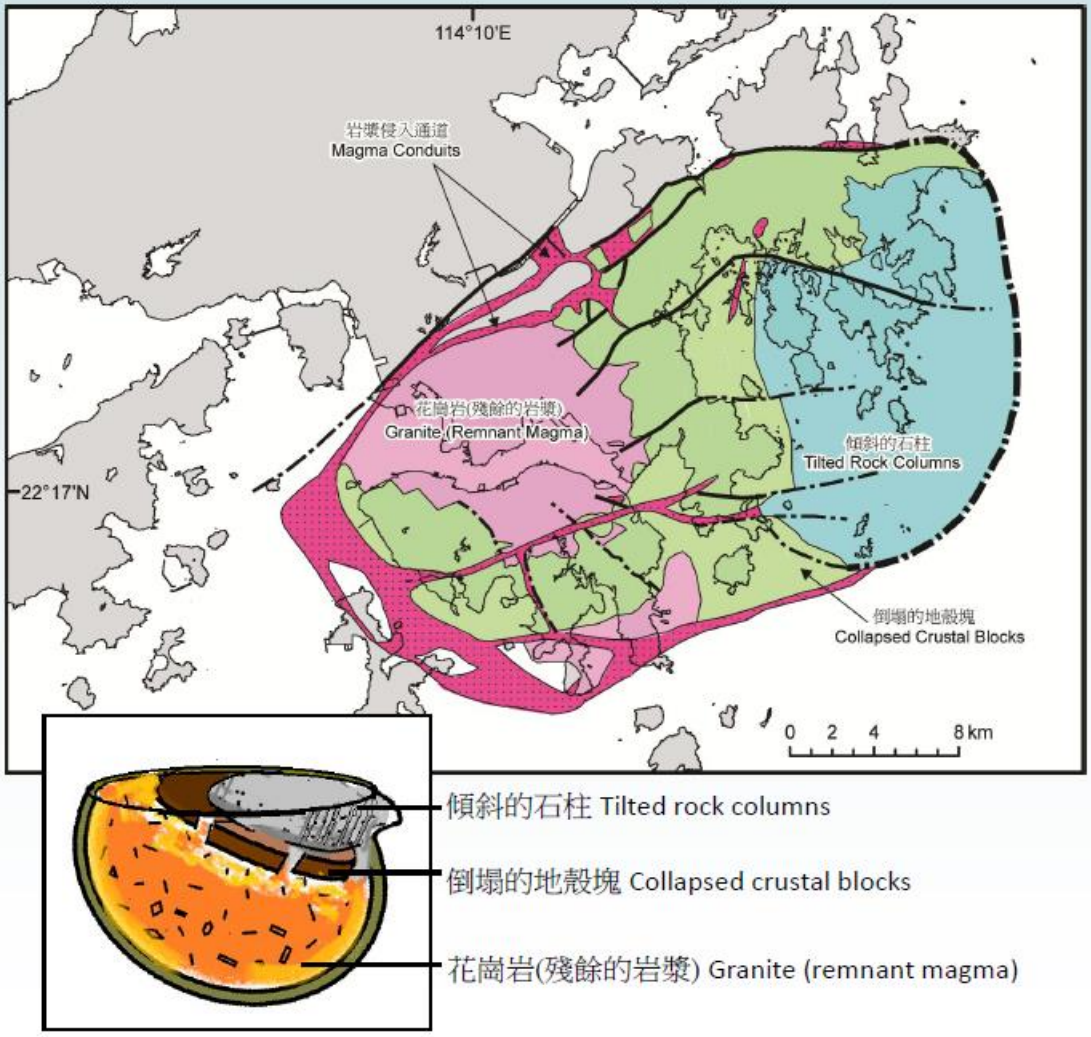
Sai Kung

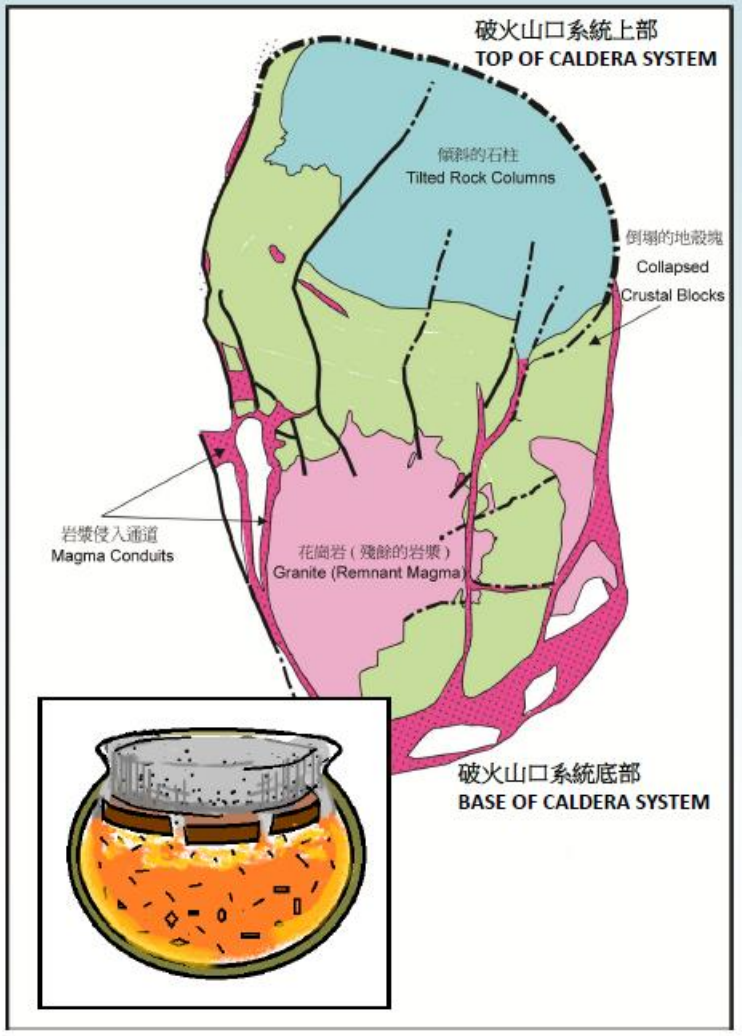
Granite

Tilted rock columns in Sai Kung



Ancient Tilted Caldera System

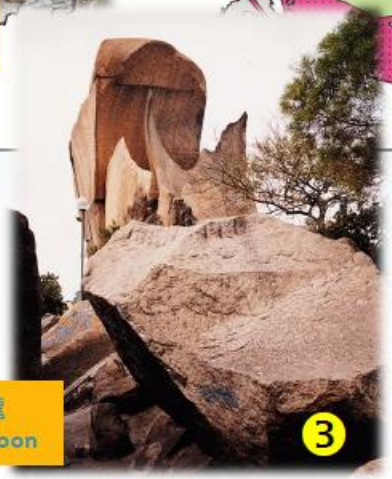




沿著岩漿通道侵入的岩牆，沙田
Dyke intruded along magma conduit, Shatin

傾斜的石柱，破邊洲
Tilted rock columns, Po Pin Chau

花崗岩與火山岩的接觸邊界，九龍東
Contact between granite and volcanic rock, Eastern Kowloon



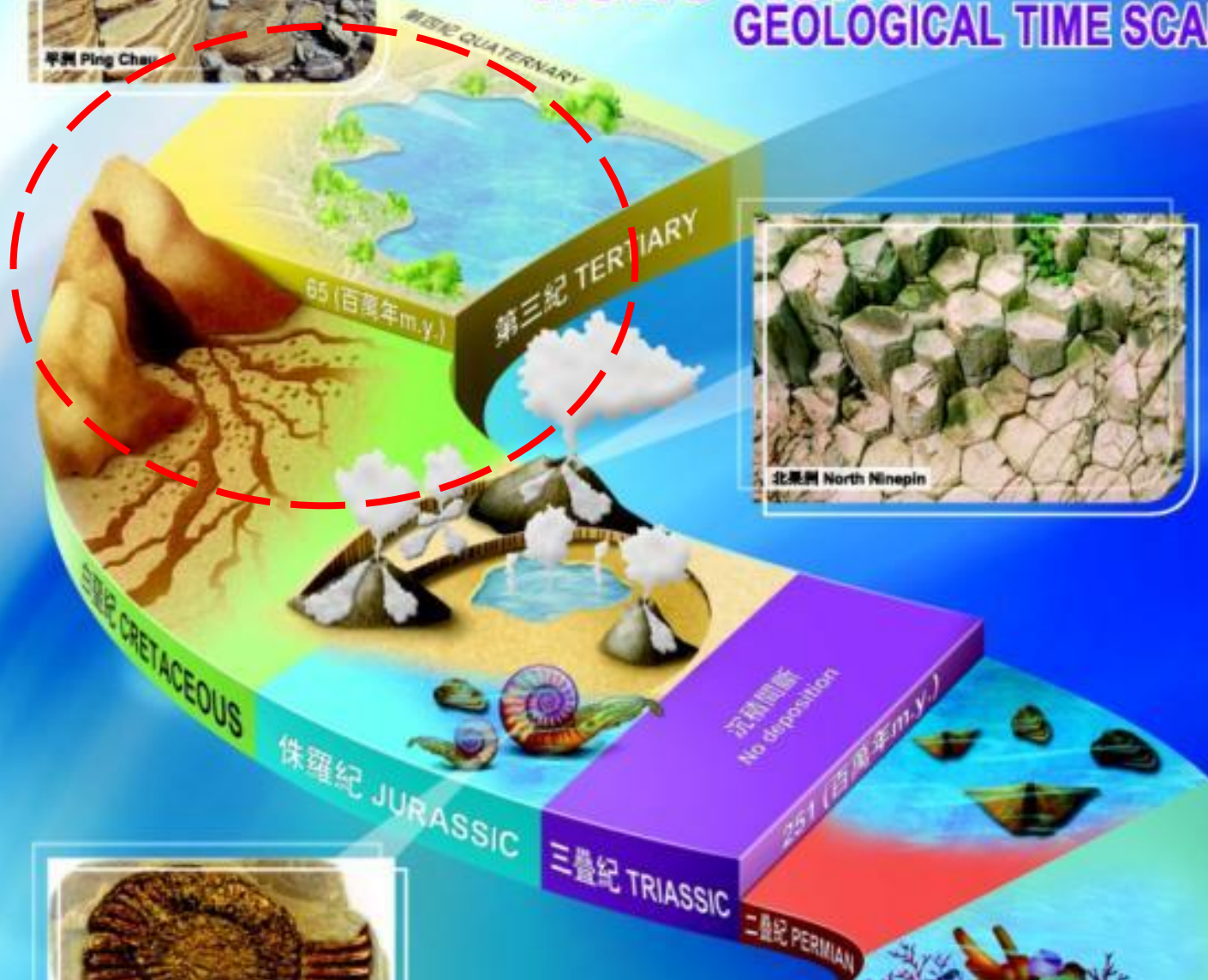
花崗岩，九龍
Granite, Kowloon

大型六角石柱，果洲群島
Large hexagonal columns, Ninepin Group

香港地質時代表

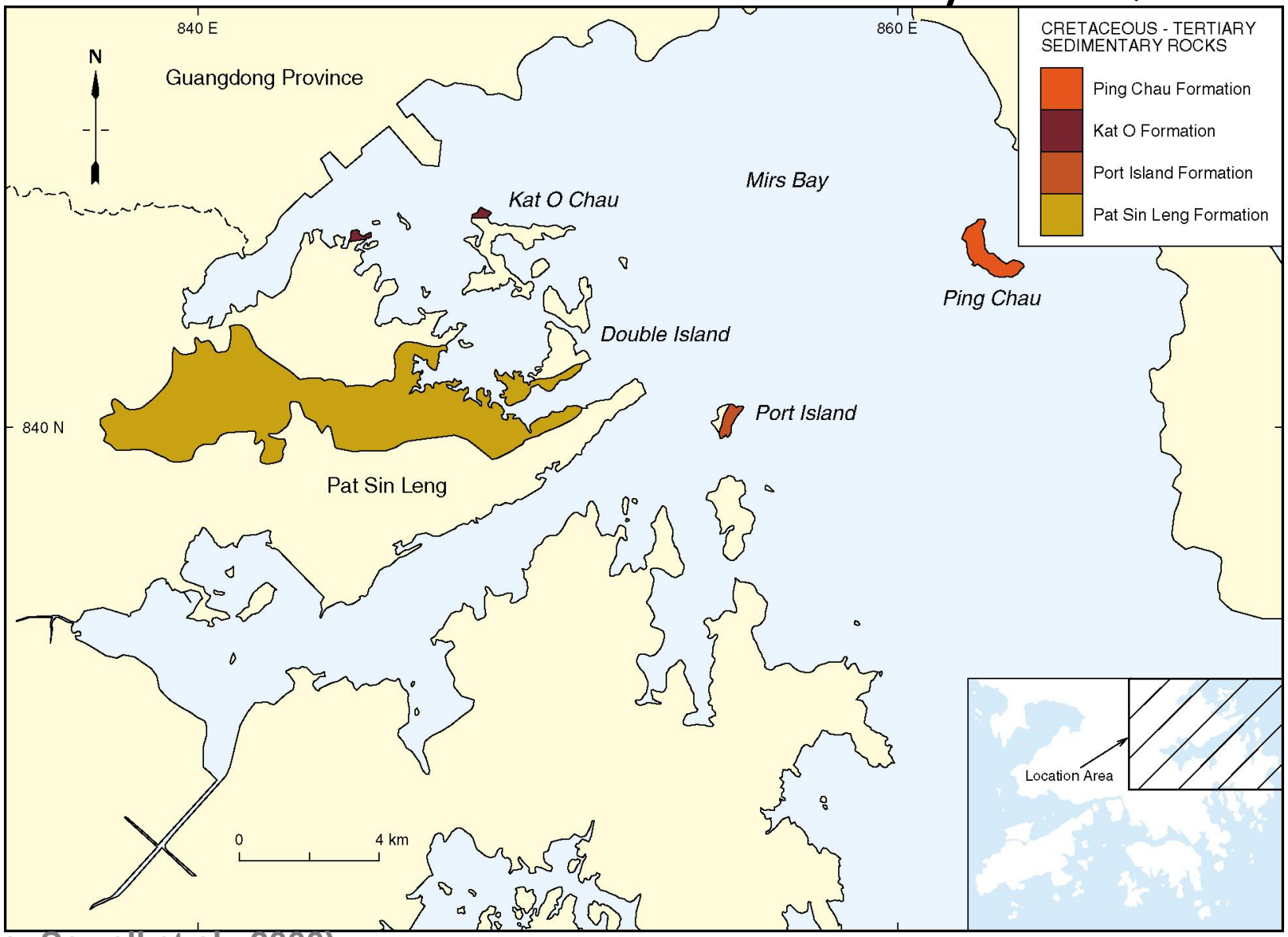
HONG KONG GEOLOGICAL TIME SCALE

代 ERA	紀 PERIOD	距今年代 (百萬年) AGE (m.y.)	TECTONIC PROCESSES AND ENVIRONMENTS IN HK
新生代 CENOZOIC	第四紀 QUATERNARY	1.8	週期性氣候變化 Cyclic climate change
	第三紀 TERTIARY 新第三紀 NEOGENE	23	亞熱帶風化 Subtropical weathering
	第三紀 TERTIARY 早第三紀 PALAEOGENE	65	
中生代 MESOZOIC	白堊紀 CRETACEOUS	145	火山活動 Active volcanism
	侏羅紀 JURASSIC	199	淺海至外陸平原 Shallow marine to fluvial plains
	三疊紀 TRIASSIC	251	板塊重組 Tectonic plate reorganisation
	二疊紀 PERMIAN	299	大陸深海 Deep continental sea



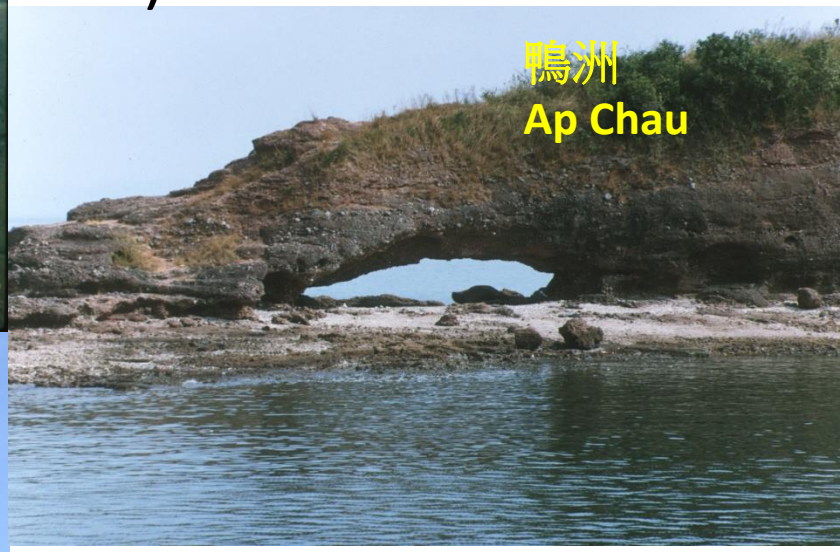
晚中生代至早新生代沉積岩（火山活動之後）

Late Mesozoic to Cenozoic Sedimentary Rock (Post-volcanism)



(Source: Sewell et al., 2000)

早至晚白堊世
EARLY TO LATE CRETACEOUS (140-100 Ma)

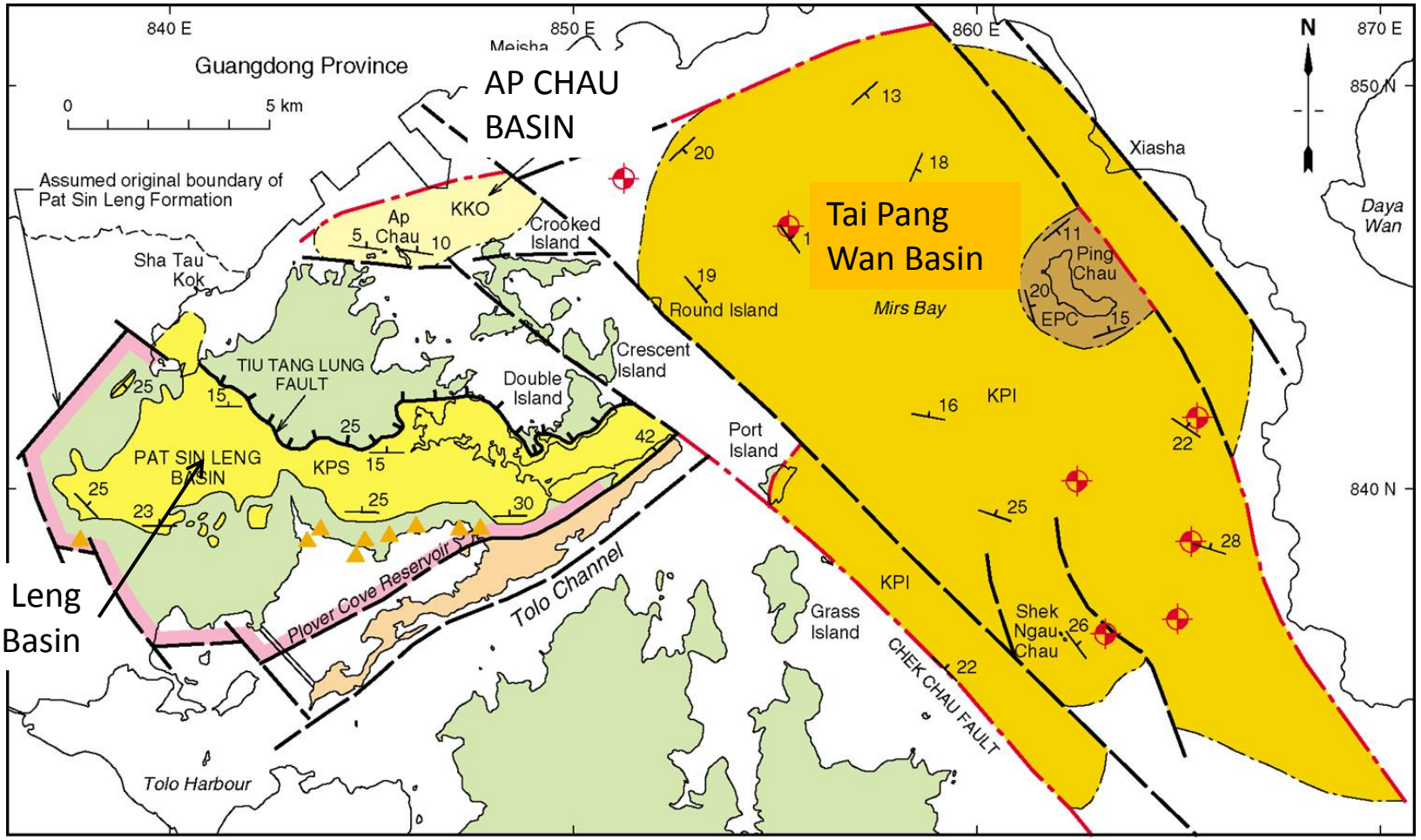


早至晚白堊紀
EARLY TO LATE CRETACEOUS

乾旱、類似沙漠的氣候

Dry and desert-like climate

Sedimentary Basins in NW NT



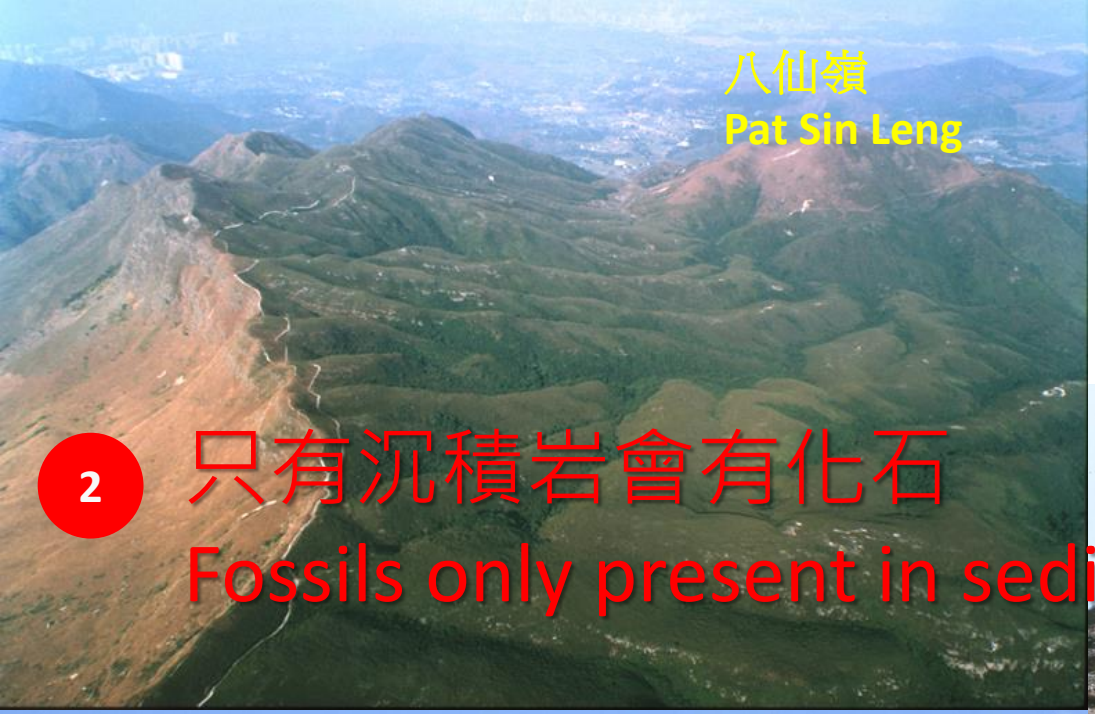
(Source: Sewell et al., 2000)

LEGEND

- EPC — Early Tertiary : Ping Chau Formation
- KKO — Late Cretaceous : Kat O Formation
- KPI — Late Cretaceous : Port Island Formation (Hong Kong)
- KPS — Early Cretaceous : Pat Sin Leng Formation
- Jurassic Volcanic rocks
- Boulders of Pat Sin Leng Formation
- Strike and dip
- Geological boundary (solid-certain, broken-inferred)
- Fault (solid-certain, broken-inferred)
- Devonian sedimentary rocks
- Thrust
- Geological boundary interpreted from seismic data
- Fault line interpreted from seismic data
- Borehole
- Margin of Pat Sin Leng Basin


香港有可能有恐龍化石嗎？
Any chance to find dinosaur fossils in Hong Kong?


1
中侏羅紀至早白堊紀是恐龍的極盛期
Middle Jurassic to Early Cretaceous was the time of Dinosaurs

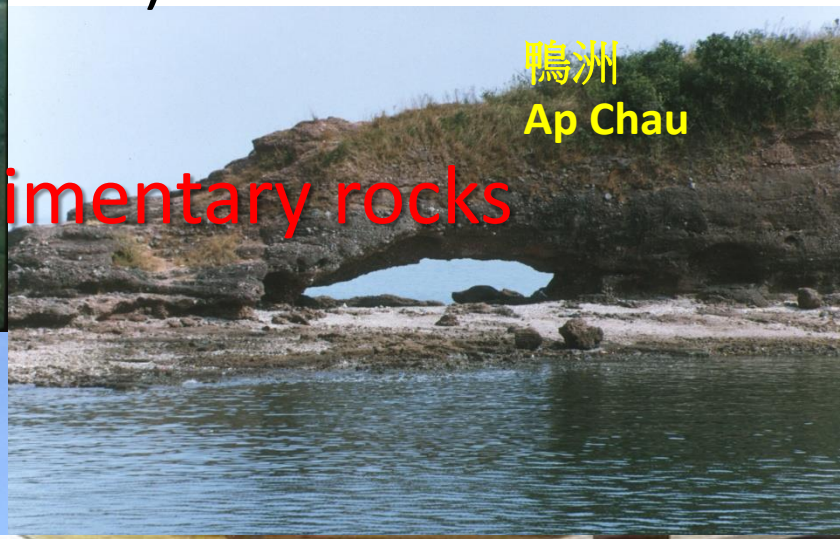


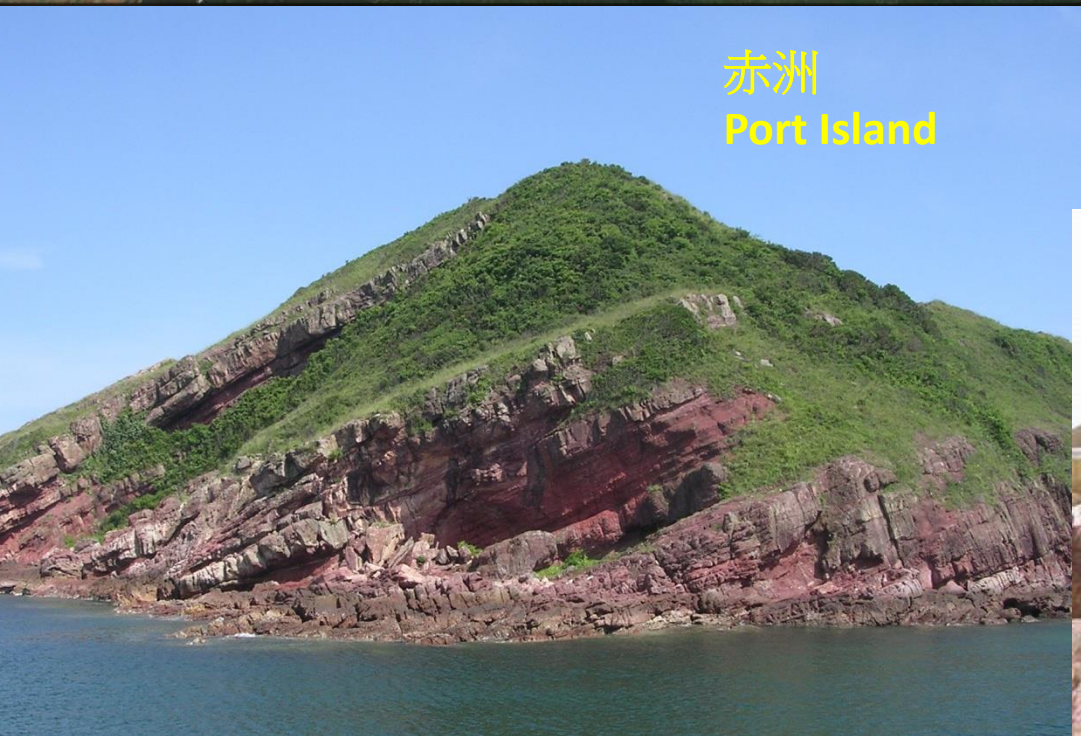
早至晚白堊世
EARLY TO LATE CRETACEOUS (140-100 Ma)

2

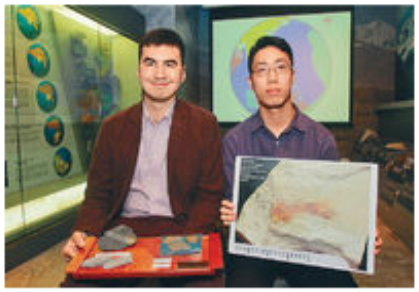
只有沉積岩會有化石

Fossils only present in sedimentary rocks





不過現時為止香港並沒有發現恐龍化石
Up till now, no dinosaur fossil has been found



■助教文嘉棋（圖左）與謝子旗（圖右）手持化石魚照片。

■電腦復原圖

放大

其它港聞

港大首鑑定侏羅紀魚化石

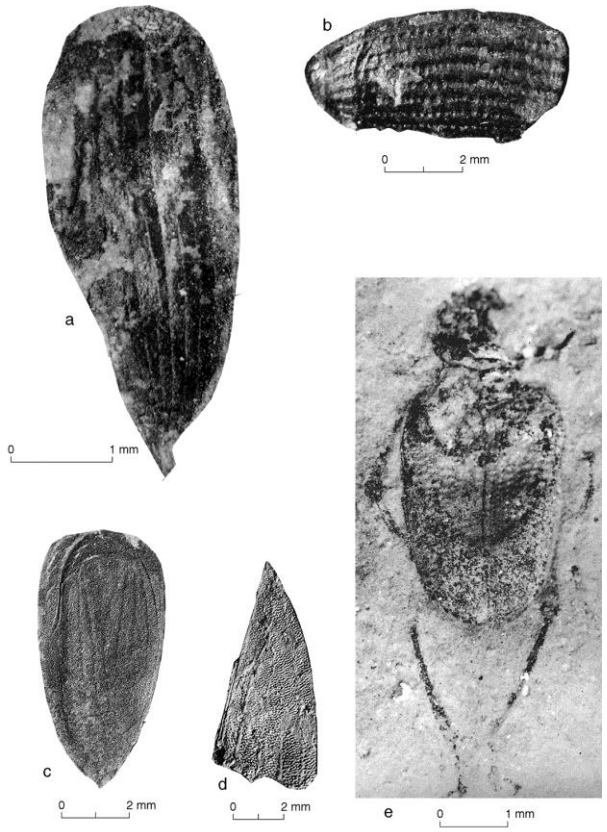
2015-04-01

頭條日報 侏羅紀生物，相信大家也只是在電影中看過，但最近香港首次鑑別出約一億四千七百萬年前侏羅紀年代的魚化石，品種屬副狼鰭魚，由一名港大地球科學系畢業生發現，今次研究可將副狼鰭物種曾經出現的範圍，由福建擴展約七百公里至香港，亦將副狼鰭出現的年代推前約四千萬年。今次是香港首次鑑別出恐龍時代脊椎動物化石，由港大地球科學系畢業生謝子旗於暑期研究時，於收藏在許士芬地質博物館由荔枝莊蒐集的化石中發現。

指導謝子旗的港大地球科學系助理教授（研究）文嘉棋指，大學本科生的畢業研究一般很少會在經專家學者評審的科學期刊中出現，故今次研究對謝特別有意義，亦對本地科學學生的科研能力予以肯定。相關研究結果在本月的科學期刊《PeerJ》中刊登。

新生代 Cenozoic
早第三紀 Palaeogene

在香港出露最年輕的岩層
Youngest rock formation in Hong Kong

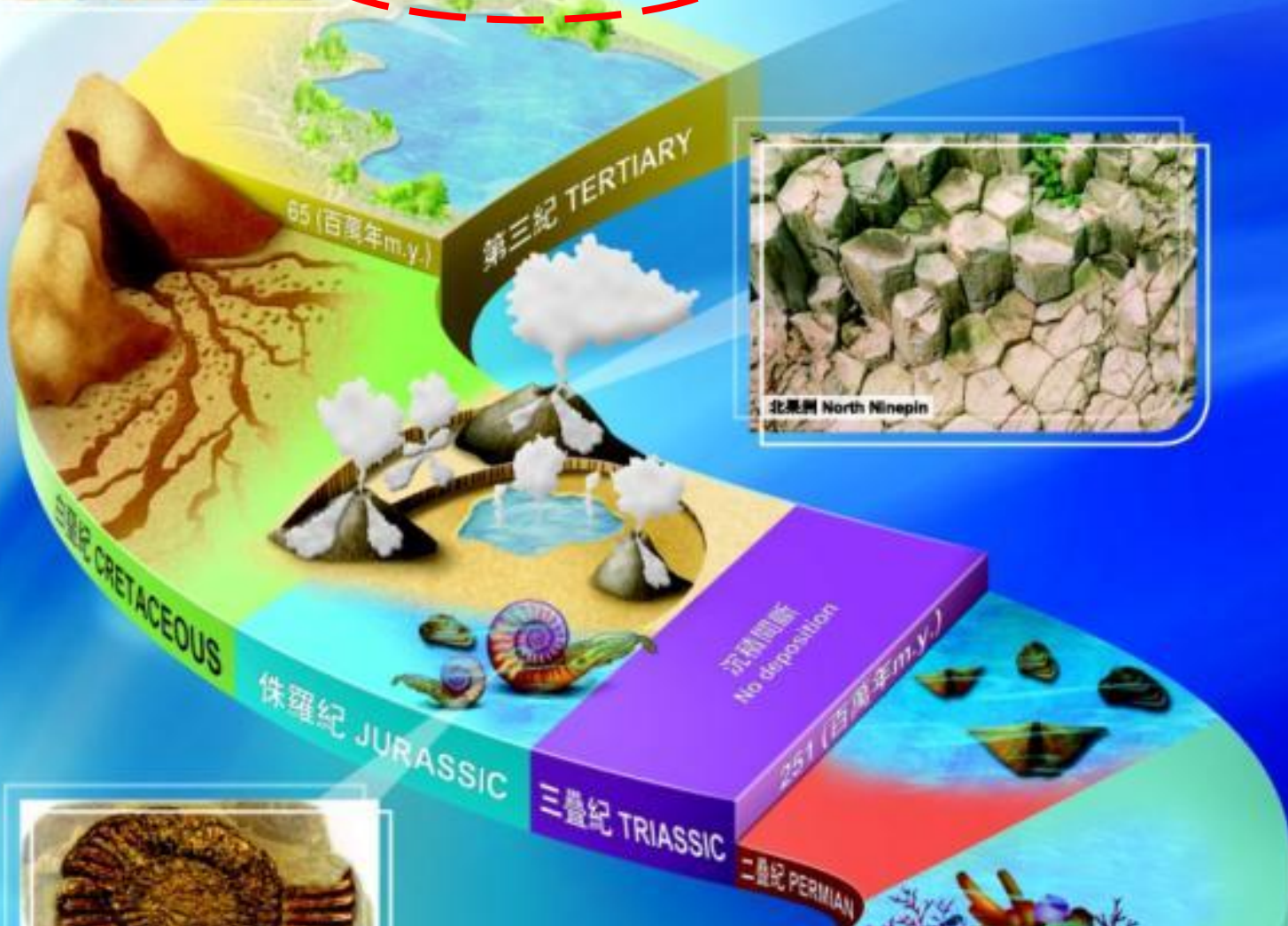



鹽湖
Salt lake

香港地質時代表

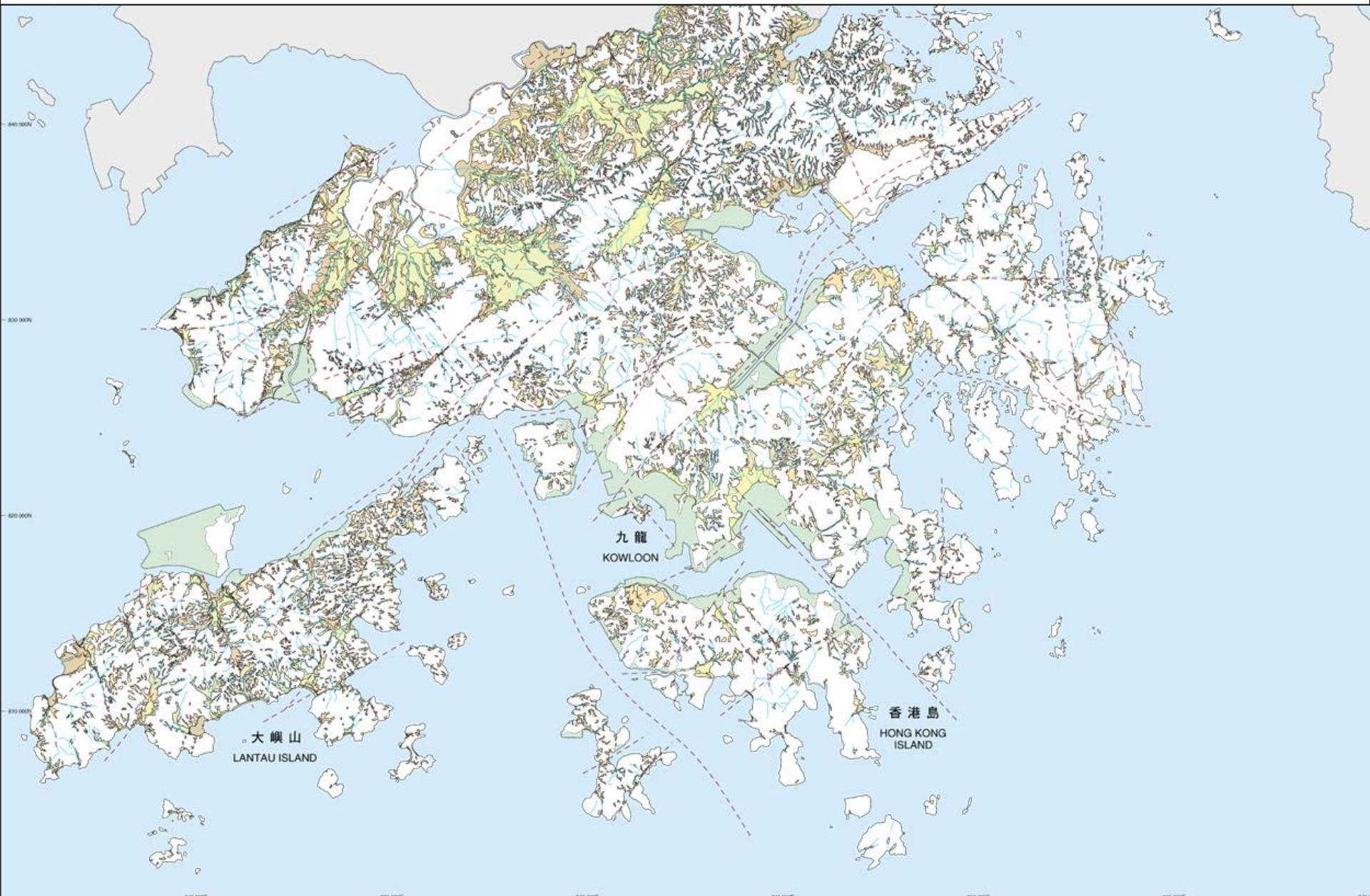
HONG KONG GEOLOGICAL TIME SCALE

代 ERA	紀 PERIOD	距今年代 (百萬年) AGE (m.y.)	TECTONIC PROCESSES AND ENVIRONMENTS IN HK
新生代 CENOZOIC	第四紀 QUATERNARY	1.8	週期性氣候變化 Cyclic climate change
	第三紀 TERTIARY 晚第三紀 NEOGENE	23	亞熱帶風化 Subtropical weathering
	早第三紀 PALAEOGENE	65	
中生代 MESOZOIC	白堊紀 CRETACEOUS	145	斷裂盆地發展 Development of faulted basins
	侏羅紀 JURASSIC	199	火山活動 Active volcanism 淺海至外陸平原 Shallow marine to fluvial plains
	三疊紀 TRIASSIC	251	板塊重組 Tectonic plate reorganization
	二疊紀 PERMIAN	299	大陸深海 Deep continental sea

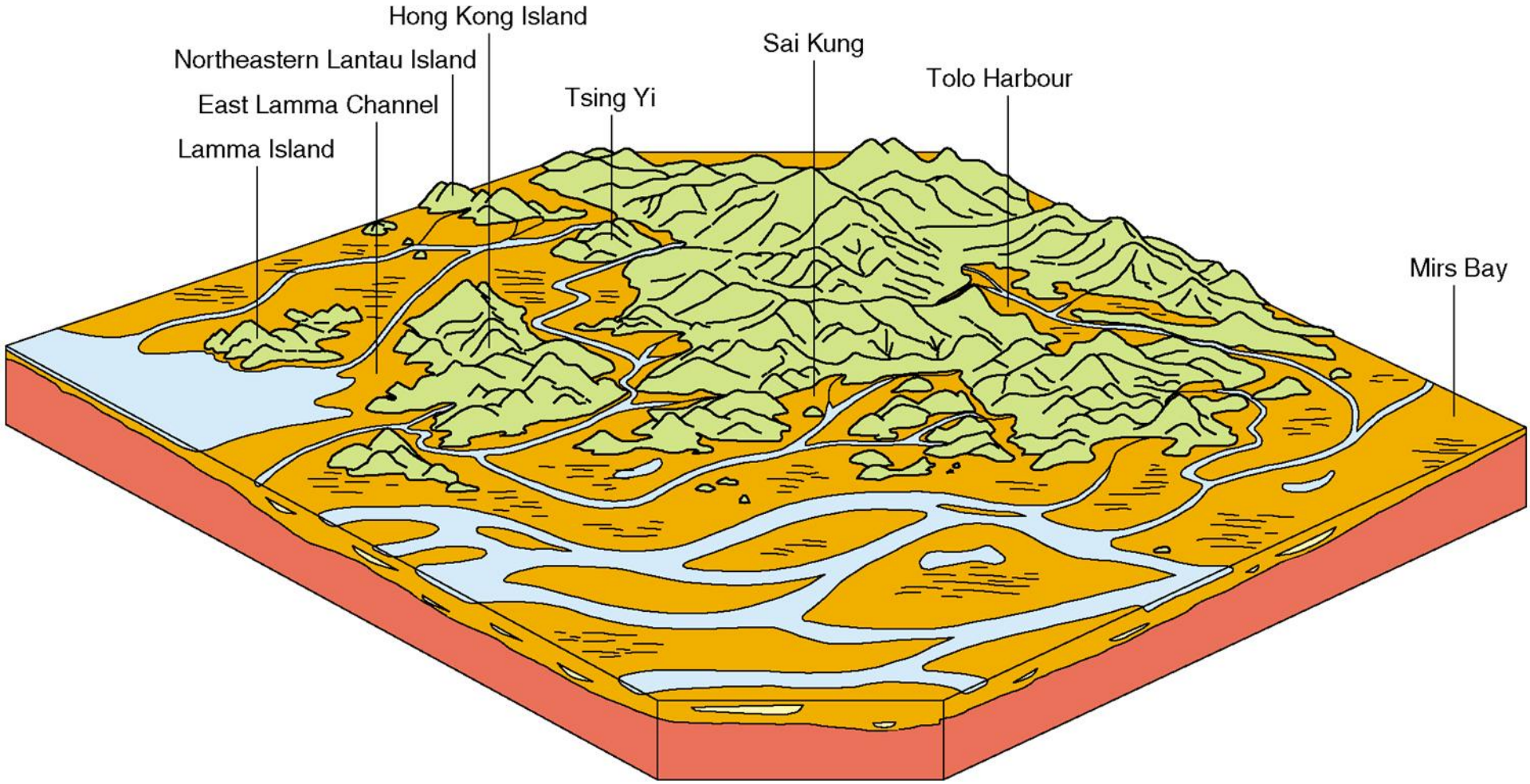


第四紀表土沉積

Quaternary Superficial Deposits

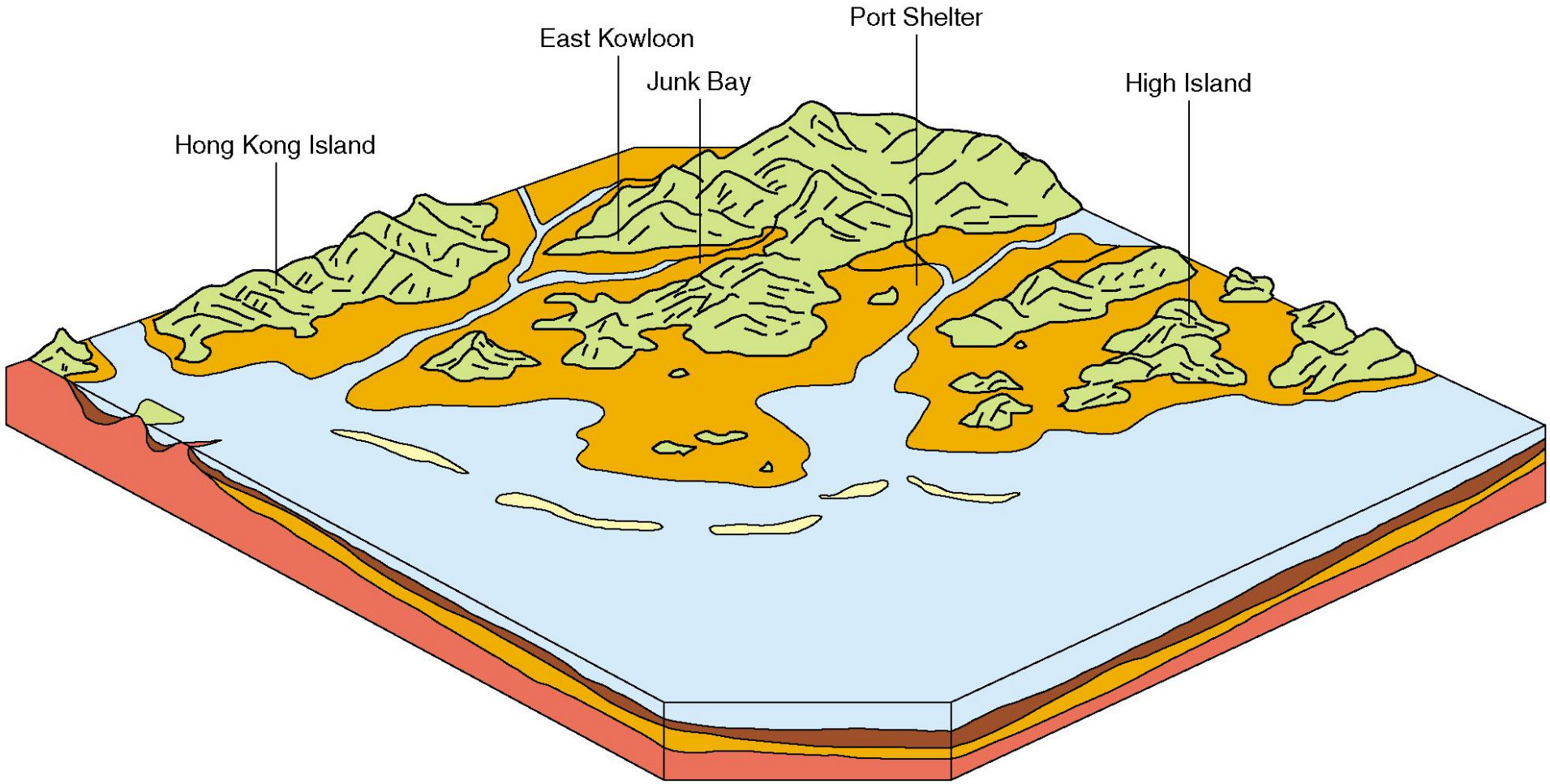


更新世沉積環境
Depositional Environment of Pleistocene Sediments



780,000– 12000 years ago

全新世沉積環境
Depositional Environment of Holocene Sediments



Since 12000 years ago to present

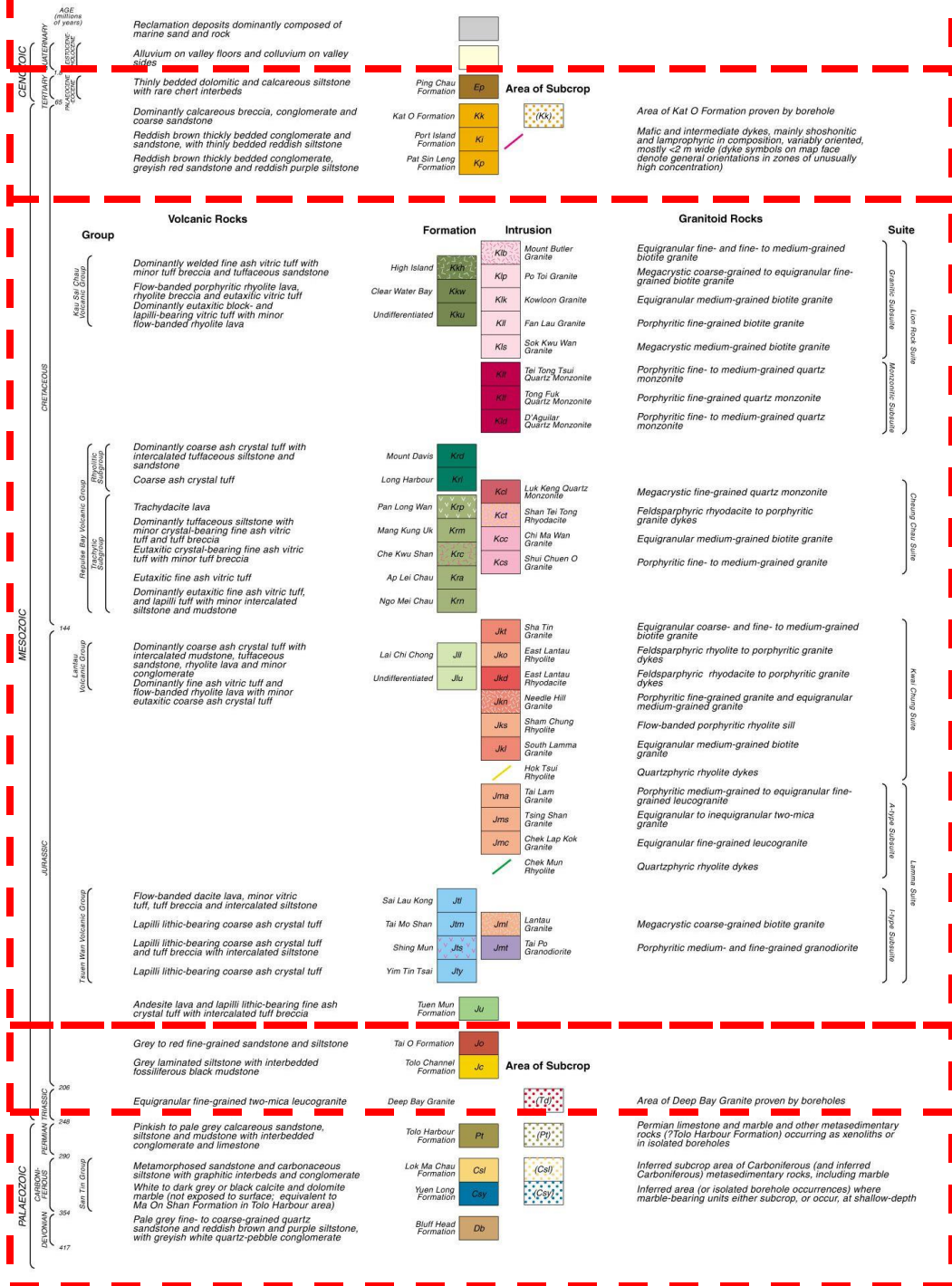
Quaternary Superficial Deposits

Late Mesozoic to Early Cenozoic Sedimentary (Post-volcanism)

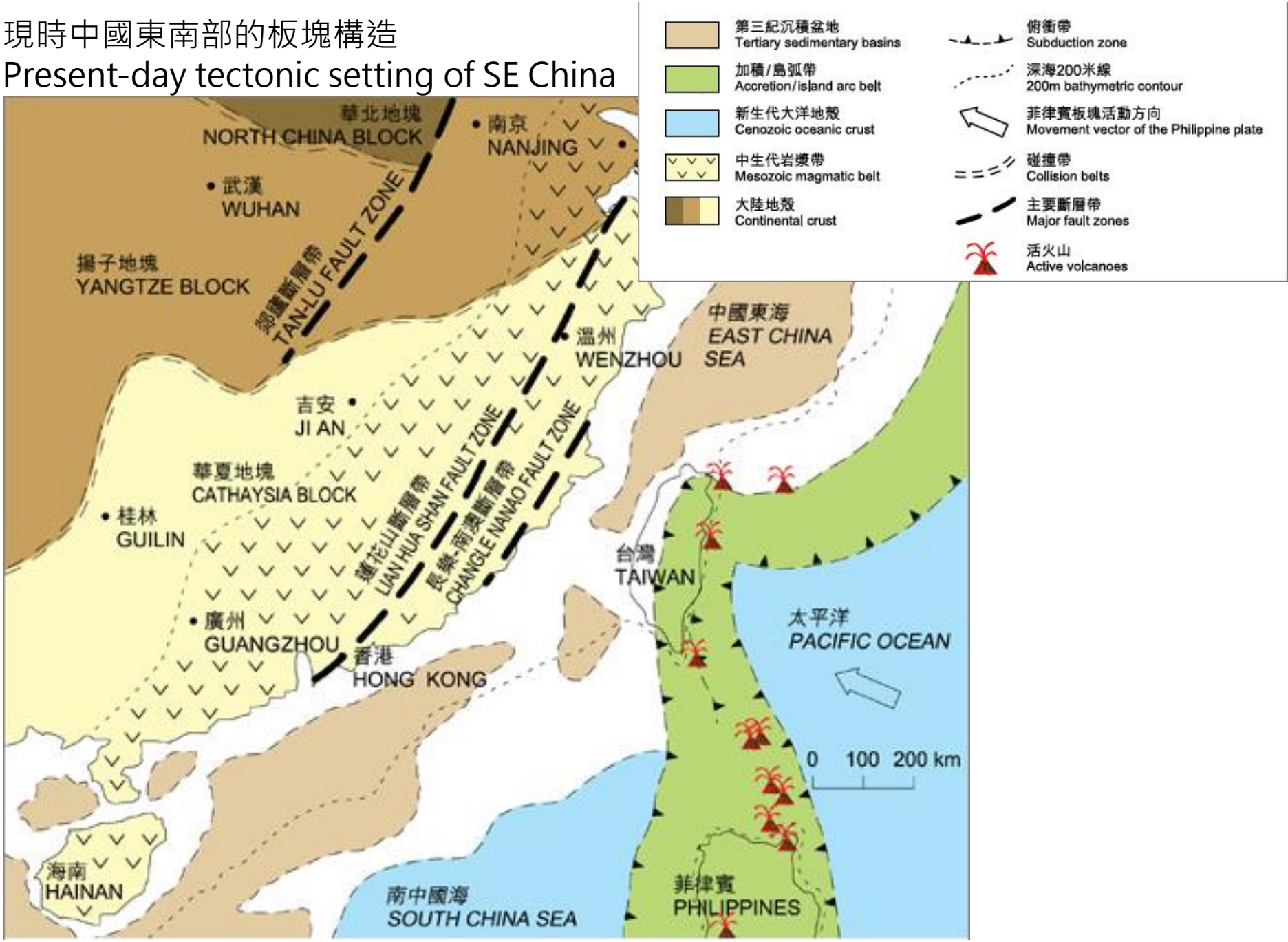
Mesozoic Volcanic and Associated Granitic Rocks

Early Mesozoic Sedimentary (Pre-volcanism)

Late Palaeozoic Sedimentary

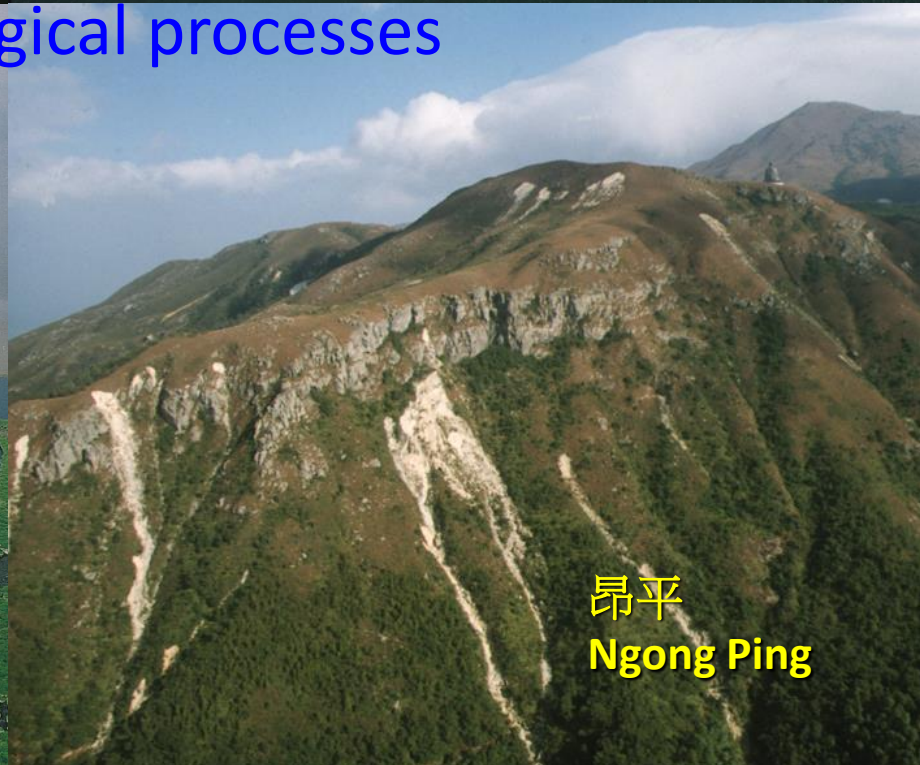


現時中國東南部的板塊構造
Present-day tectonic setting of SE China



地質作用與地貌

Geomorphological processes & landscapes



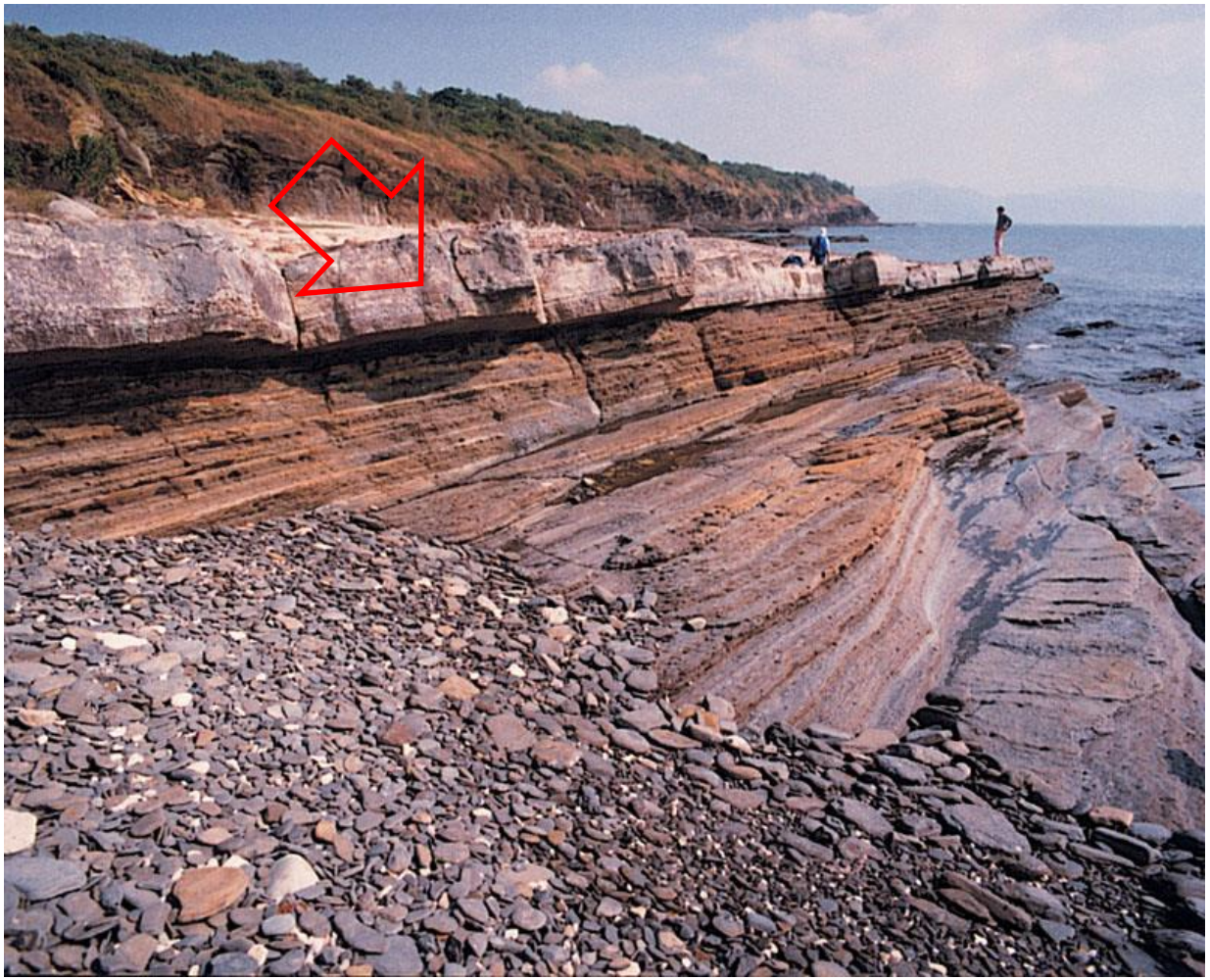
影響地貌因素Landscape controls

- 石質 Lithology (rock type)
- 結構 Structure
- 氣候 Climate – rate of weathering & erosion
- 過程 Process
- 階段 Stage – maturity of landscape
- 時間 Time – changes over time e.g. sea-level changes

大嶼山分流半島的花崗岩矮崖；背景群山為火山岩。

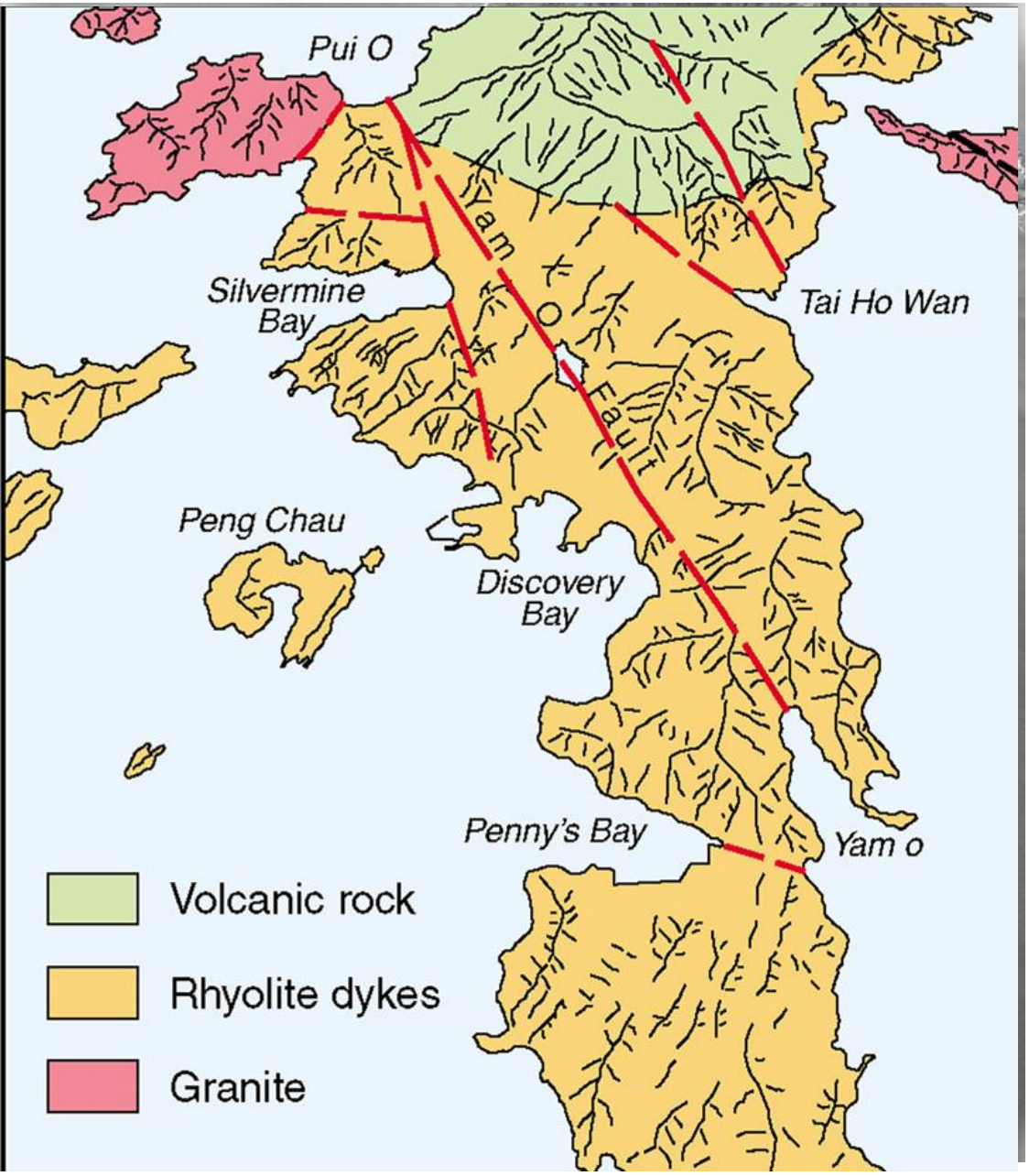
Low granite cliffs on the Fan Lau peninsula, Lantau Island; the higher hills in the background are composed of volcanic rock.

萬宜水庫東霸
East Dam of High Island Reservoir



平洲 - 龍落水

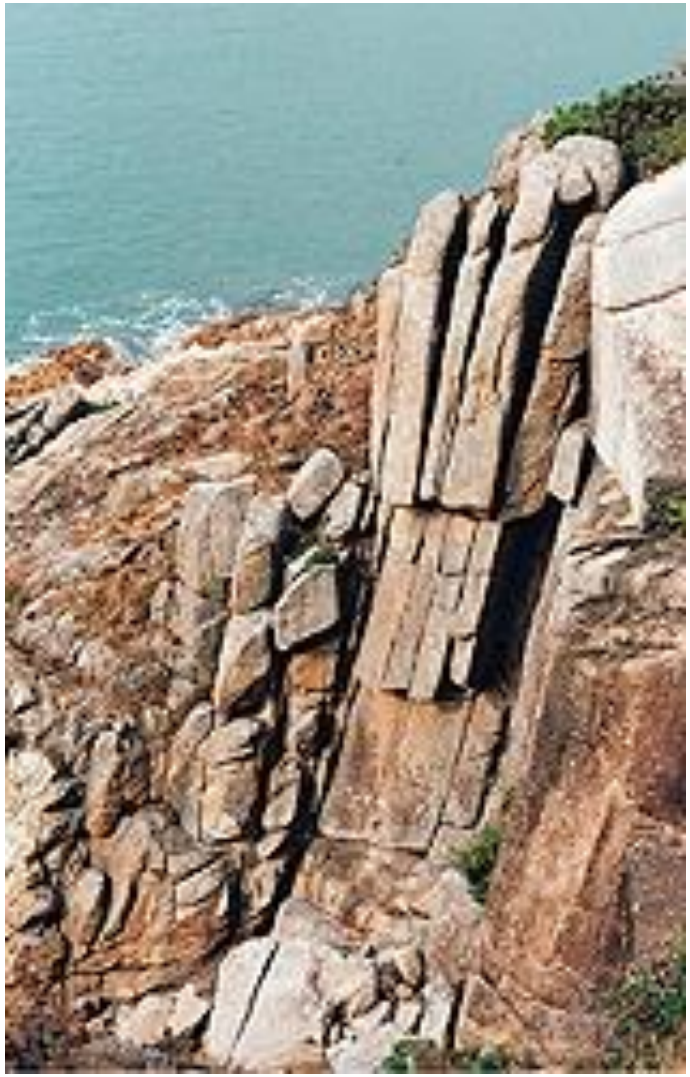
Light-coloured chert beds within thinly-bedded red siltstone of the Ping Chau Formation, Ping Chau



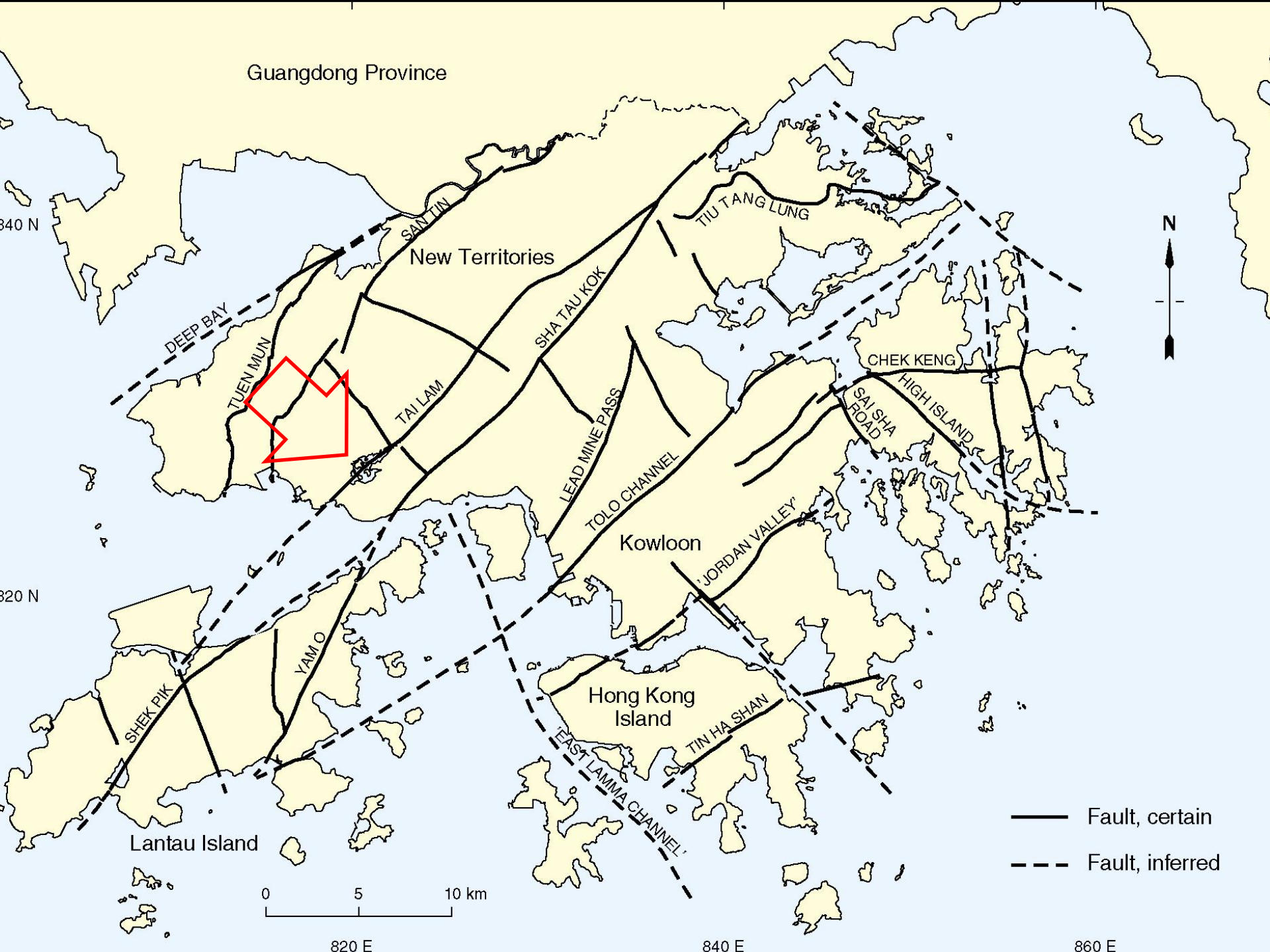
(Source: Sewell et al., 2000)

Dyke Rock - Feldsparphyric rhyolite

褶皺 Fold

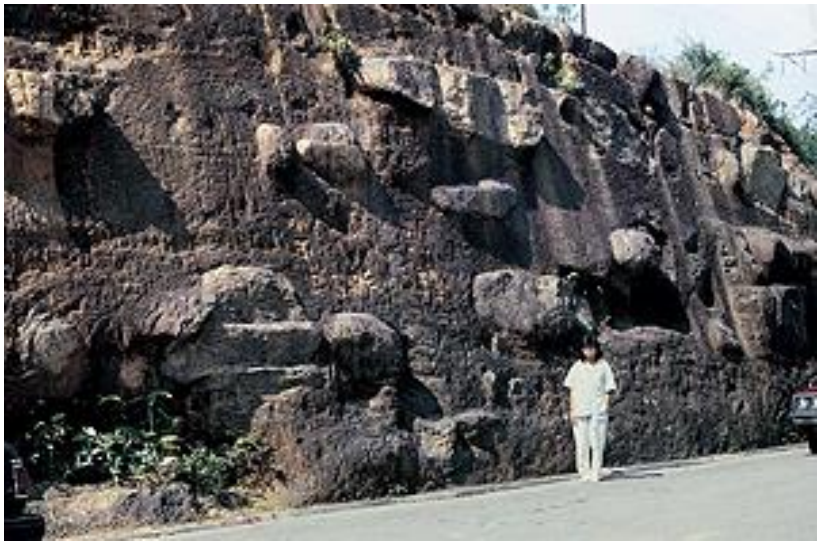


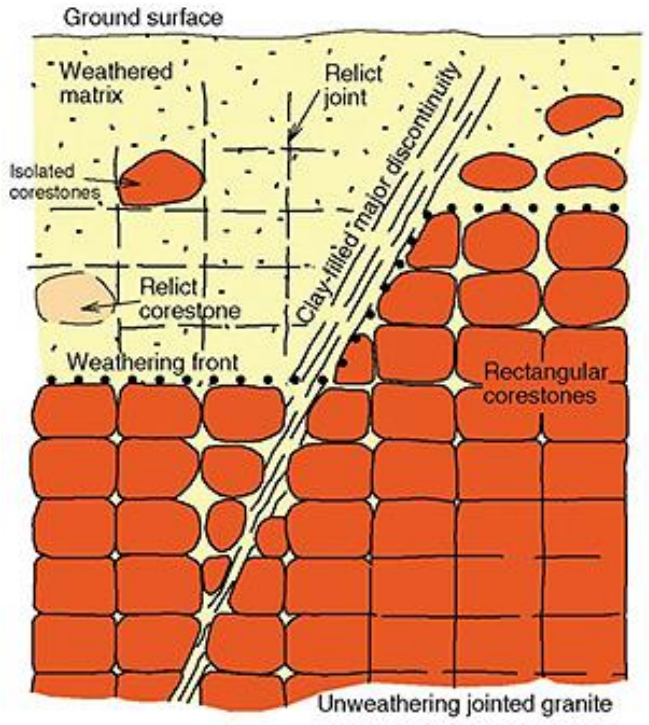
節理 Joint


Guangdong Province
New Territories
Kowloon
Hong Kong Island
Lantau Island
SAN TIN
DEEP BAY
TUEN MUN
TAI LAM
SHA TAU KOK
LEAD MINE PASS
TOLO CHANNEL
TIU TANG LUNG
CHEK KENG
HIGH ISLAND
SAI SHA ROAD
'JORDAN VALLEY'
TIN HA SHAN
'EAST LAMMA CHANNEL'
YAM O
SHEK PIK
N
0
5
10 km
Fault, certain
Fault, inferred
820 E
840 E
860 E
840 N
820 N

大欖涌水塘位於大欖斷層上，圖片遠方為斷層的東北方向

Looking northeast along the strike of the Tai Lam Fault, western New Territories





風化　Weathering

侵蝕和沉積 Erosion, transportation & deposition:

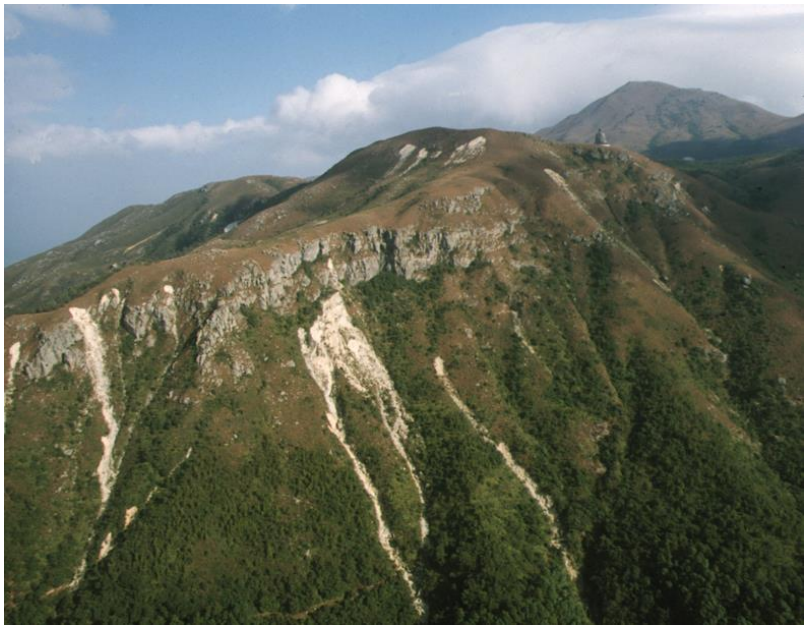
山體崩移 Mass wasting

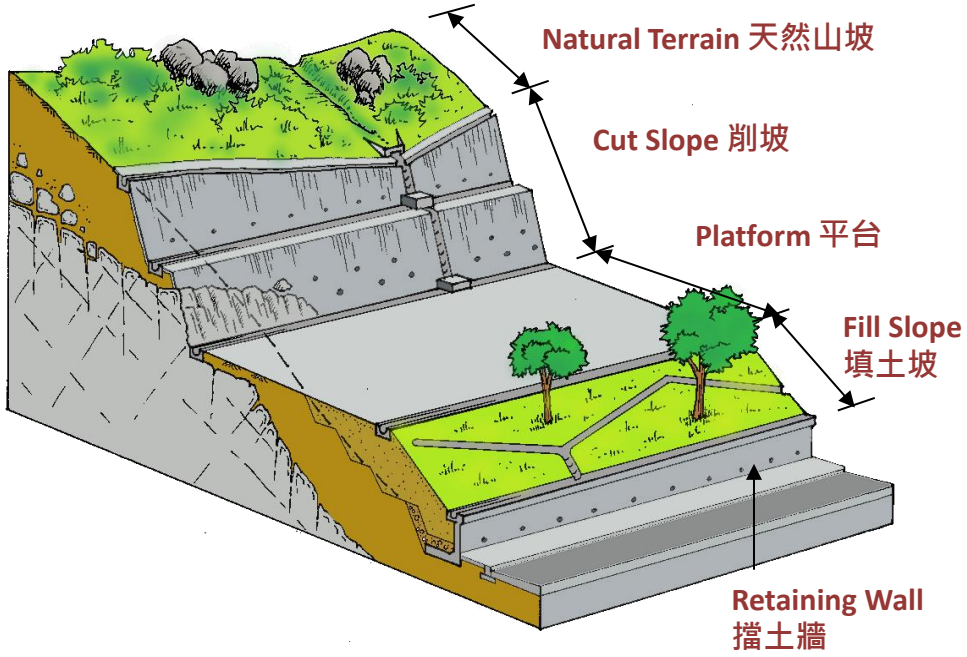
河流 Fluvial

海岸 Coastal

風力 Wind

冰川 Glacial





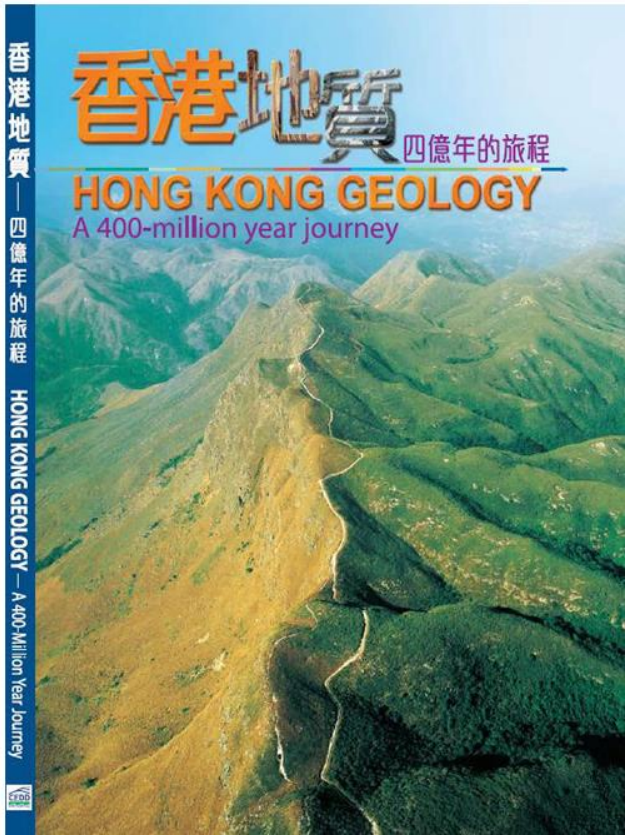
河流 Fluvial

Landform	Local Example
山谷 River valley	林村河谷 Lam Tsuen Valley
瀑布 Waterfall	新娘潭 Bride's Pool
曲流河 Meandering channels	錦田 Kam Tin
泛濫平原 Floodplain	元朗 Yuen Long
河階 Terraces	林村河谷 Lam Tsuen Valley
自然河堤 Natural levee	錦田 Kam Tin

海岸 Coastal

Landform	Local Example
海蝕洞 Sea Cave	吉澳 Kat O
海蝕拱 Sea Arch	鴨洲 Ap Chau
海蝕柱 Sea Stack	平洲 Ping Chau
浪蝕平台 Wave-cut Platform	平洲 Ping Chau
沙灘 Beach	大浪灣 Tai Long Wan
沙壩 Sand Bar	往灣洲 Double Island
三角洲 Delta	珠江三角洲 Pearl River Delta
連島沙洲 Tombolo	長洲 Cheng Chau
潮區 Estuary	后海灣 Deep Bay

參考資料 References

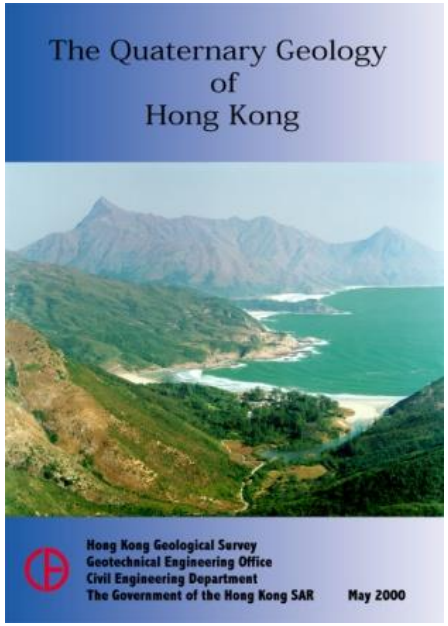


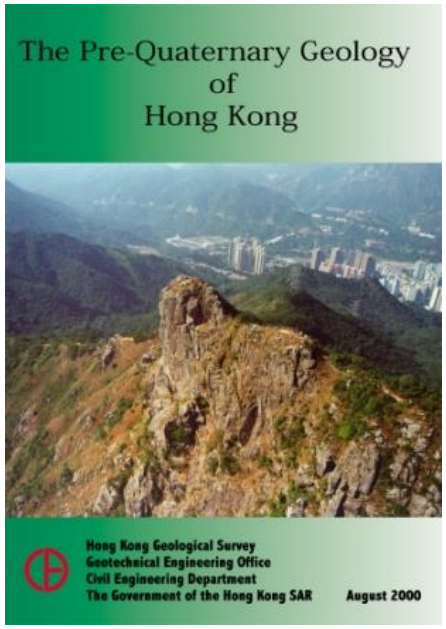
Download Mobile App of "HK Geology"

The HKGeology gives a simplified account of the geology of Hong Kong and is a useful reference tool in field, which will help teachers, students, members of the public and geotechnical practitioners.

Download on the App Store

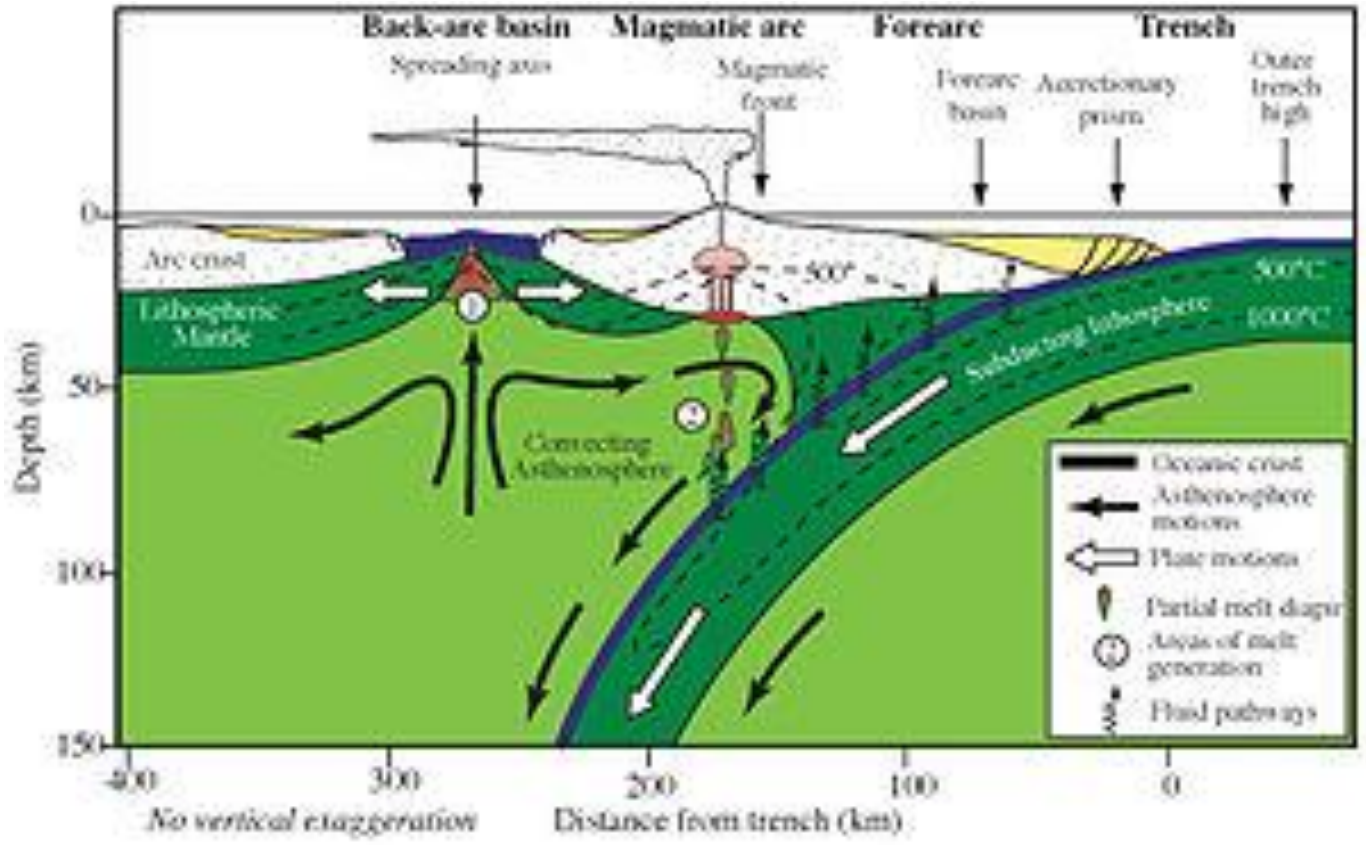
ANDROID APP ON Google play





THANK YOU!

Q&A?


Back-arc basin
Magmatic arc
Forearc
Trench
Spreading axis
Magmatic front
Forearc basin
Accretionary prism
Outer trench high
0
Arc crust
Lithospheric Mantle
~500°
500°C
1000°C
Subducting lithosphere
50
Convecting Asthenosphere
100
150
Depth (km)
Oceanic crust
Asthenosphere motions
Plate motions
Partial melt diapir
Areas of melt generation
Fluid pathways
400
300
200
100
0
No vertical exaggeration
Distance from trench (km)

Relative age

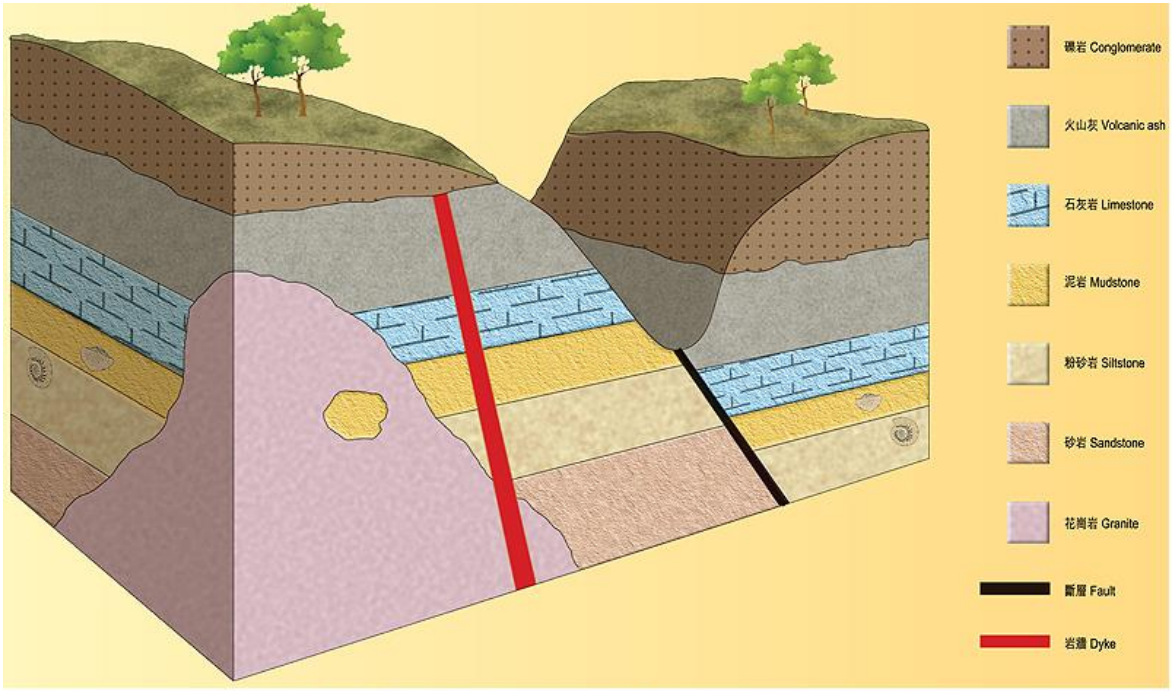


Figure 2: Relative age relationship of sedimentary and igneous rocks.

1.	砂岩沉積	Deposition of the sandstone
2.	粉砂岩沉積	Deposition of the siltstone
3.	泥岩沉積	Deposition of the mudstone
4.	石灰岩沉積	Deposition of the limestone
5.	火山灰沉積	Deposition of the volcanic ash
6.	花崗岩侵入	Intrusion of the granite
7.	岩牆侵入	Intrusion of the dyke
8.	侵蝕作用	Erosion
9.	礫岩沉積	Deposition of the conglomerate
10.	正斷層錯動	Normal faulting
11.	風化及侵蝕形成現今地貌	Weathering and erosion to form the present day topography

Table 1: The sequence of geological events shown in Figure 2.