بخش 5
ریفت ها - نقاط داغ- الاکوژن

وَمَنْ أَعْرَضَ عَن ذِكْرِي فَإِنَّ لَهُ مَعِيشَةً ضَنكًا
وَنَحْشُرُهُ يَوْمَ الْقِيَامَةِ أَعْمَى (طه١٢٤)

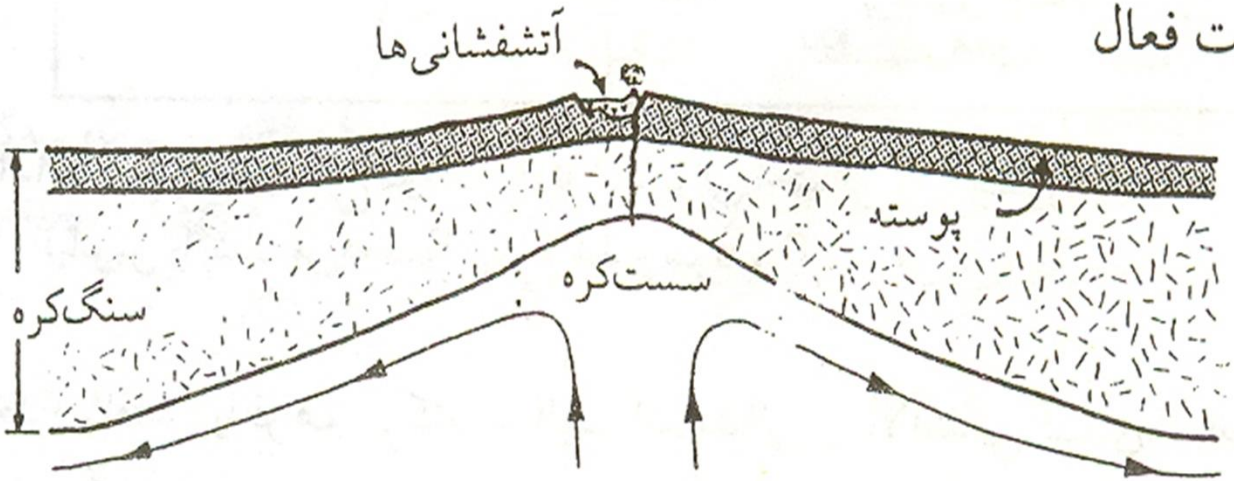
و هر كس از ياد من رويگردان شود زندگي تنگ
(و سختي) خواهد داشت،
.و روز قيامت او را نابينا محشور مي كنيم

انواع ریفت ها از نظر منشا:

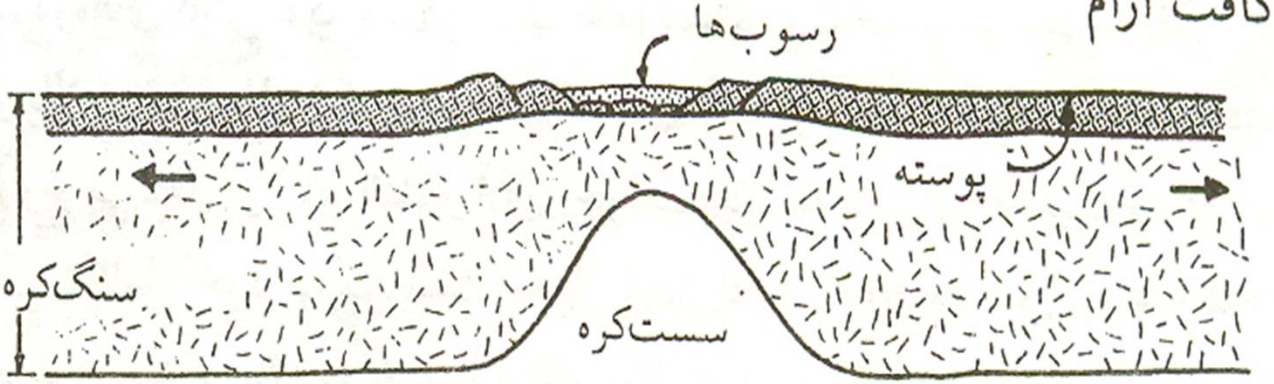
1- ریفت فعال شده گوشته ای

2-ریفت فعال شده لیتوسفری

کافت فعال



کافت آرام



شکل ۴-۲۰. رده‌بندی کافت‌های آرام و فعال (کاندی ۱۹۸۹).

Models of Early Continental Breakup

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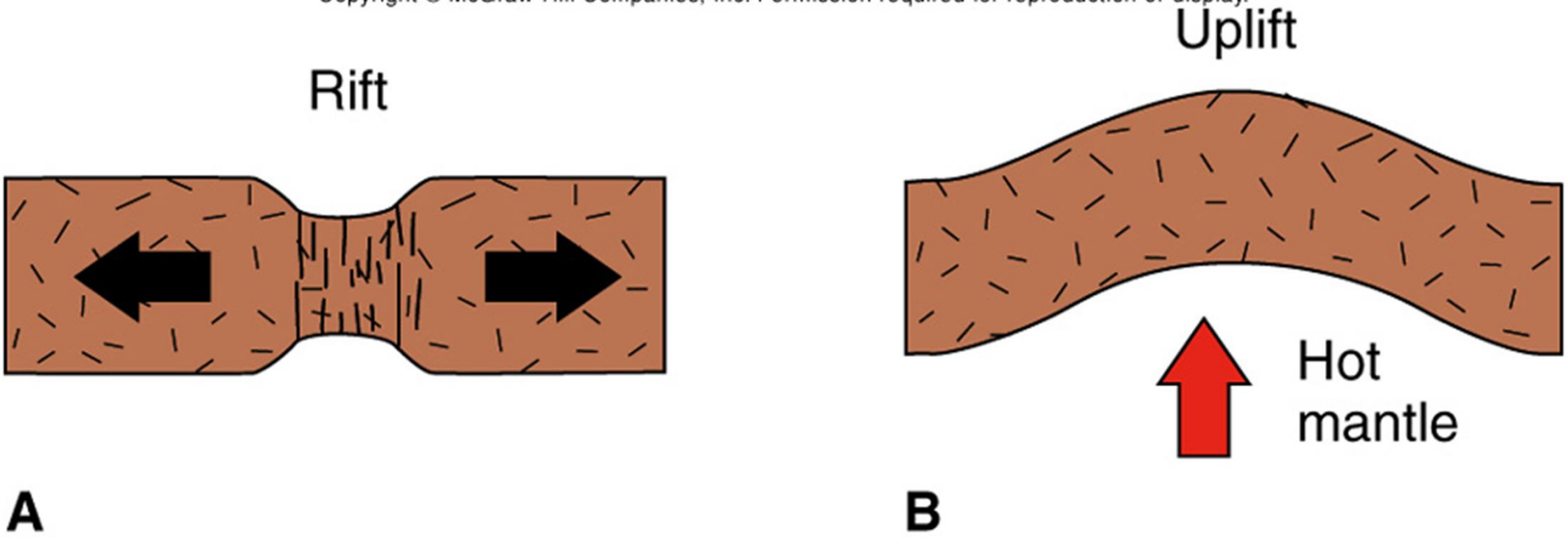

انواع ریفت ها از نظر سیستم:

1- سیستم کشیده وباریك

2-سیستم کوتاه و باریك

3- سیستم بسیار وسیع

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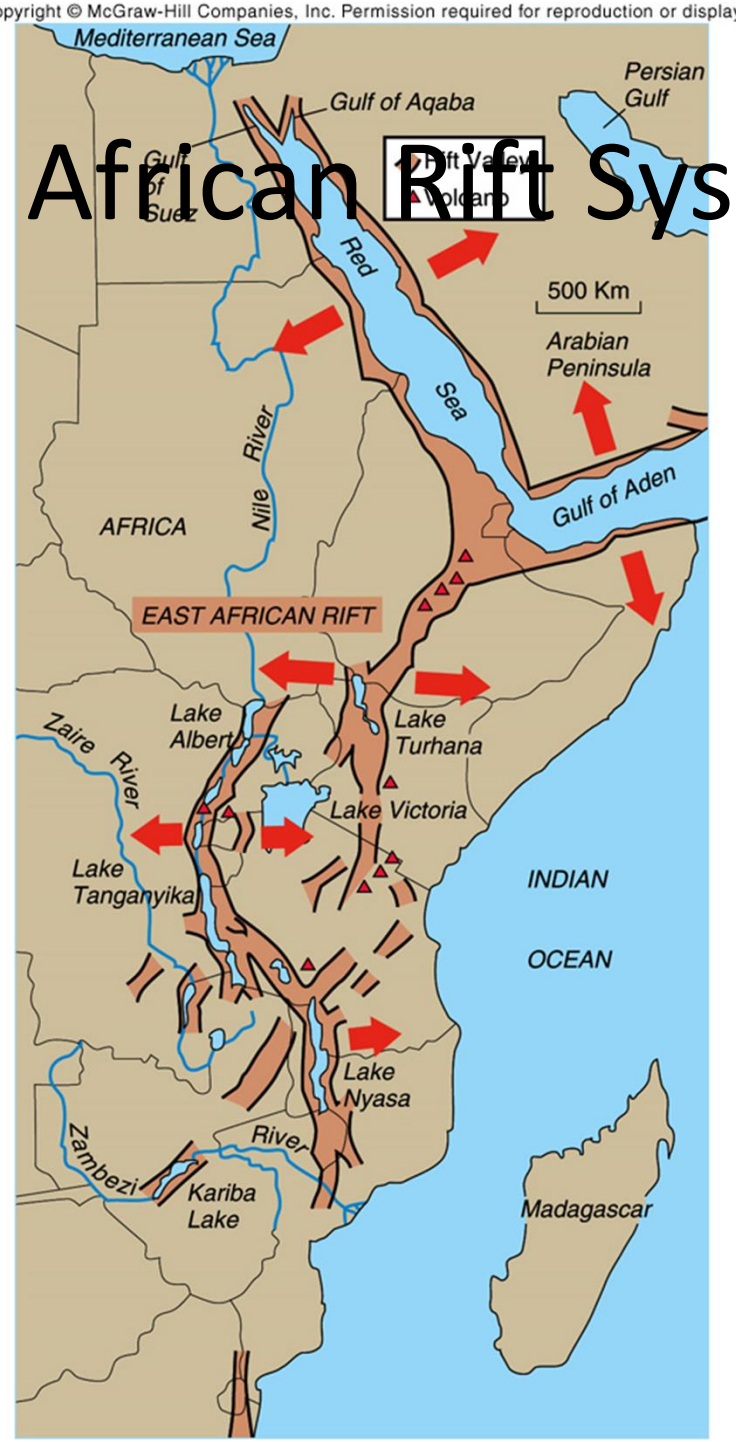
East African Rift System



شکل ۴-۲۱. توالی آرمانی تشکیل کافت‌های برخوردزاد گرابن راین. (الف) همگرایی آفریقا و اروپا؛ (ب) برخورد پیشرفتگی موجود در حاشیهٔ اروپا، با قاره آفریقا و آغاز تشکیل کافت؛ (ج) بخیه‌شدن قاره‌ها و گسلش امتدادلغز همراه با دگرشکلی (کاندی، ۱۹۸۹).

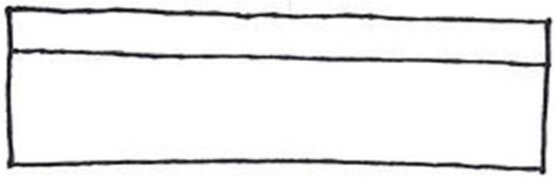
Active rift system in the Basin and Range province

The Basin and Range Province

Boundaries and Landmarks

Scale = 1: 200,000

A.



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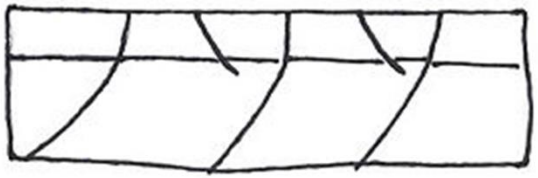
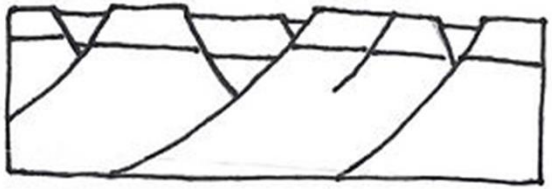
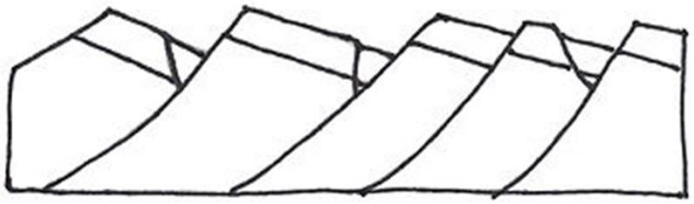


C.



D.



Formation of Basin and Range topography by crustal extension:

A. No deformation has taken place.

B. Formation of listric normal faults.

C. Faults connect at depth forming horst and graben geometry.

D. Fault blocks form series of peaks and valleys.

Models of Early Continental Breakup

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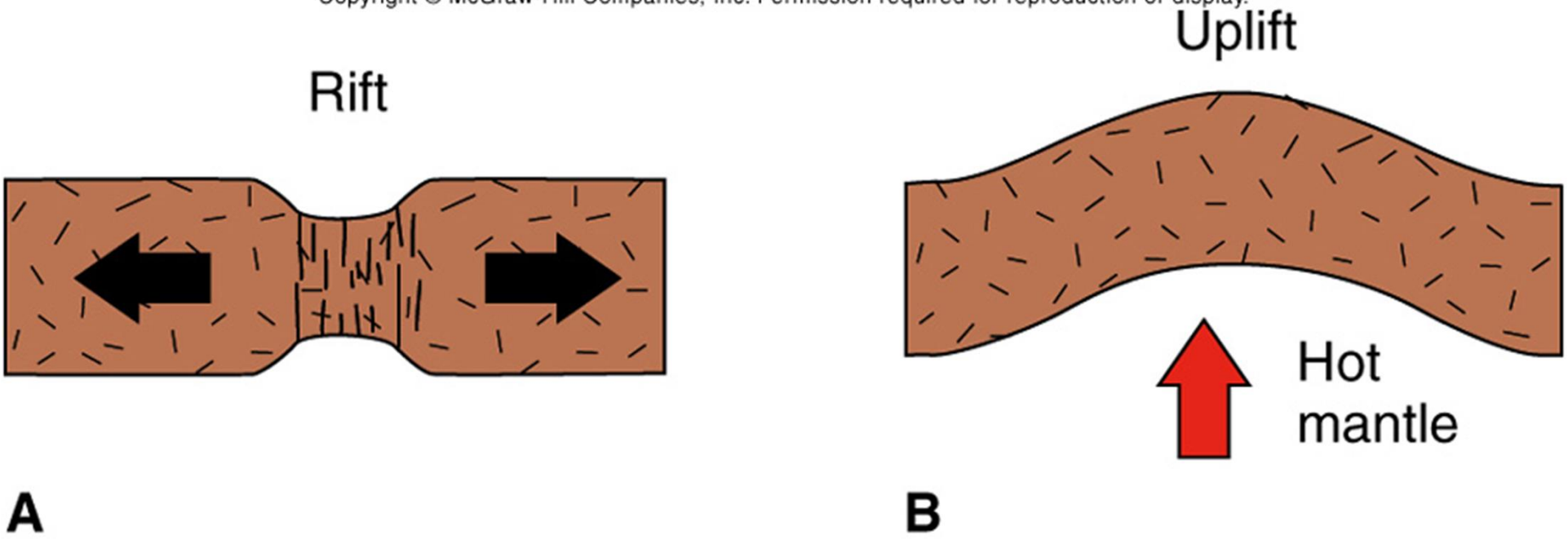

Continental Breakup Caused by a Mantle Plume

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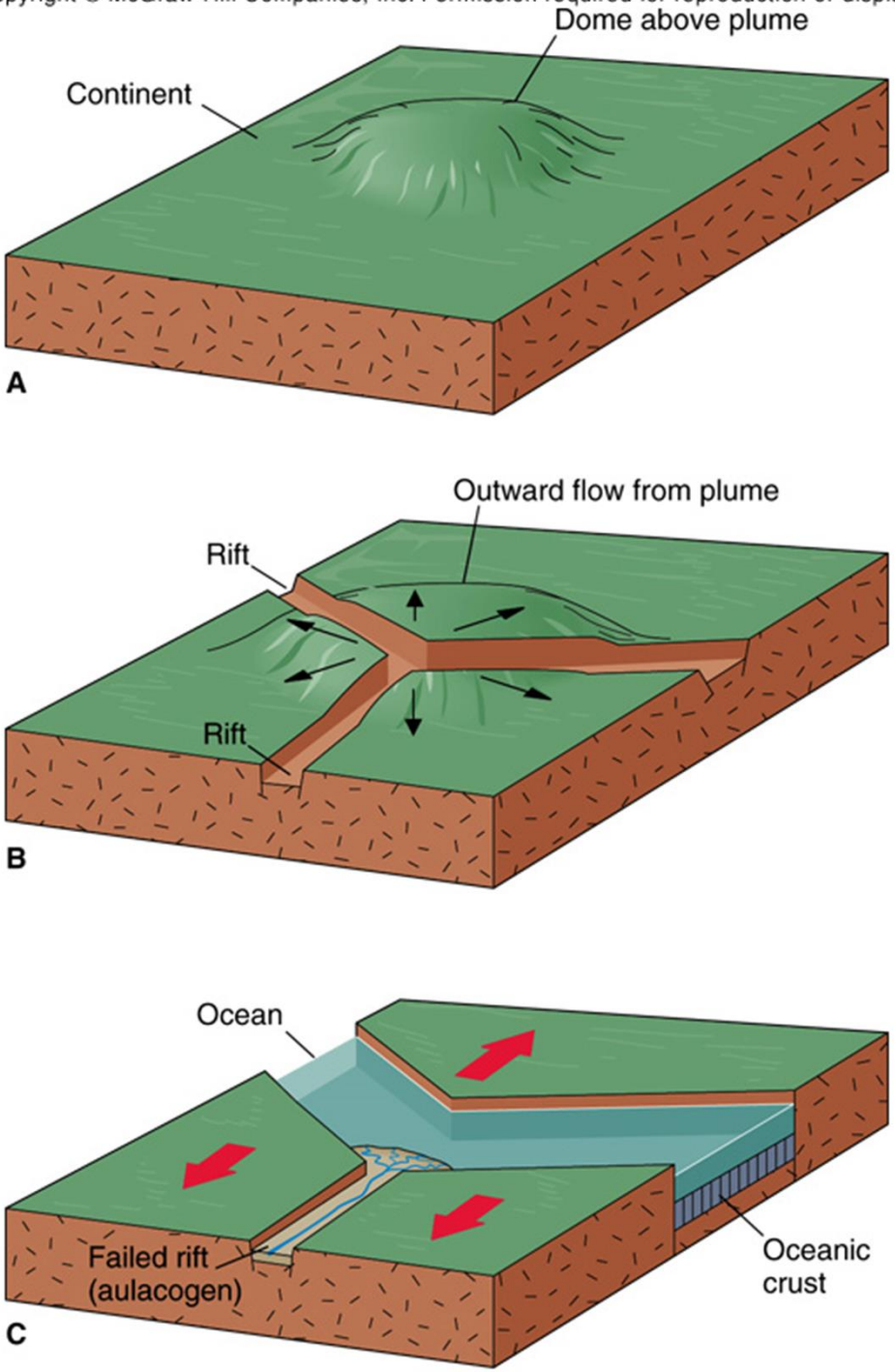
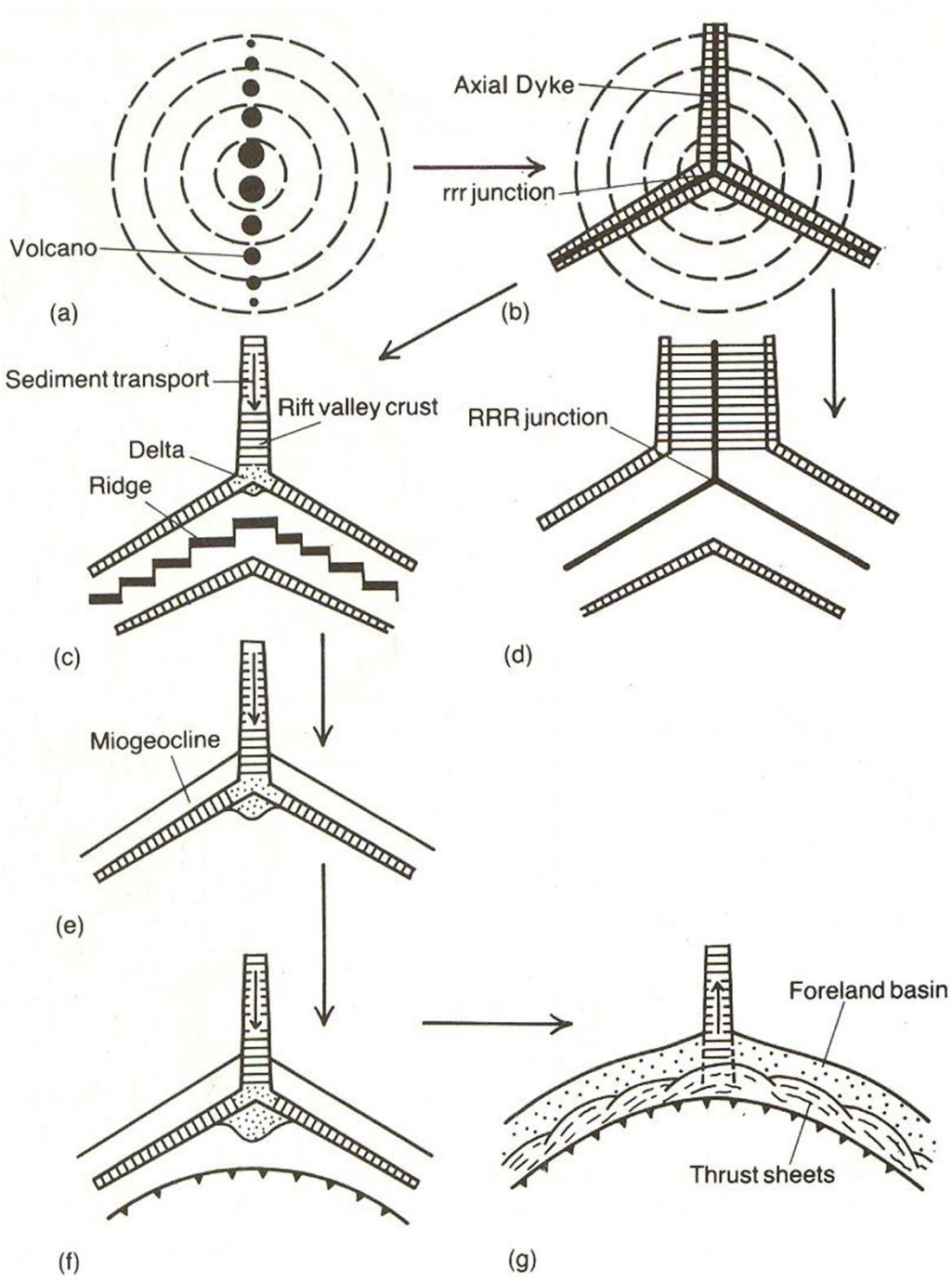
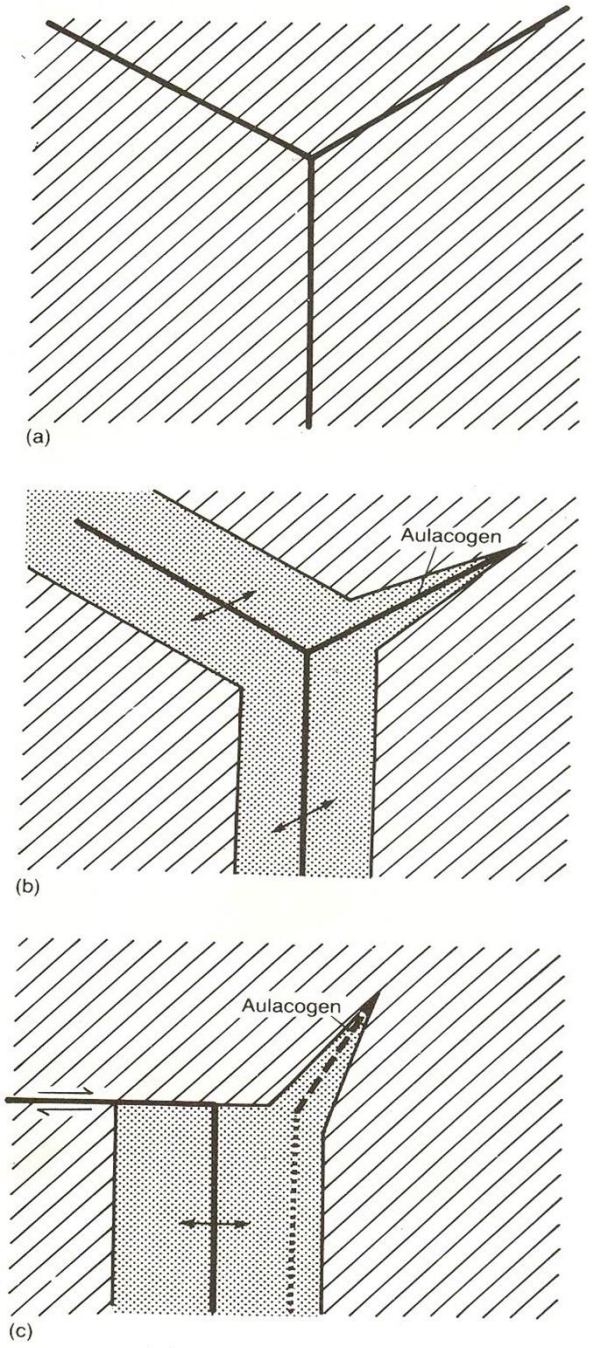



Volcano
(a)
Axial Dyke
rrr junction
(b)
Sediment transport
Rift valley crust
Delta
Ridge
(c)
RRR junction
(d)
Miogeocline
(e)
(f)
Foreland basin
Thrust sheets
(g)


(a)
Aulacogen
(b)
Aulacogen
(c)

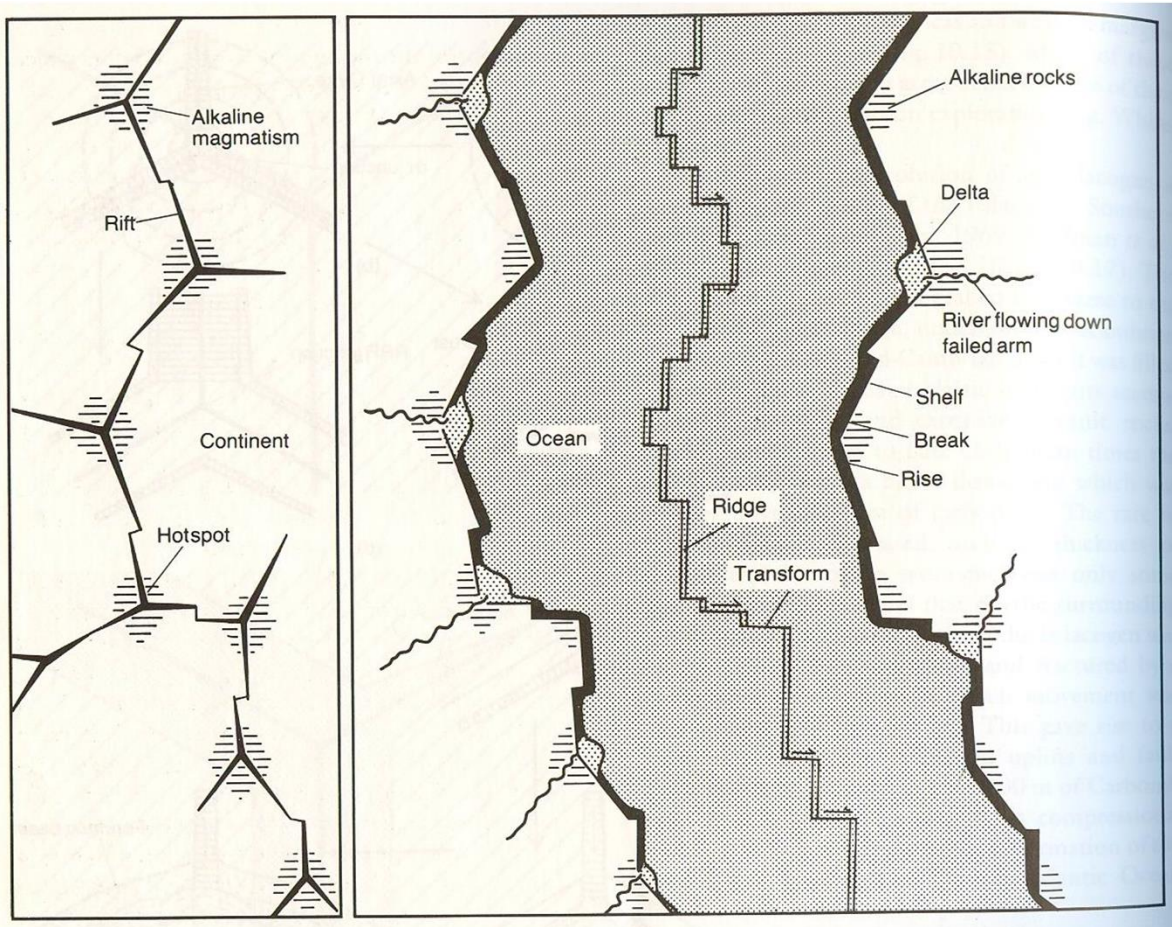


Fig. 10.14 Evolution of a continental rift to continental

more commonly interpreted in terms of the passage

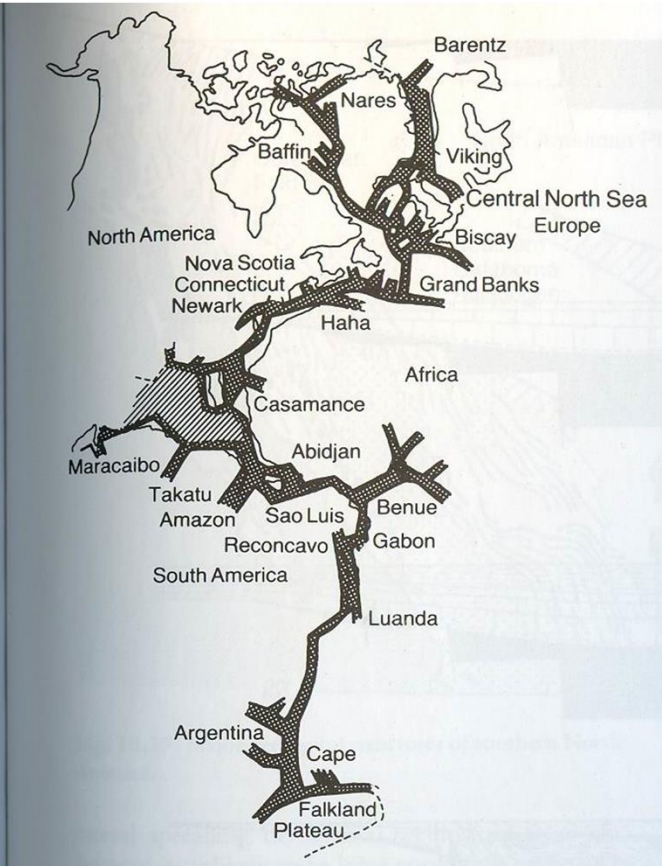
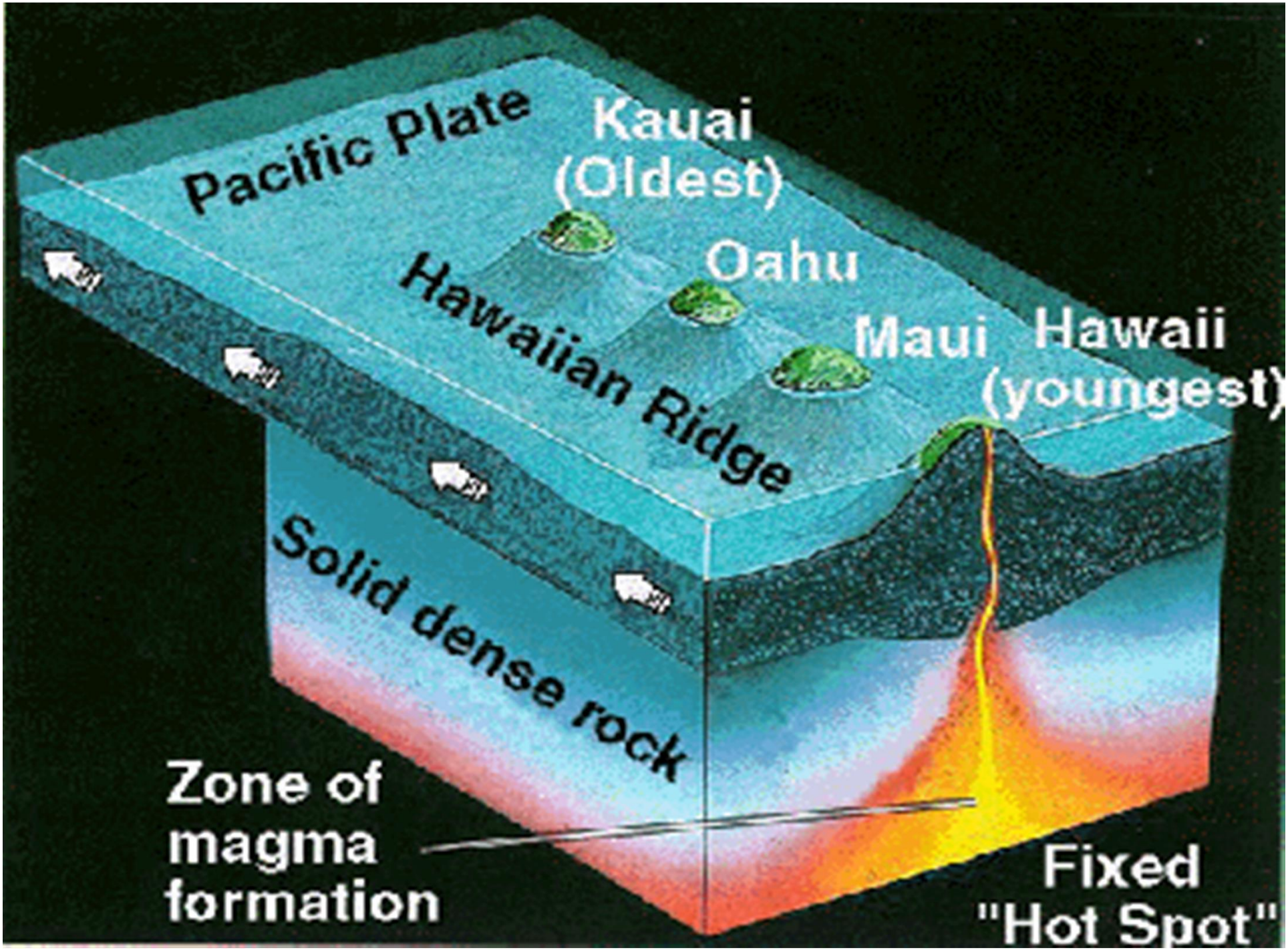


Fig. 10.15 Aulacogens developed around the Atlantic Ocean as a result of the model shown in Fig. 10.14 (redrawn from Burke, 1976).

نقاط داغ
Hot spots


Pacific Plate
Kauai
(Oldest)
Oahu
Maui
Hawaii
(youngest)
Hawaiian Ridge
Solid dense rock
Zone of
magma
formation
Fixed
"Hot Spot"

es of Mantle Plumes

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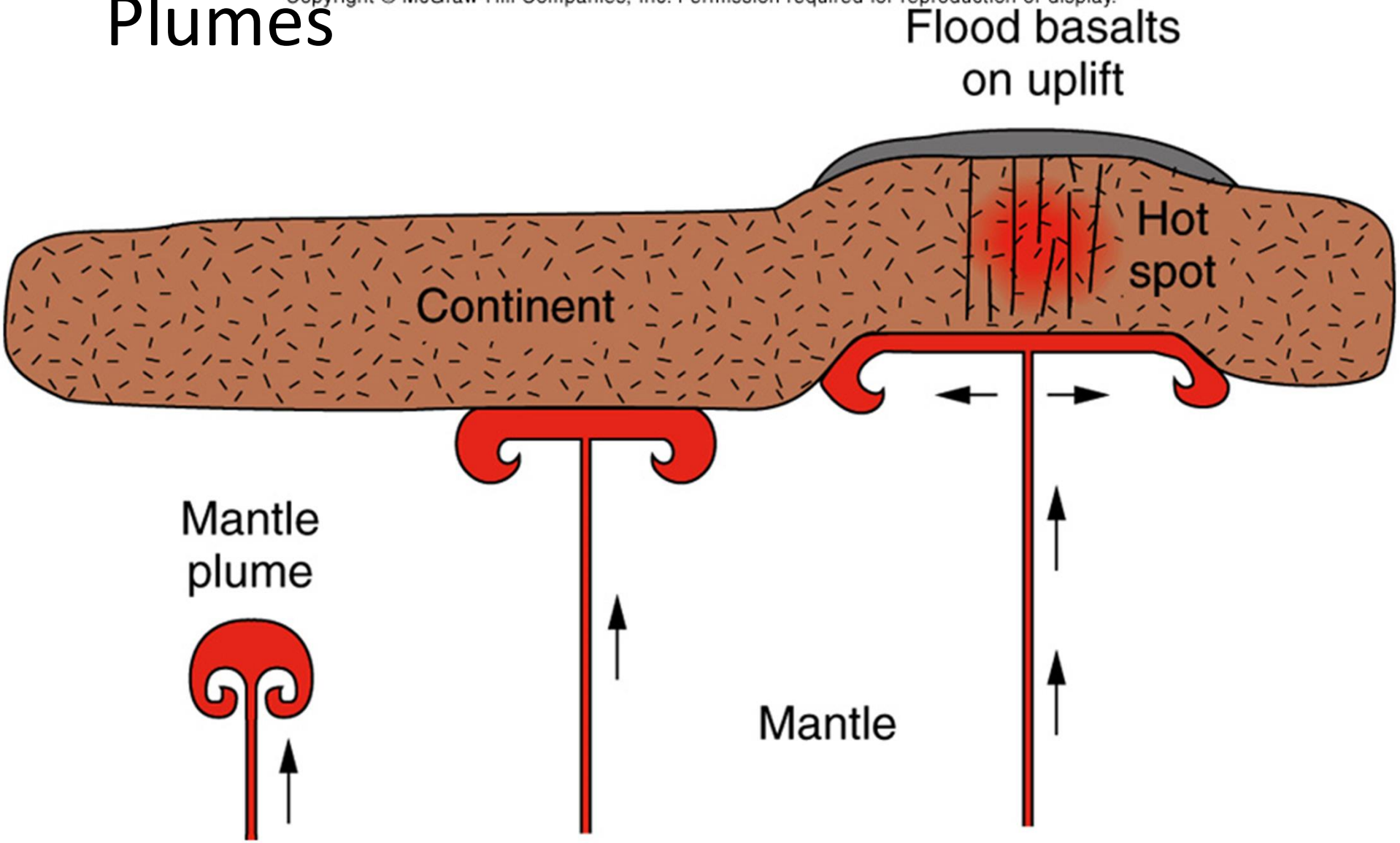
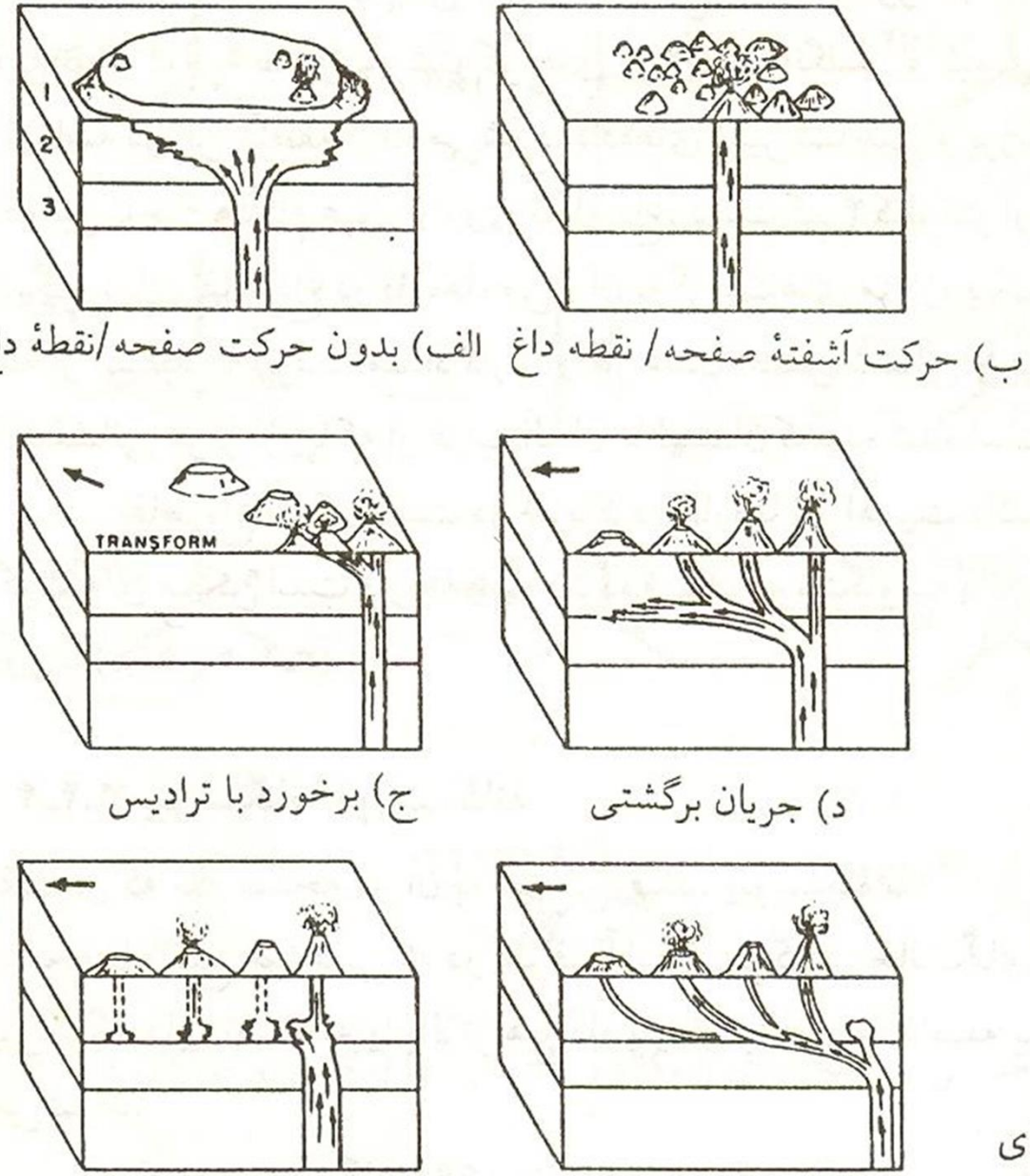




الف) بدون حرکت صفحه/نقطهٔ داغ

ب) حرکت آشفتهٔ صفحه/ نقطه داغ

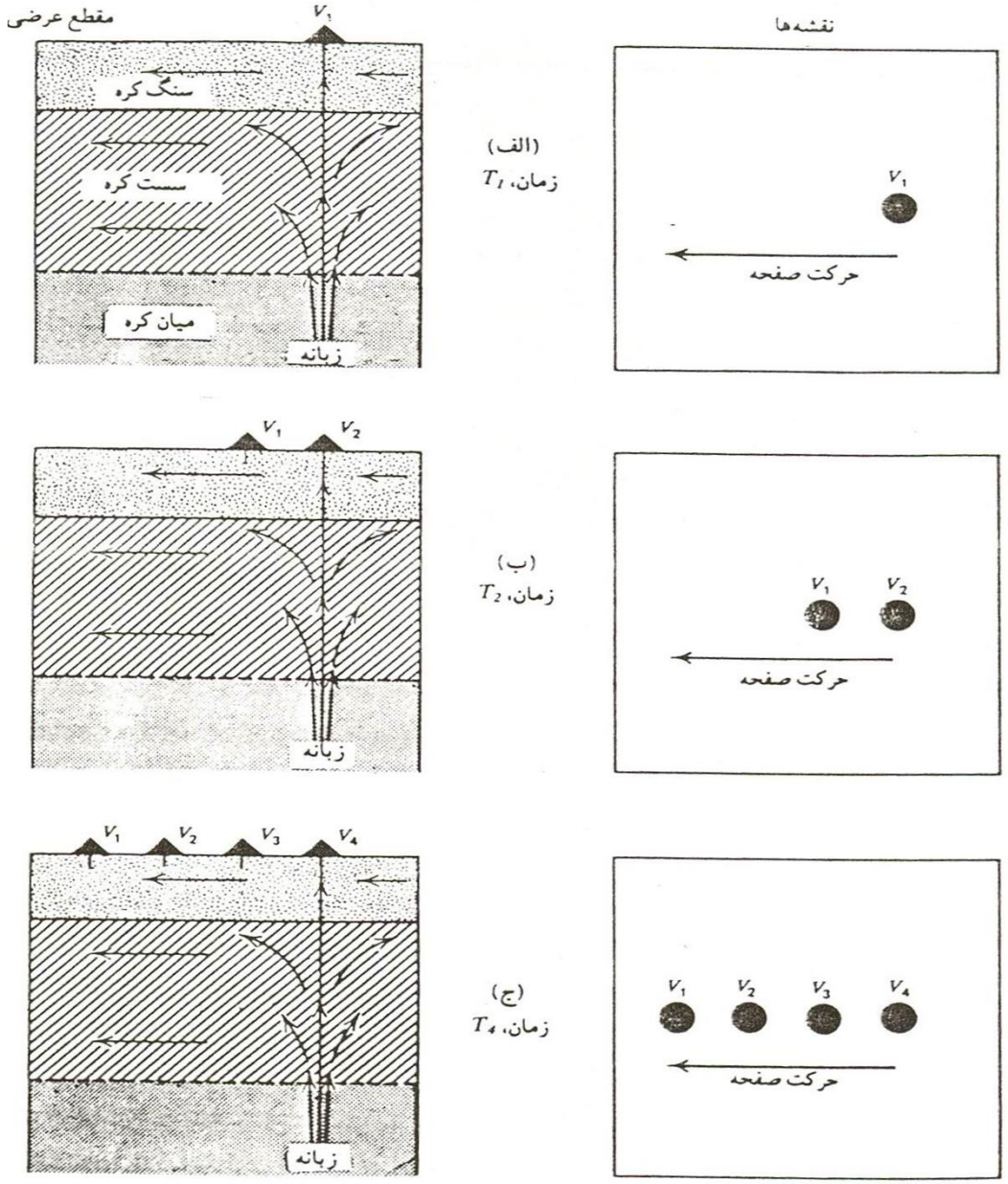
ج) برخورد با ترادیس

د) جریان برگشتی

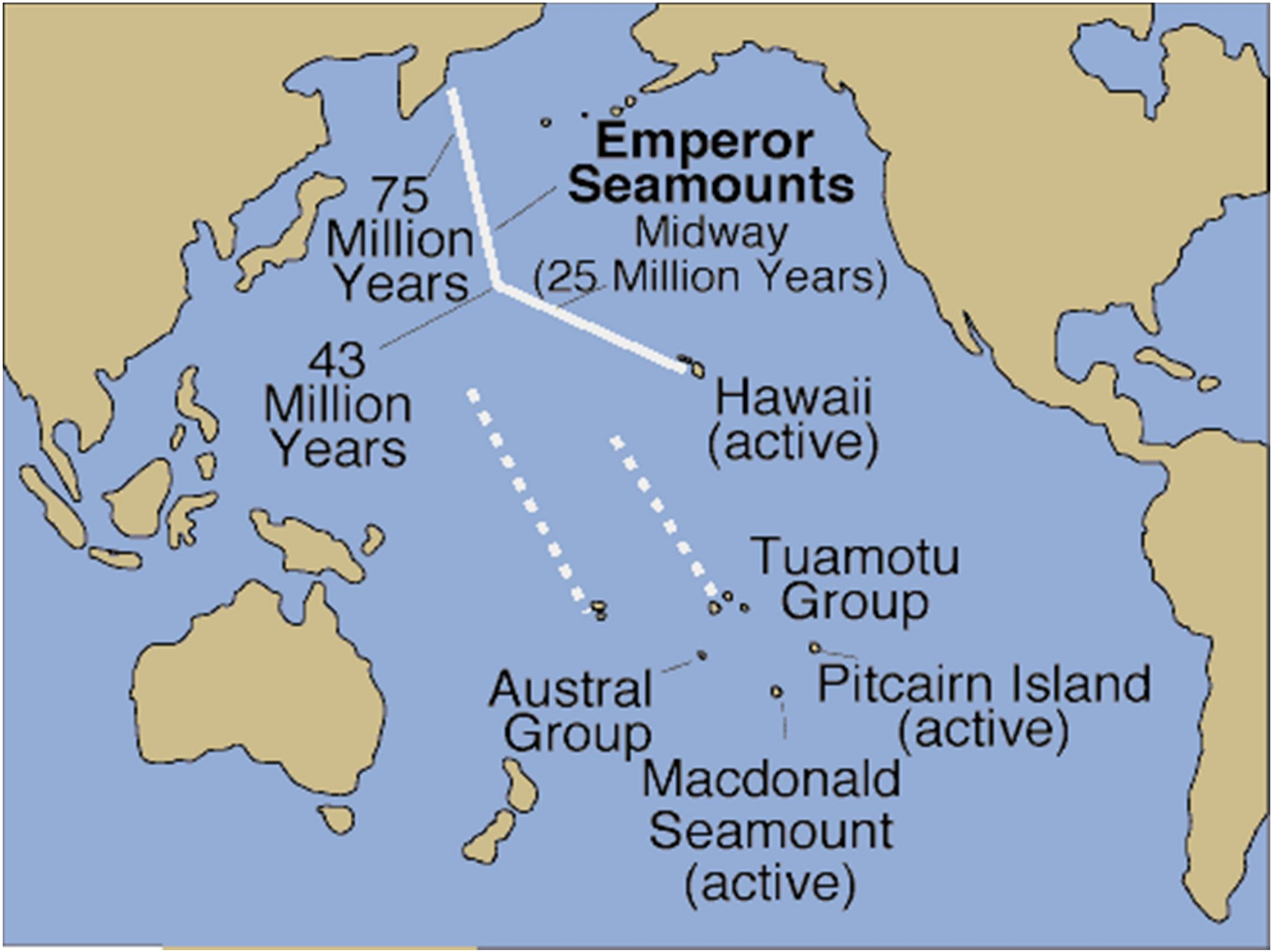
ه) ذخیره‌سازی ماگما

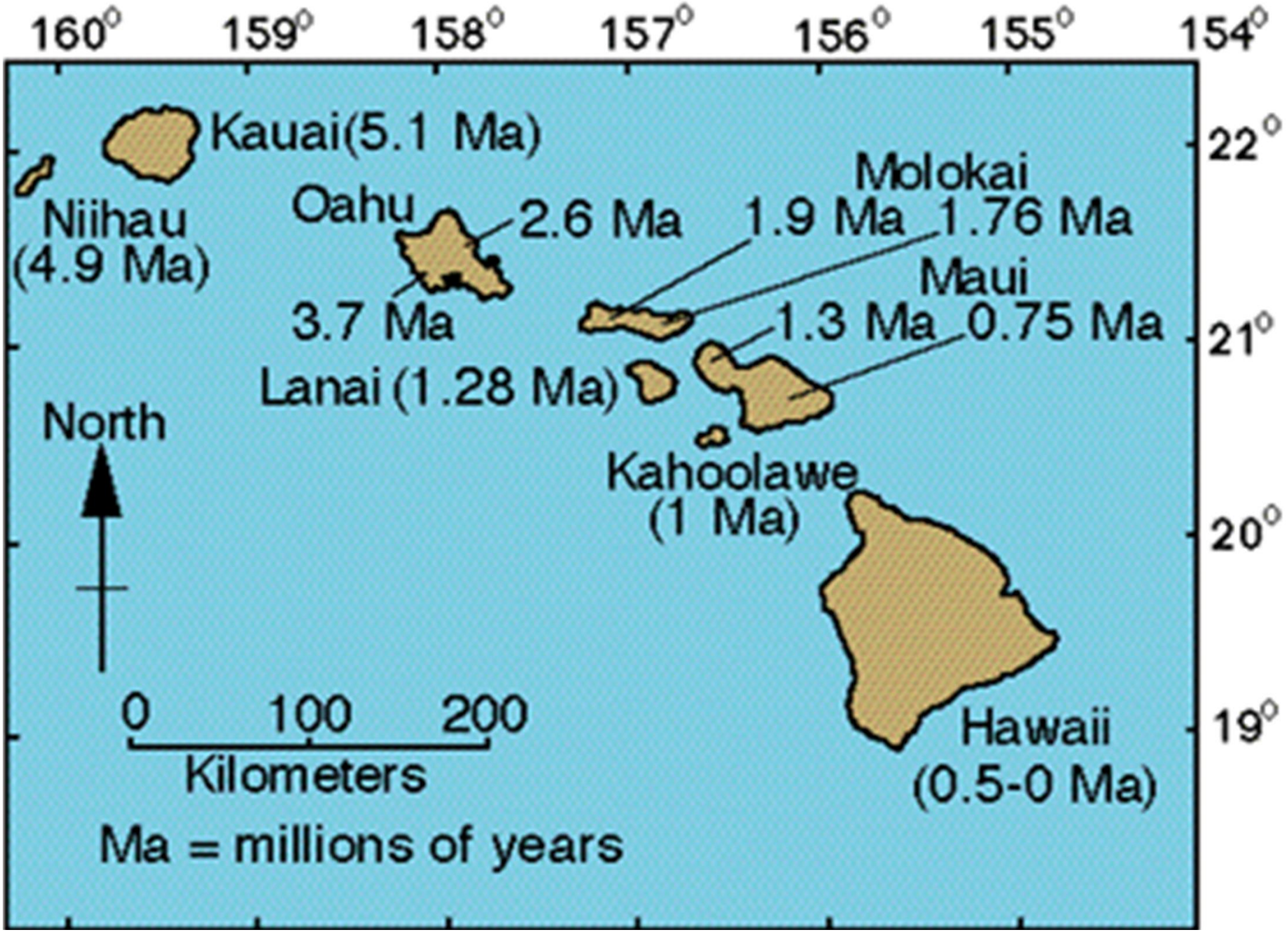
و) گذرگاه خمیده

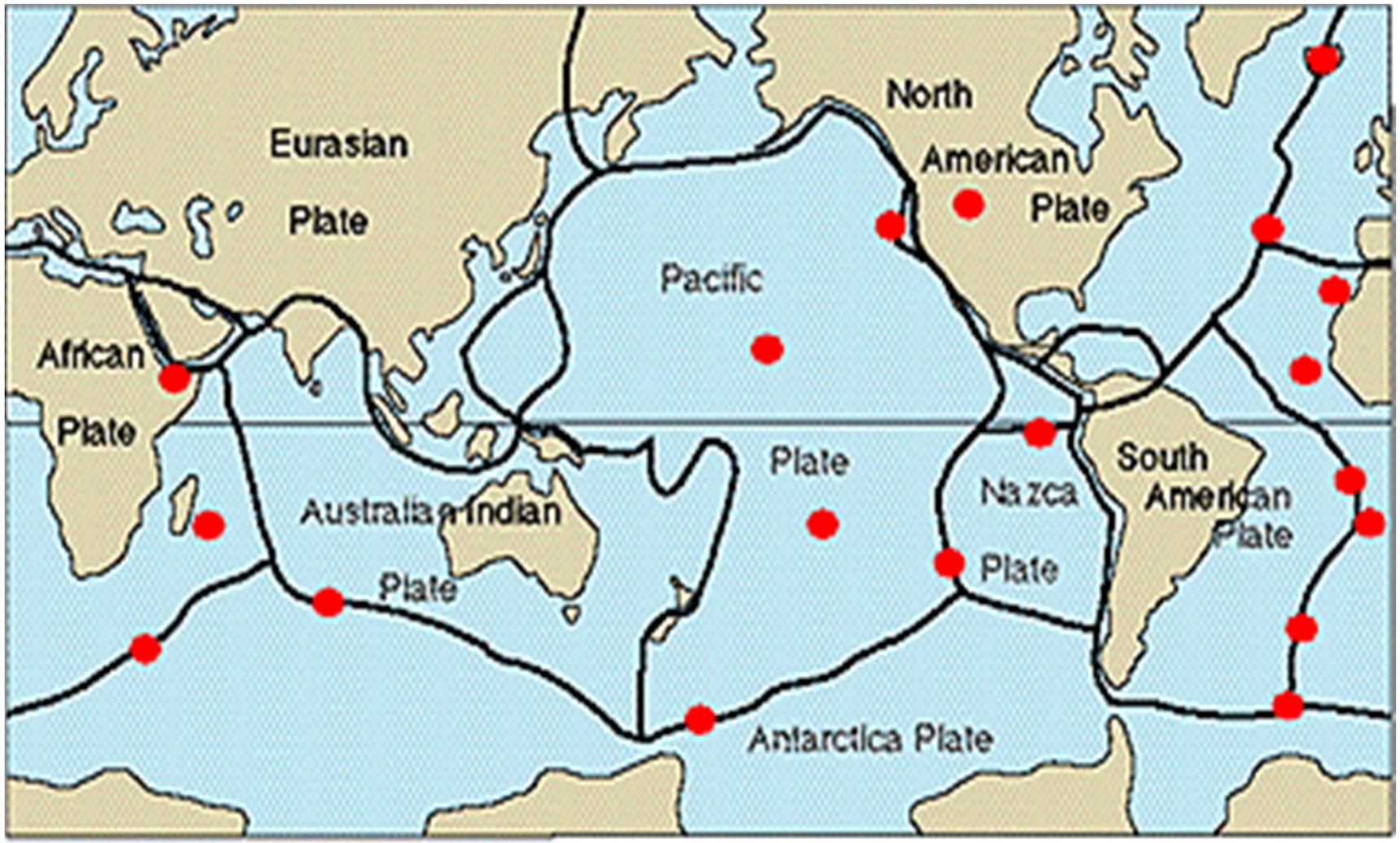
شکل ۴-۲۴. برخی برهم‌کنش‌های احتمالی صفحات سنگ‌کره‌ای و نقاط داغ (کاندی، ۱۹۸۹).



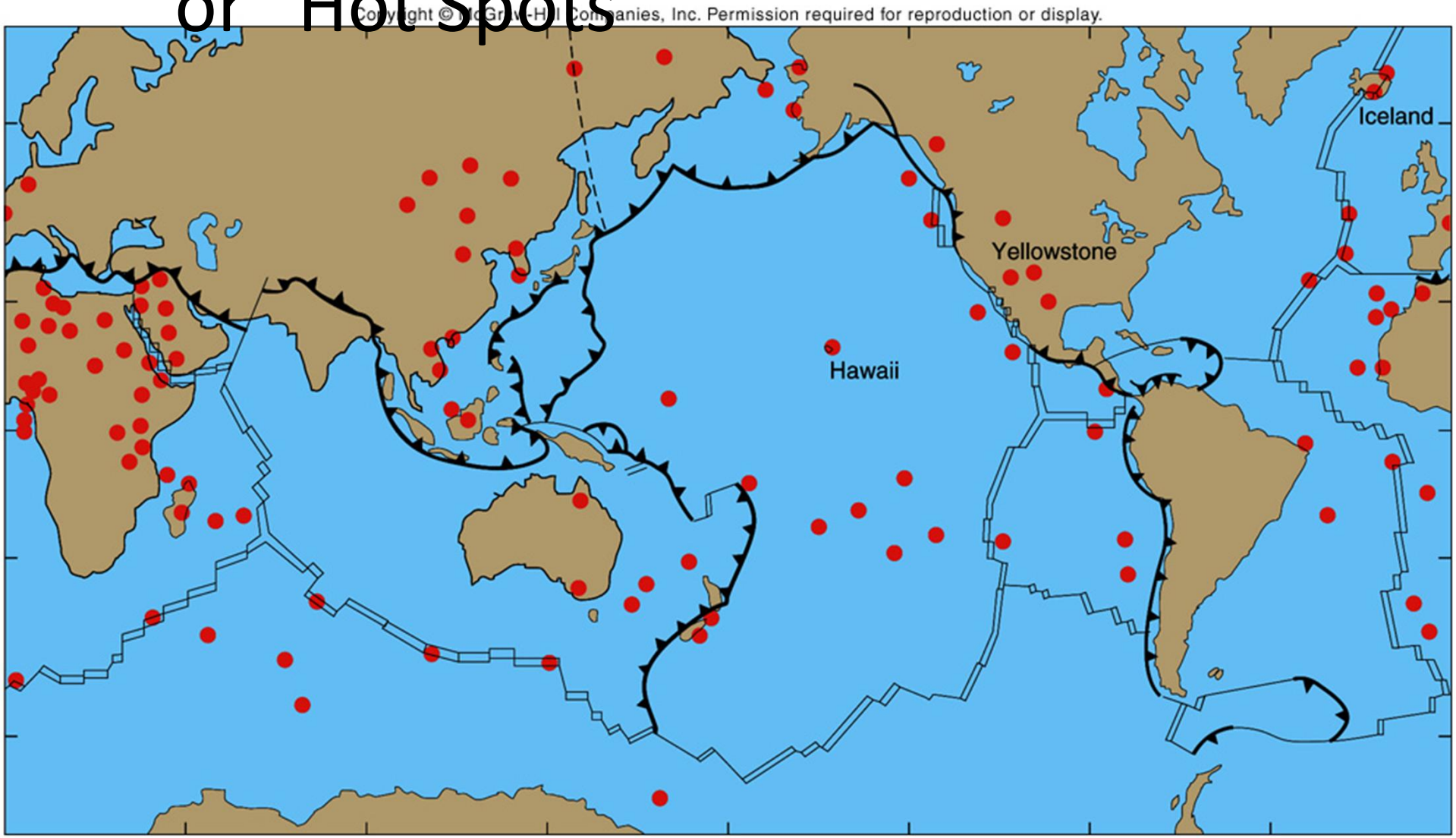
شکل ۱۶ـ۹ این شکل نمایش نمودار گونه‌ای است از اینکه چگونه یك نقطهٔ داغ ثابت می‌تواند رشته‌ای از آتشفشانها را ایجاد کند که سنسان از یك سر به سر دیگر افزایش می‌یابد. رشته جزایر آتشفشانی هاوایی مثالی از این پدیده است. آتشفشانهای کهنسال‌تر V_1، V_2 و V_3 در اثر حرکت صفحهٔ سنگ کره از روی منبع گدازه دور شده و به خاموشی گراییده‌اند.


Emperor
Seamounts
Midway
(25 Million Years)
75
Million
Years
43
Million
Years
Hawaii
(active)
Tuamotu
Group
Austral
Group
Pitcairn Island
(active)
Macdonald
Seamount
(active)

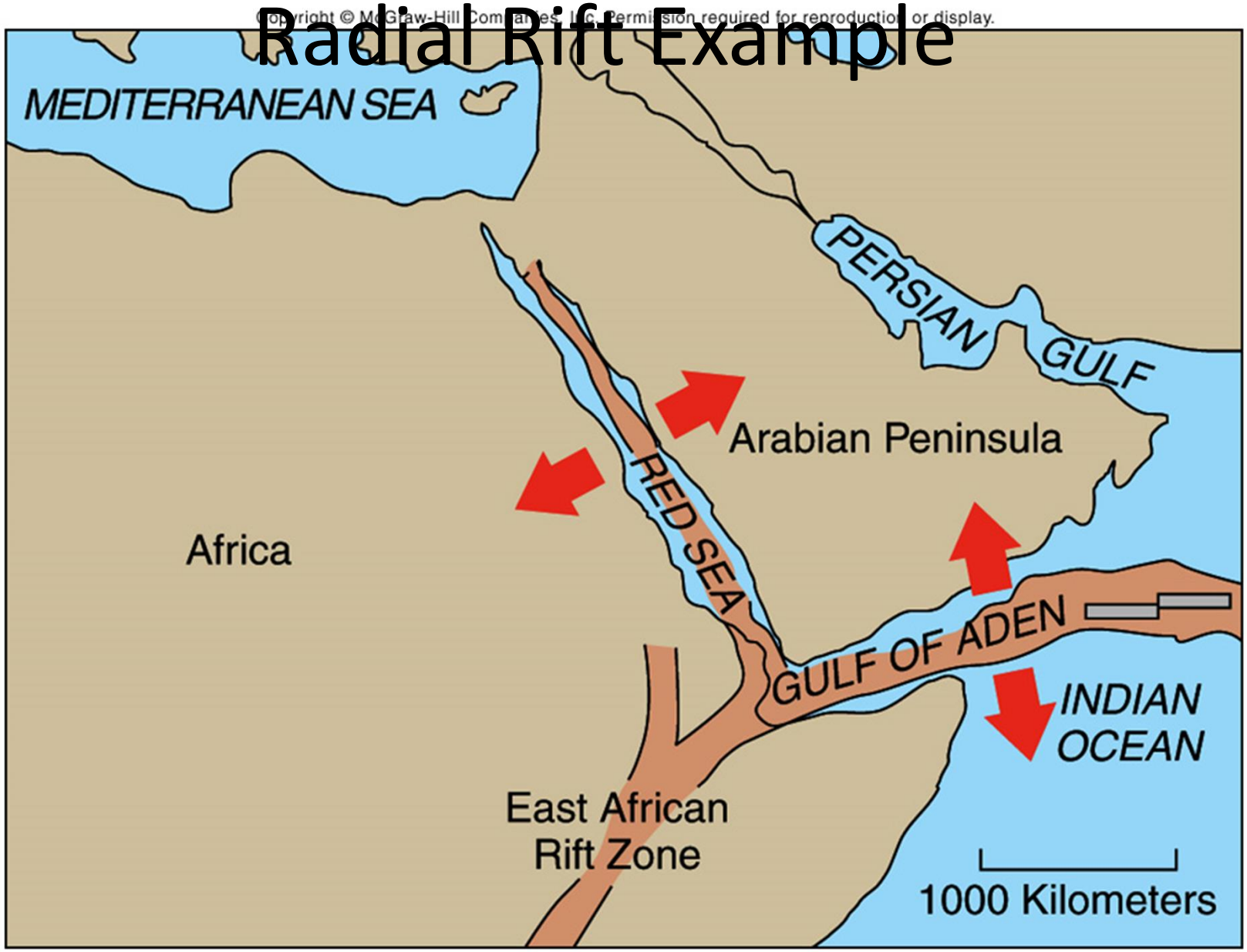

160°
159°
158°
157°
156°
155°
154°
22°
21°
20°
19°
Kauai(5.1 Ma)
Niihau
(4.9 Ma)
Oahu
2.6 Ma
3.7 Ma
Molokai
1.9 Ma
1.76 Ma
Maui
1.3 Ma
0.75 Ma
Lanai (1.28 Ma)
Kahoolawe
(1 Ma)
Hawaii
(0.5-0 Ma)
North
0
100
200
Kilometers
Ma = millions of years


Eurasian
Plate
North
American
Plate
Pacific
African
Plate
Plate
Australian-Indian
Plate
Plate
Nazca
Plate
South
American
Plate
Antarctica Plate
= HOT SPOT
= BOUNDARY BETWEEN TECTONIC PLATE

Putative Mantle Plumes or "Hot Spots"



Radial Rift Example



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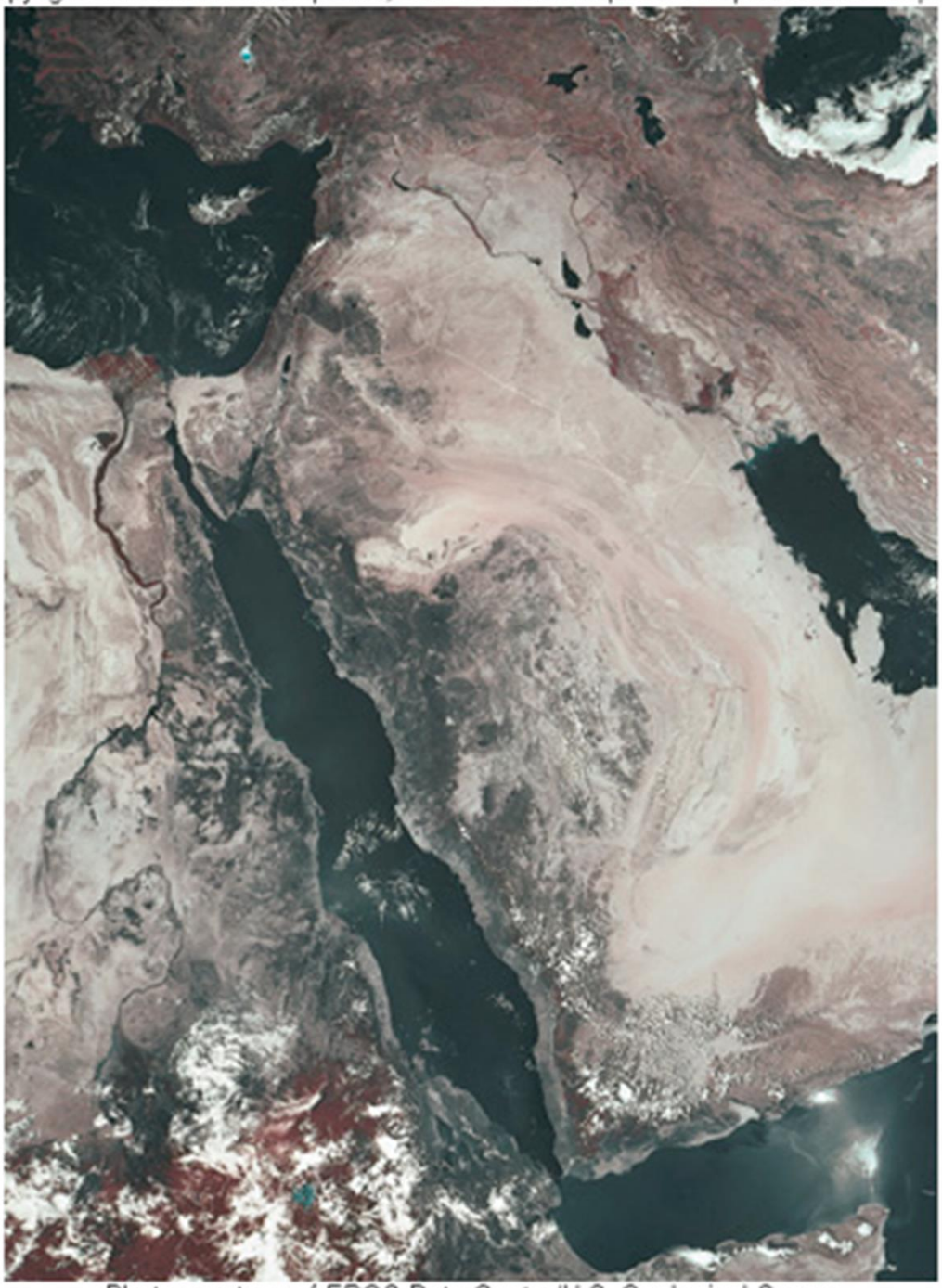

Photo courtesy of EROS Data Center/U.S. Geological Survey

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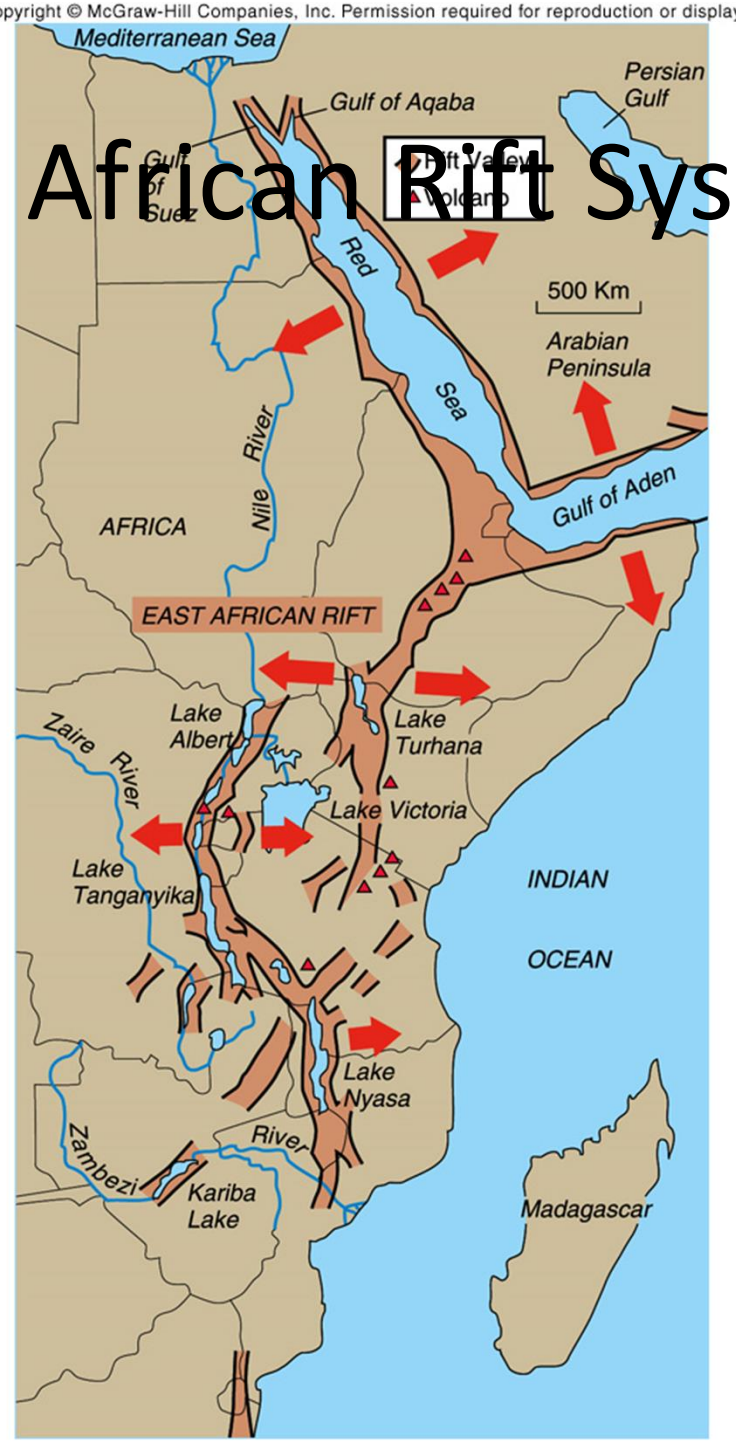
East African Rift System



Driven by Multiple Mantle Plumes

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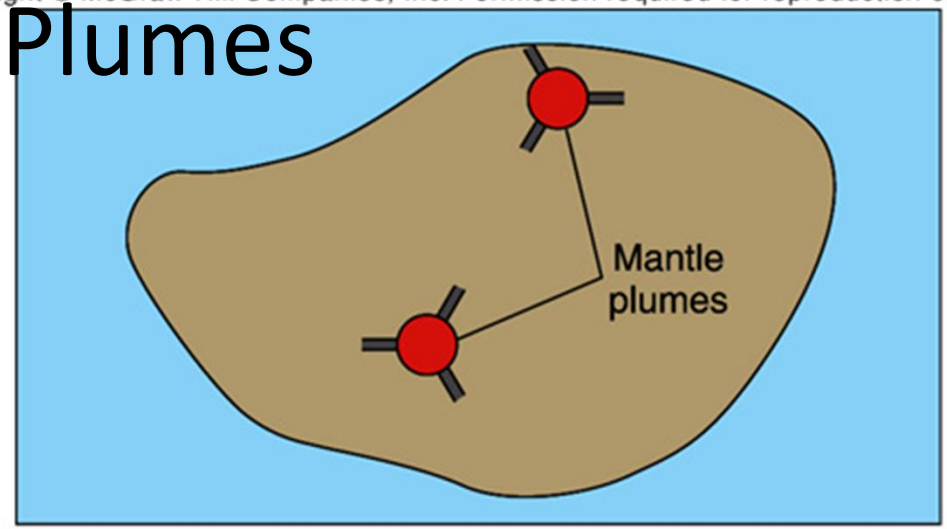
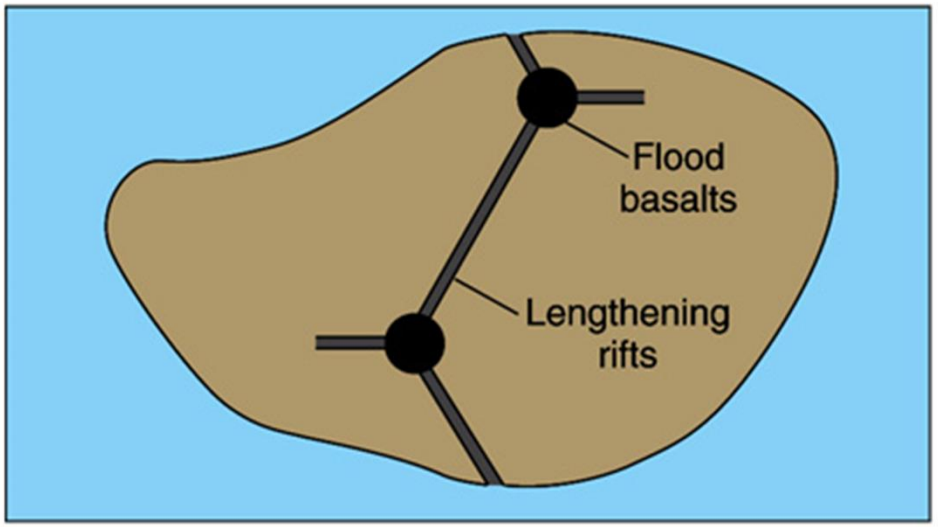
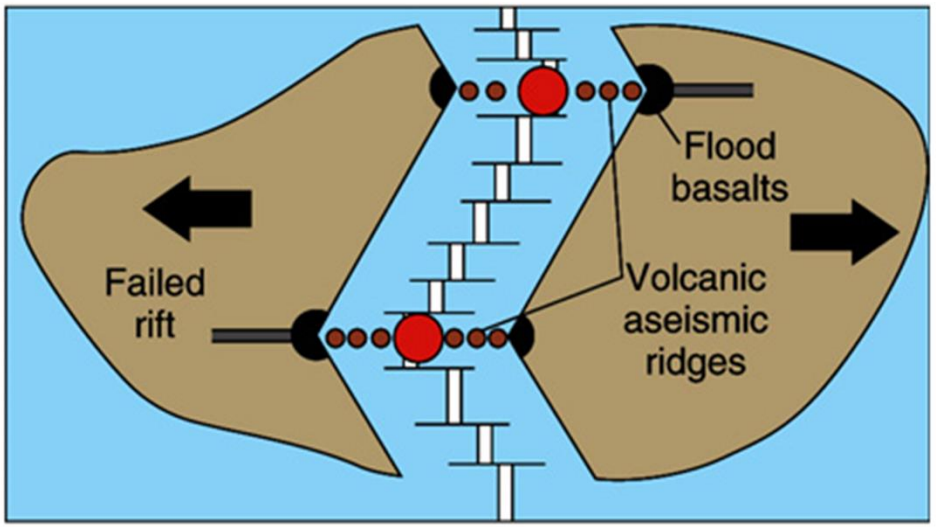


A

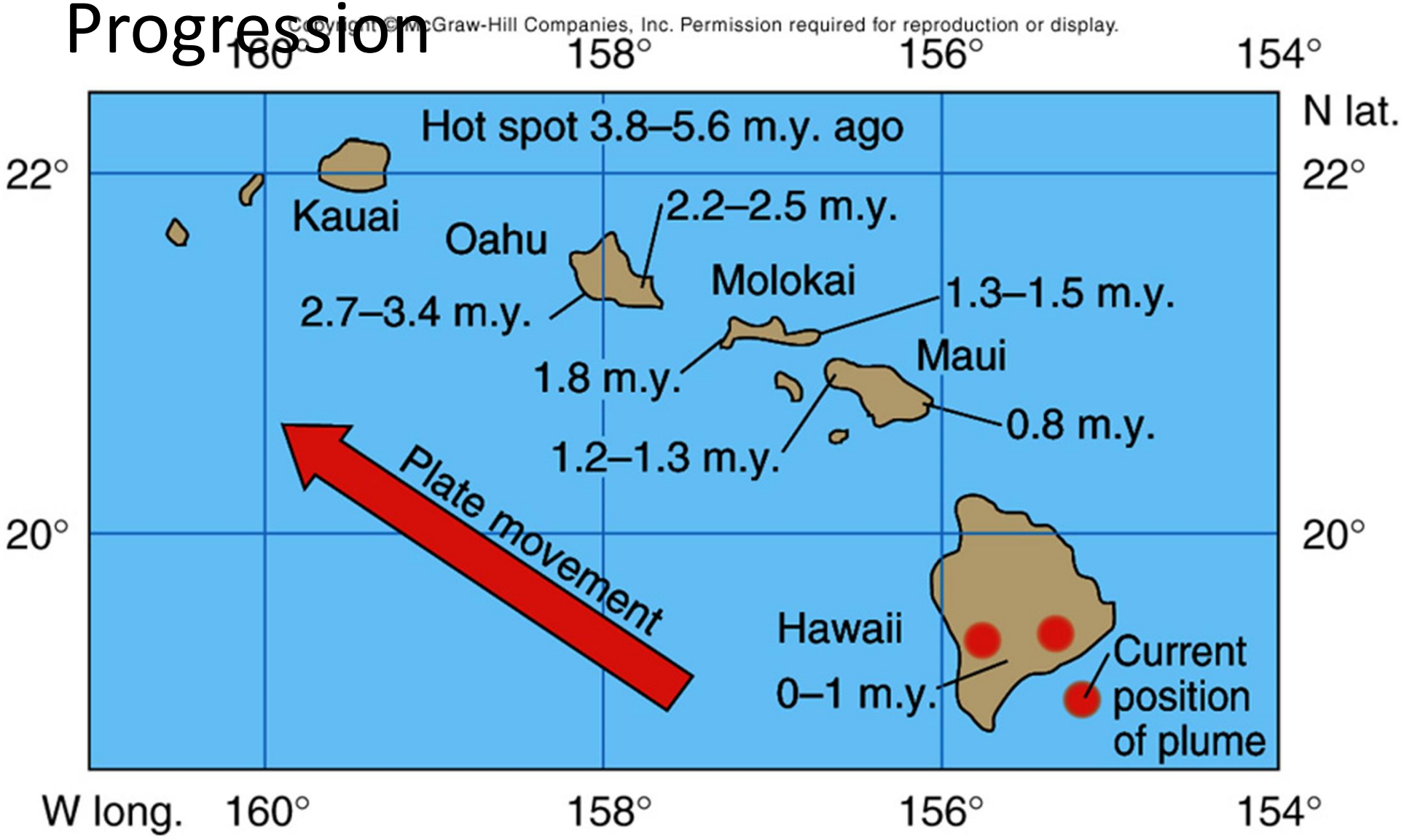


B

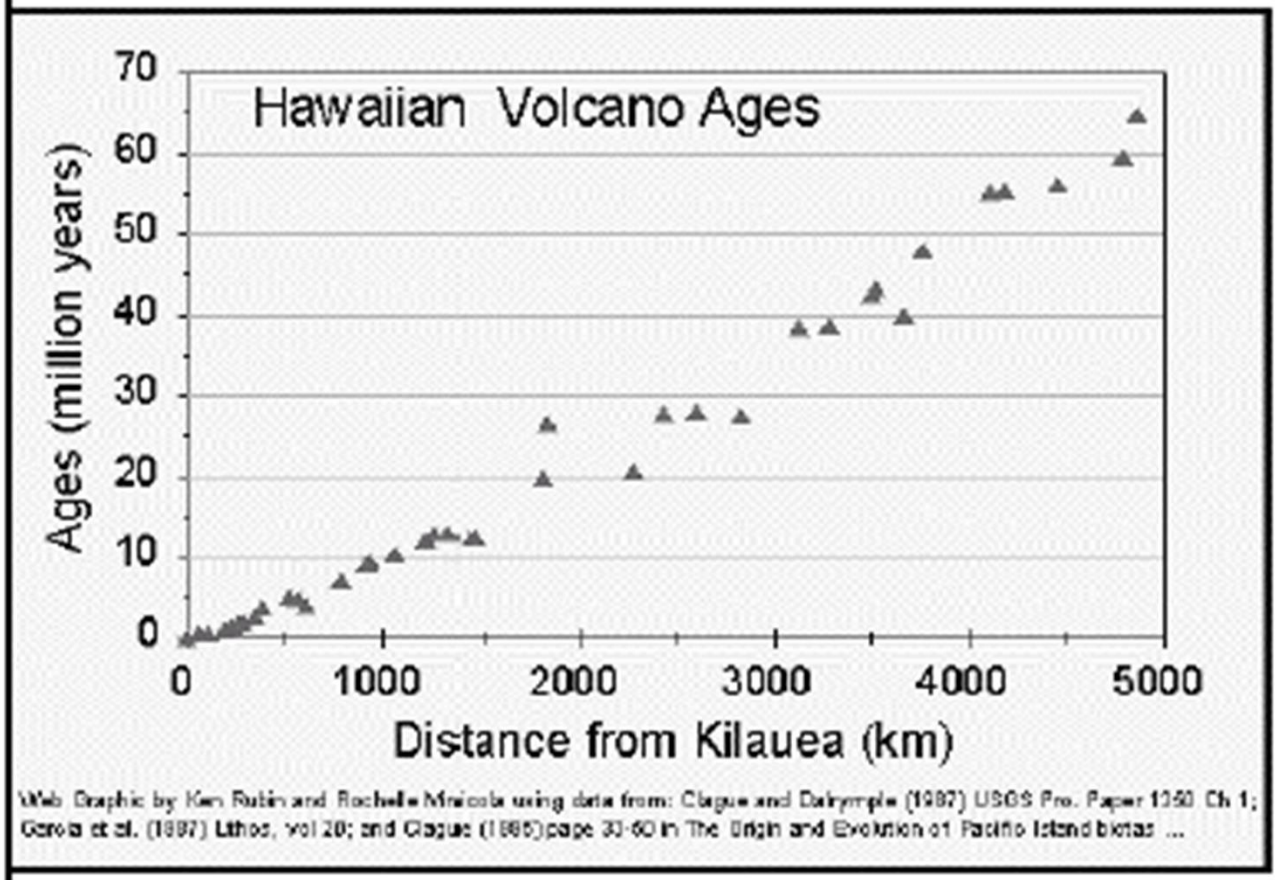


C

Volcanics Age Progression



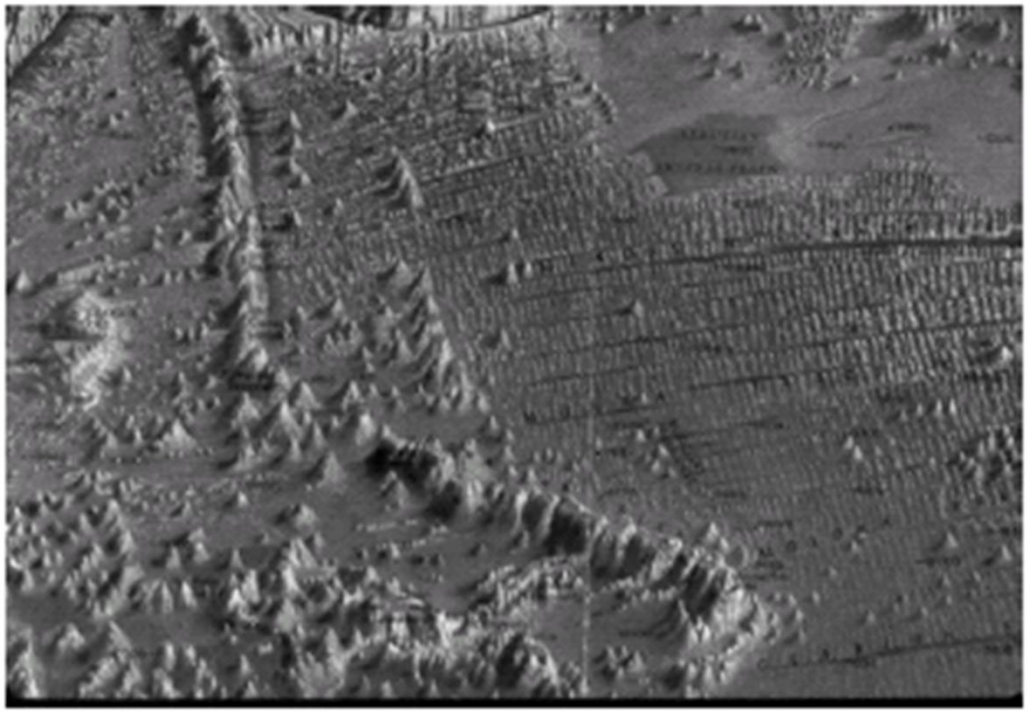
Age Progression of Hawaiian Volcanoes



Web Graphic by Ken Rubin and Rochelle Mraicola using data from: Clague and Dalrymple (1987) USGS Pro. Paper 1350 Ch 1; Garcia et al. (1997) Lithos, vol 20; and Clague (1995) page 31-60 in The Origin and Evolution of Pacific Island biotas ...

The age progression of the volcanoes corresponds to a 9-10 cm/year north-west movement of the Pacific plate.

Hawaii



The Hawaiian Islands, in the middle of the Pacific Ocean, are volcanic islands at the end of a long chain of submerged volcanoes.
These volcanoes get progressively older to the north-west (the direction of movement of the Pacific plate).