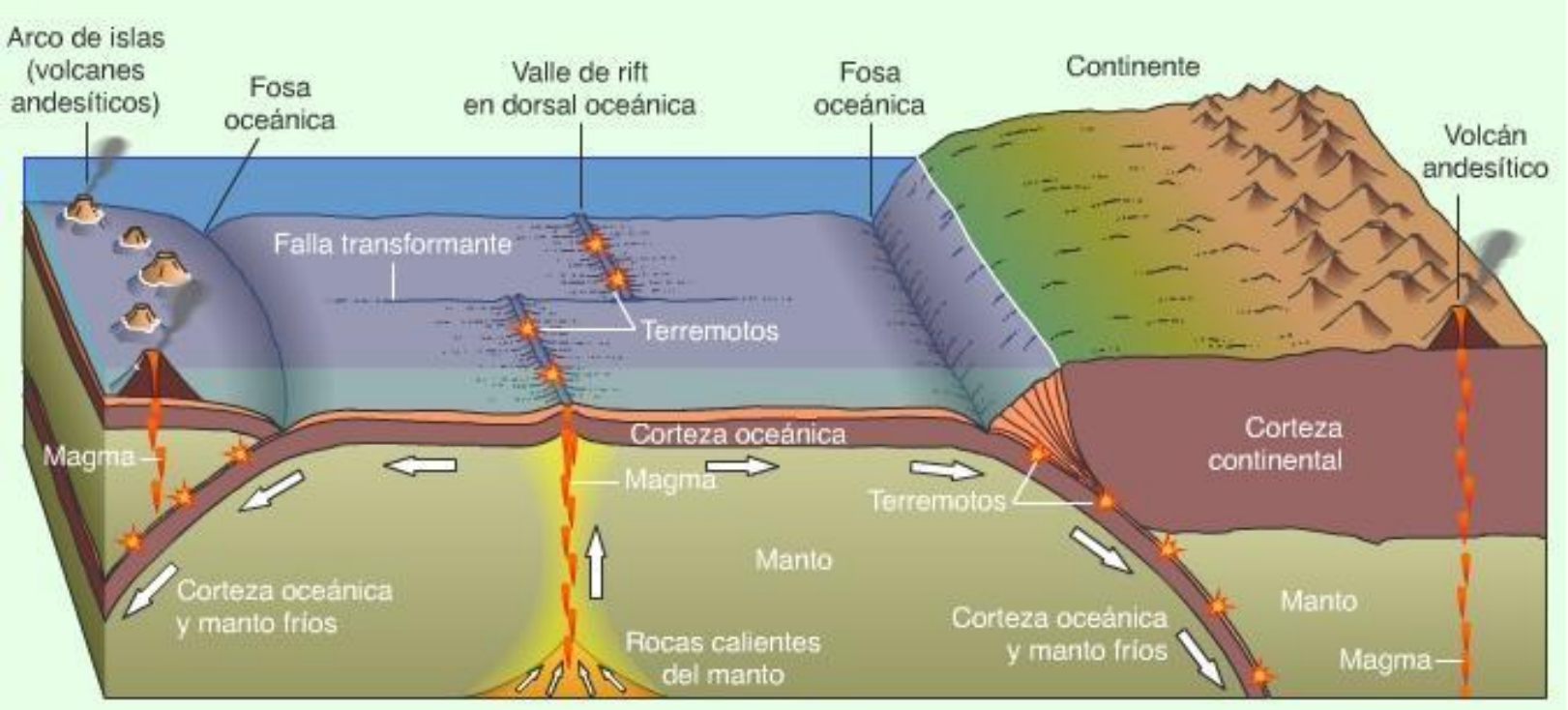
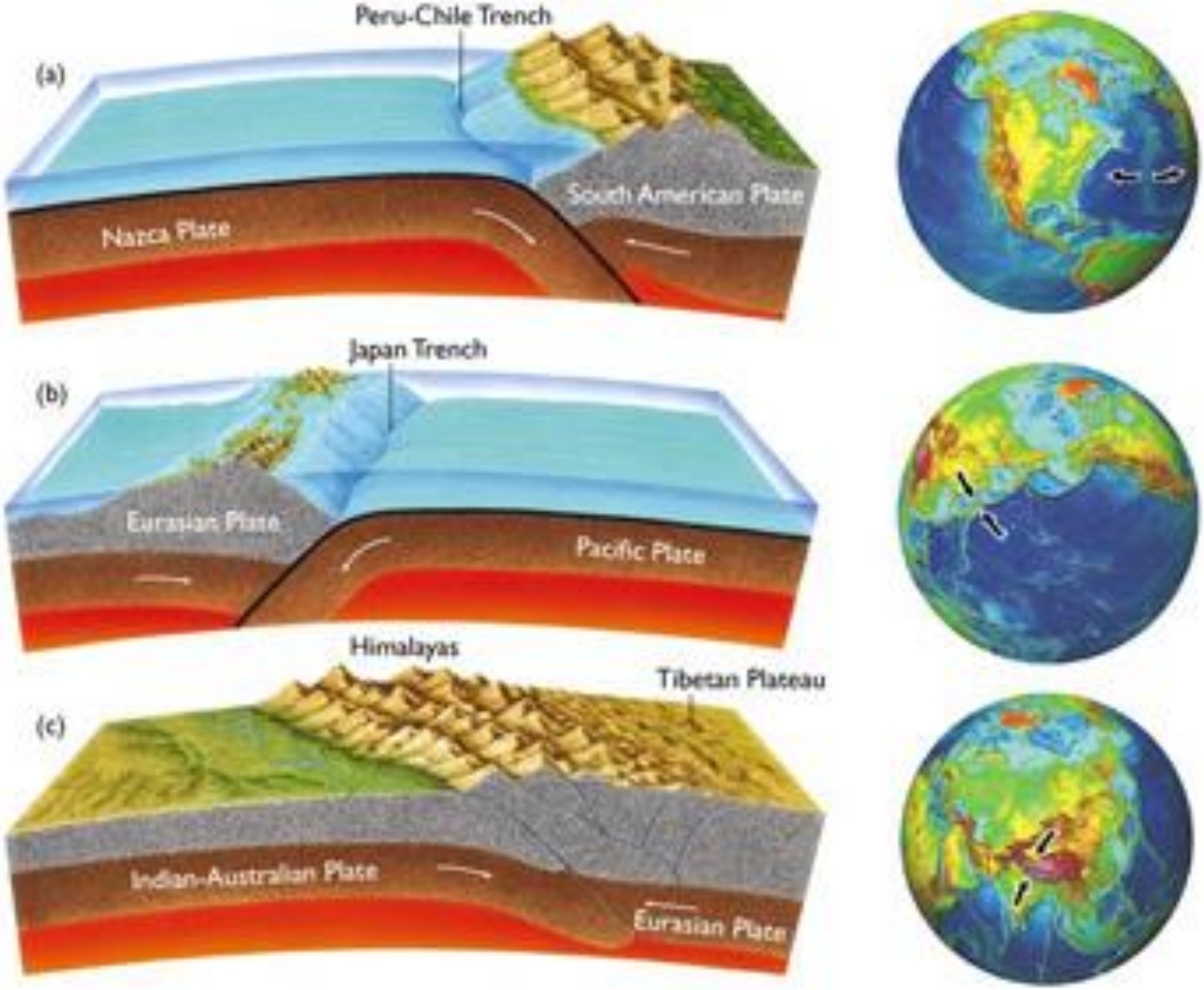
Tema 4.

A TECTÓNICA DE PLACAS II

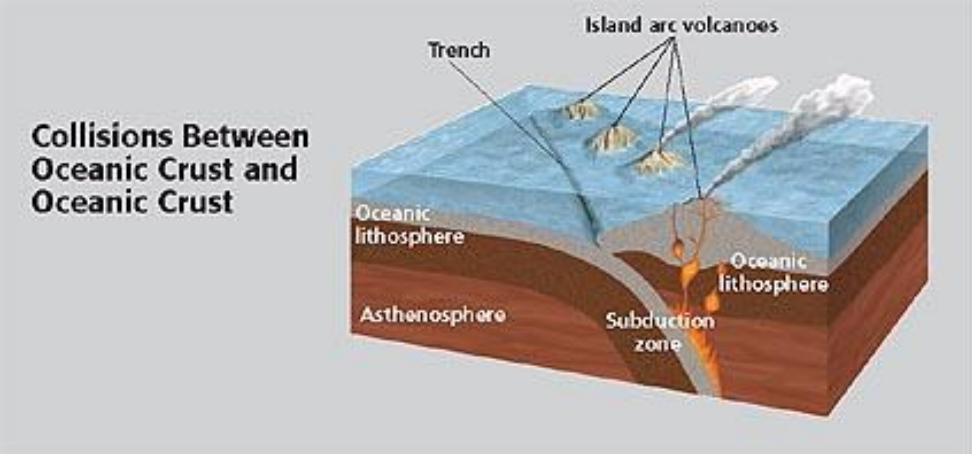
ORÓXENOS

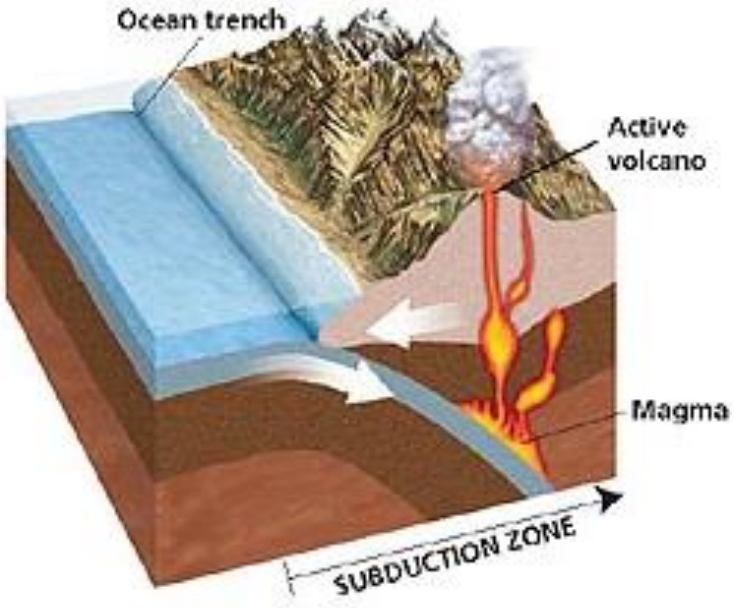
ASOCIADOS A BORDES DE PLACA CONVERXENTES

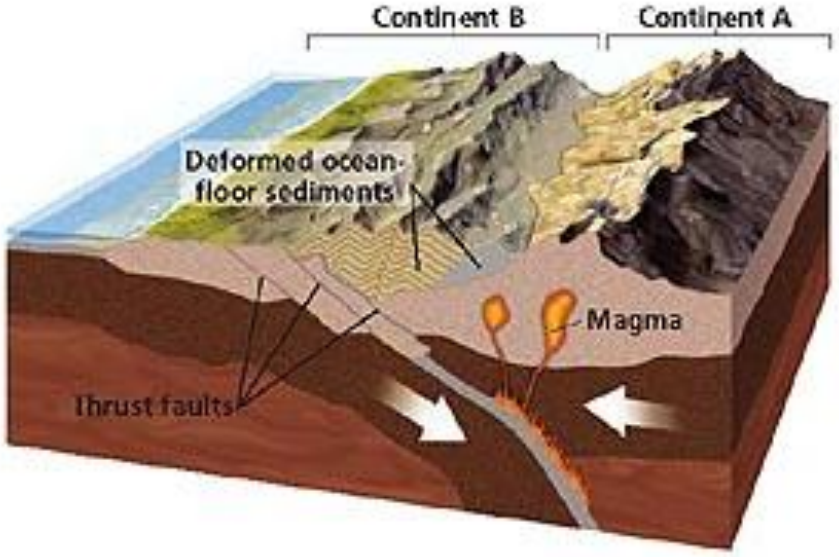



Peru-Chile Trench
(a)
Nazca Plate
South American Plate
Japan Trench
(b)
Eurasian Plate
Pacific Plate
Himalayas
Tibetan Plateau
(c)
Indian-Australian Plate
Eurasian Plate

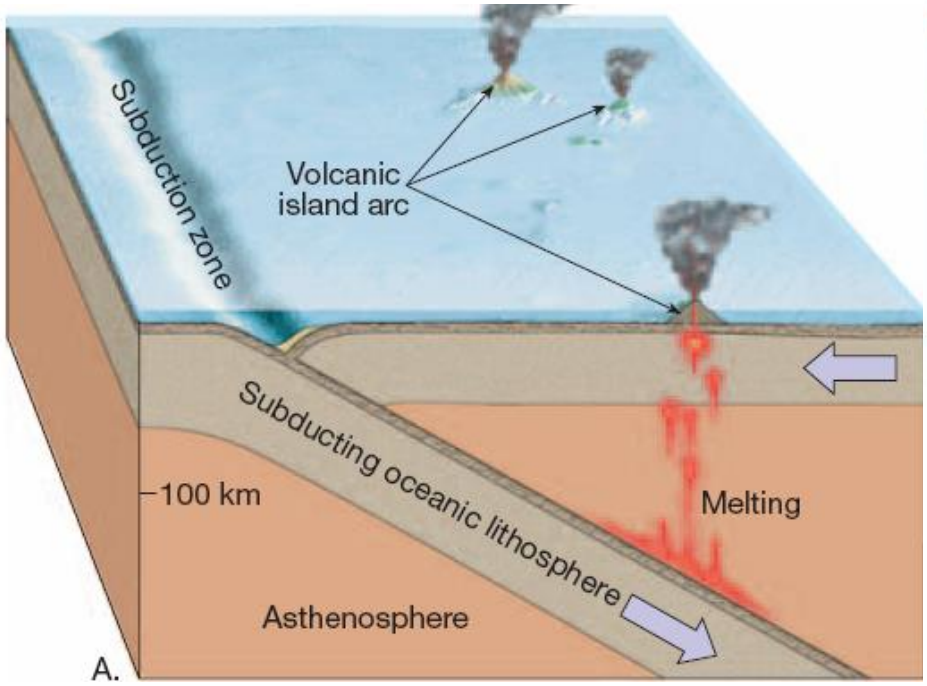
ORÓXENOS ≠ CORDILLEIRA

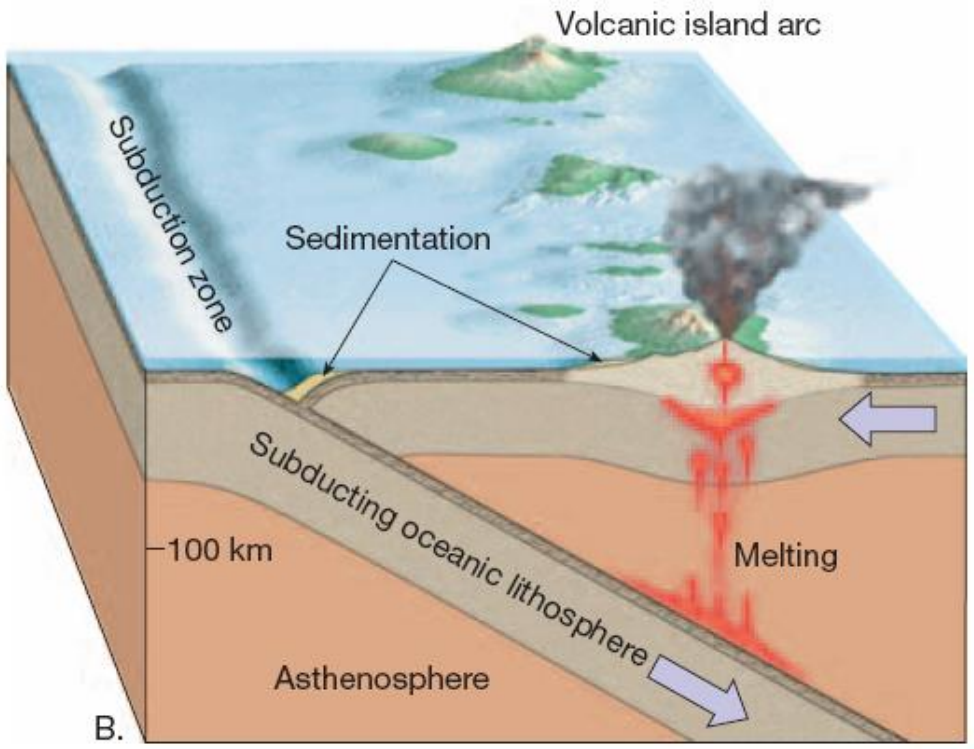


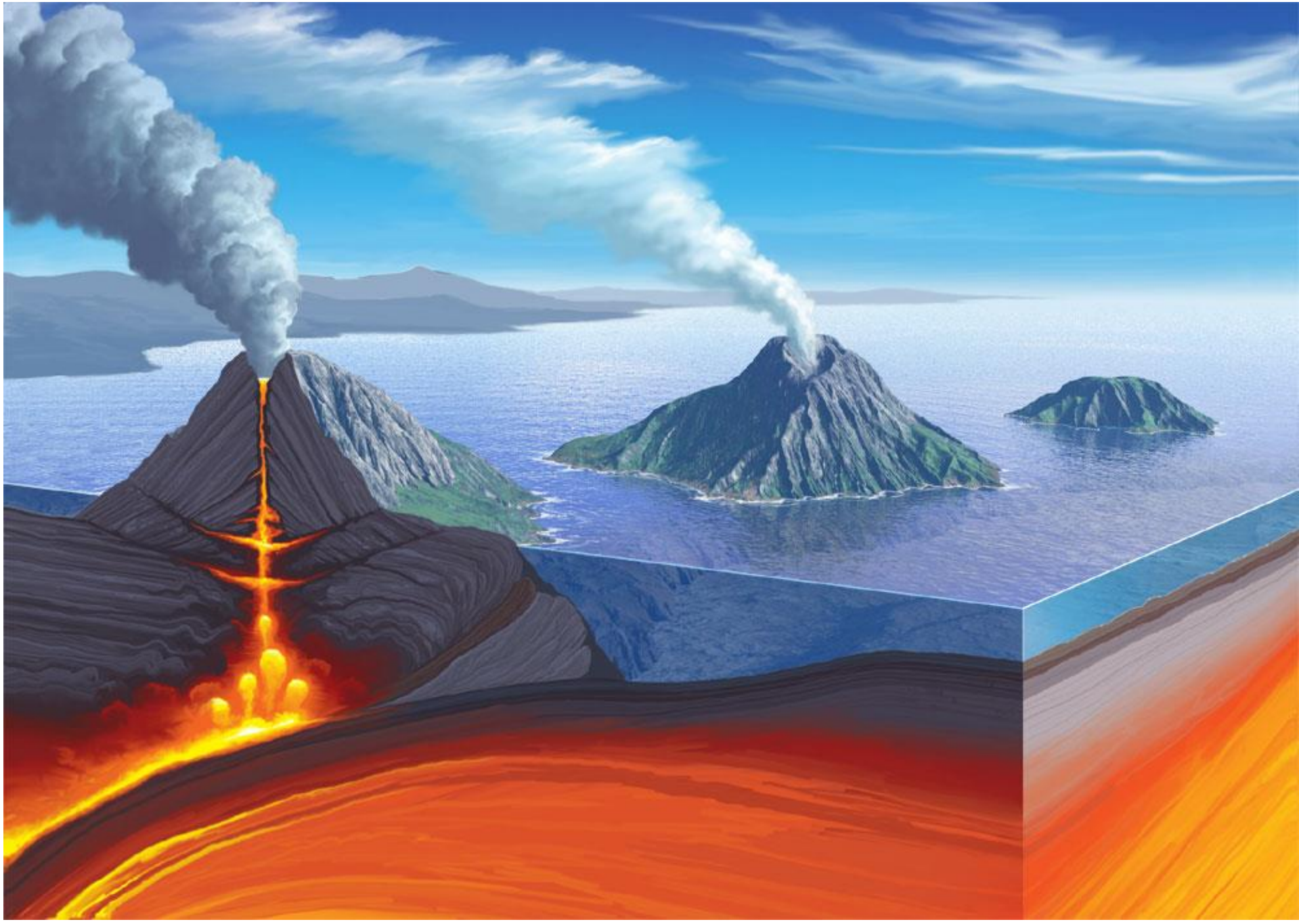




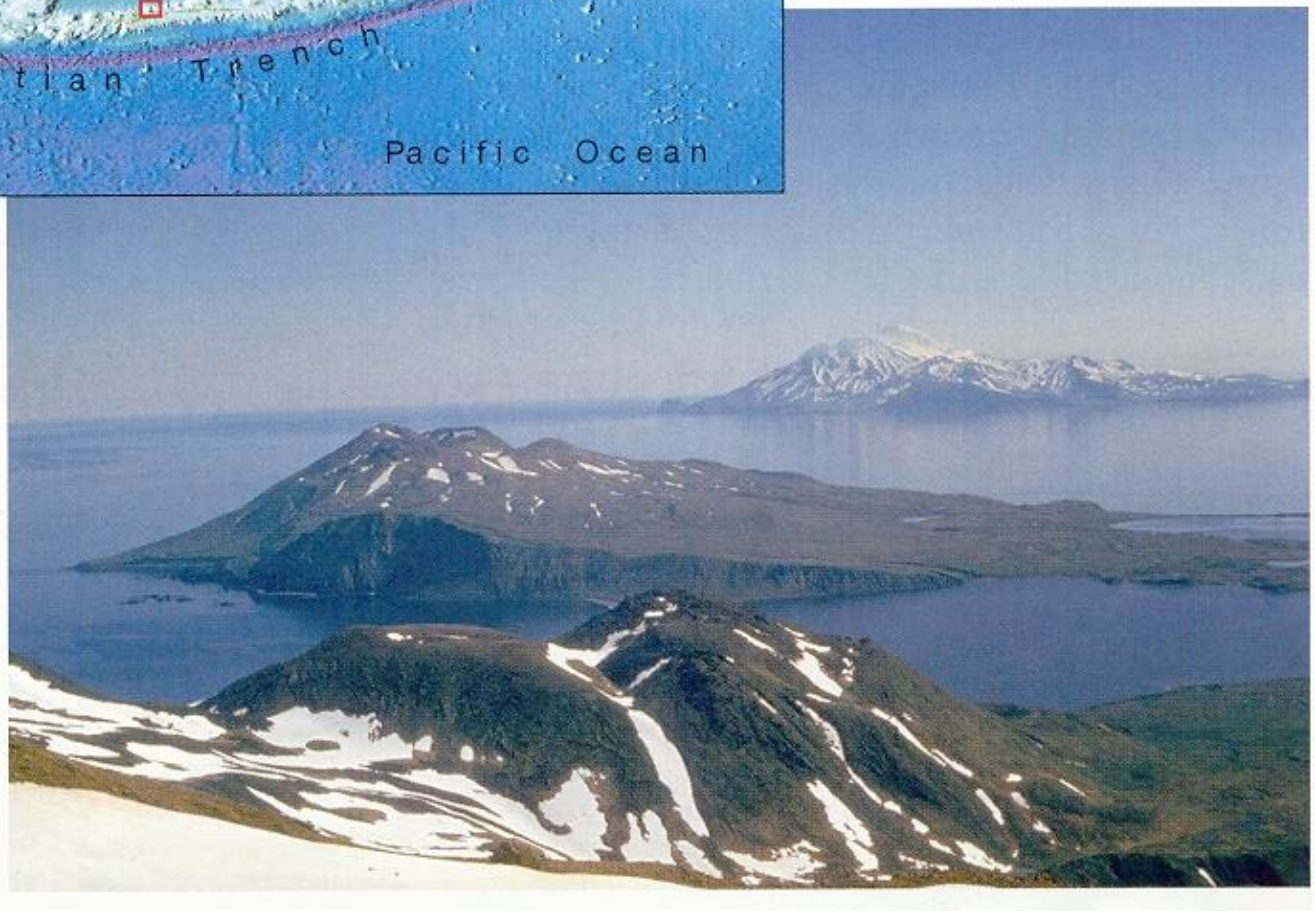
ARCOS-ILLA

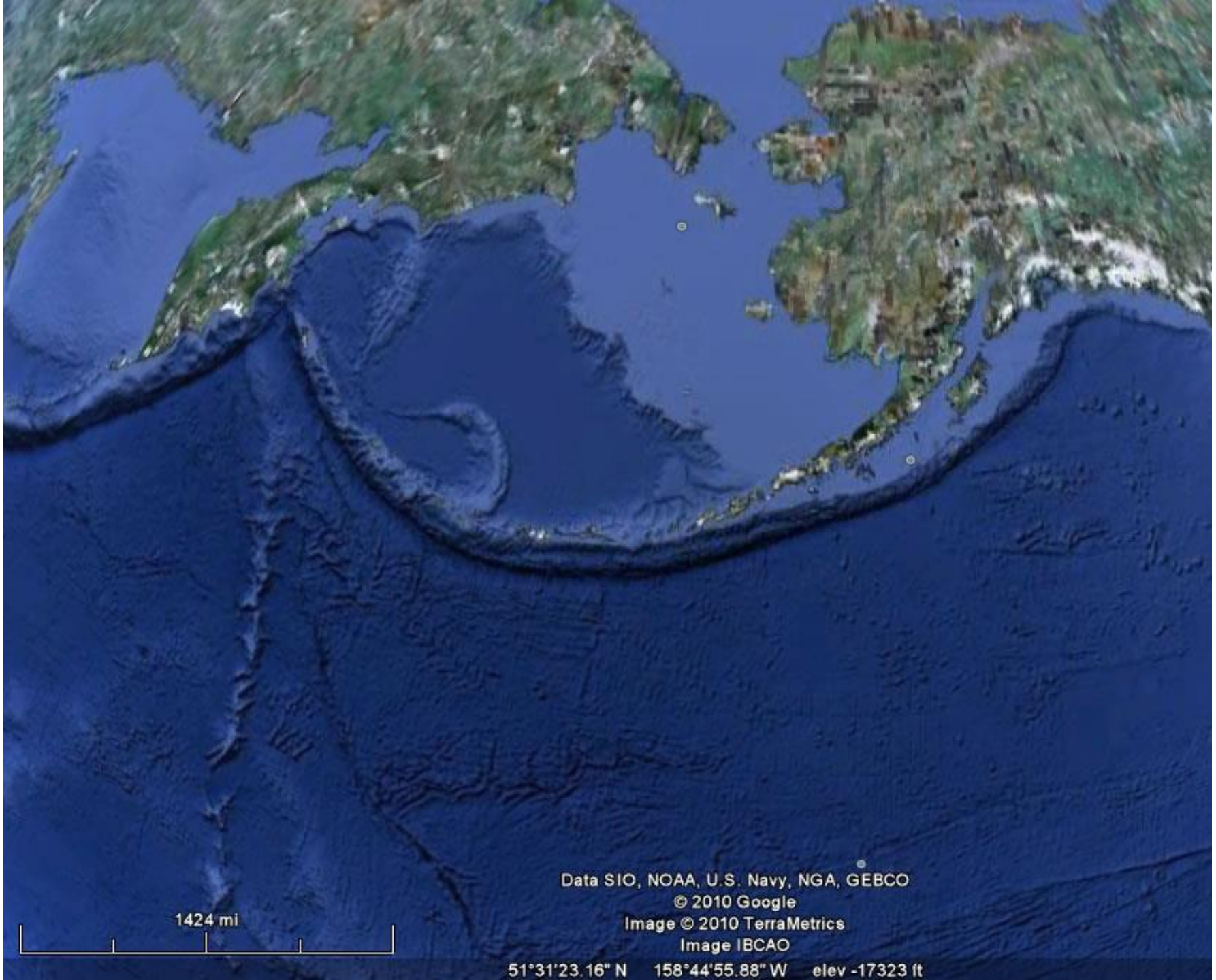

Subduction zone
Volcanic
island arc
Subducting oceanic lithosphere
100 km
Melting
Asthenosphere
A.


Volcanic island arc
Subduction zone
Sedimentation
Subducting oceanic lithosphere
100 km
Melting
Asthenosphere
B.

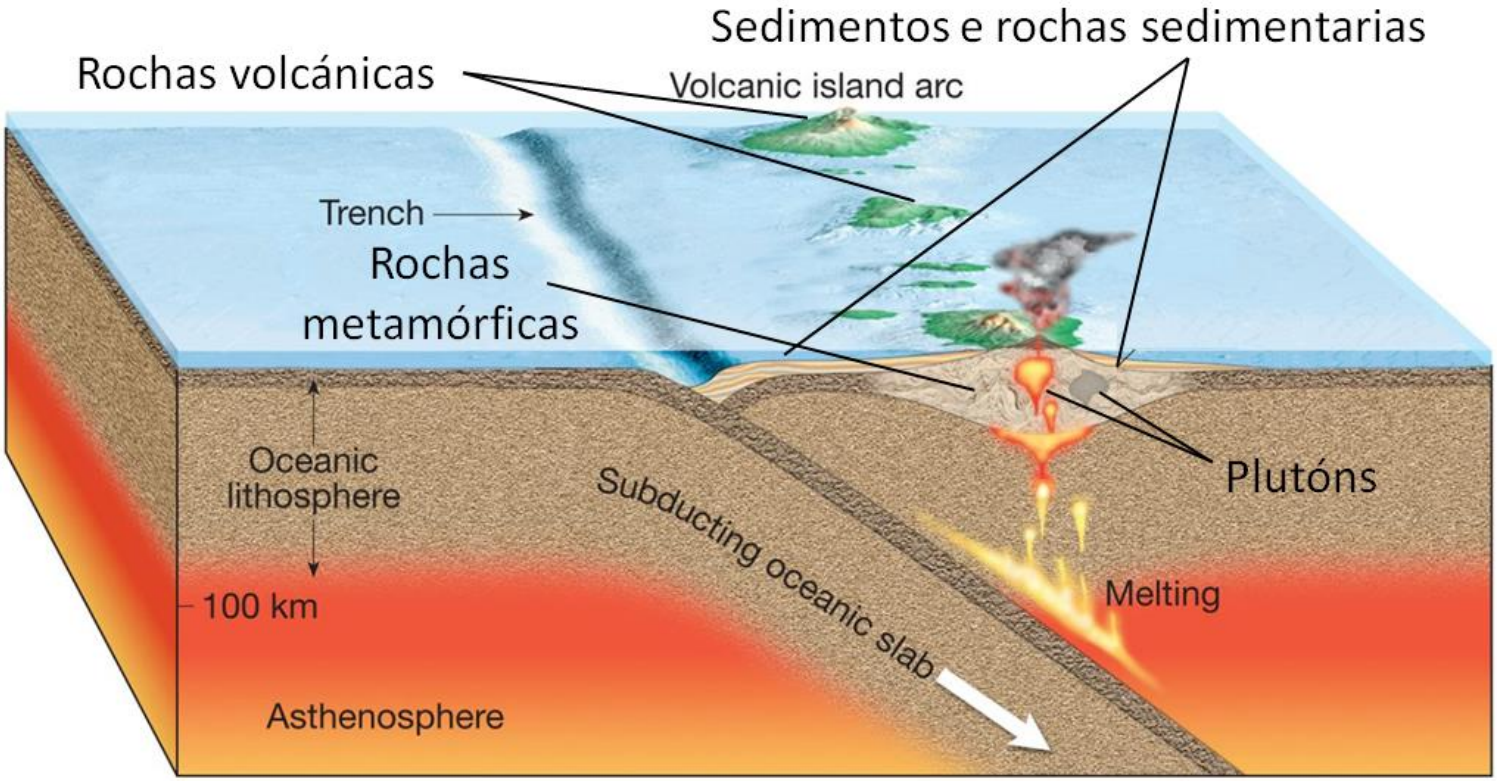


Aleutian Island Arc, Alaska

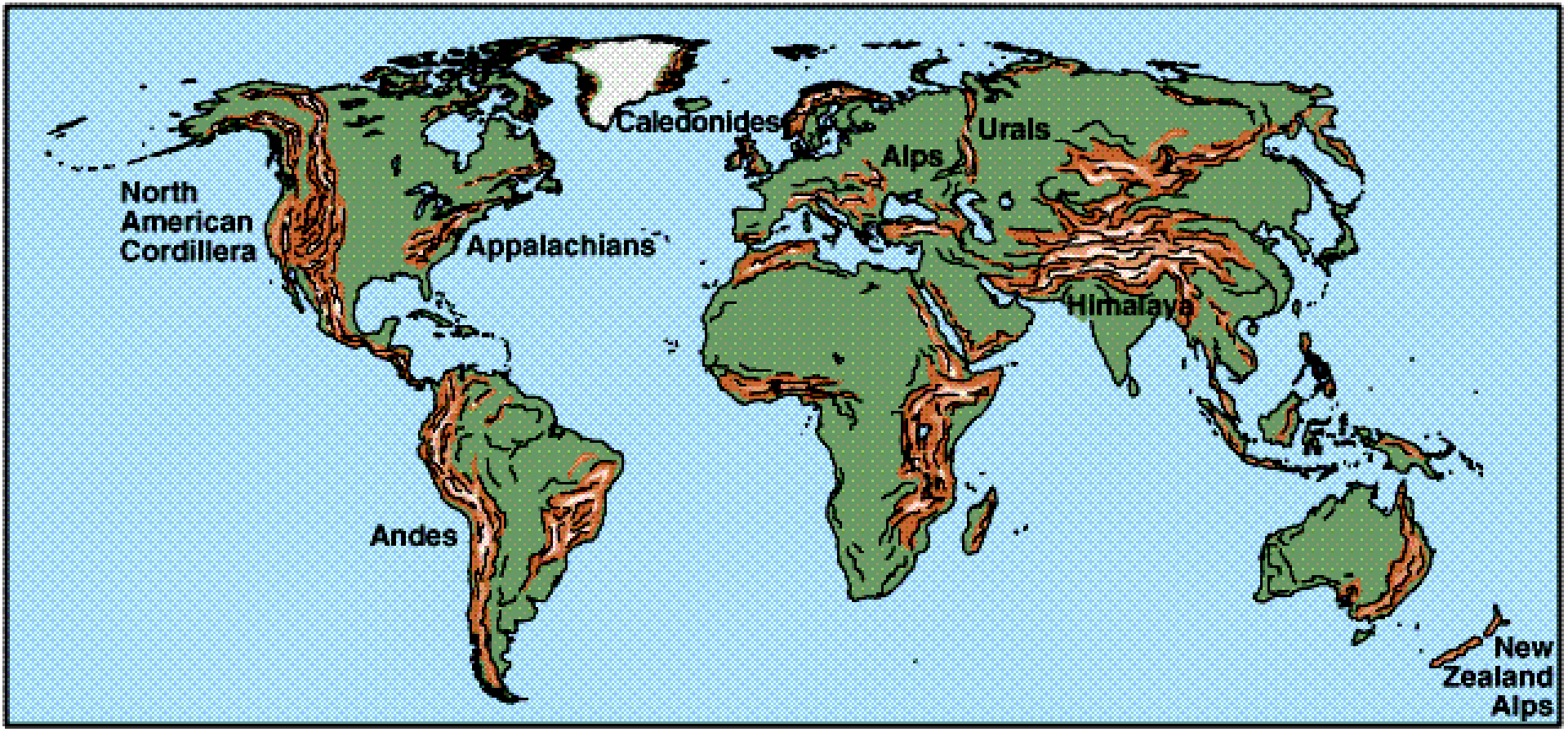



1424 mi
Data SIO, NOAA, U.S. Navy, NGA, GEBCO
© 2010 Google
Image © 2010 TerraMetrics
Image IBCAO
51°31'23.16" N 158°44'55.88" W elev -17323 ft

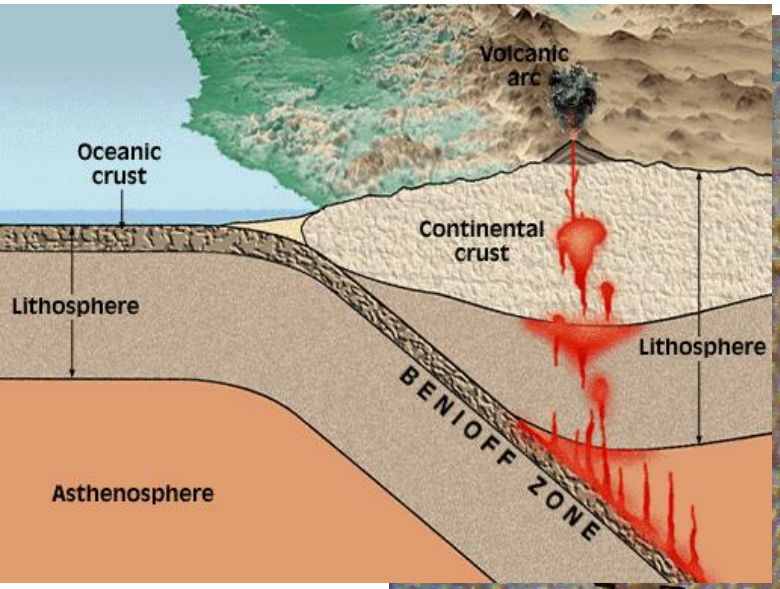
DISTRIBUCIÓN DAS ROCHAS

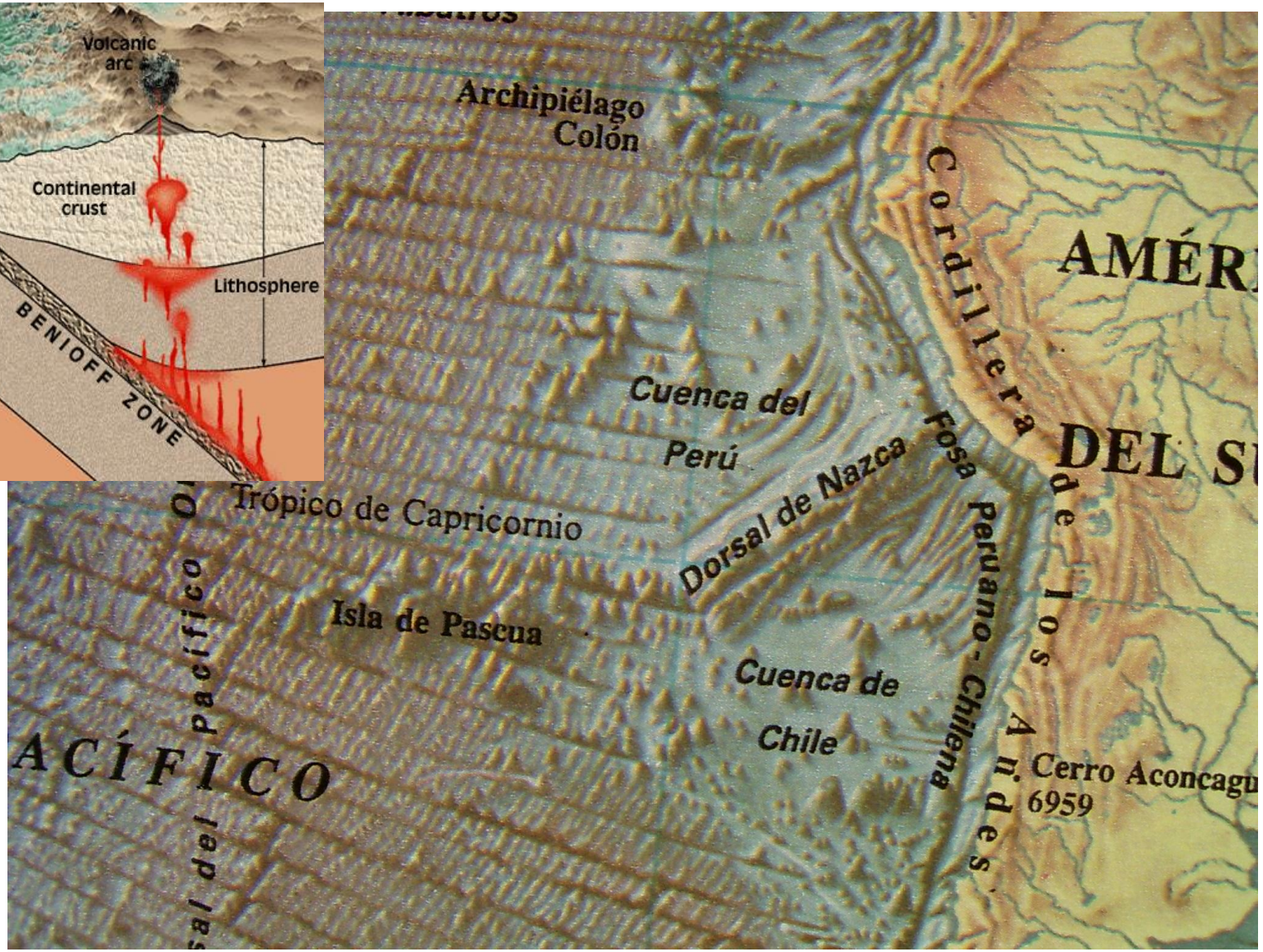


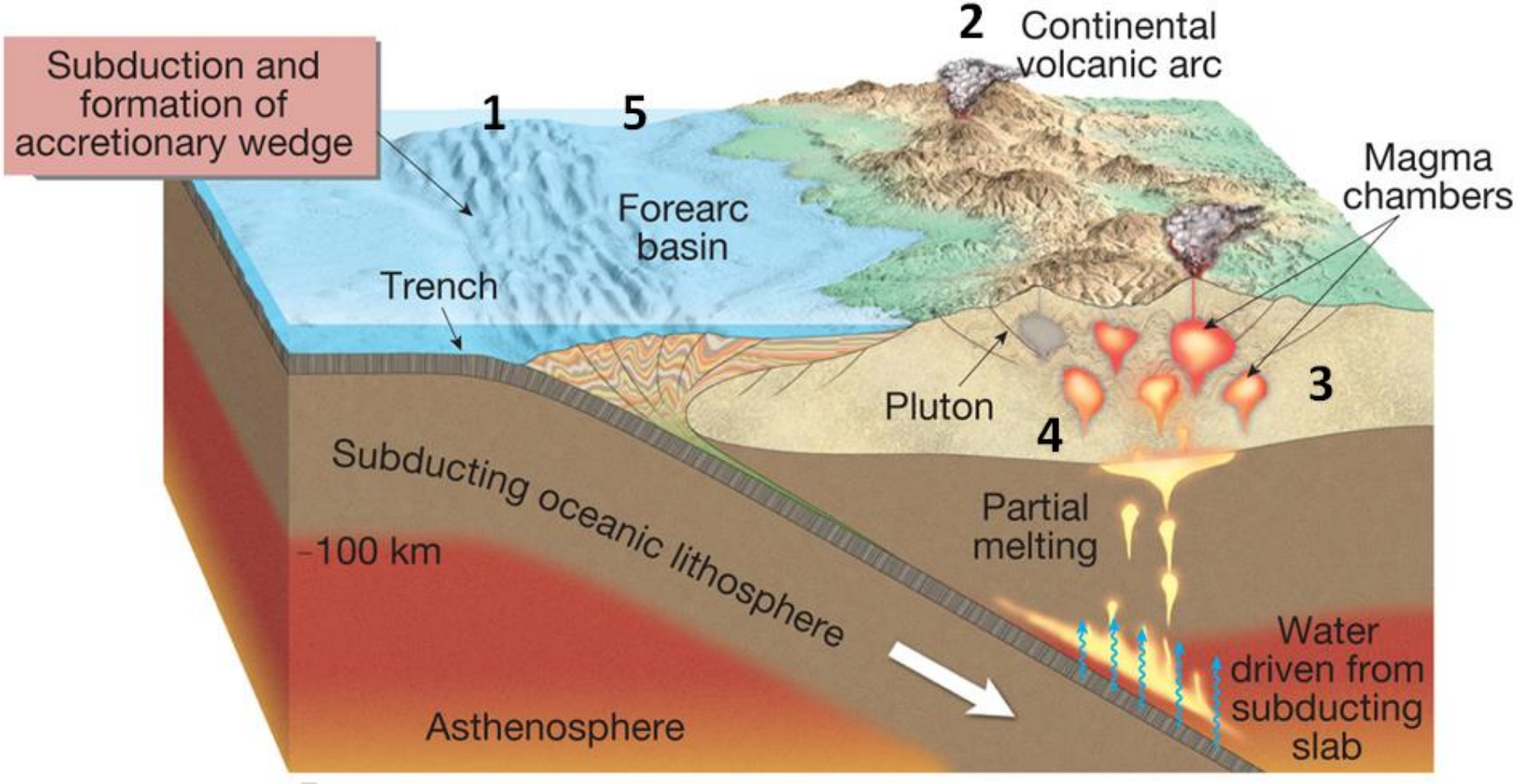
World's Major Mountain Belts



ORÓXENOS PERICONTINENTAIS
TIPO ANDINO

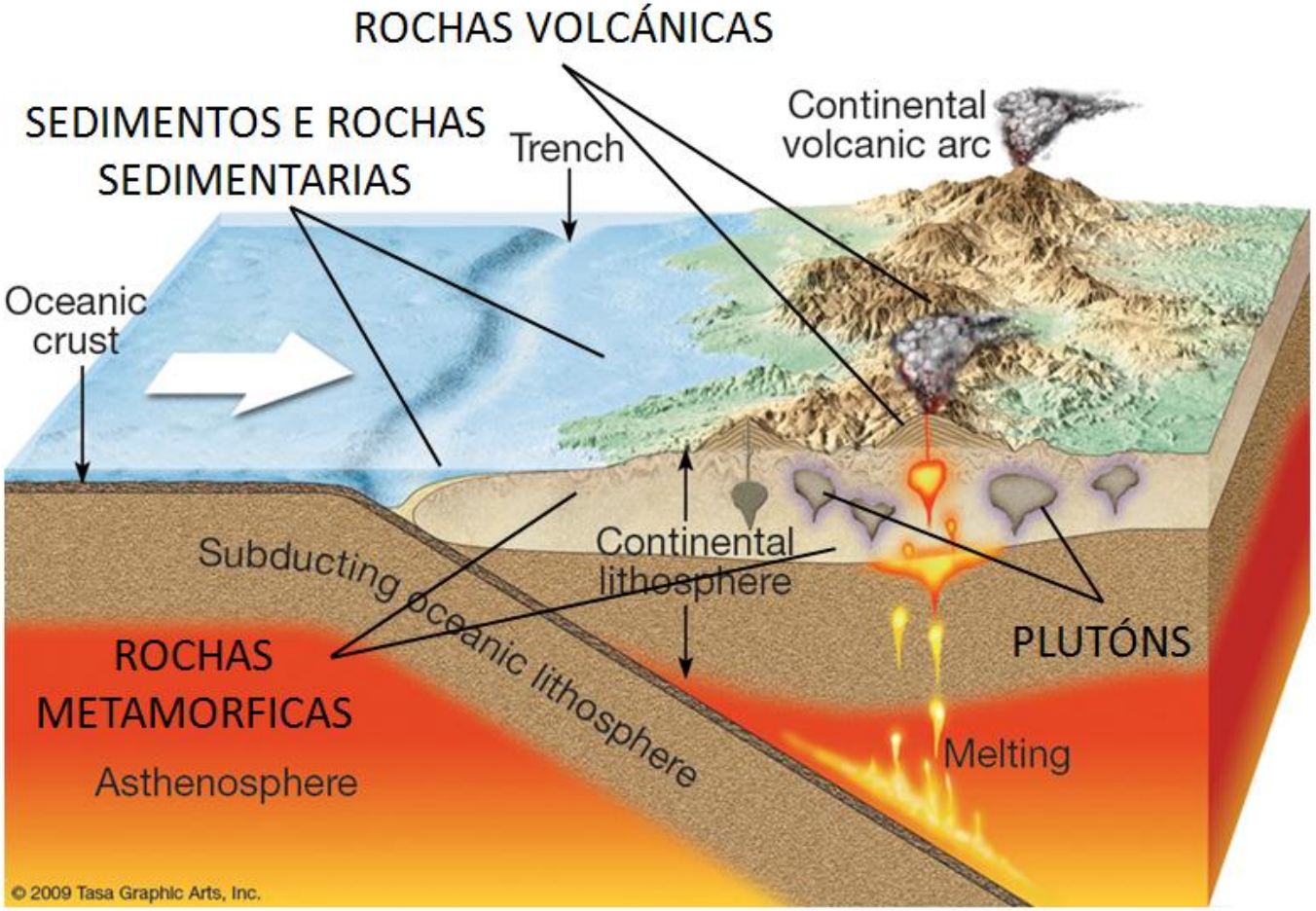





Subduction and formation of accretionary wedge
1
2
Continental volcanic arc
5
Forearc basin
Trench
Magma chambers
Pluton
3
4
Subducting oceanic lithosphere
100 km
Partial melting
Water driven from subducting slab
Asthenosphere

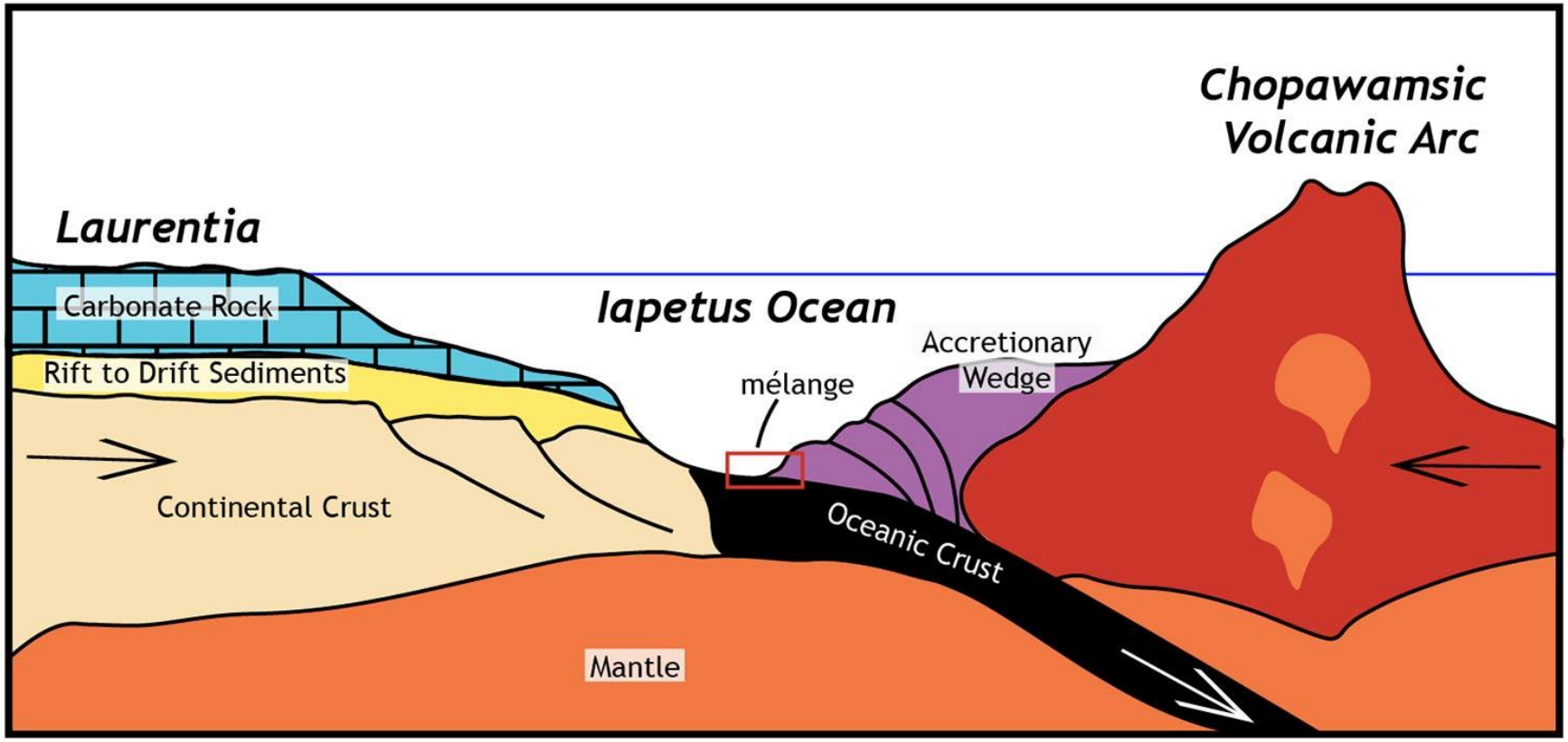

South America
Amazon Rive
AMAZON RAINFOREST
ANDES MOUNTAINS
THE PAMPAS
PACIFIC OCEAN
ATLANTIC OCEAN
Deserts
Grasslands
Tropical forests
Mountain ranges
N
W
E
S
0
500
1000 mi
©MAPS.COM

DISTRIBUCIÓN DAS ROCHAS



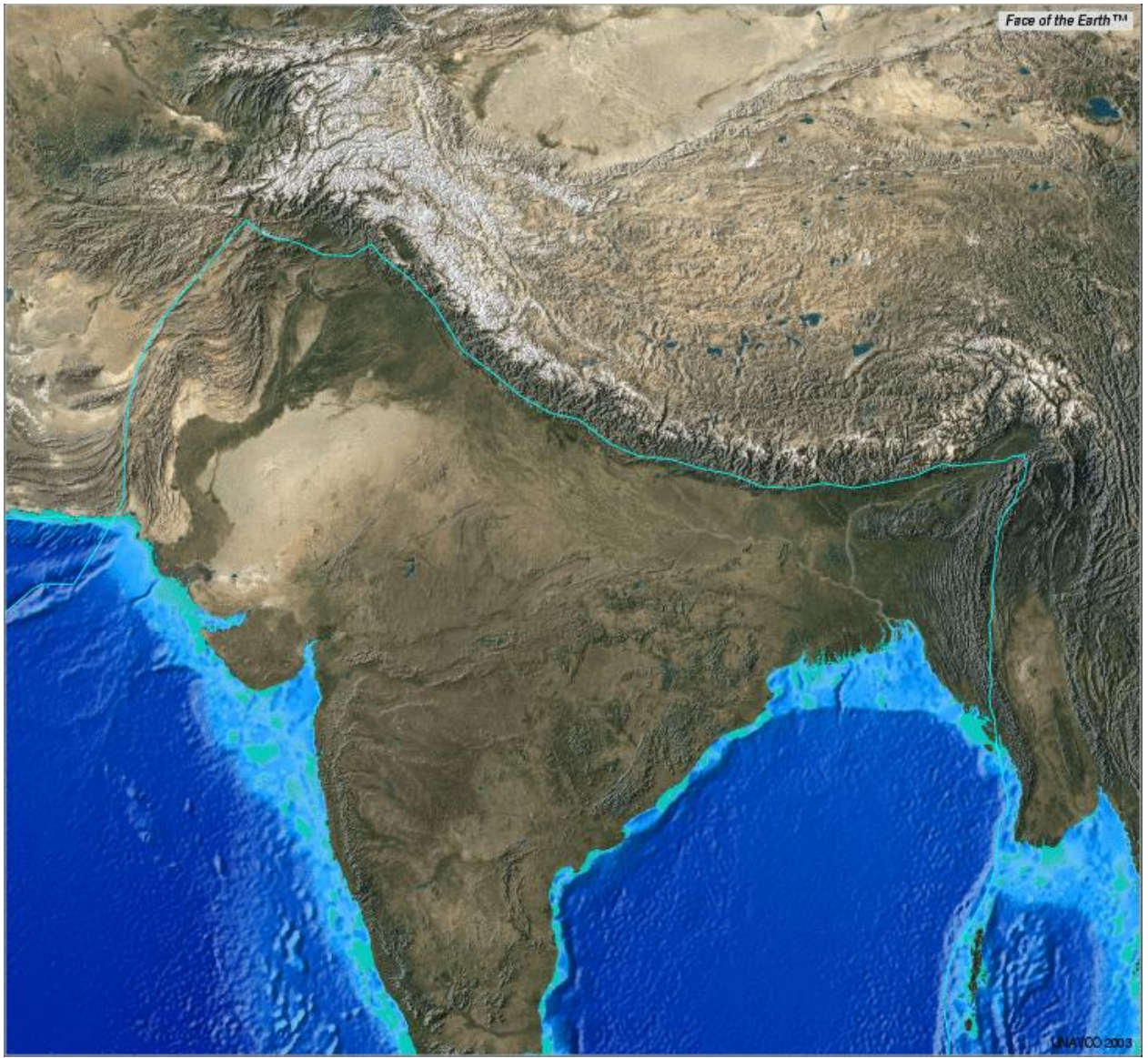
Melange

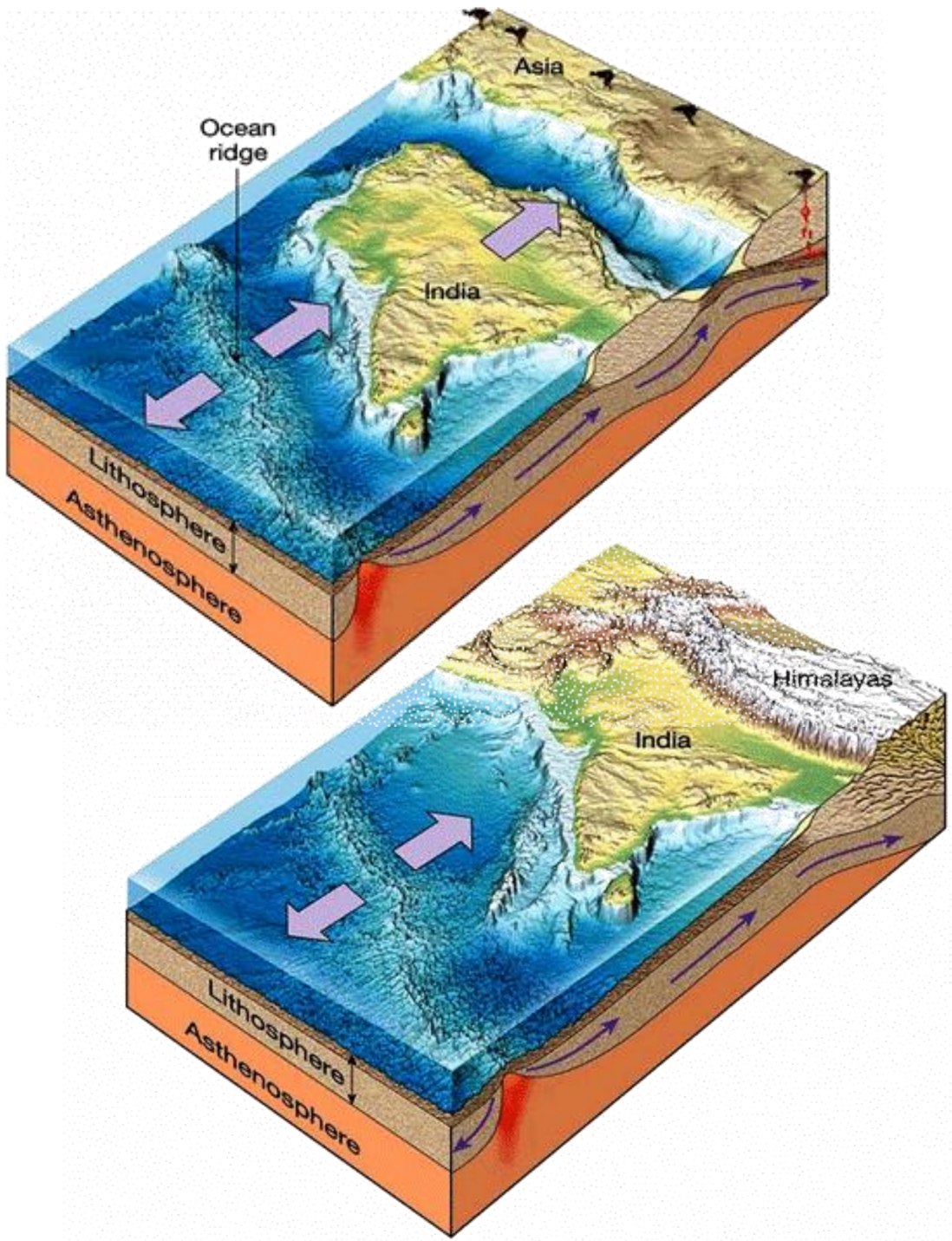
mesturado en francés

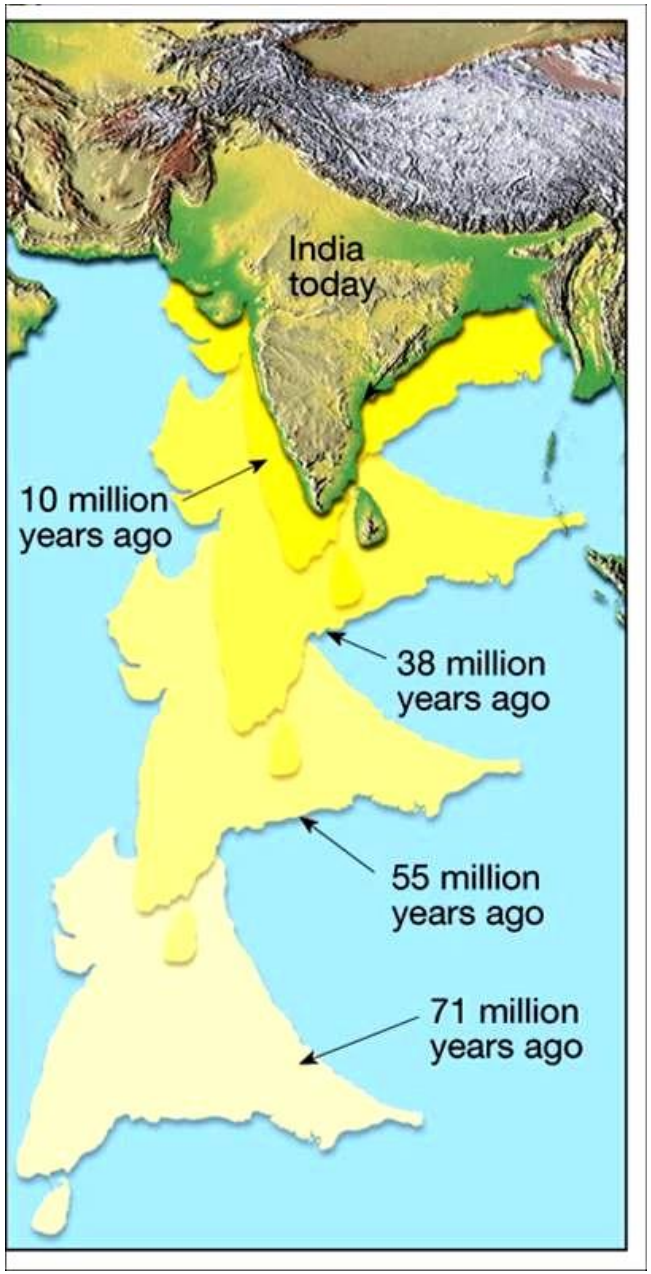


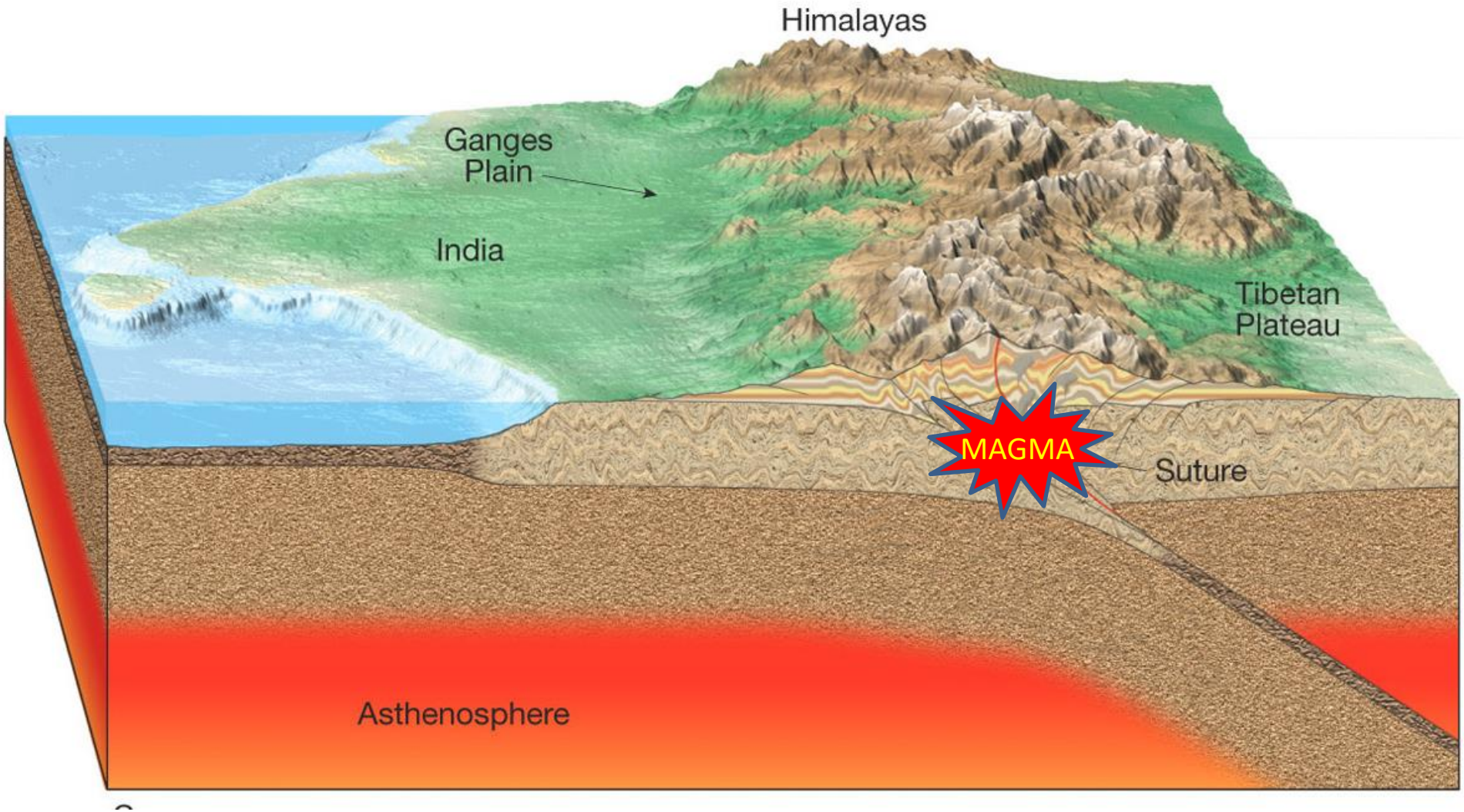

Serpentinita
Mármore

ORÓXENOS INTRACONTINENTAIS TIPO ALPINO

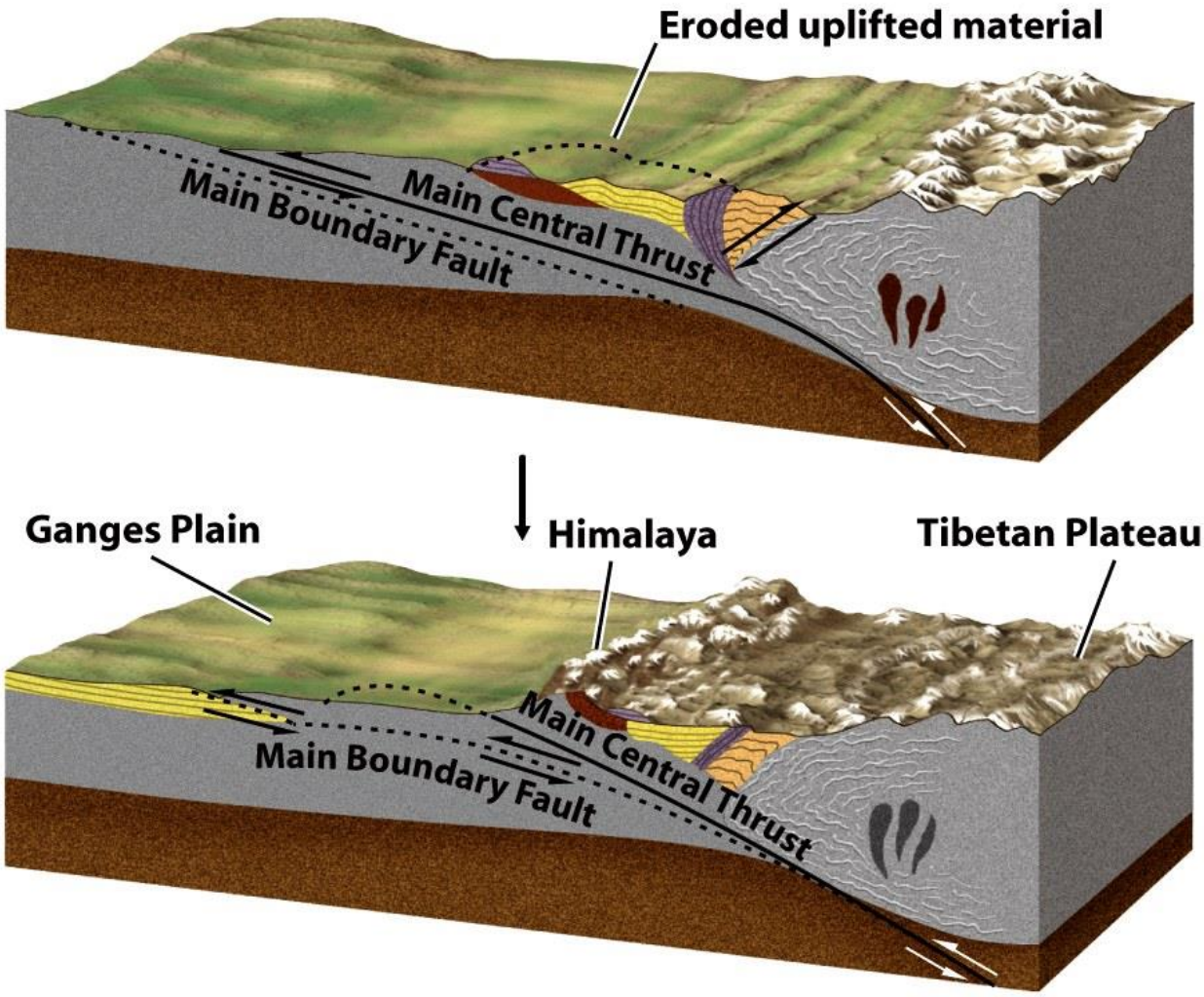



Asia
Ocean ridge
India
Lithosphere
Asthenosphere
Himalayas
India
Lithosphere
Asthenosphere


India today
10 million years ago
38 million years ago
55 million years ago
71 million years ago


Himalayas
Ganges
Plain
India
Tibetan
Plateau
MAGMA
Suture
Asthenosphere

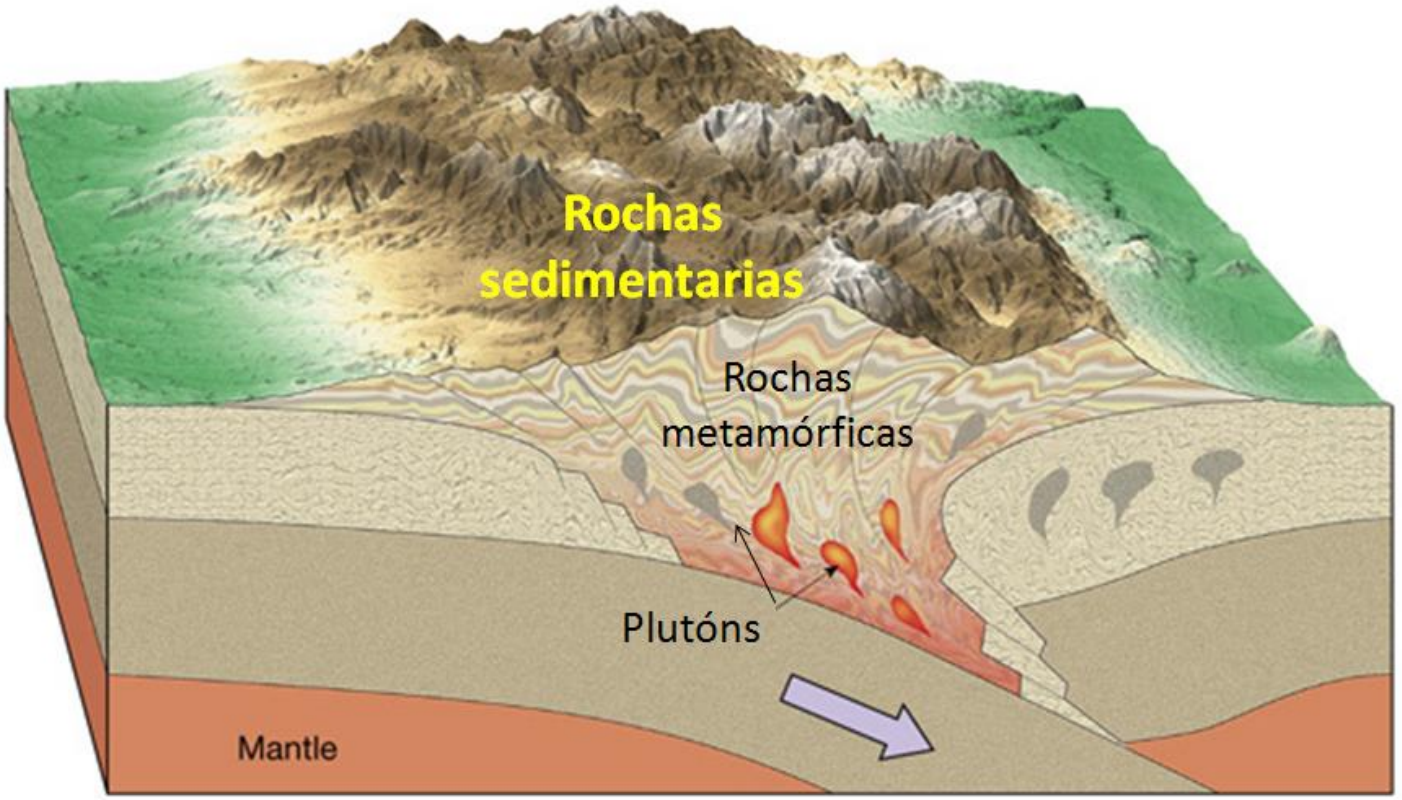
Cabalgamento basal



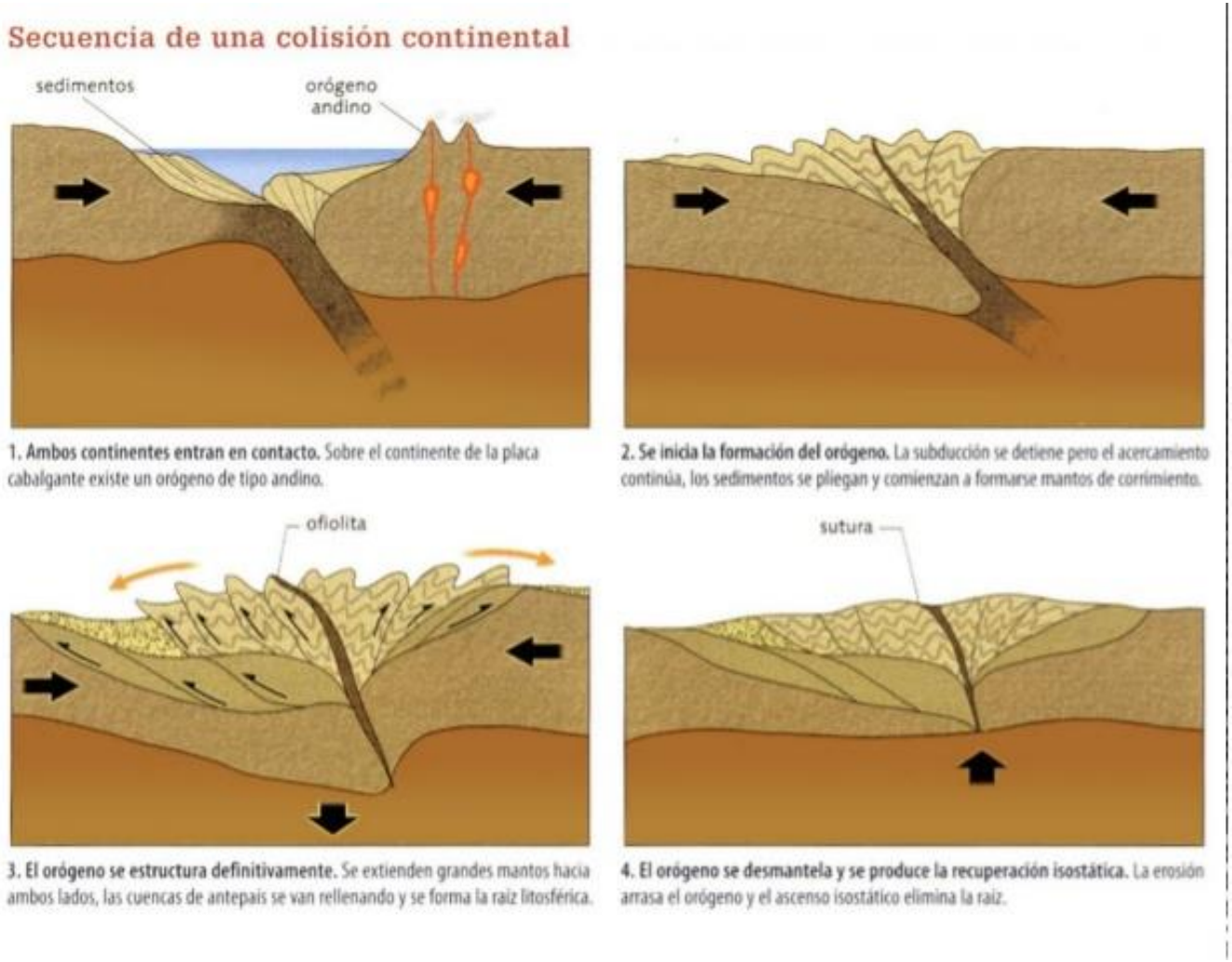
10–20 Ma
A second thrust fault—the Main Boundary Fault—developed, stacking a second slice of crust on India and lifting the first slice. Thus, two overthrust sheets make up the bulk of the Himalaya.

Figure 10.15 part 4
***Understanding Earth*, Sixth Edition**

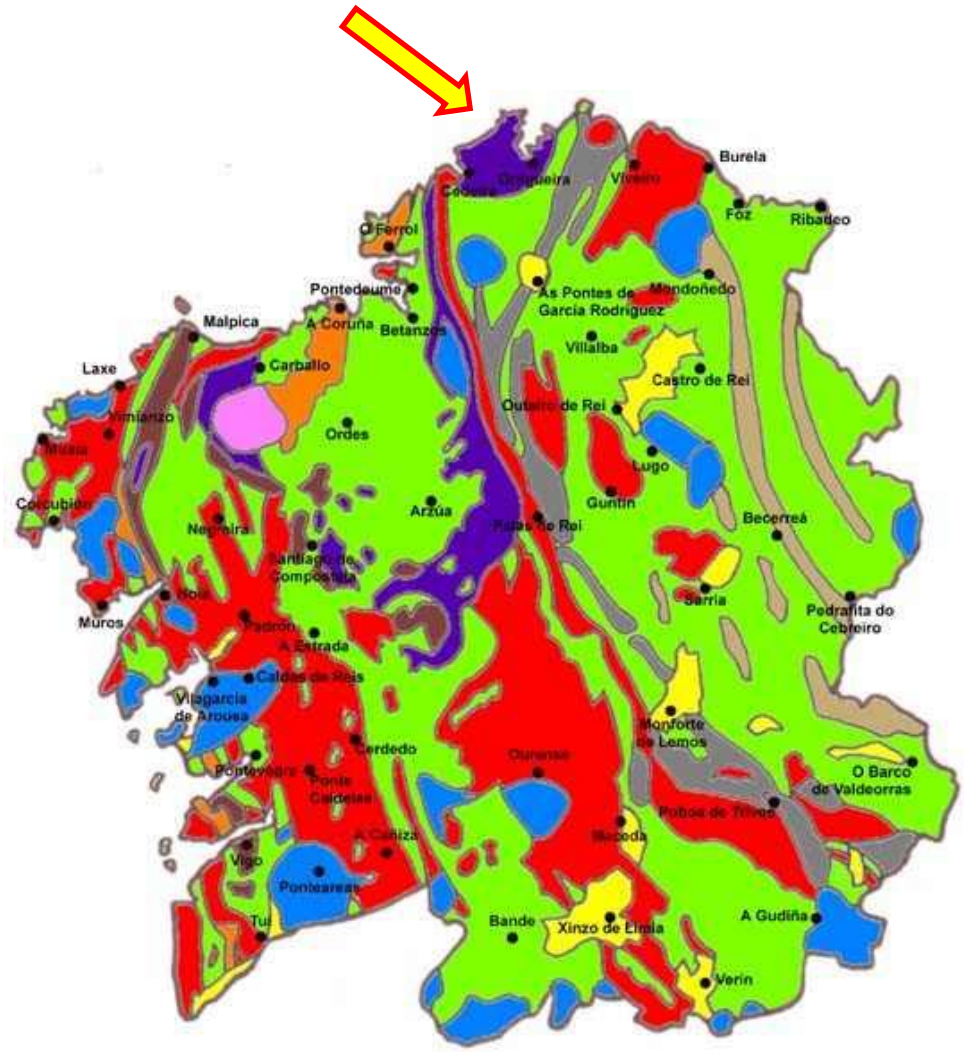
DISTRIBUCIÓN DAS ROCHAS



OBDUCCIÓN E OFIOLITAS



SERRA DA CAPELADA

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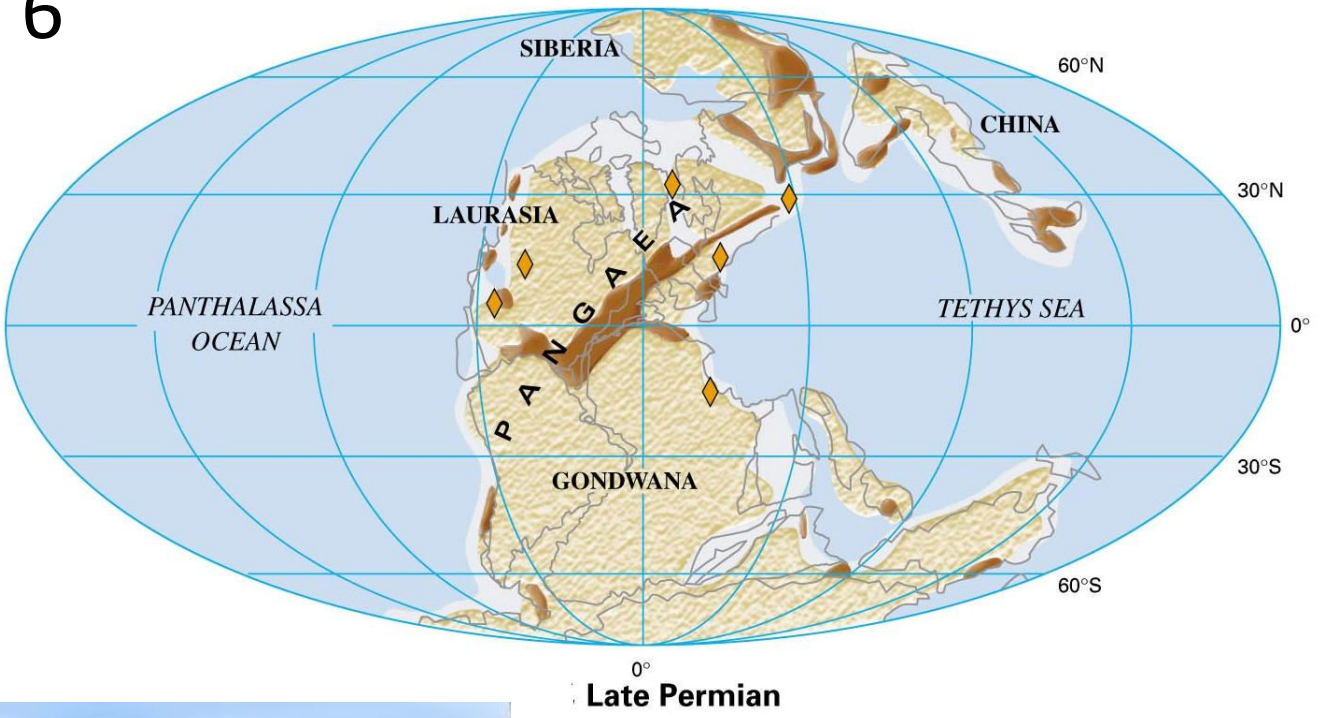
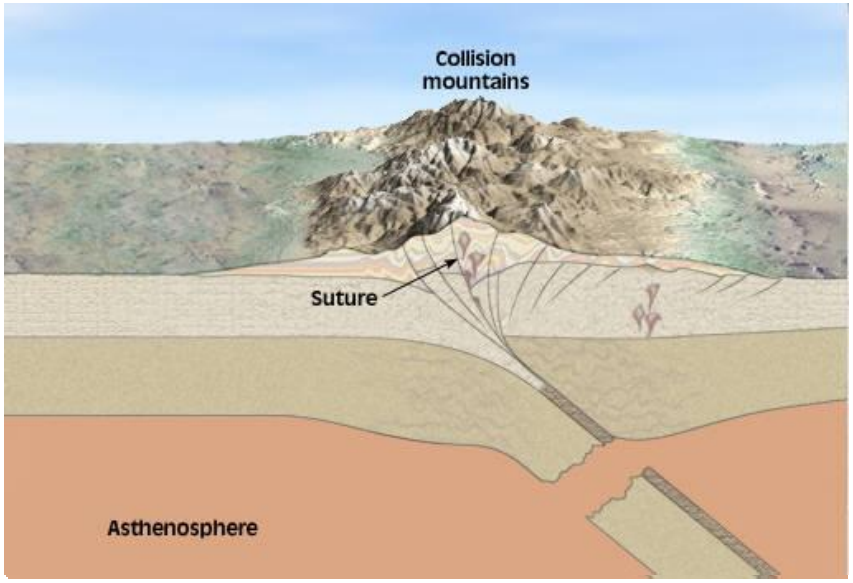
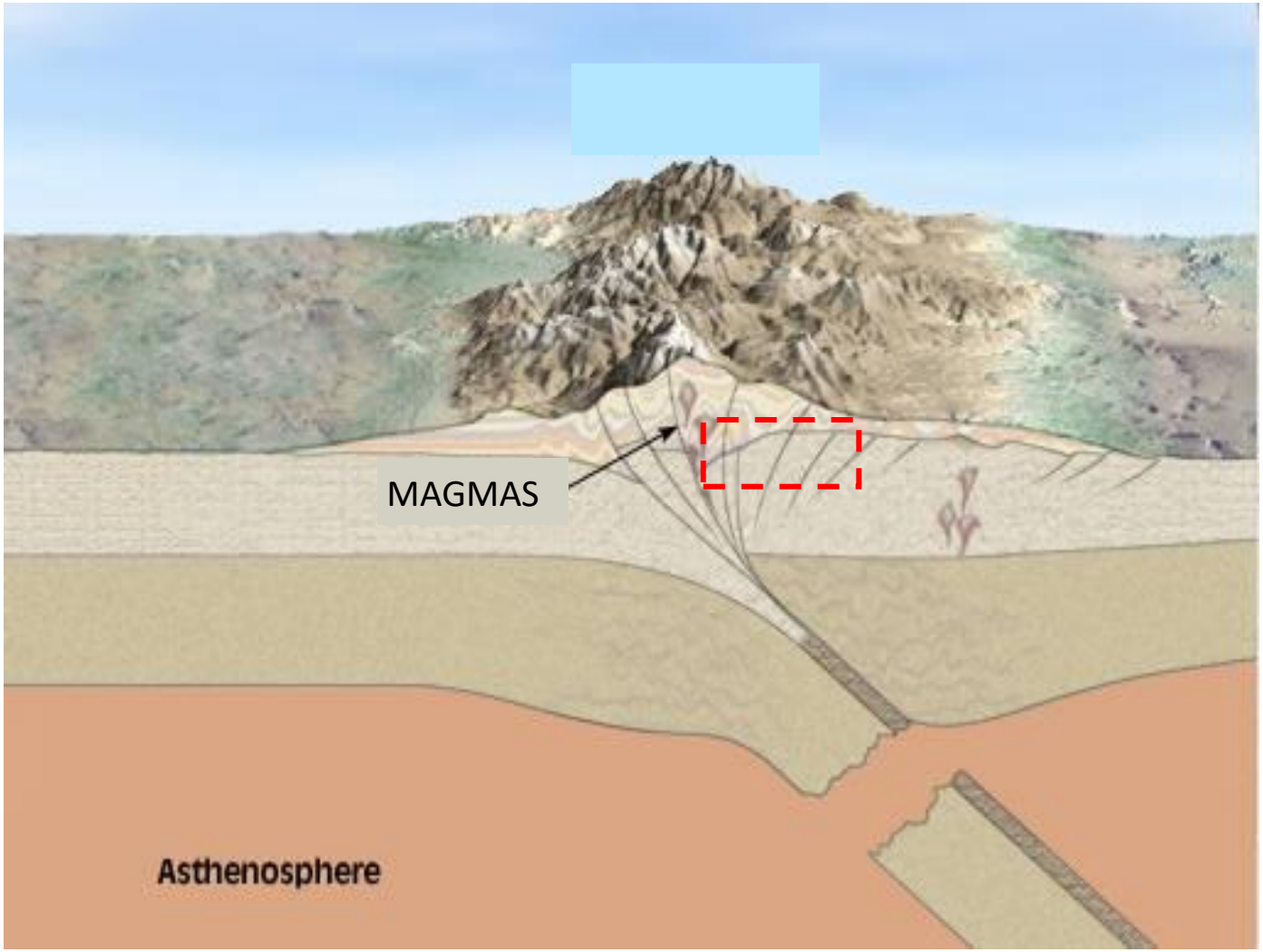
EXERCICIO 6



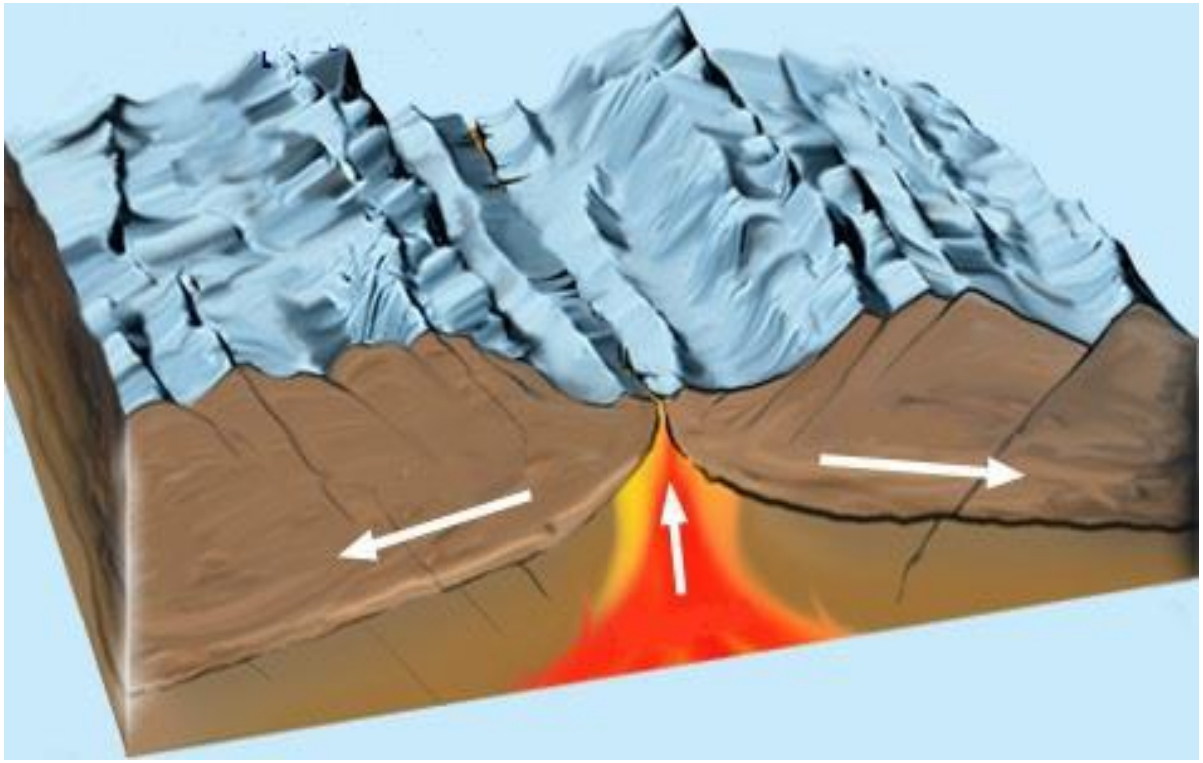


ORÓXENO HERCÍNICO OU VARISCO

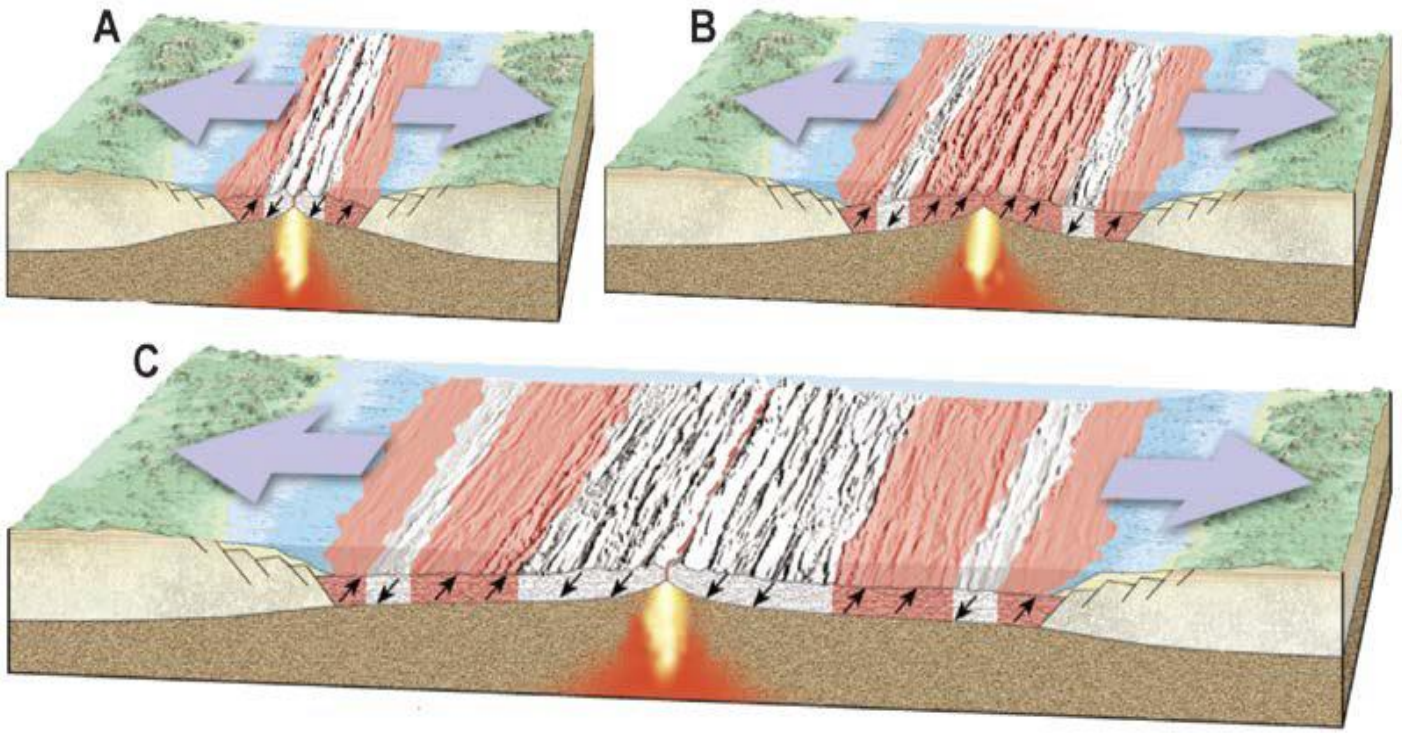

MAGMAS
Asthenosphere

EXERCICIO 1 ABAU (2025)

EXERCICIO 3 ABAU (2025)



EXERCICIO 6 ABAU (2024)



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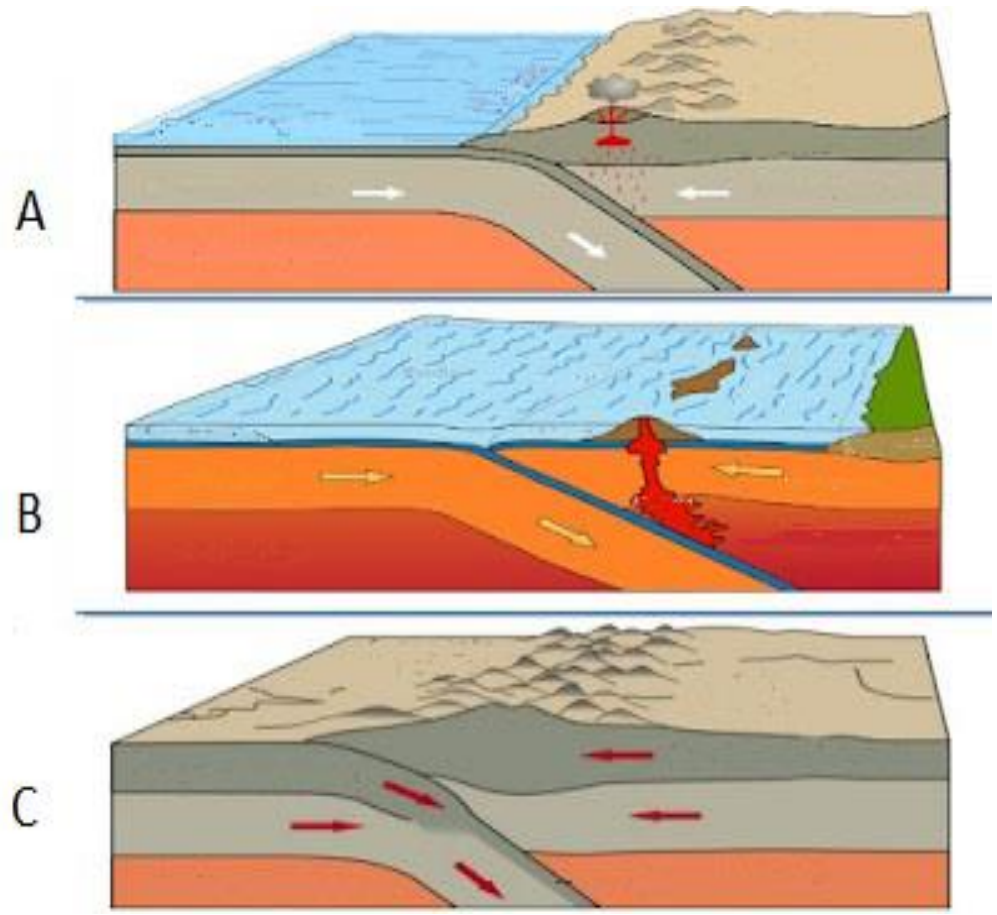

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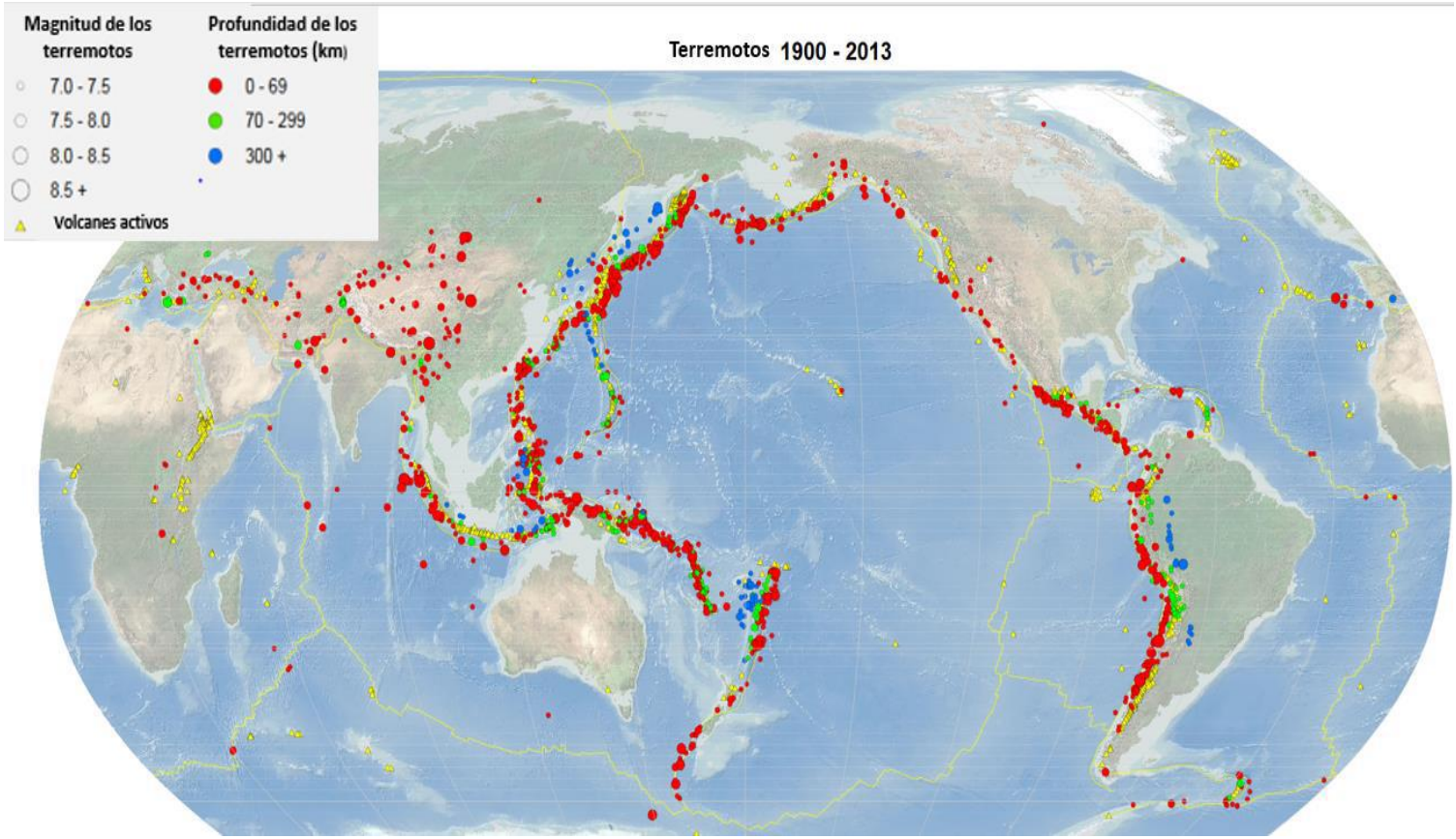

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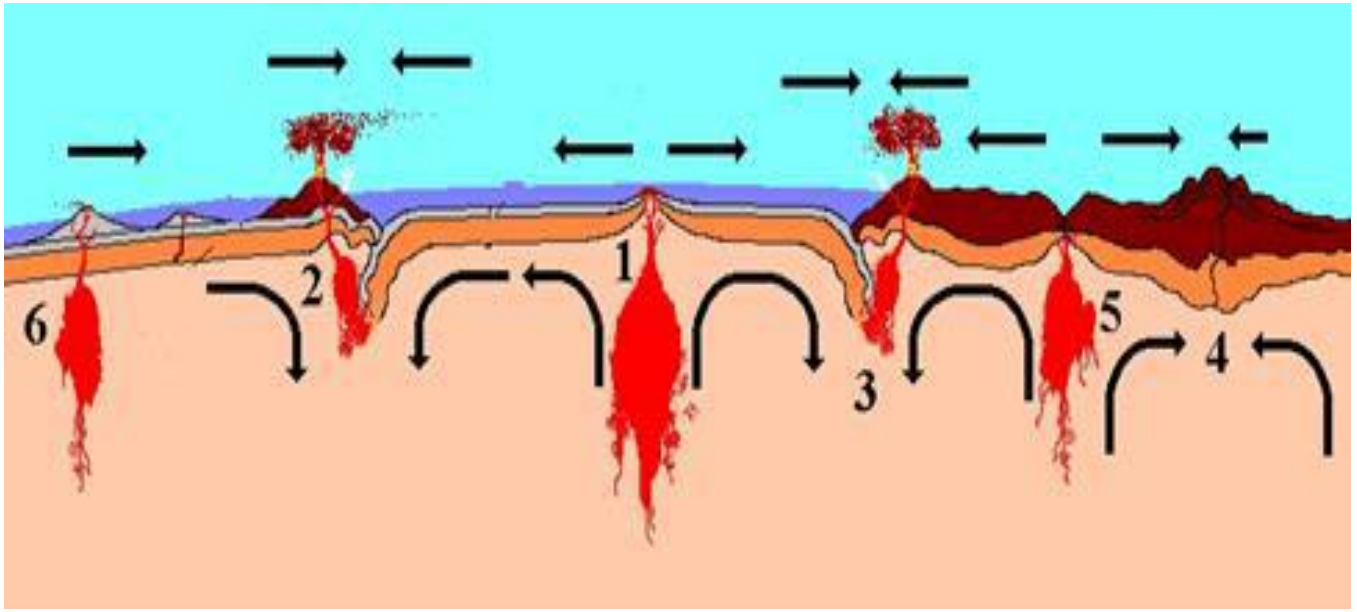

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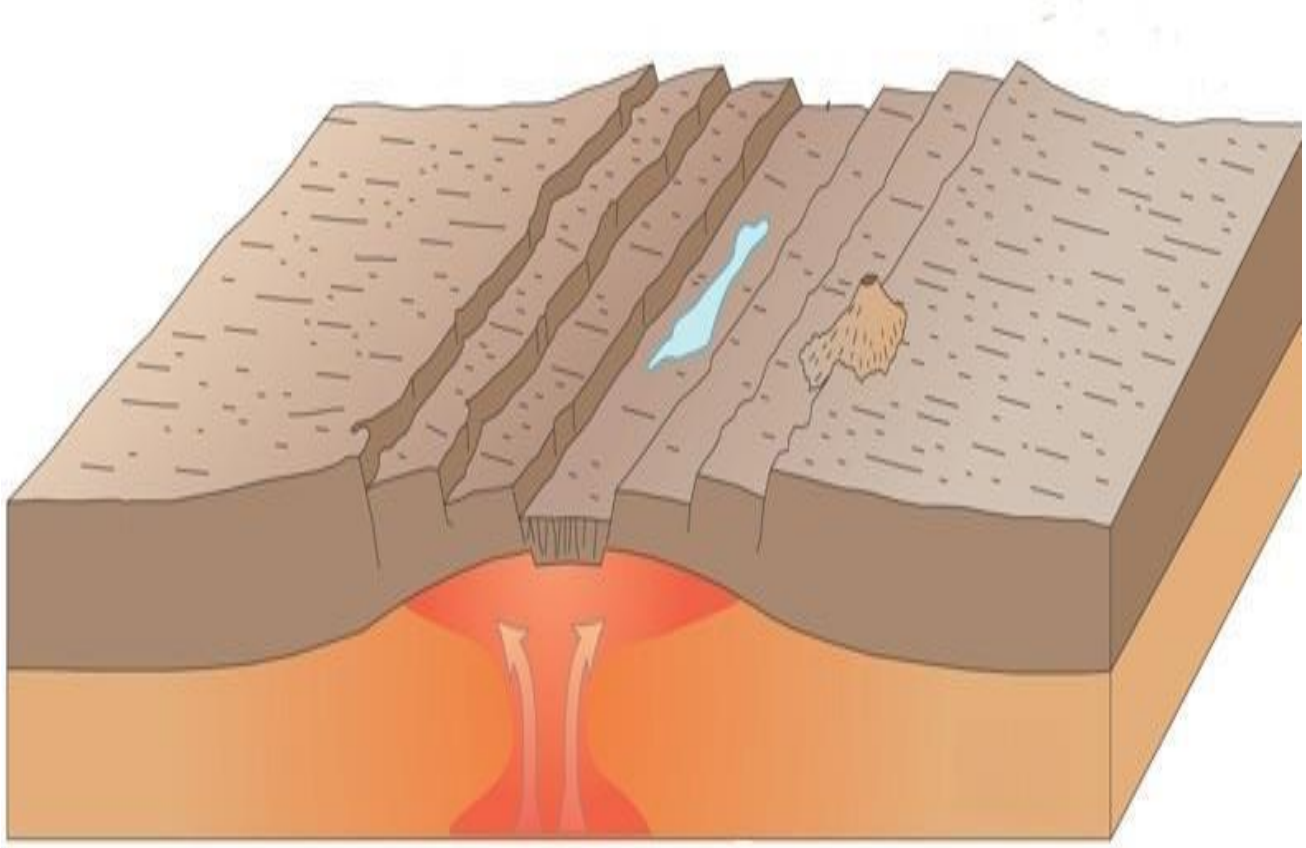

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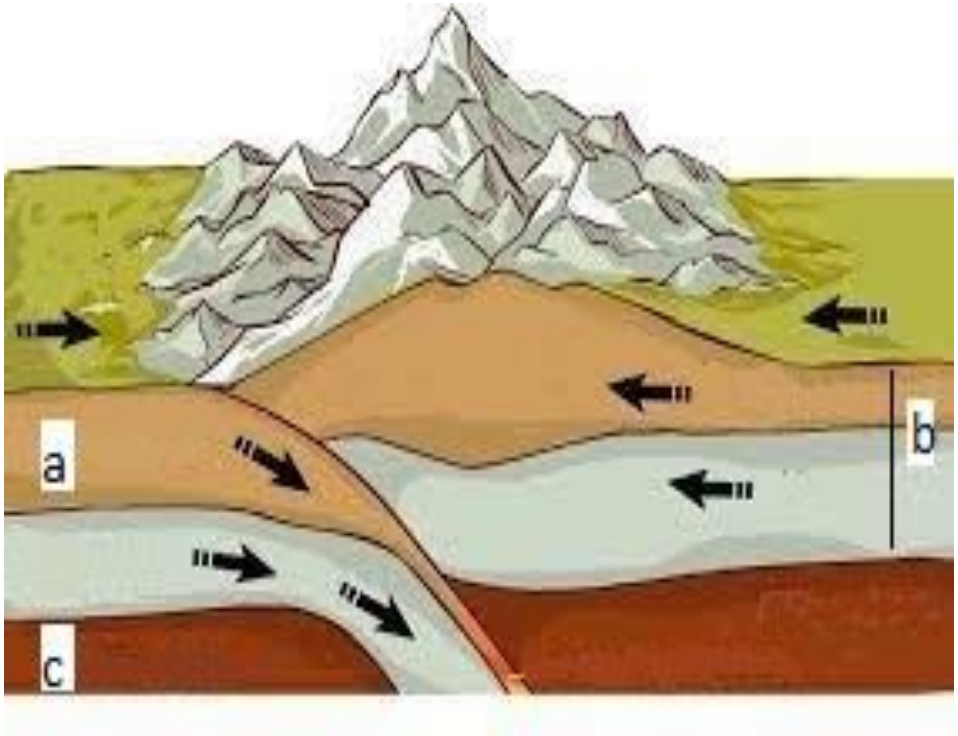
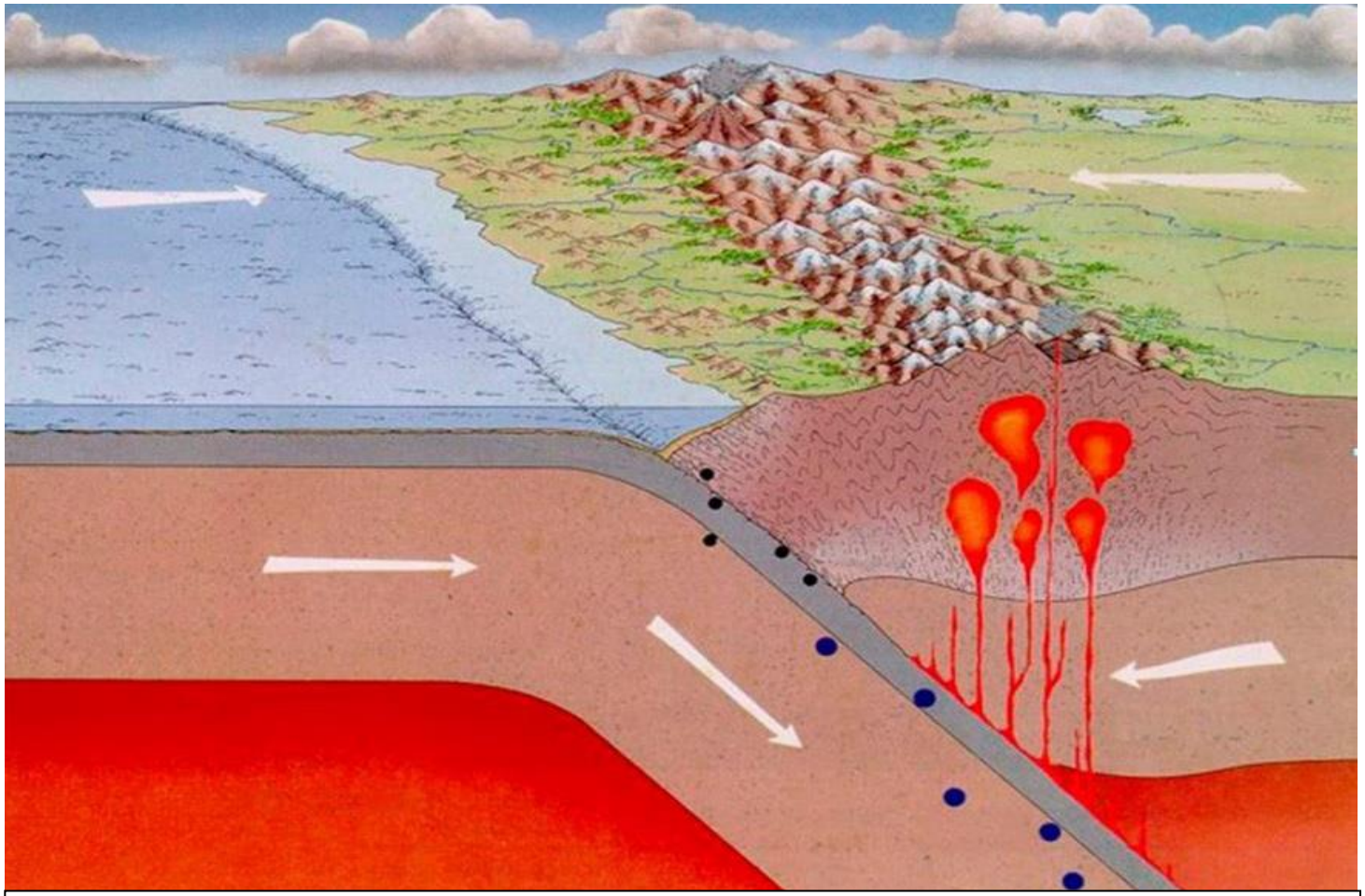
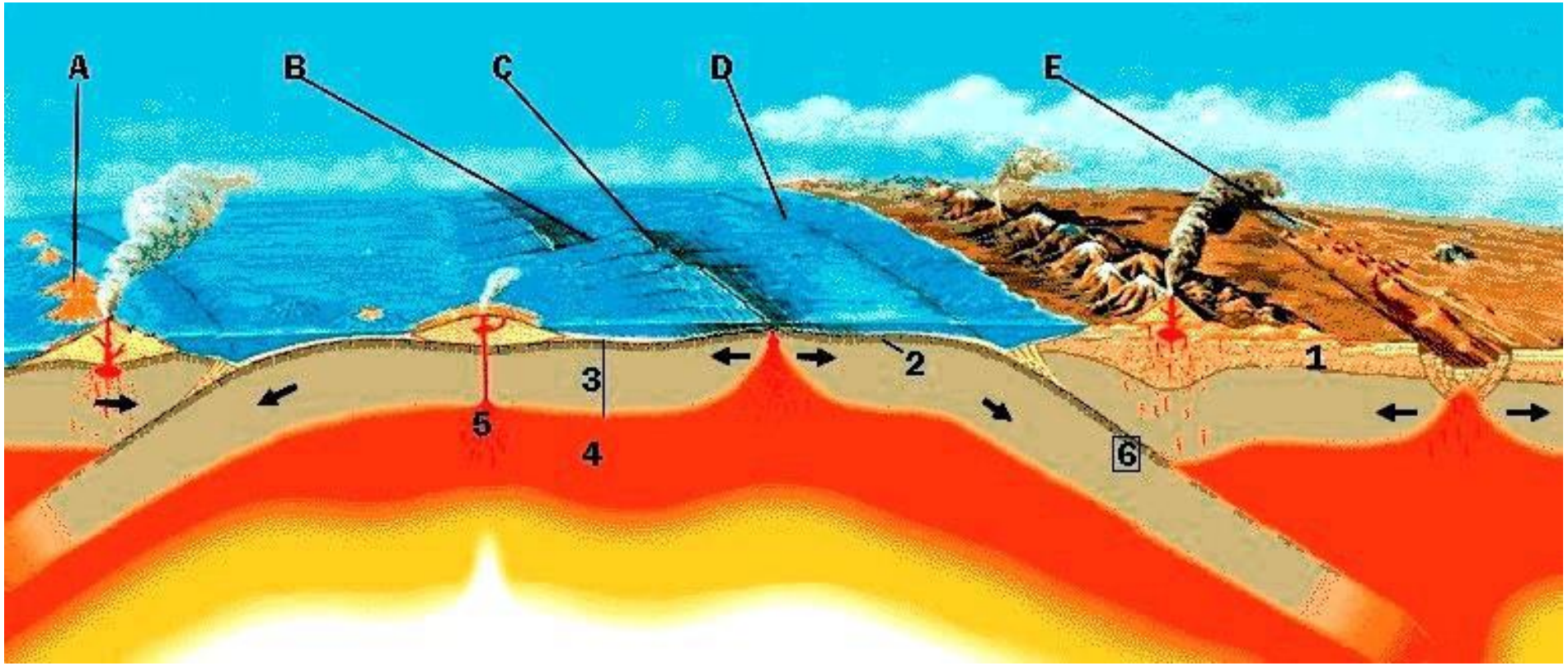


EXERCICIO ABAU 2020



Esquema - diagrama 1

Exercicio ABAU

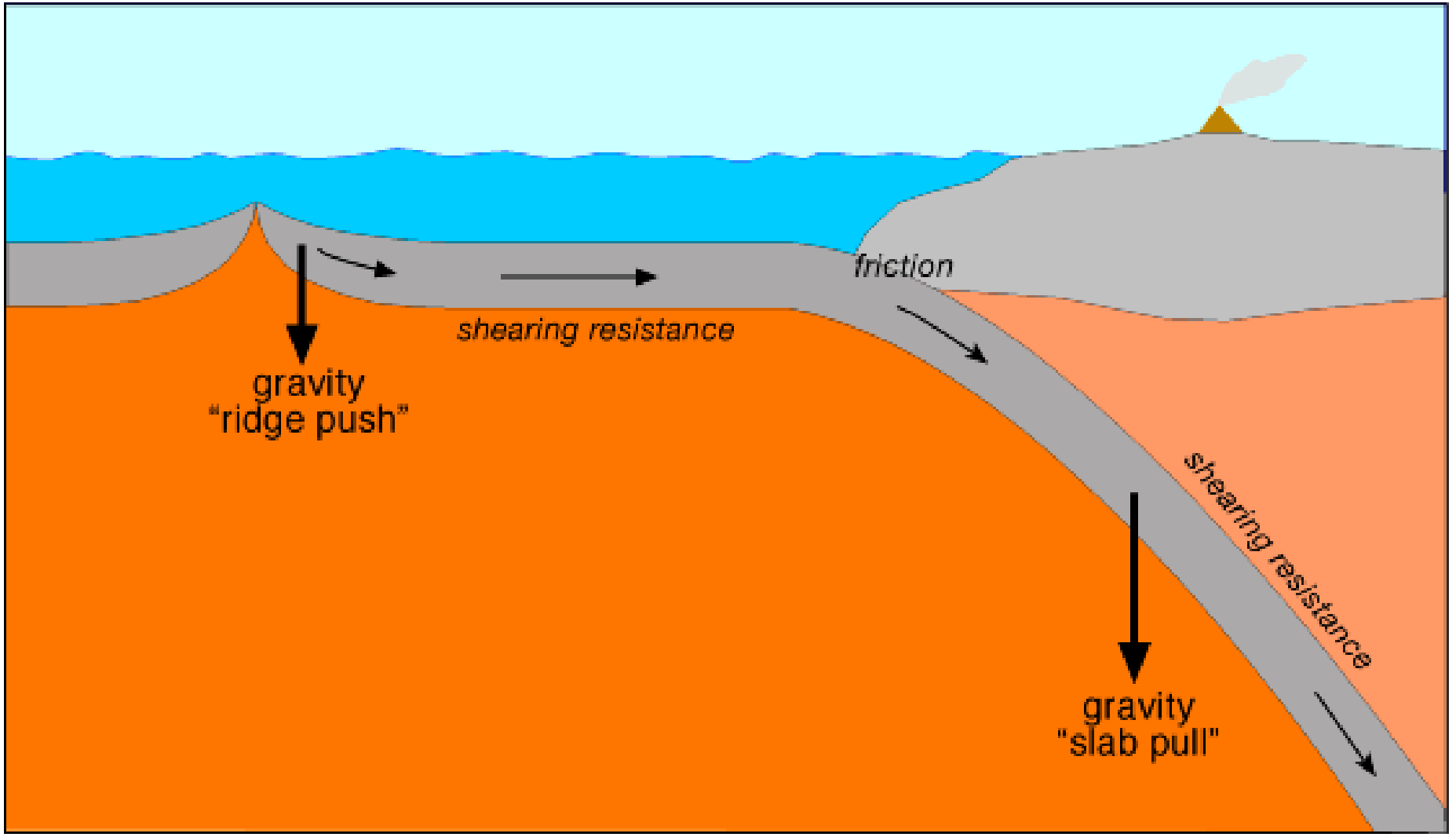


EXERCICIOS ABAU

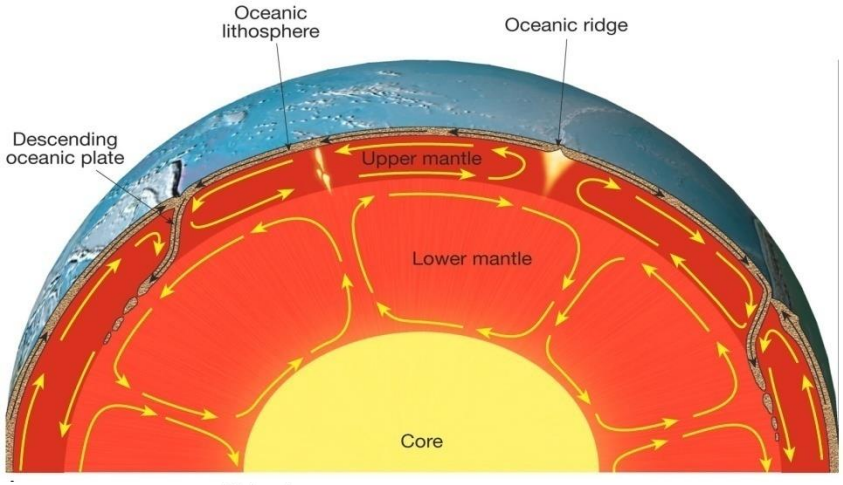
Forma cinco frases correctas e con significado xeolóxico empregando un término de cada columna en cada frase

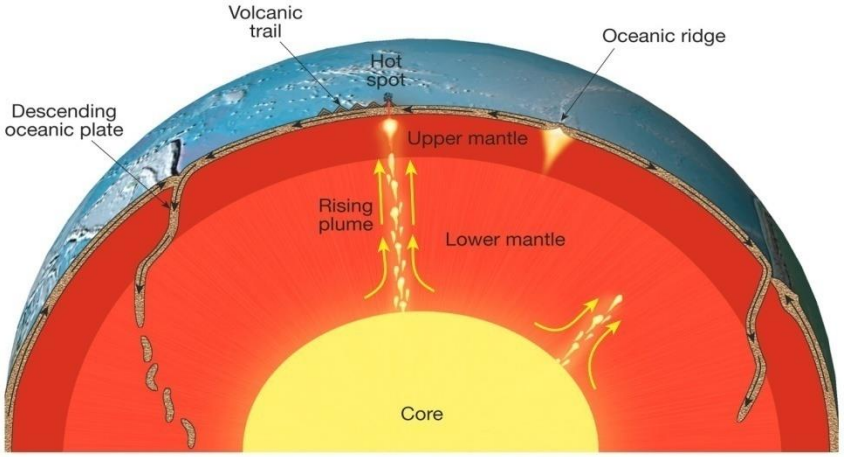
LIGNITO	METAMÓRFICA	TEORÍA
COMPACTACIÓN	WEGENER	CARBÓN
GNEIS	ORGANÓXENA	DIAXÉNESE
DERIVA CONTINENTAL	SUBDUCCIÓN	SEISMOS
BENIOFF	CEMENTACIÓN	FOLIACIÓN

CAUSAS MOVEMENTO DAS PLACAS

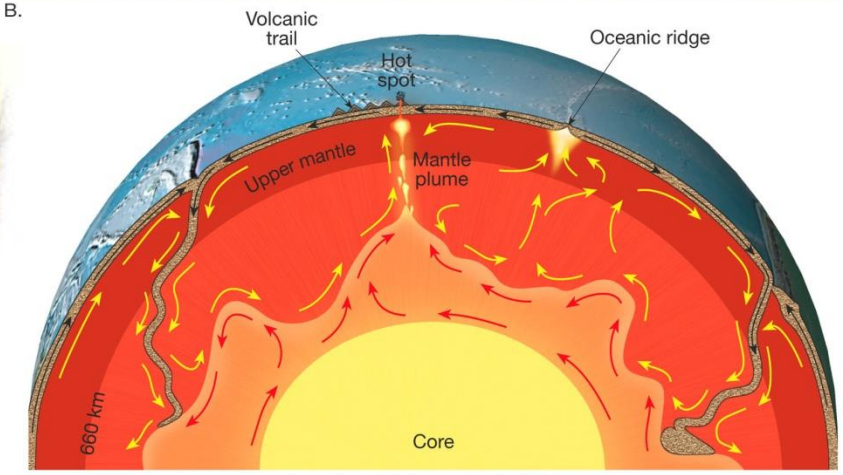


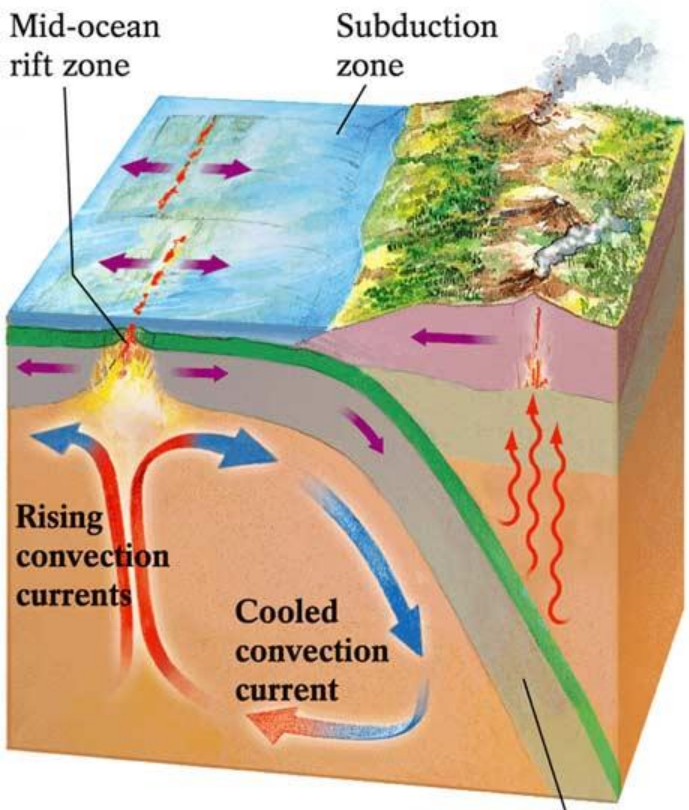
Convección no manto sublitosférico



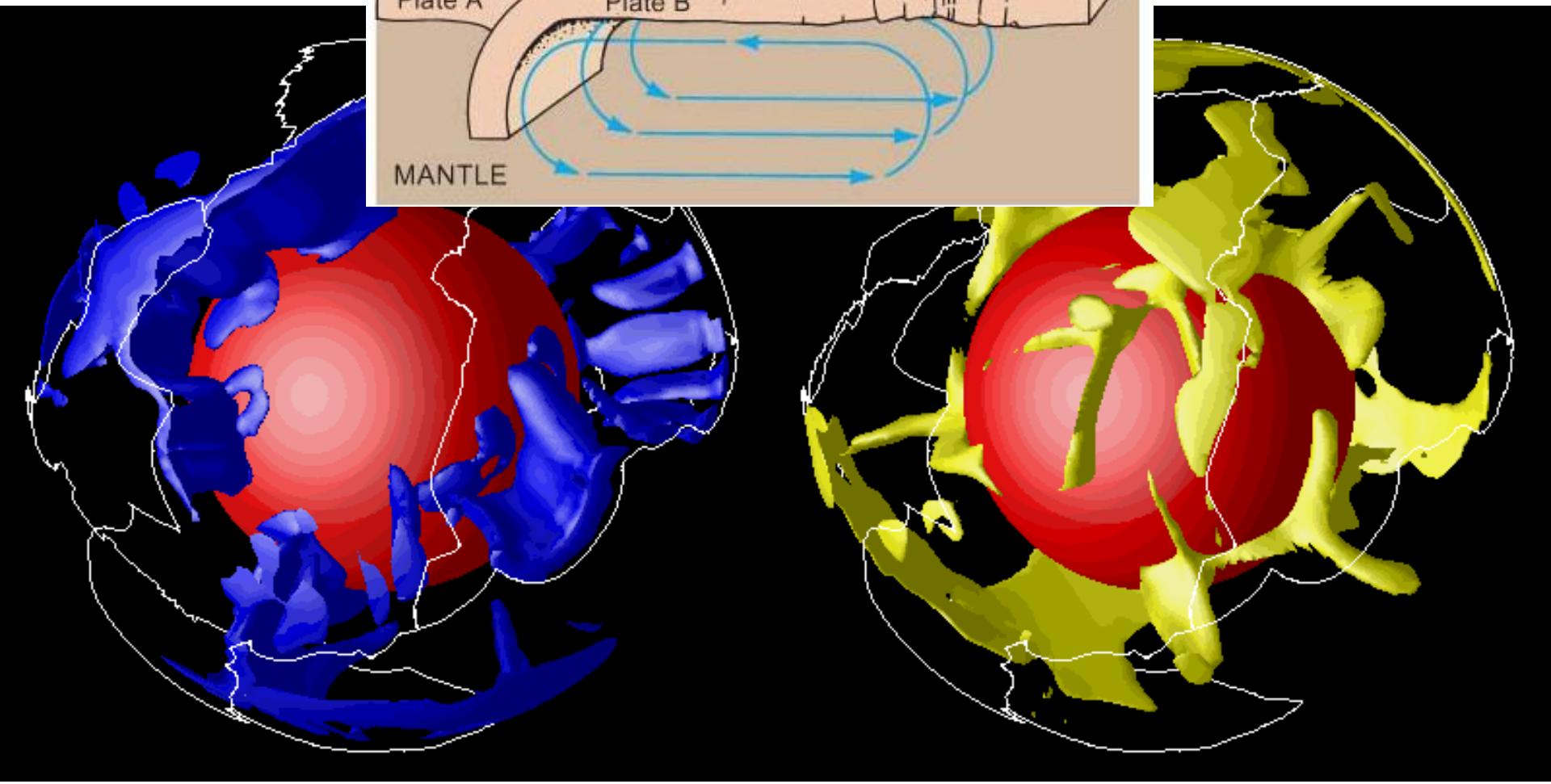


B.

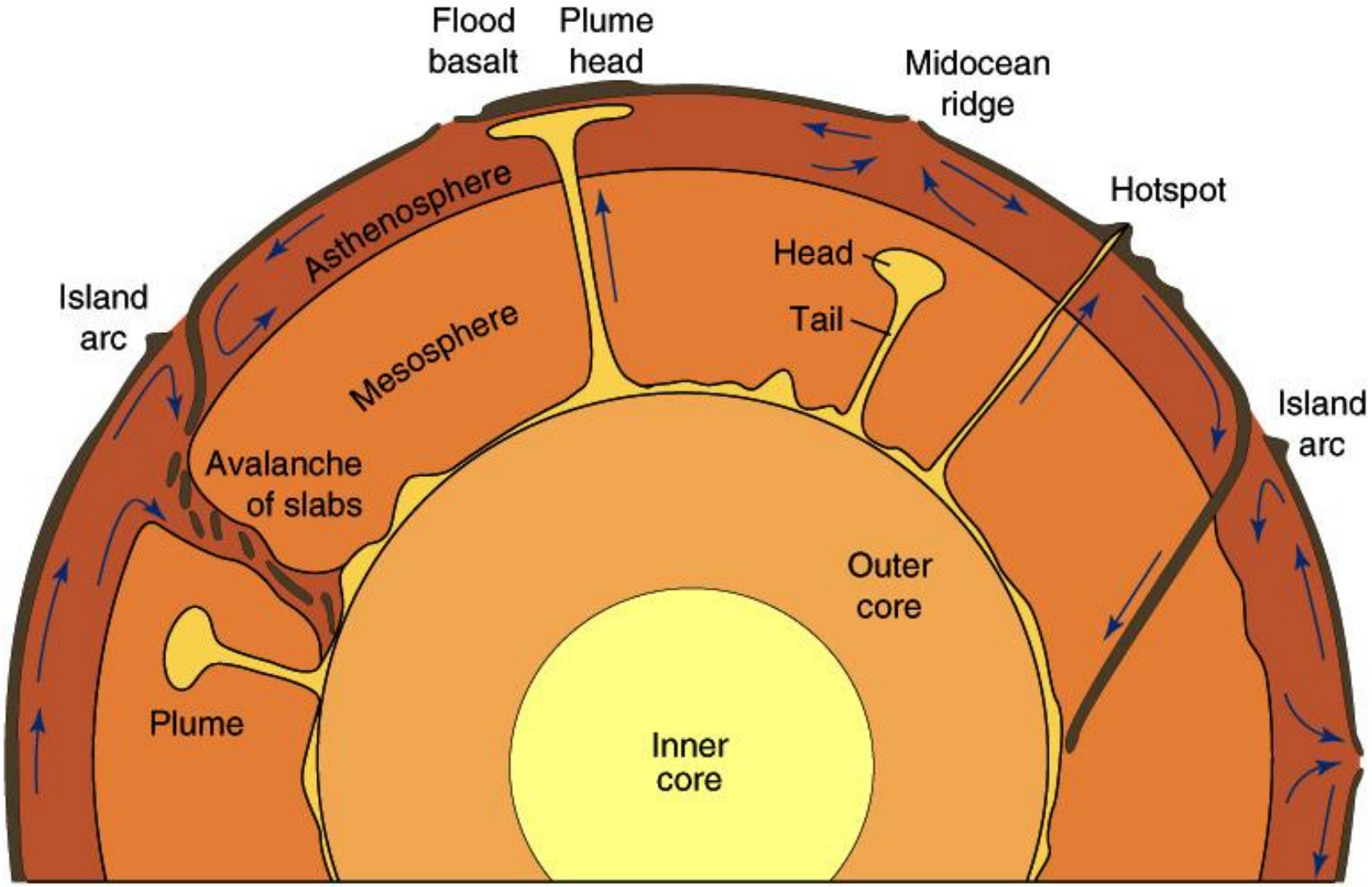




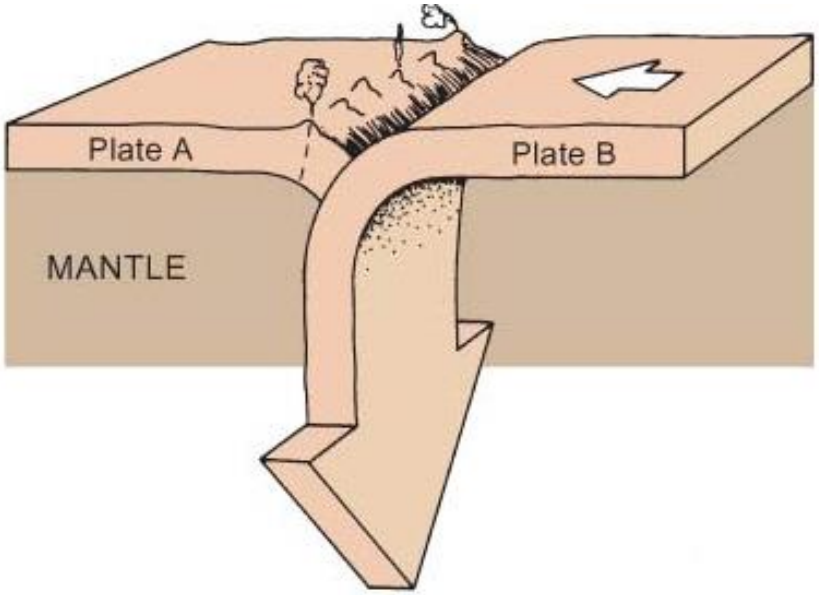
A convección no manto



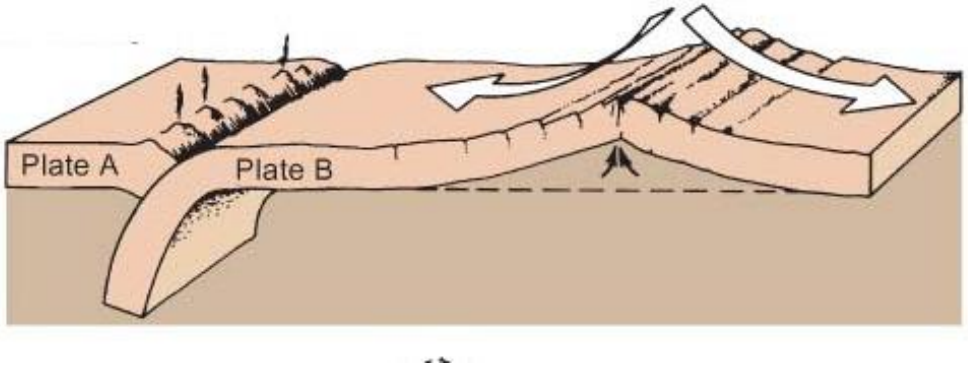
MODELO ACTUAL DE CONVECCIÓN



Mecanismos alternativos para o movemento das placas litosféricas



Tirón gravitacional nas zonas de subducción



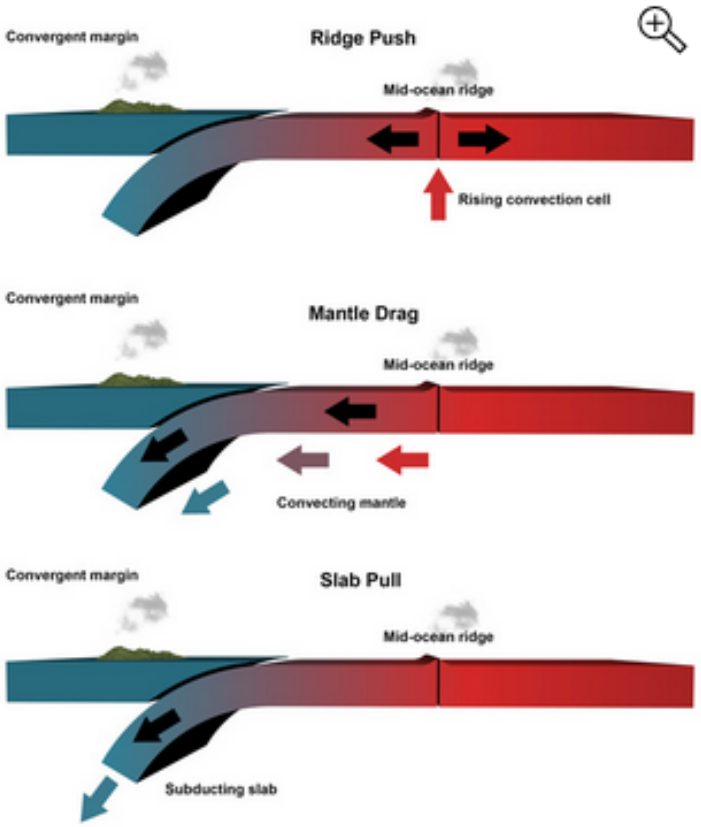
Deslizamento gravitacional nas dorsais oceánicas

What drives the movement of tectonic plates?

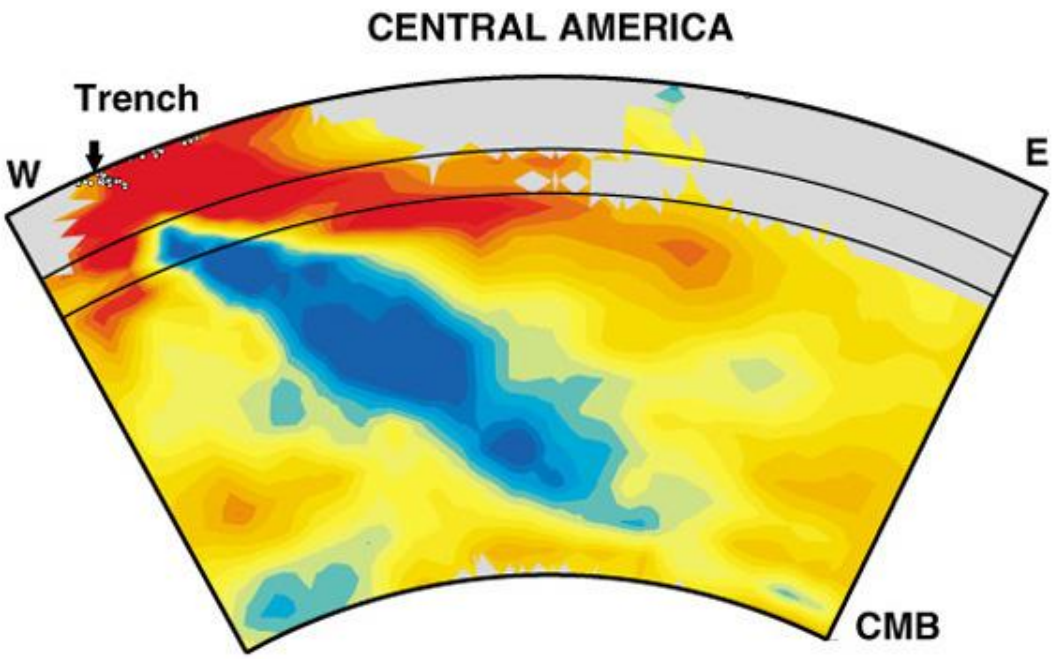
There are a number of competing theories that attempt to explain what drives the movement of tectonic plates. Three of the forces that have been proposed as the main drivers of tectonic plate movement are:

- mantle convection currents— warm mantle currents drive and carry plates of lithosphere along a like a conveyor belt;
- ridge push (buoyant upwelling mantle at mid-ocean ridges) — newly-formed plates at oceanic ridges are warm, and so have a higher elevation at the oceanic ridge than the colder, more dense plate material further away; gravity causes the higher plate at the ridge to push away the lithosphere that lies further from the ridge;
- slab pull — older, colder plates sink at subduction zones, because as they cool, they become more dense than the underlying mantle. The cooler sinking plate pulls the rest of the warmer plate along behind it.

Recent research has shown that the **major** driving force for most plate movement is slab pull, because the plates with more of their edges being subducted are the faster-moving ones. However ridge push is also presented in recent research to be a force that drives the movement of plates.



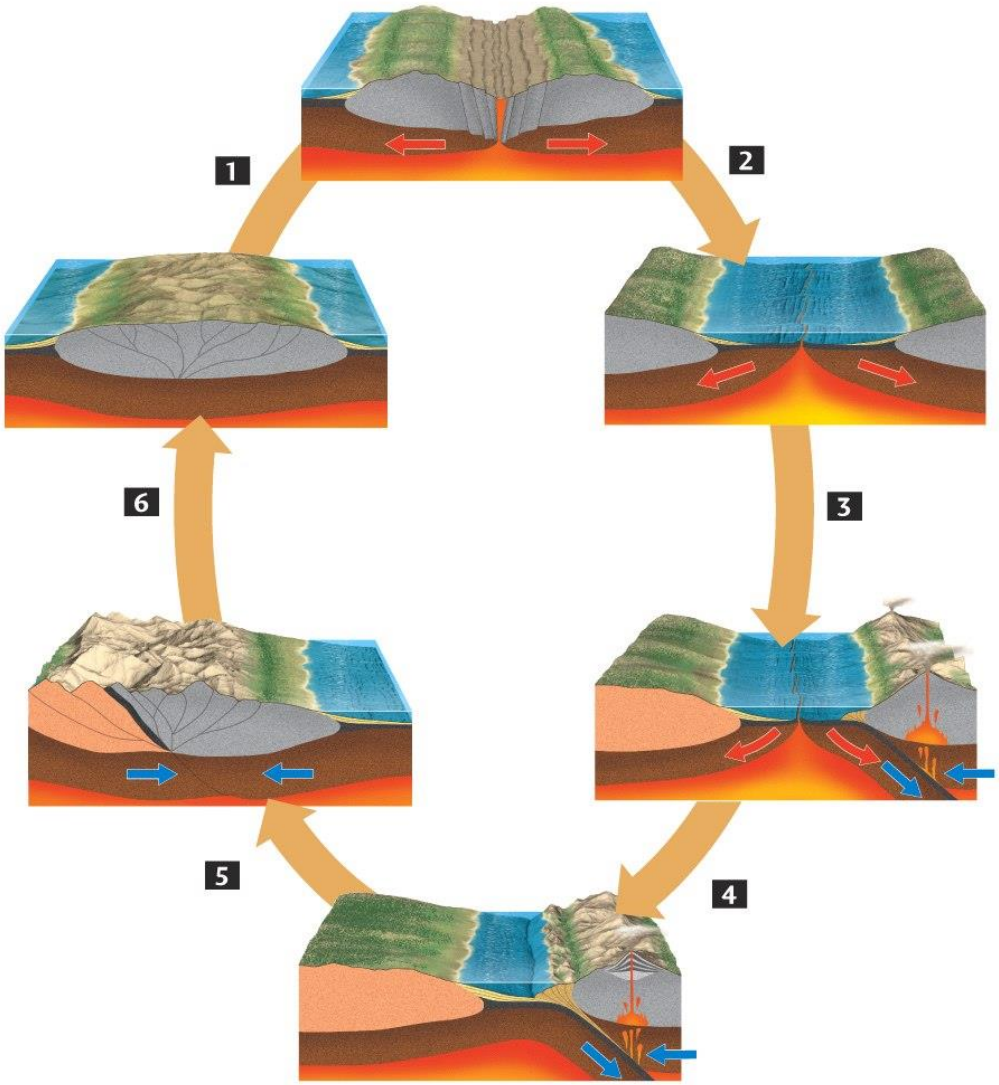
Temperature Anomalies

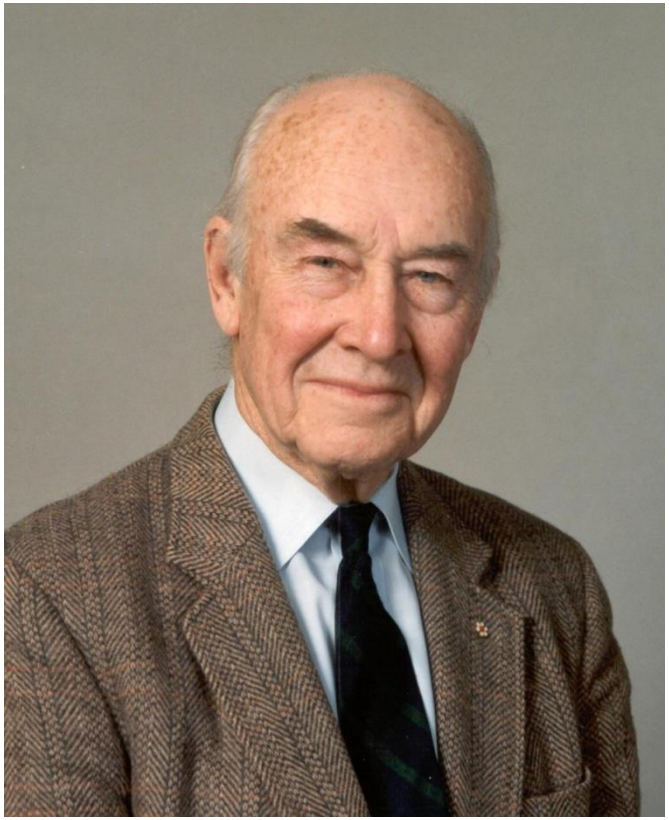


Blue = cooler
Red = warmer

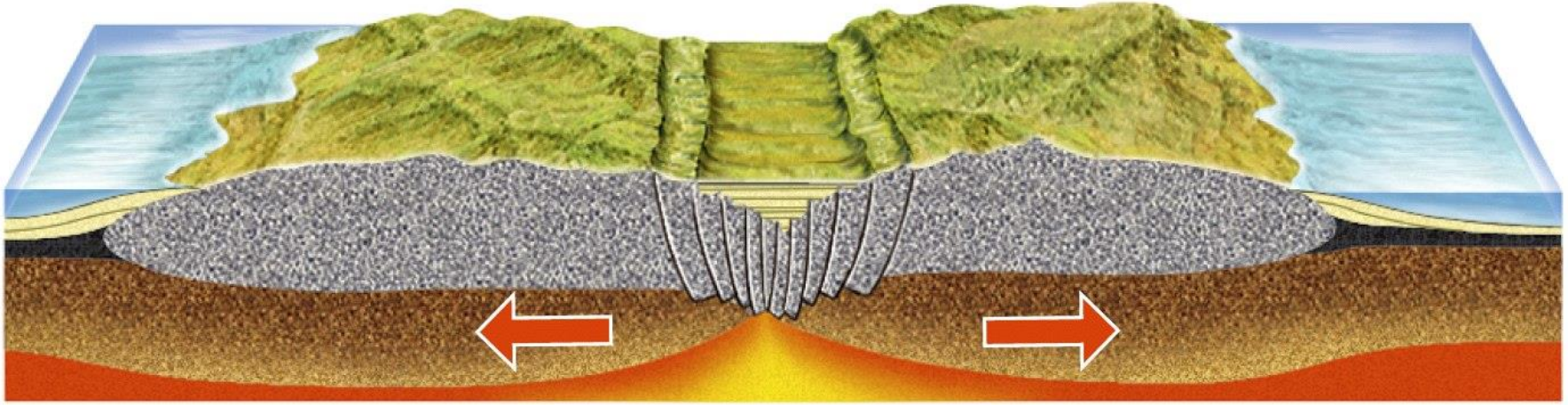
Can identify slab using tomography

O CICLO DE WILSON



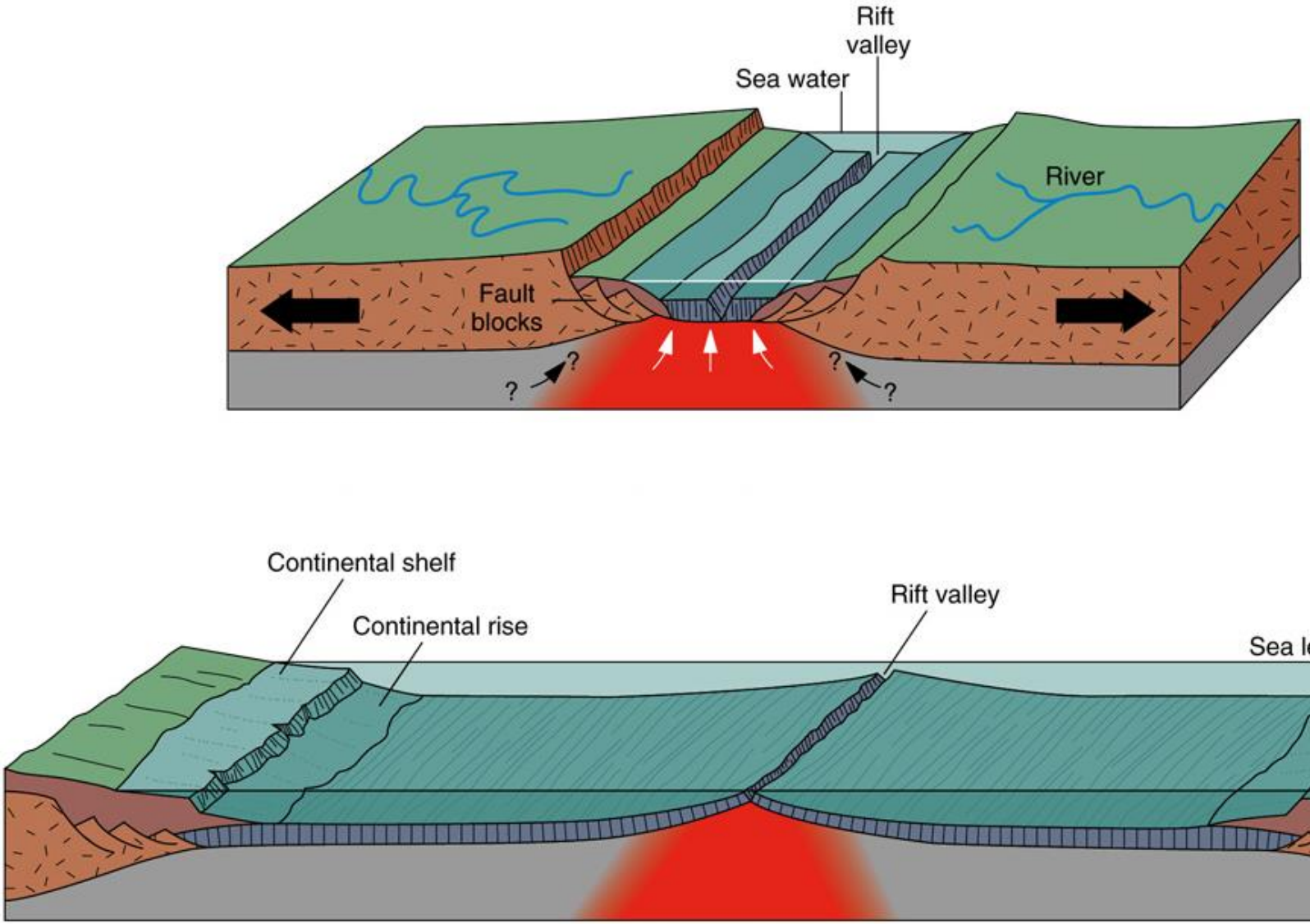


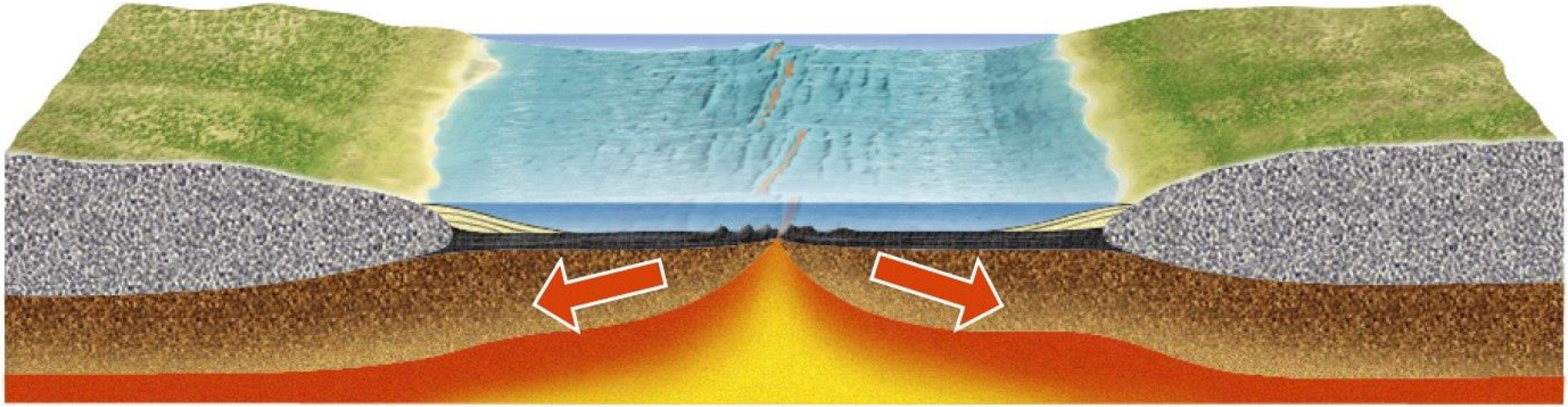
SUPERCONTINENTE



1 Rifting within a continent splits the continent...

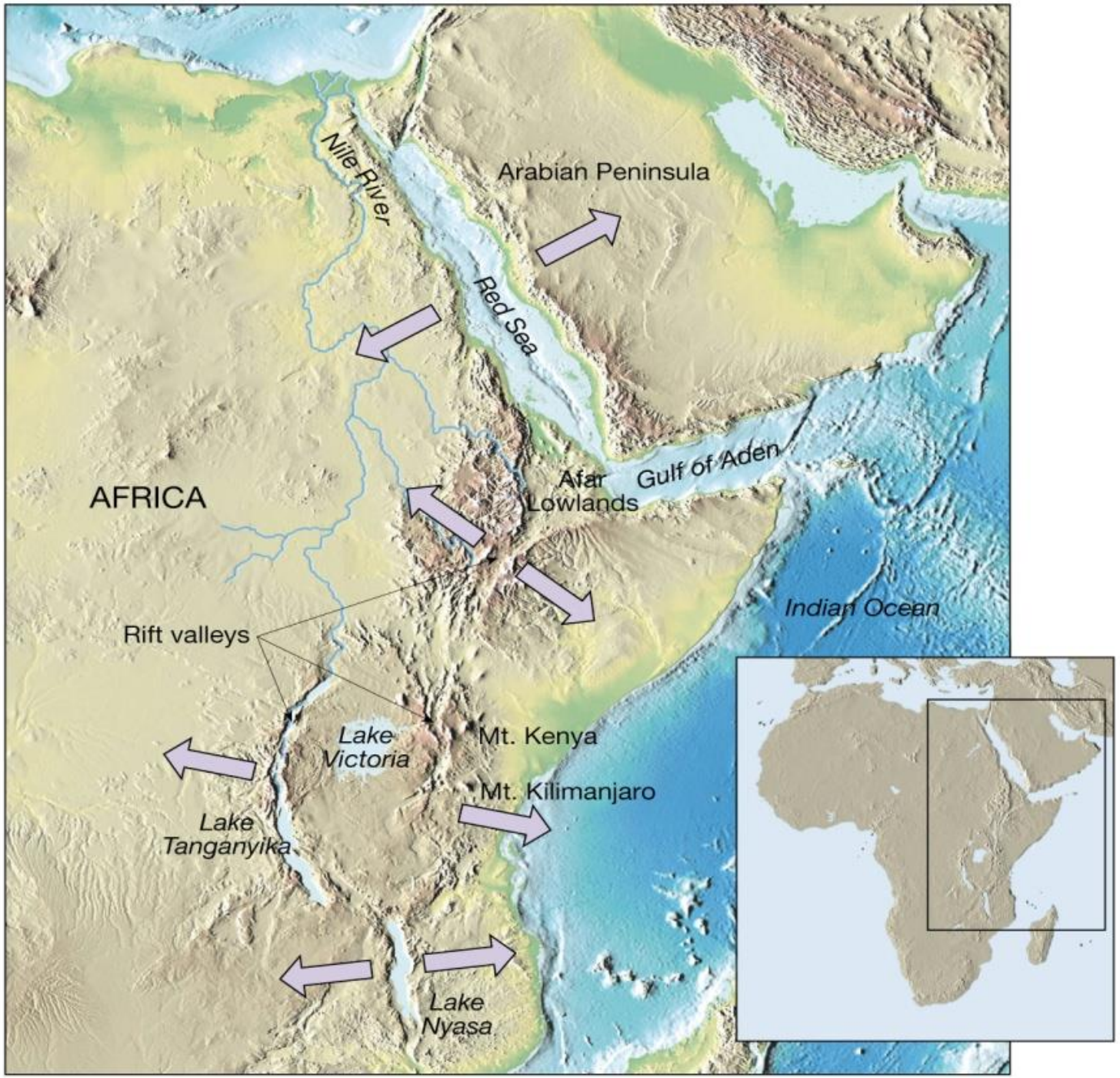
Figure 10-18 part 1
Understanding Earth, Fifth Edition


Rift
valley
Sea water
River
Fault
blocks
?
?
?
?
Continental shelf
Continental rise
Rift valley
Sea level



2 ...leading to the opening of a new ocean basin and creation of new oceanic crust, starting the cycle.

Figure 10-18 part 2
Understanding Earth, Fifth Edition


Nile River
Arabian Peninsula
Red Sea
AFRICA
Afar Lowlands
Gulf of Aden
Indian Ocean
Rift valleys
Lake Victoria
Mt. Kenya
Mt. Kilimanjaro
Lake Tanganyika
Lake Nyasa

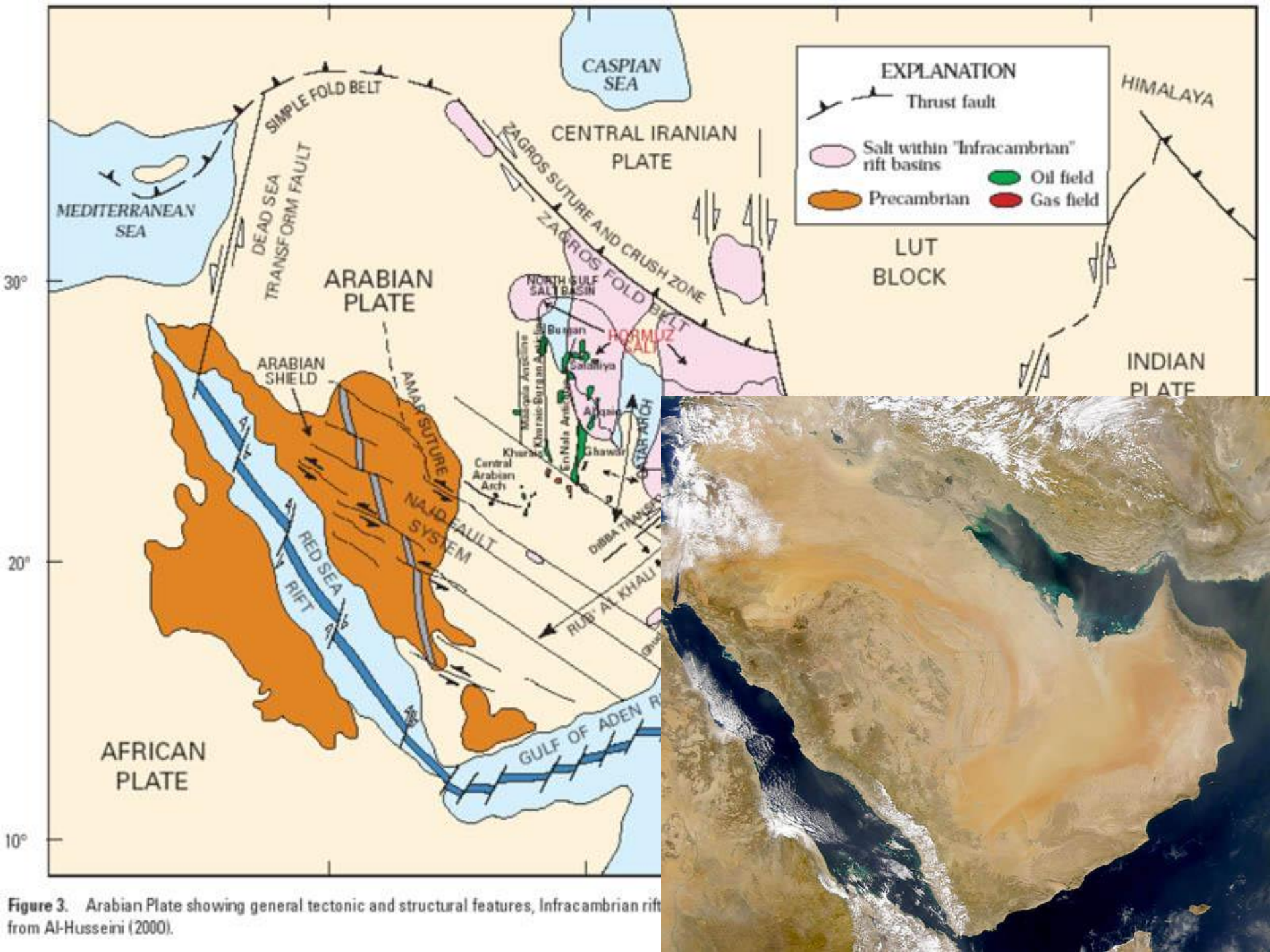
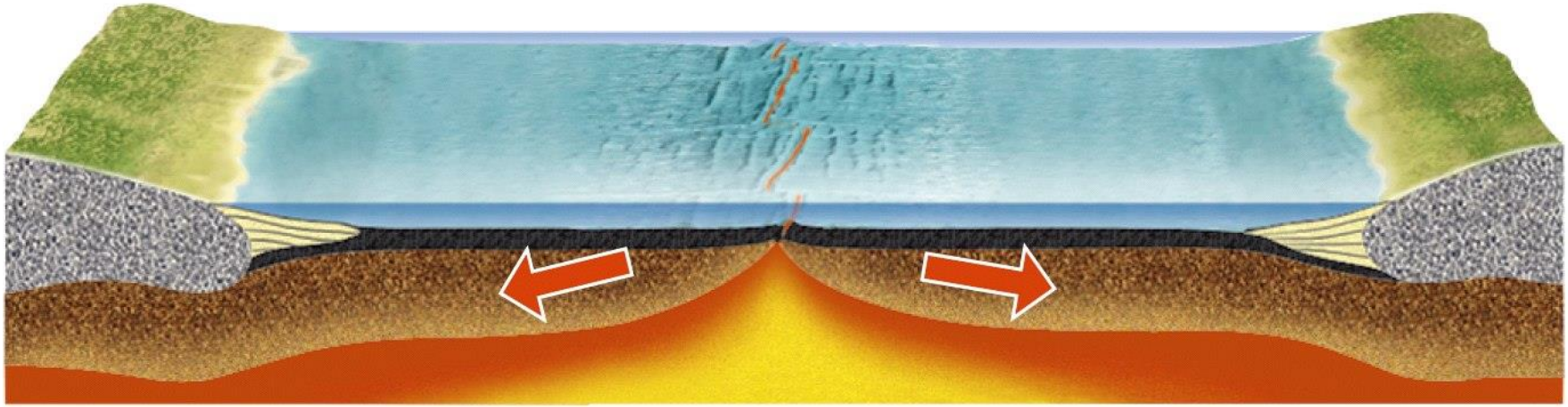
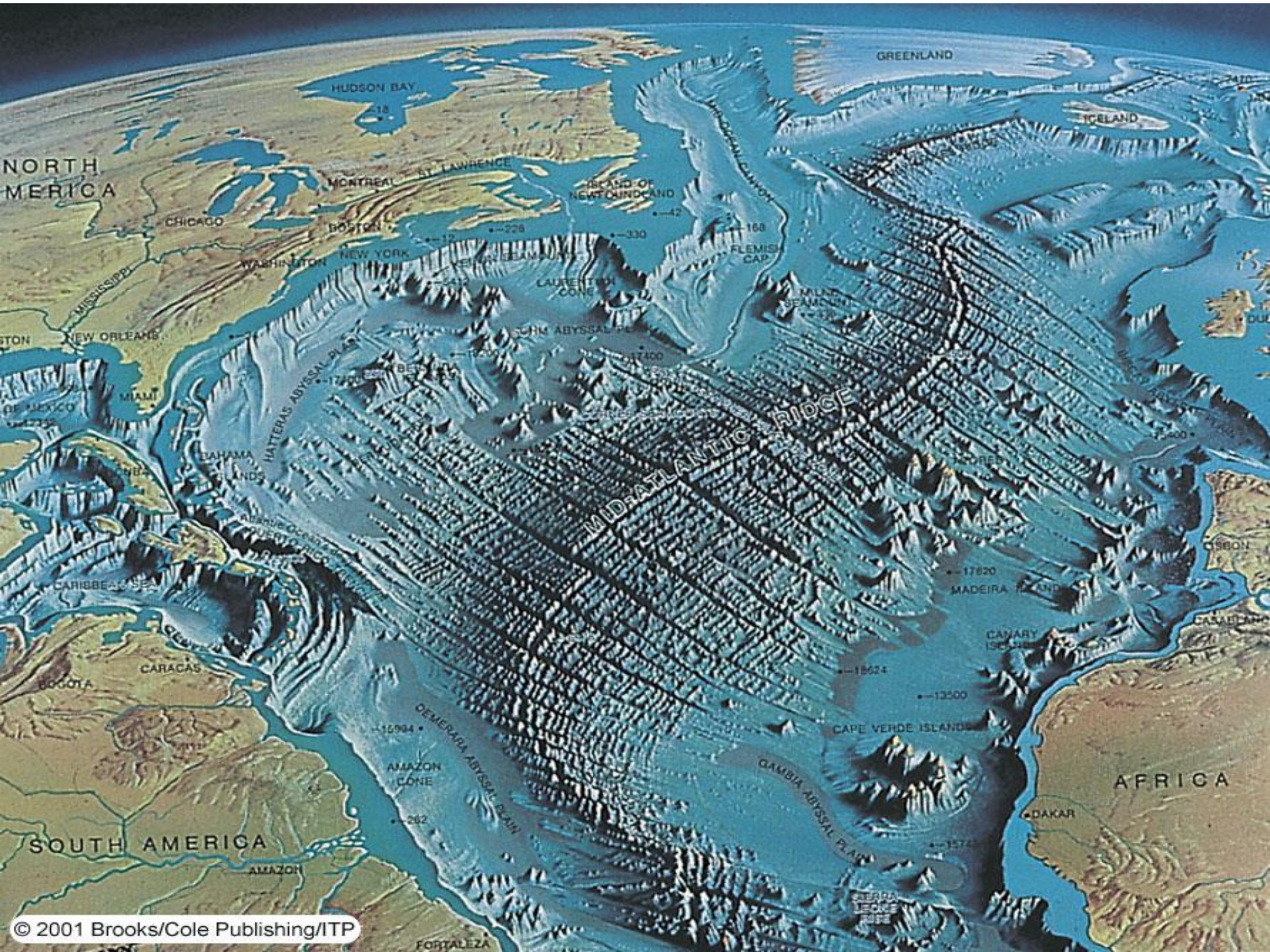


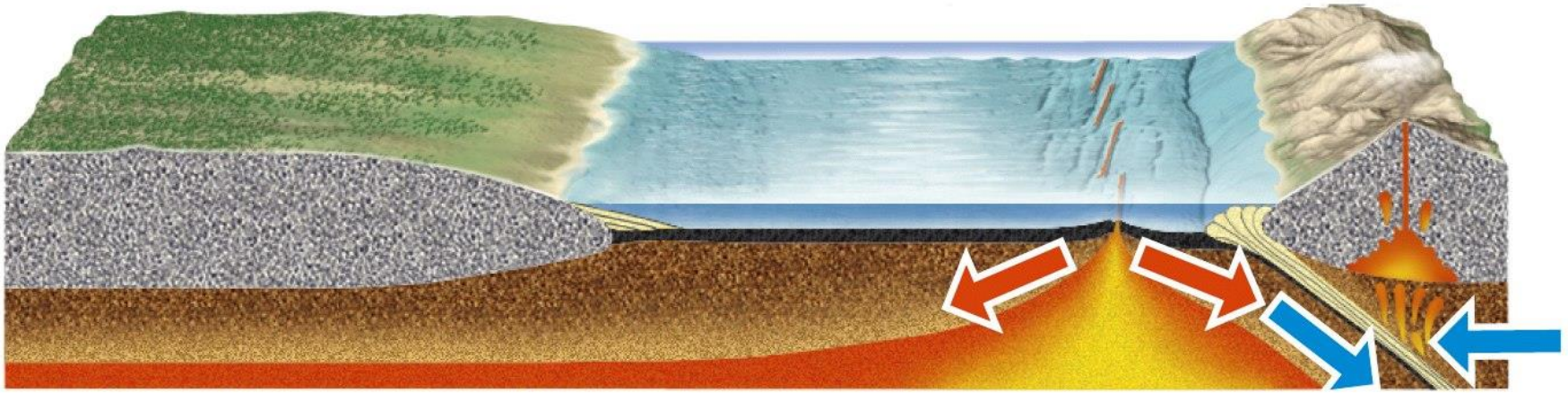
Figure 3. Arabian Plate showing general tectonic and structural features, Infracambrian rift
from Al-Husseini (2000).



3 As spreading continues and an ocean opens, passive margin cooling occurs and sediment accumulates during seafloor spreading.

Figure 10-18 part 3
Understanding Earth, Fifth Edition



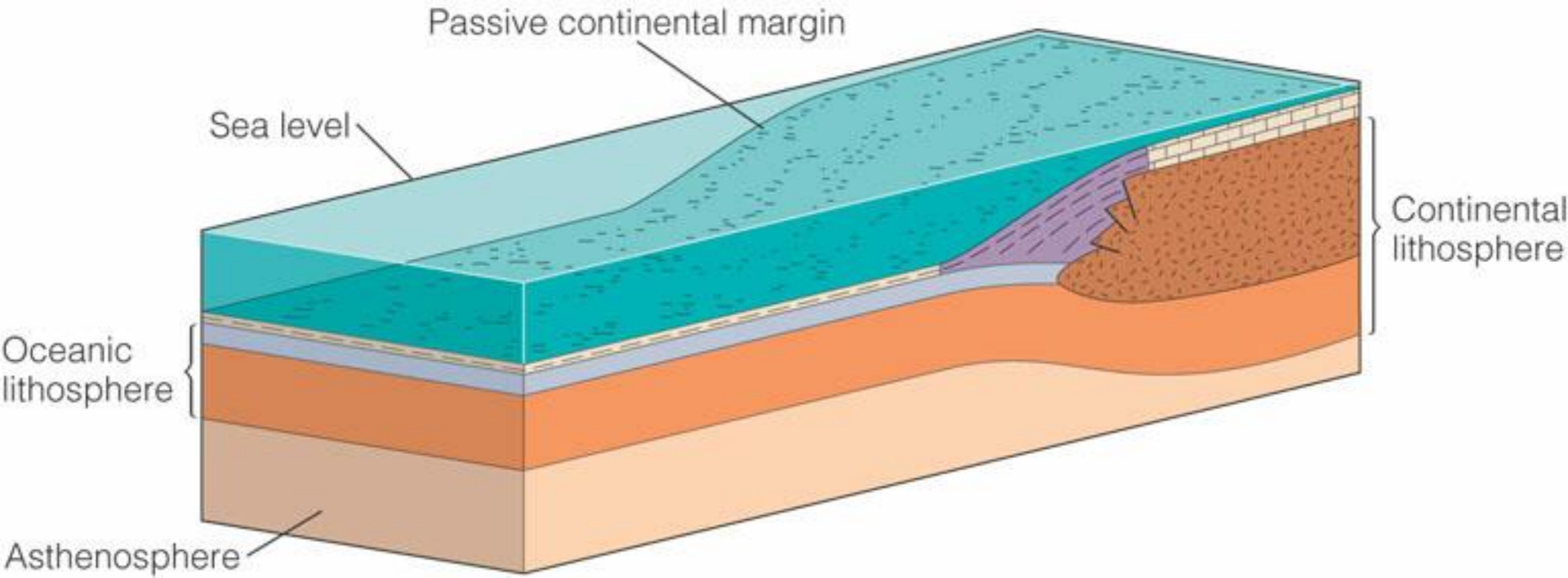


4 **Convergence begins; an oceanic plate subducts beneath a continental plate, creating a volcanic chain at the active margin.**

Figure 10-18 part 4
Understanding Earth, Fifth Edition

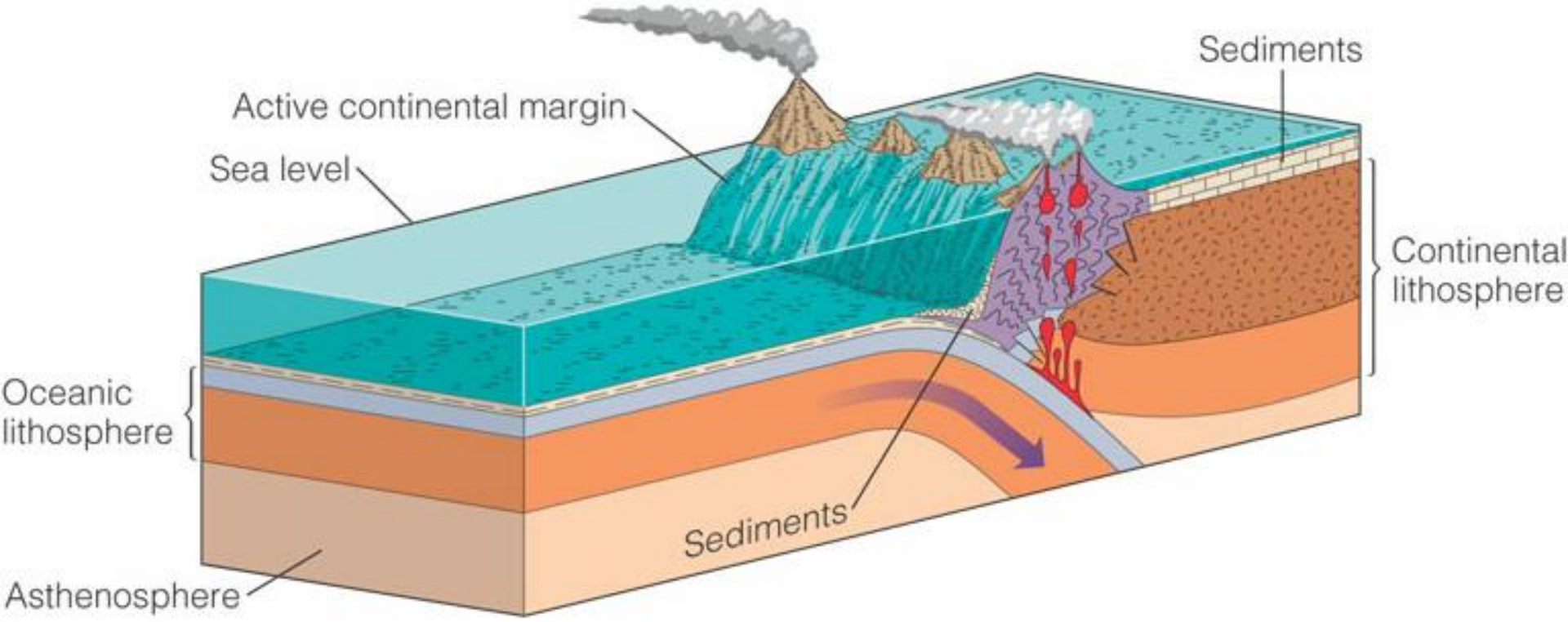
Evolution of the Andes Mountains

- Prior to 200 million years ago,
  - the west coast of South America
  - was a passive continental margin
  - where huge quantities of sediment were deposited



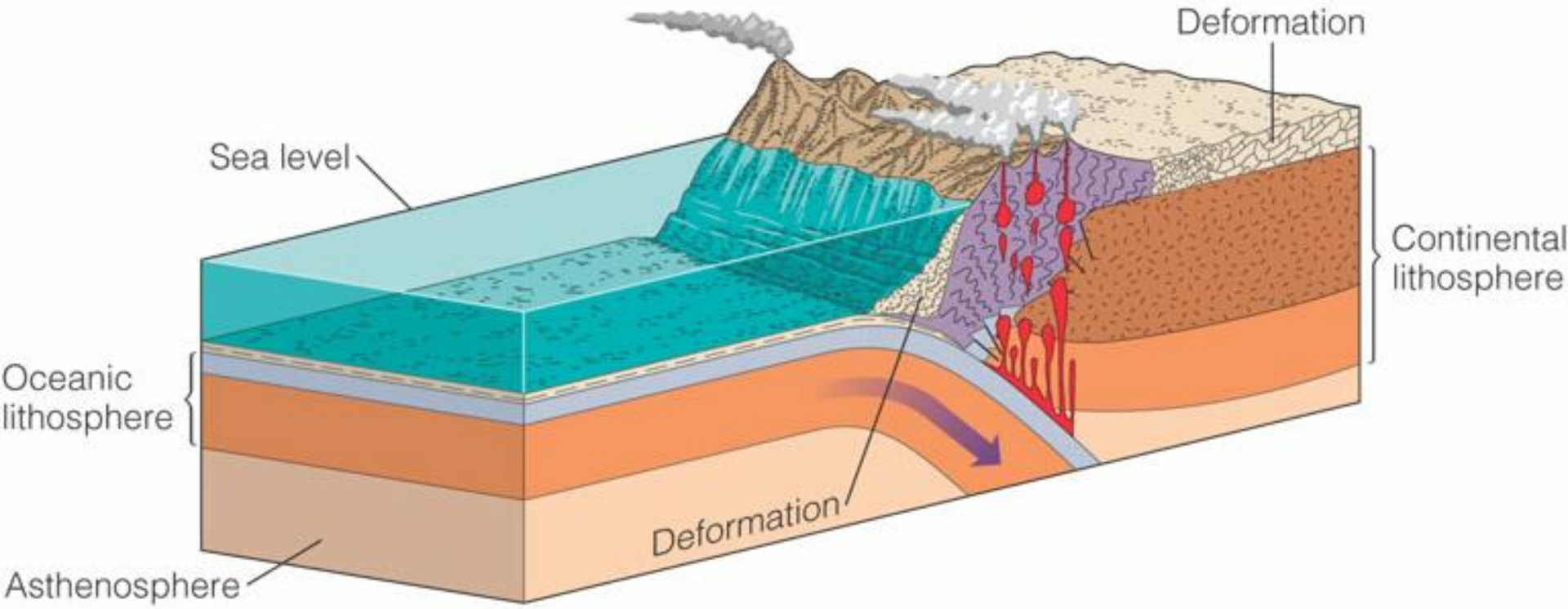
Evolution of the Andes Mountains

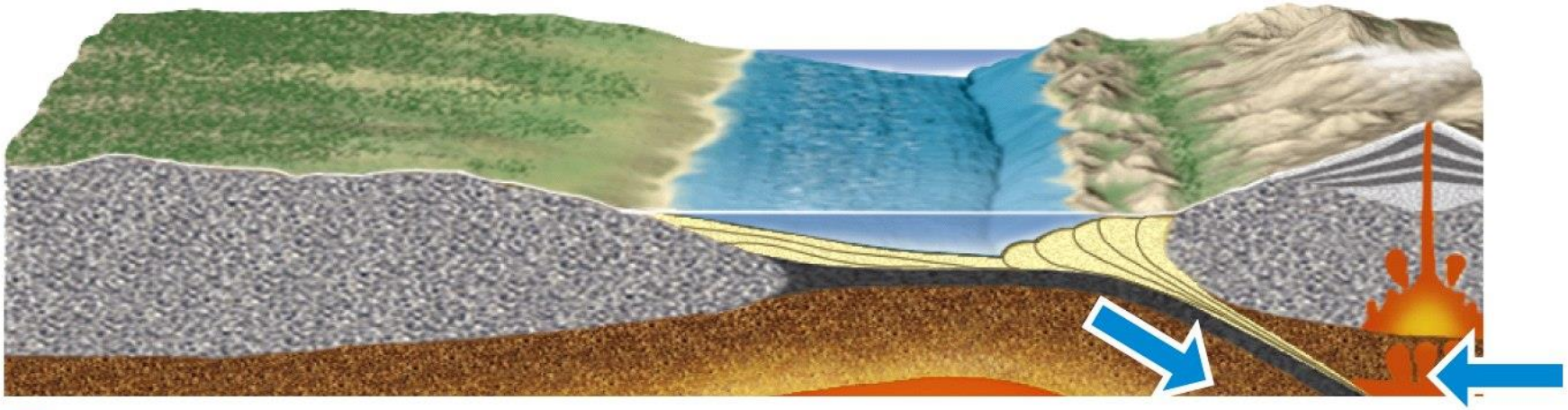
- Orogeny began when this area
  - became an active continental margin
  - as South America moved westerly
  - and collided with oceanic lithosphere



Evolution of the Andes Mountains

- Deformation, volcanism and plutonism continued

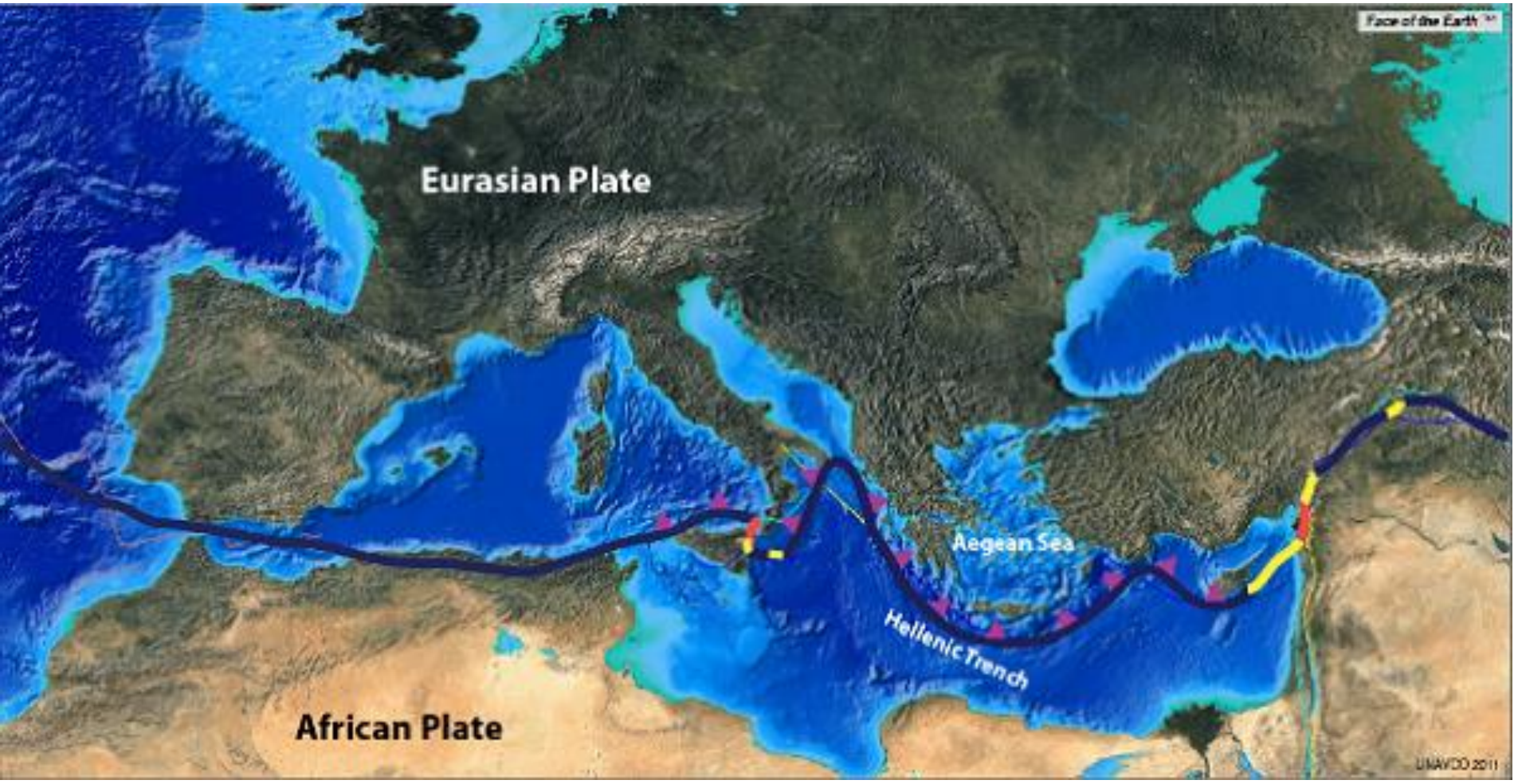


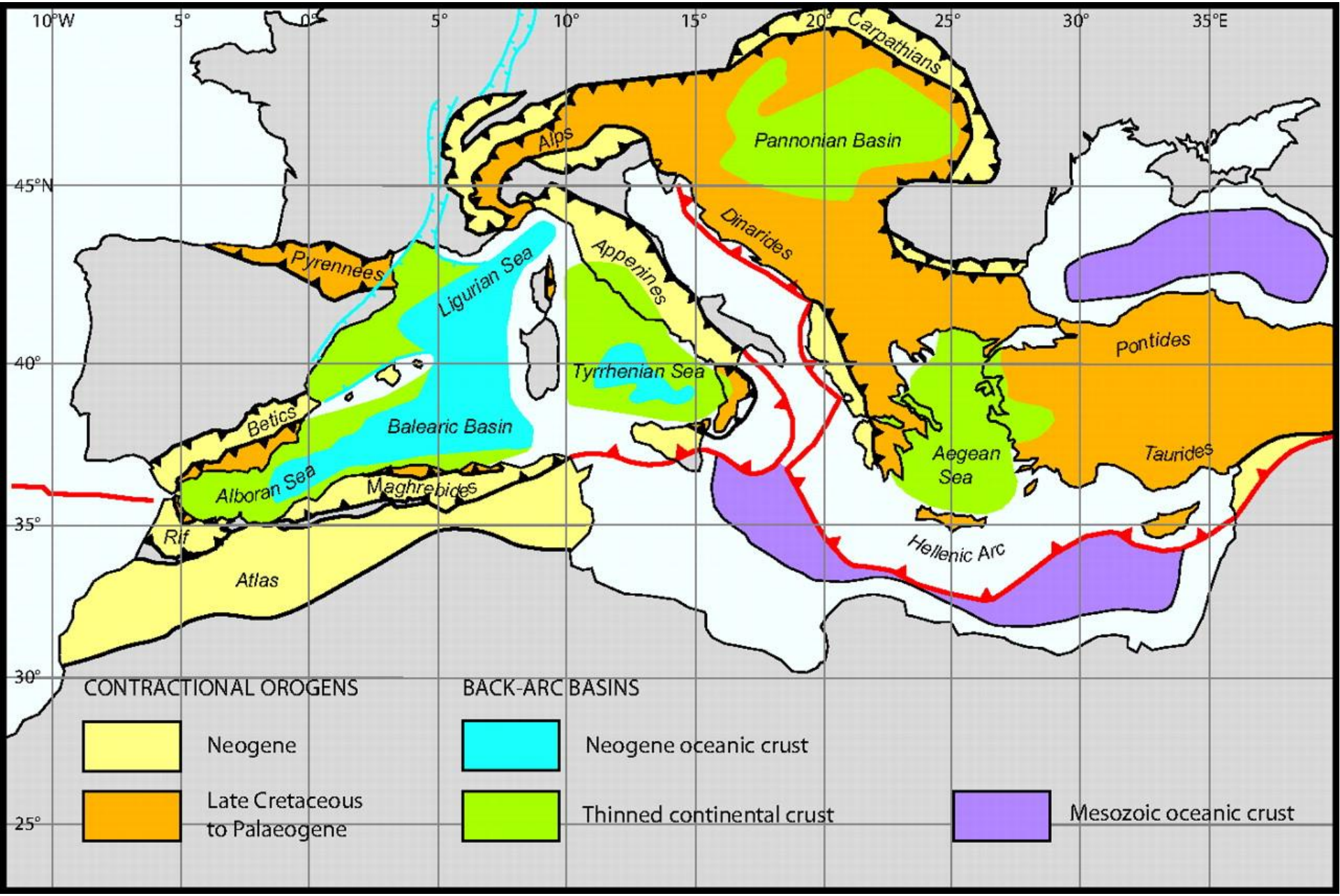


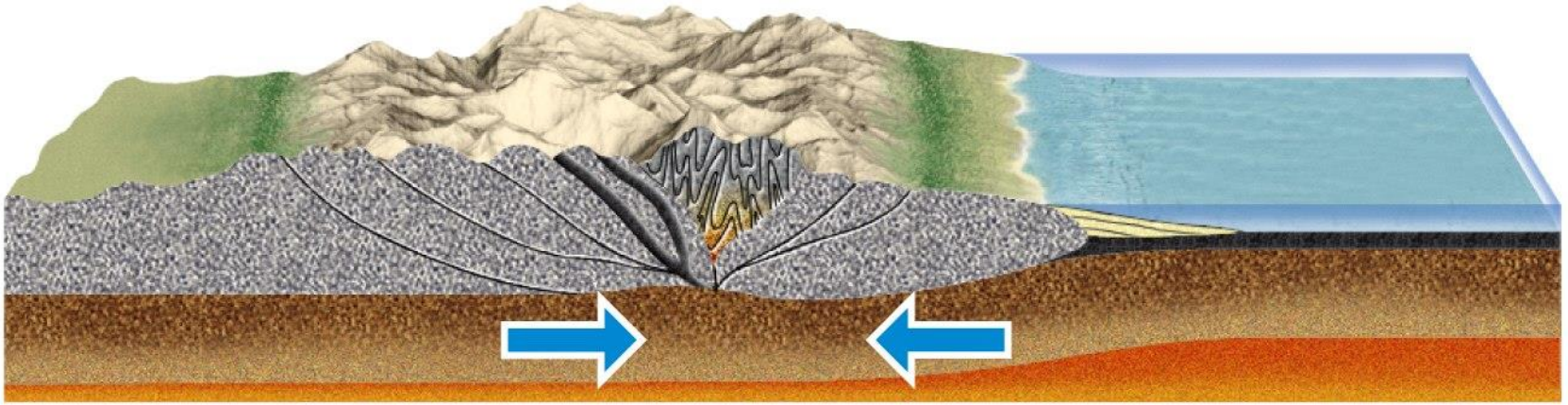
5 **Terrane accretion—from the sedimentary accretionary wedge or fragments carried by the subducting plate—welds material to the continent.**

Figure 10-18 part 5
Understanding Earth, Fifth Edition


PACIFIC OCEAN FLOOR
SIBERIA
ASIA
SEA OF OKHOTSK
BERING SEA
GULF OF ALASKA
SEA OF JAPAN
YELLOW SEA
EAST CHINA SEA
SOUTH CHINA SEA
PHILIPPINE SEA
NORTHWEST PACIFIC BASIN
CENTRAL PACIFIC BASIN
MENDOCINO FRACTURE ZONE
PIONEER FRACTURE ZONE
MURRAY FRACTURE ZONE
MOLOKAI FRACTURE ZONE
CLARION FRACTURE ZONE
CLIPPERTON FRACTURE ZONE
GALÁPAGOS FRACTURE ZONE
MARQUESAS FRACTURE ZONE
EASTER FRACTURE ZONE
CHALLENGER FRACTURE ZONE
AGASSIZ FRACTURE ZONE
MENARD FRACTURE ZONE
NORTH AMERICA
CENTRAL AMERICA
ROCKY MOUNTAINS
GREAT PLAINS
INDONESIA
NEW GUINEA
AUSTRALIA
CORAL SEA
TASMAN SEA
NEW ZEALAND
INDIAN OCEAN
SOUTH AUSTRALIAN BASIN
SOUTH FIJI BASIN
TONGA TRENCH
KERMADEC TRENCH
NEW HEBRIDES TRENCH
PERU-CHILE TRENCH
CAMPBELL PLATEAU
CHATHAM RISE
BOUNTY TROUGH

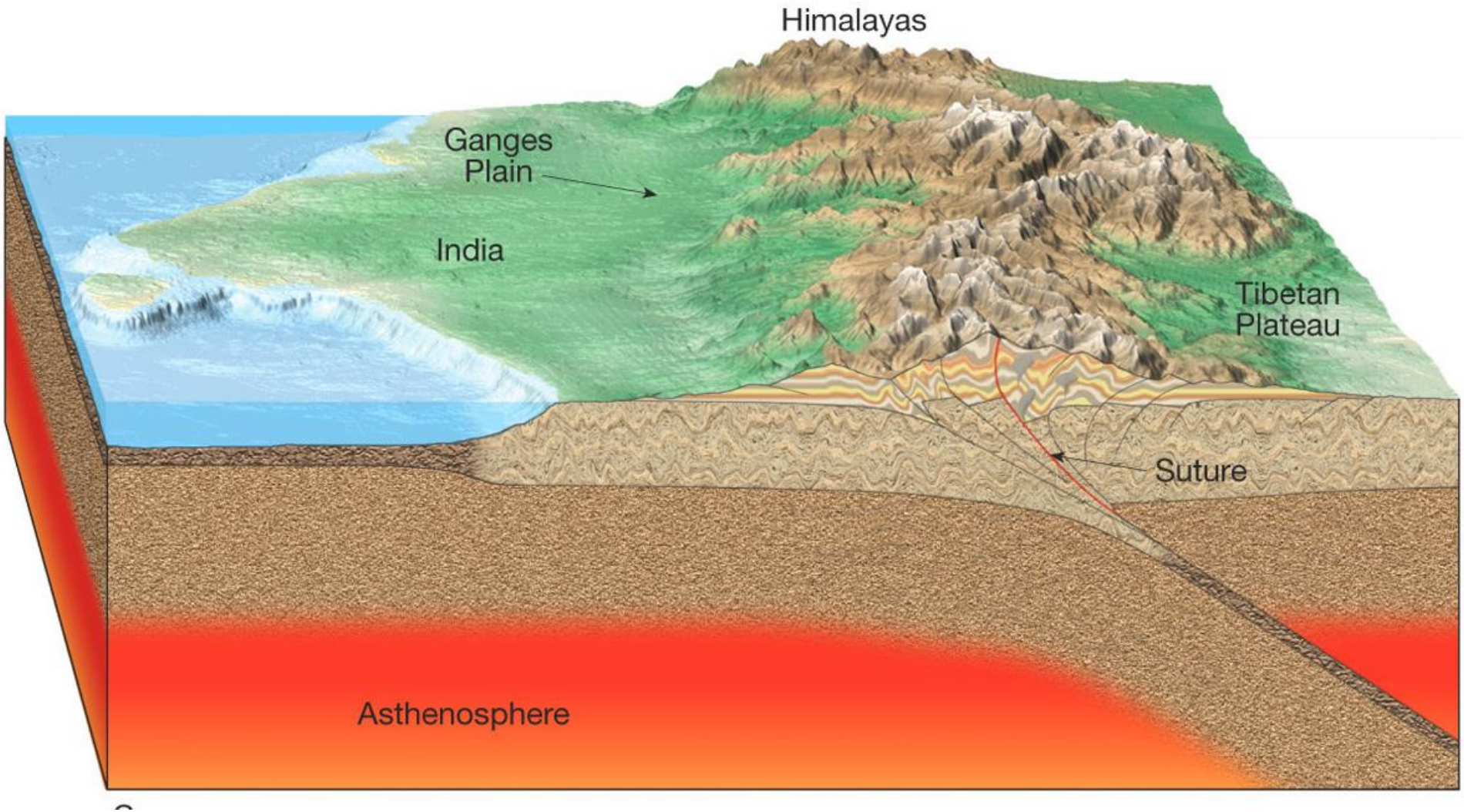

Face of the Earth
Eurasian Plate
Aegean Sea
Hellenic Trench
African Plate
UNAVCO 2011


10°W
5°
0°
5°
10°
15°
20°
25°
30°
35°E
45°N
40°
35°
30°
25°
Carpathians
Alps
Pannonian Basin
Dinarides
Pyrenees
Ligurian Sea
Appenines
Pontides
Tyrrhenian Sea
Betics
Balearic Basin
Aegean Sea
Taurides
Alboran Sea
Maghrebides
Rif
Atlas
Hellenic Arc
CONTRACTIONAL OROGENS
Neogene
Late Cretaceous to Palaeogene
BACK-ARC BASINS
Neogene oceanic crust
Thinned continental crust
Mesozoic oceanic crust

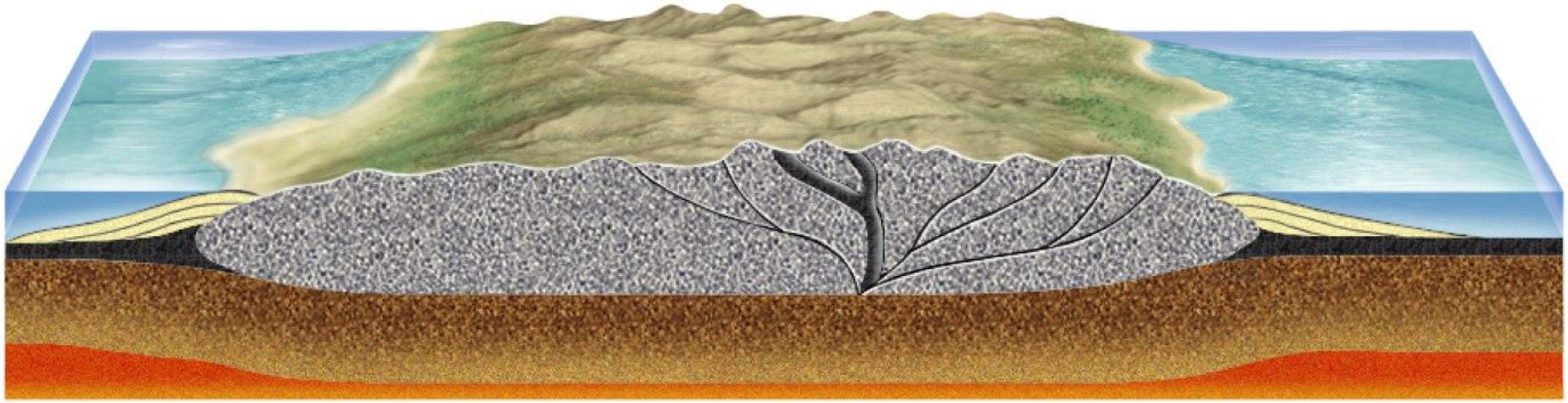


6 **As two continents collide, orogeny thickens the crust and builds mountains, forming a new supercontinent.**

Figure 10-18 part 6
Understanding Earth, Fifth Edition


Himalayas
Ganges
Plain
India
Tibetan
Plateau
Suture
Asthenosphere

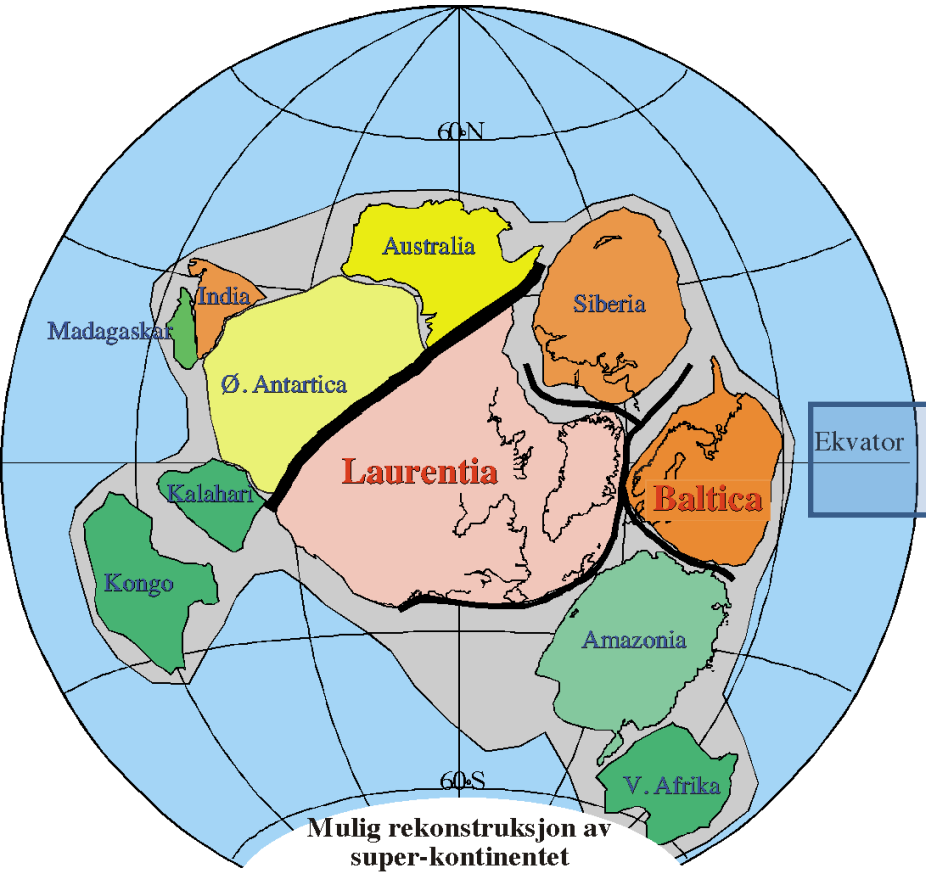
SUPERCONTINENTE



7 **The continent erodes, thinning the crust. Eventually the process may begin again.**

Figure 10-18 part 7
Understanding Earth, Fifth Edition

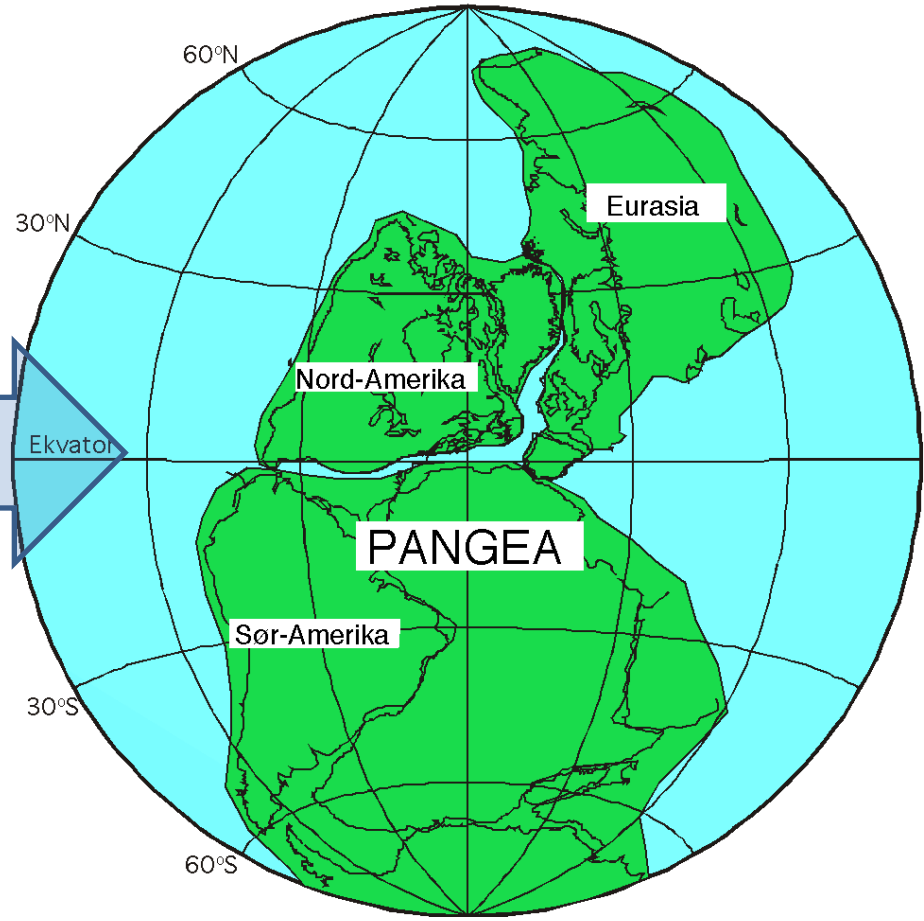
From Rodinia to Pangea and a future supercontinent??



Mulig rekonstruksjon av
super-kontinentet
RHODINA
i sen-proterosoikum
for ca 750 millioner år siden

Ekvator

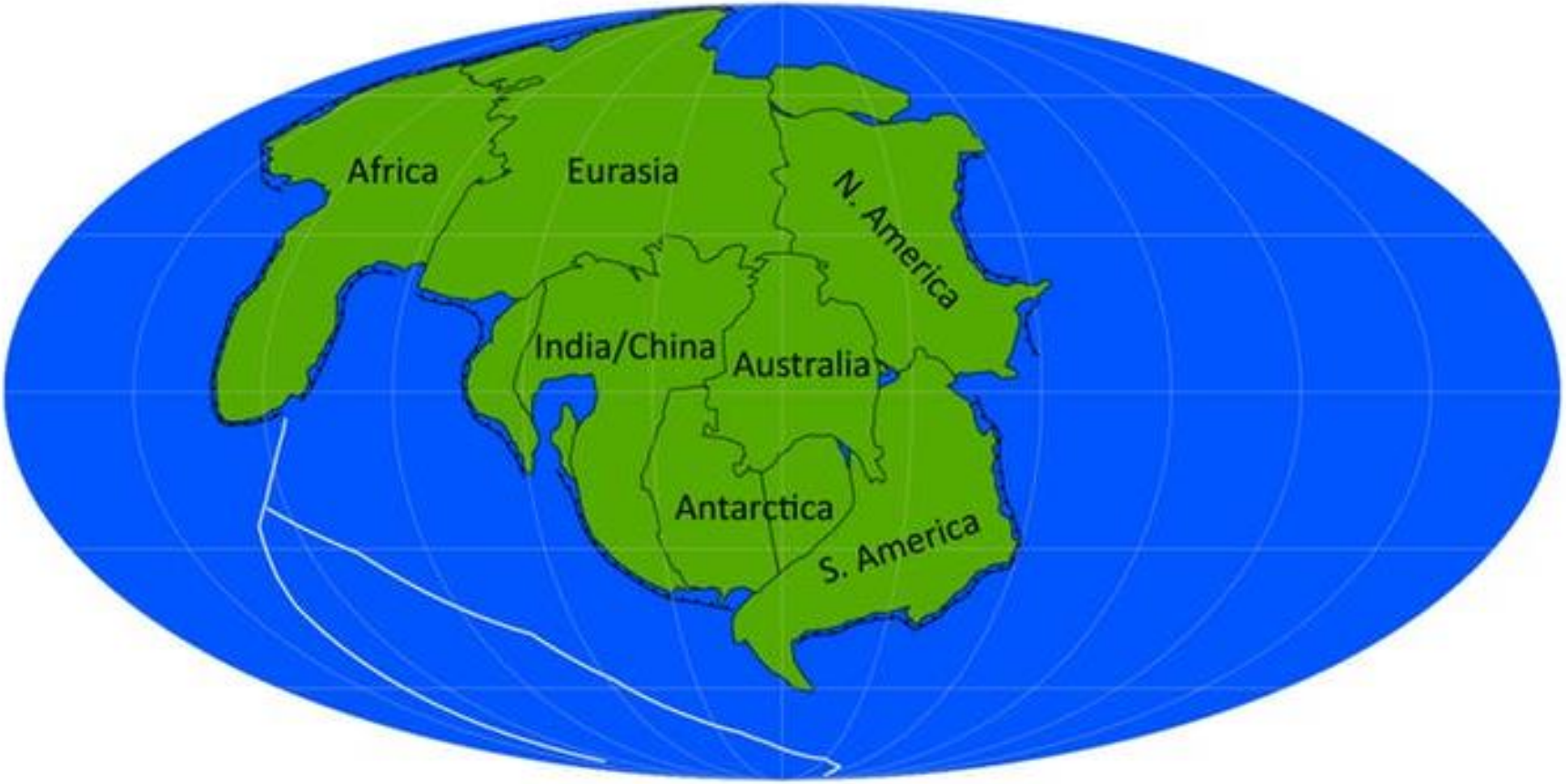
SUPERKONTINENTET PANGEA SENT I
PERMTIDEN, CA 255 MILLIONER ÅR SIDEN



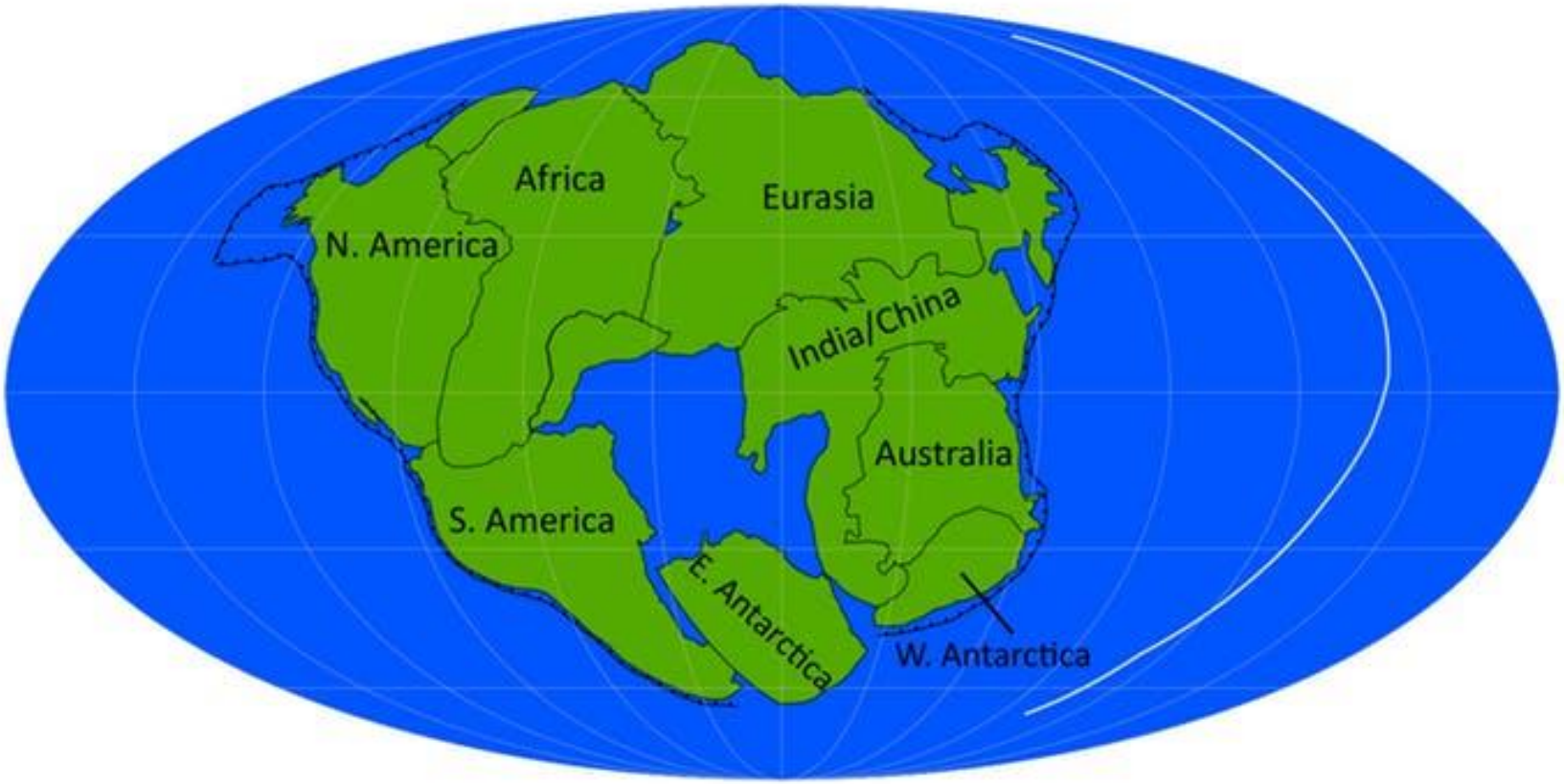
FUTURA PANXEA?

HIPÓTESES

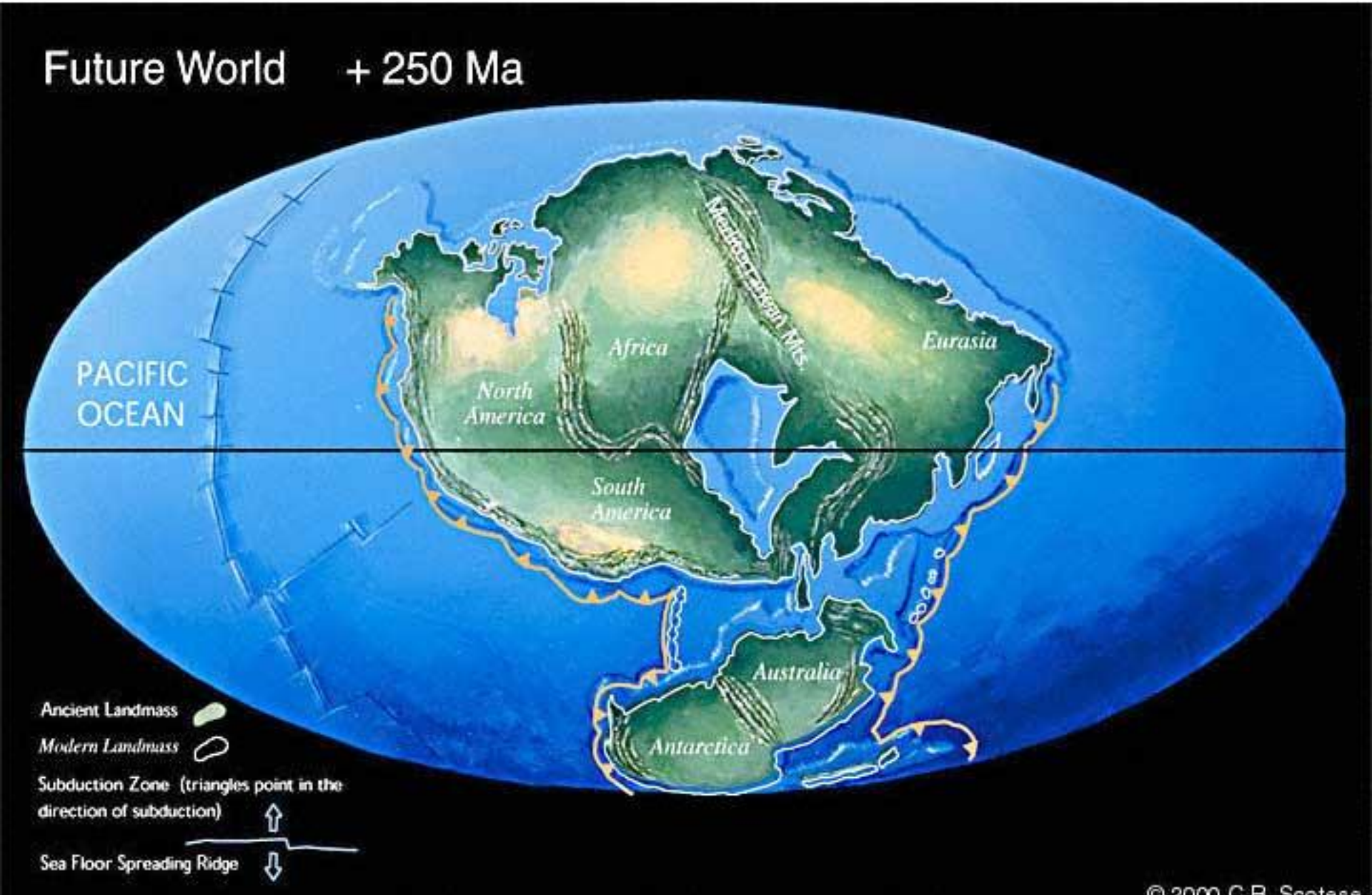
Novopangea
Unión polo outro lado



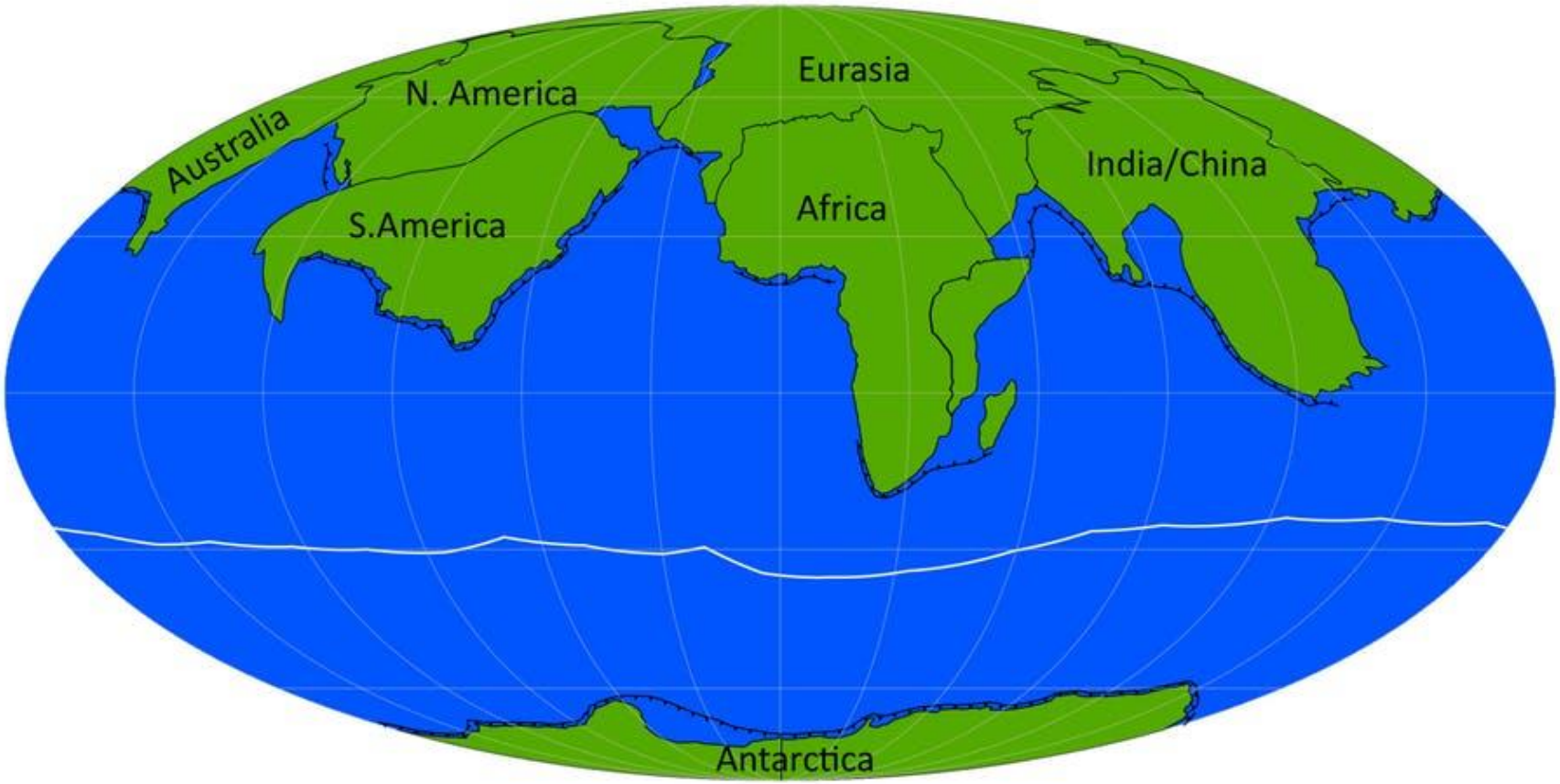
Pangea ultima



Fragmentación e reunificación da Panxea



Amasia


Australia
N. America
Eurasia
India/China
S.America
Africa
Antarctica

Aurica
Rotura de Eurasia

Geólogos rusos predicen que dentro de 20 millones de años el continente euroasiático se dividirá en dos partes a lo largo del lago Baikal, **a partir del cual surgirá un nuevo océano.**