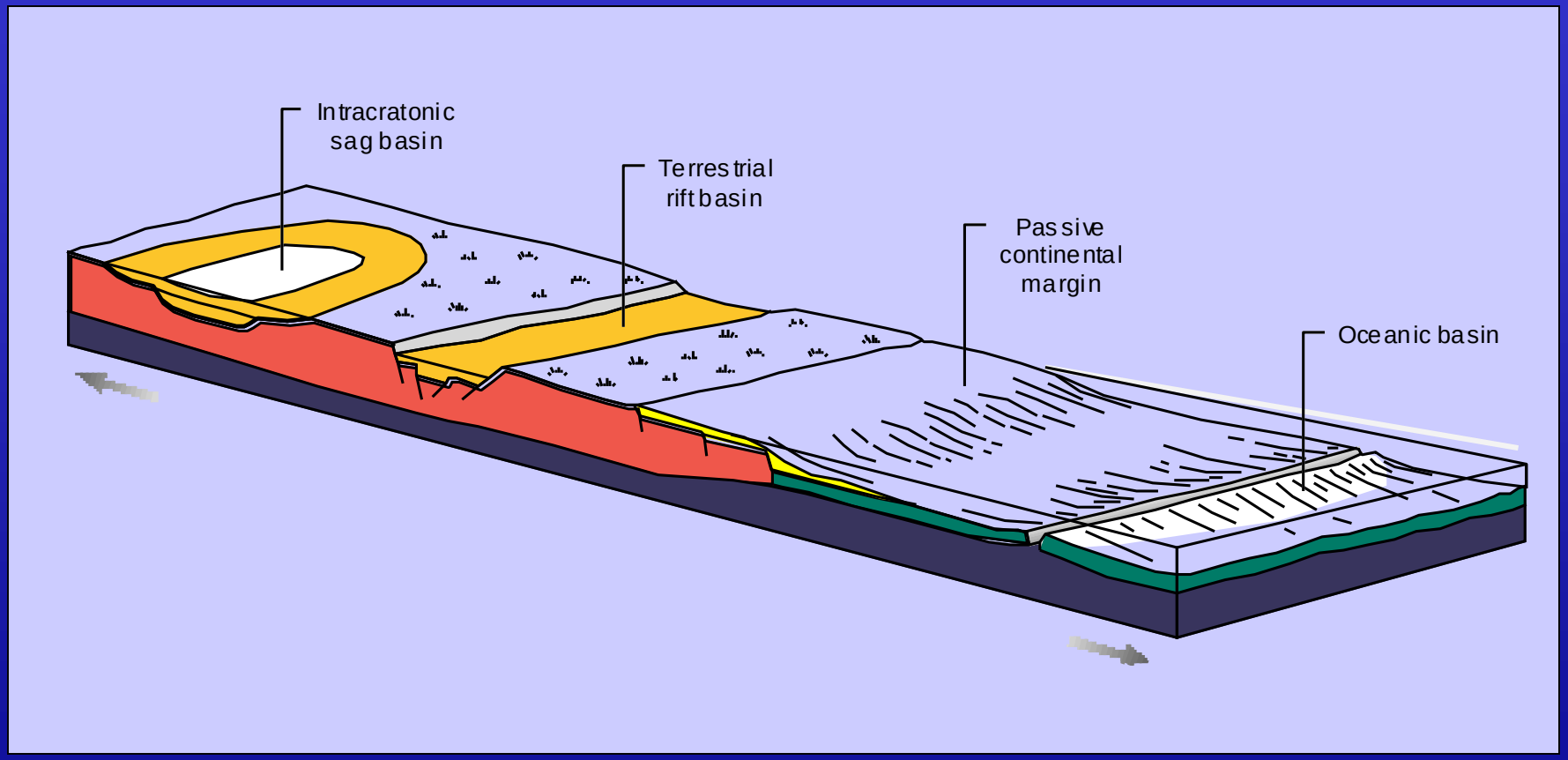
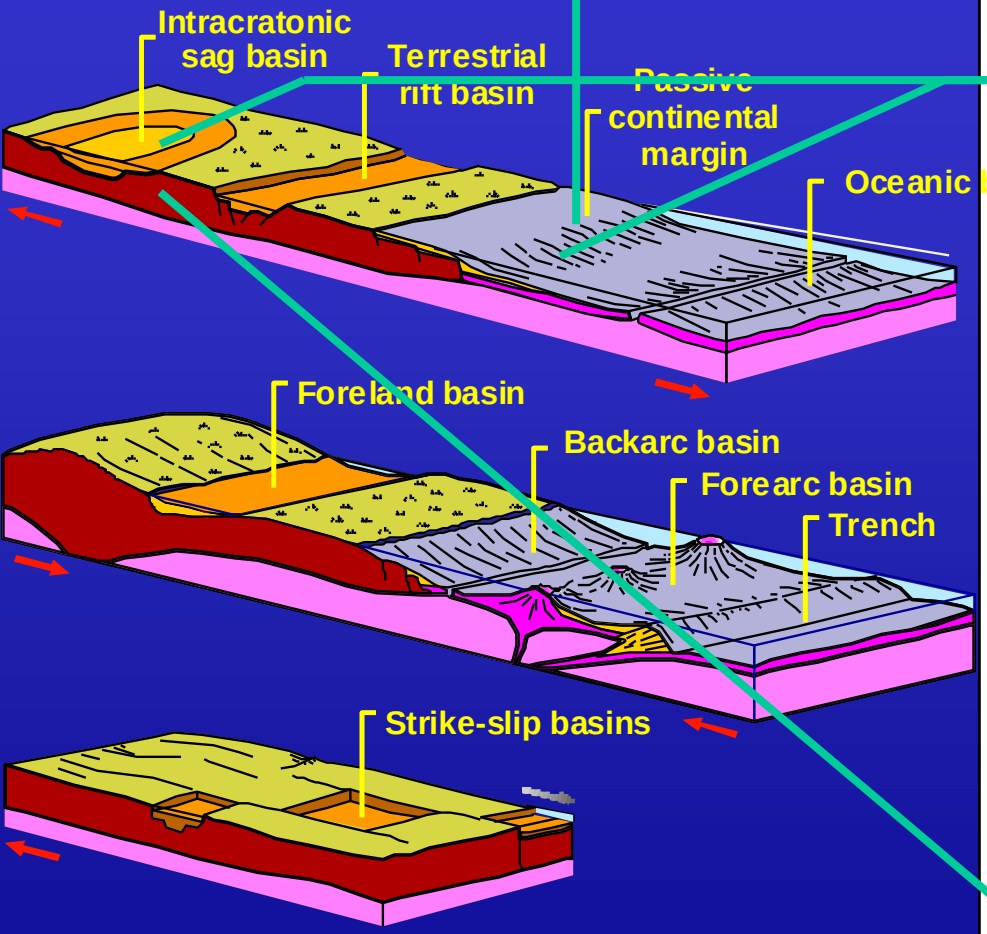
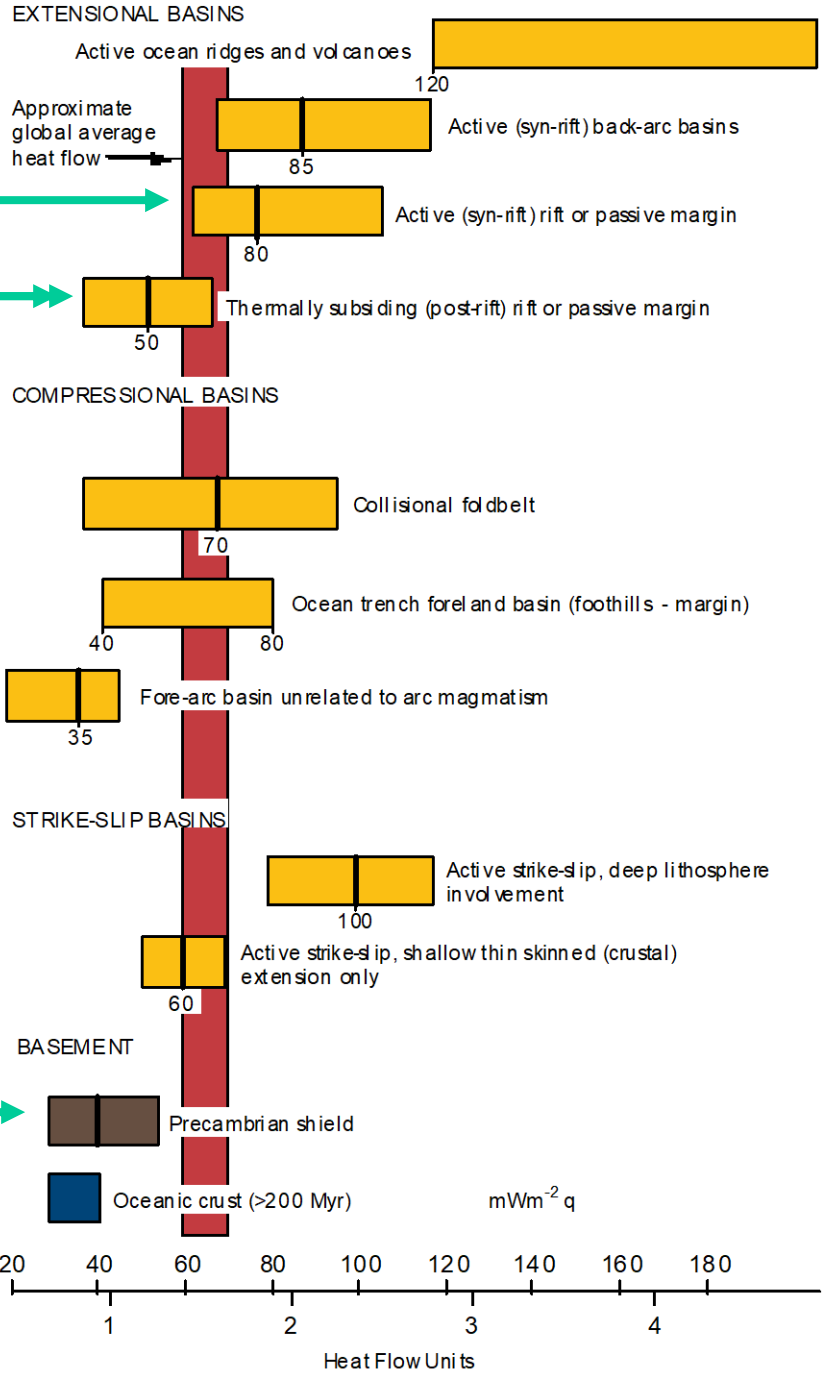
INTRACRATONIC BASINS

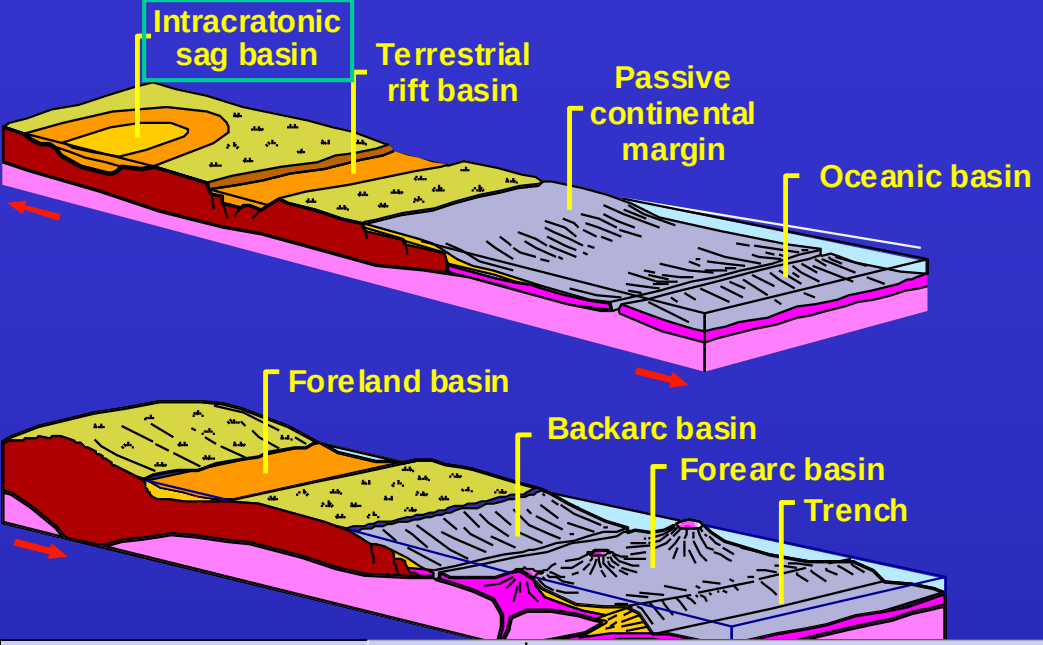

Intracratonic
sag basin
Terrestrial
rift basin
Passive
continental
margin
Oceanic basin

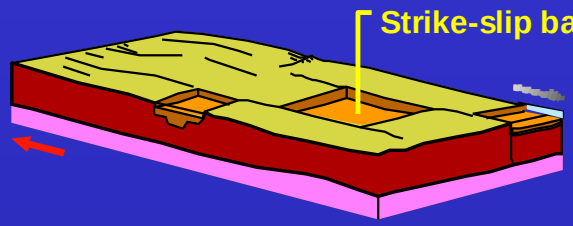
Basin Heat flow





Basin preservation potential





Medium

High

Lifespan of sediment accumulation in Ma

1000

100

10

0

Low

Active ocean basins

Oceanic islands, aseismic ridges/plateaux

Remnant ocean basins

Backarc basins

Trench-slope basins

Piggyback basins

Trenches

Transpressional basins

Dormant ocean basins

Successor basins

Forearc basins

Intra-arc basins

Retroarc foreland basins

Foreland intermontane basins

Intracontinental wrench basins

Peripheral foreland basins

Transtensional basins

Transrotational basins

Aulacogens

Intracratonic basins

Continental platform

Continental rises and terraces

Continental embankments

Proto-oceanic rift troughs

Terrestrial rift valleys

Impactogens

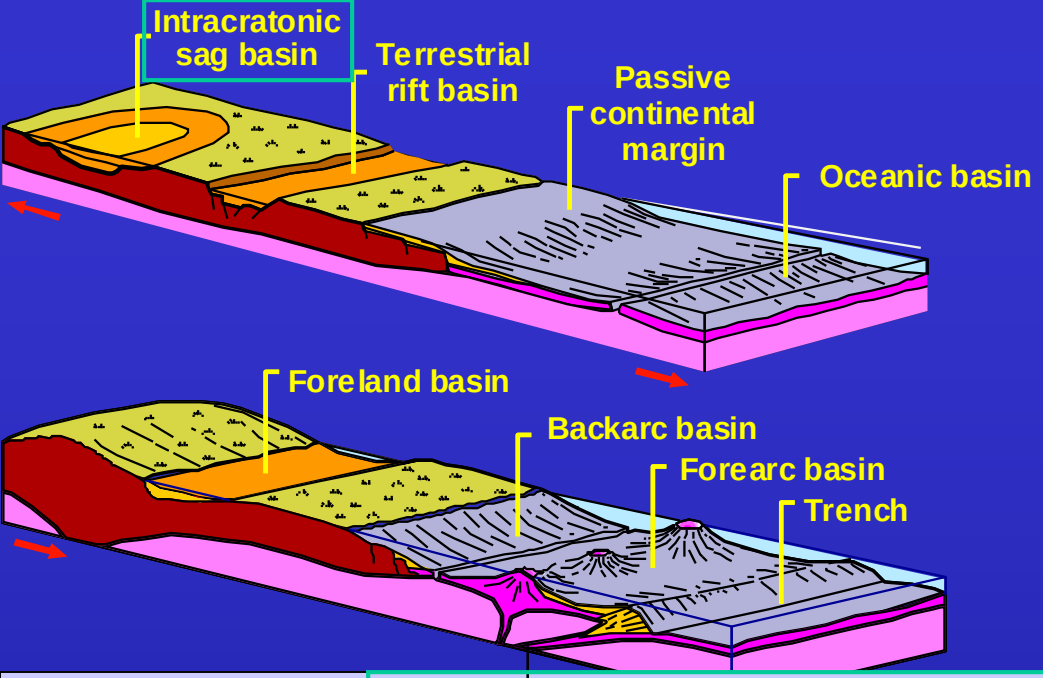
Low

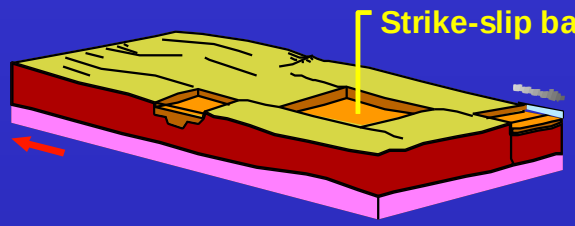
Medium

High

Post-sedimentation preservation potential

Basin lifespan

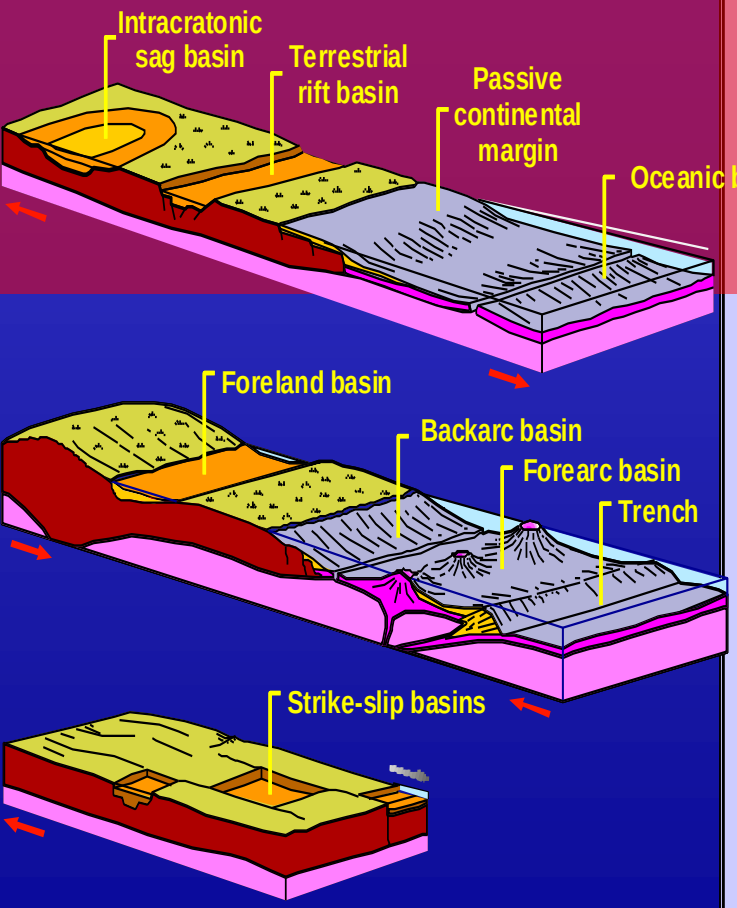




Lifespan of sedimentary accumulation in Ma	Low	Medium	High
1000 – Long	Active ocean basins	Dormant ocean basins Successor basins Forearc basins	Aulacogens Intracratonic basins Continental platform Continental rises and terraces Continental embankments
100 – Medium	Oceanic islands, aseismic ridges/plateaux Remnant ocean basins Backarc basins Trench-slope basins	Intra-arc basins Retroarc foreland basins Foreland intermontane basins Intracontinental wrench basins Peripheral foreland basins	Proto-oceanic rift troughs Terrestrial rift valleys Impactogens
10 – Short	Piggyback basins Trenches Transpressional basins	Transtensional basins Transrotational basins	
0			

Post-sedimentation preservation potential

Subsidence mechanism

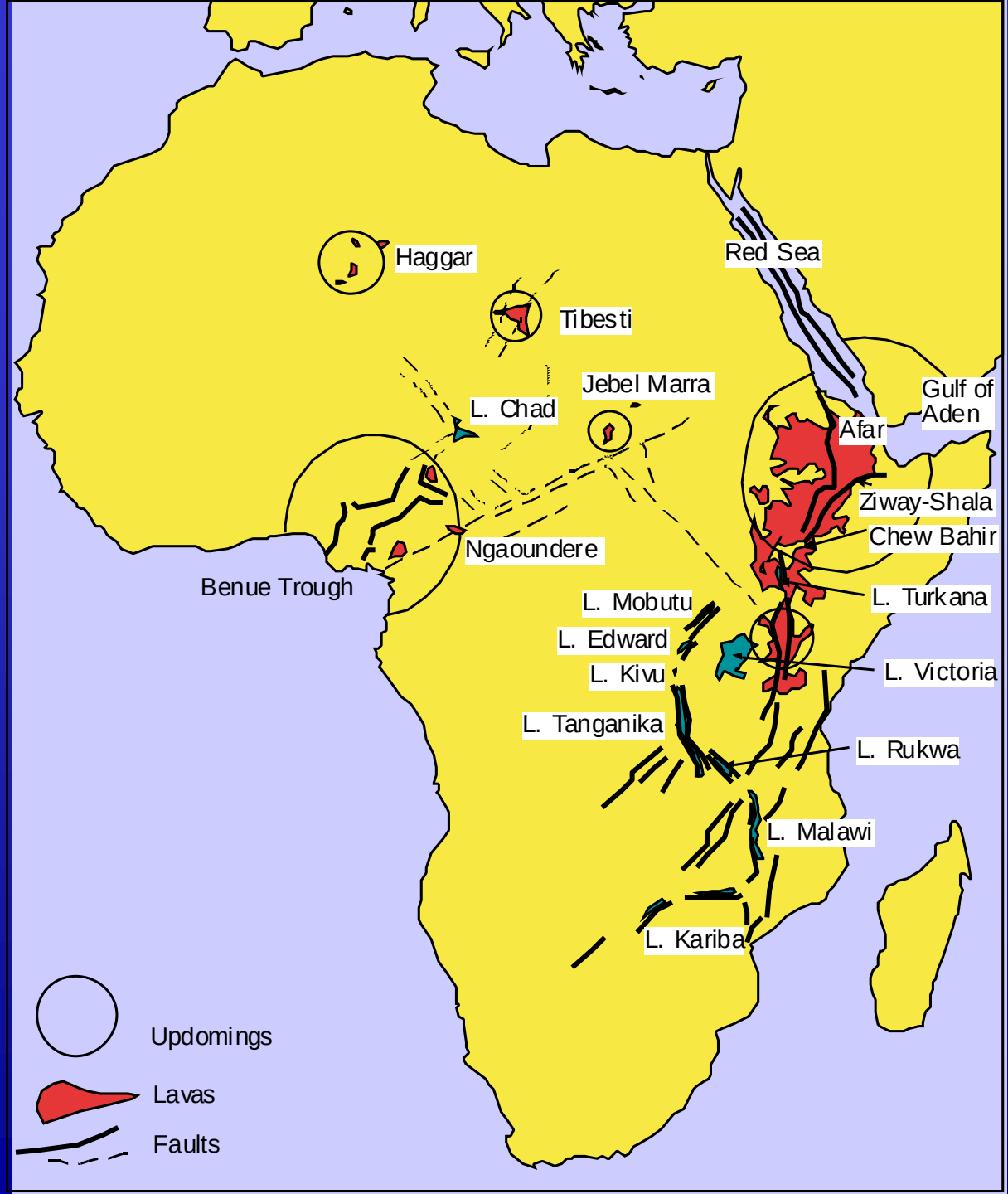


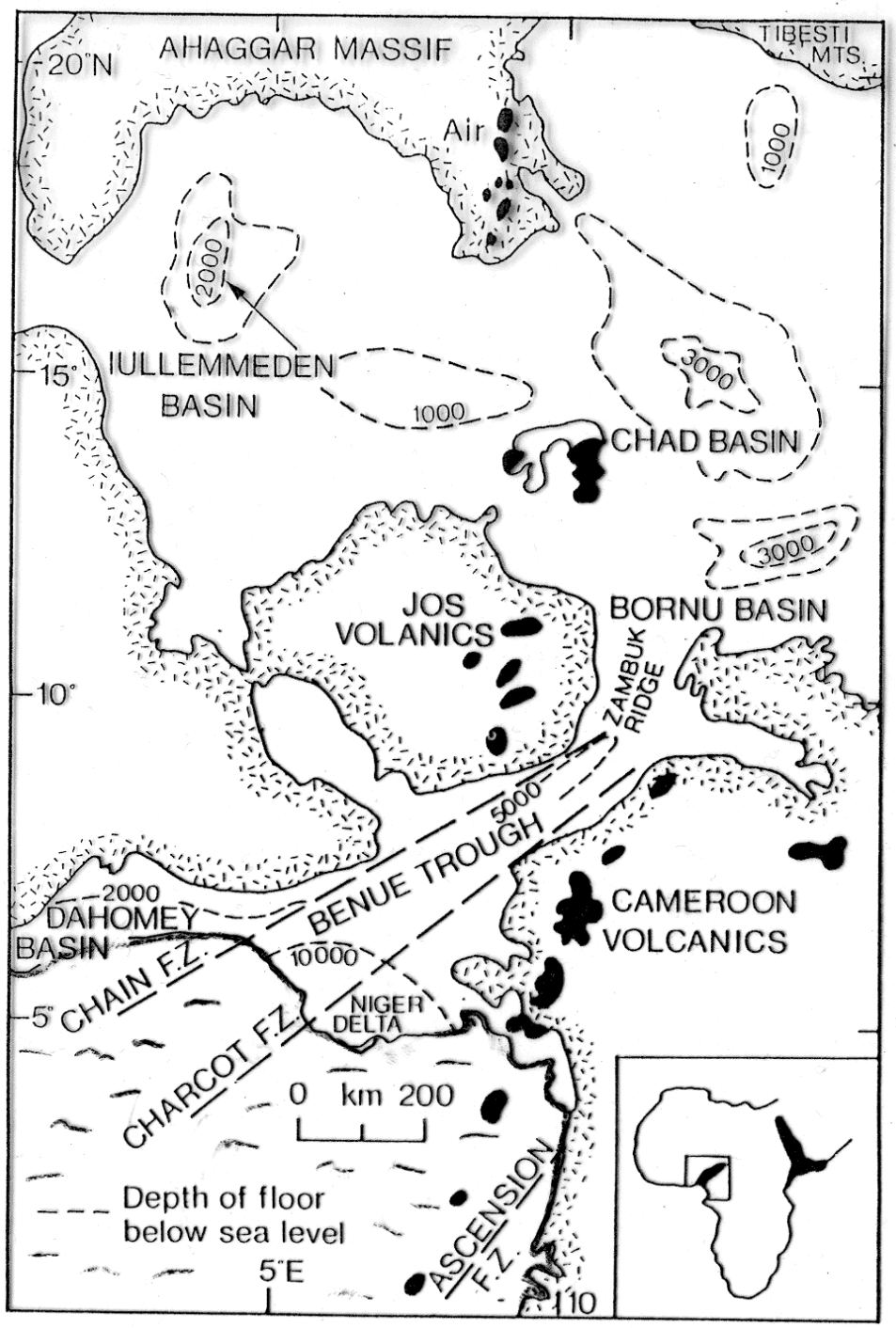
SUBSIDENCE MECHANISMS

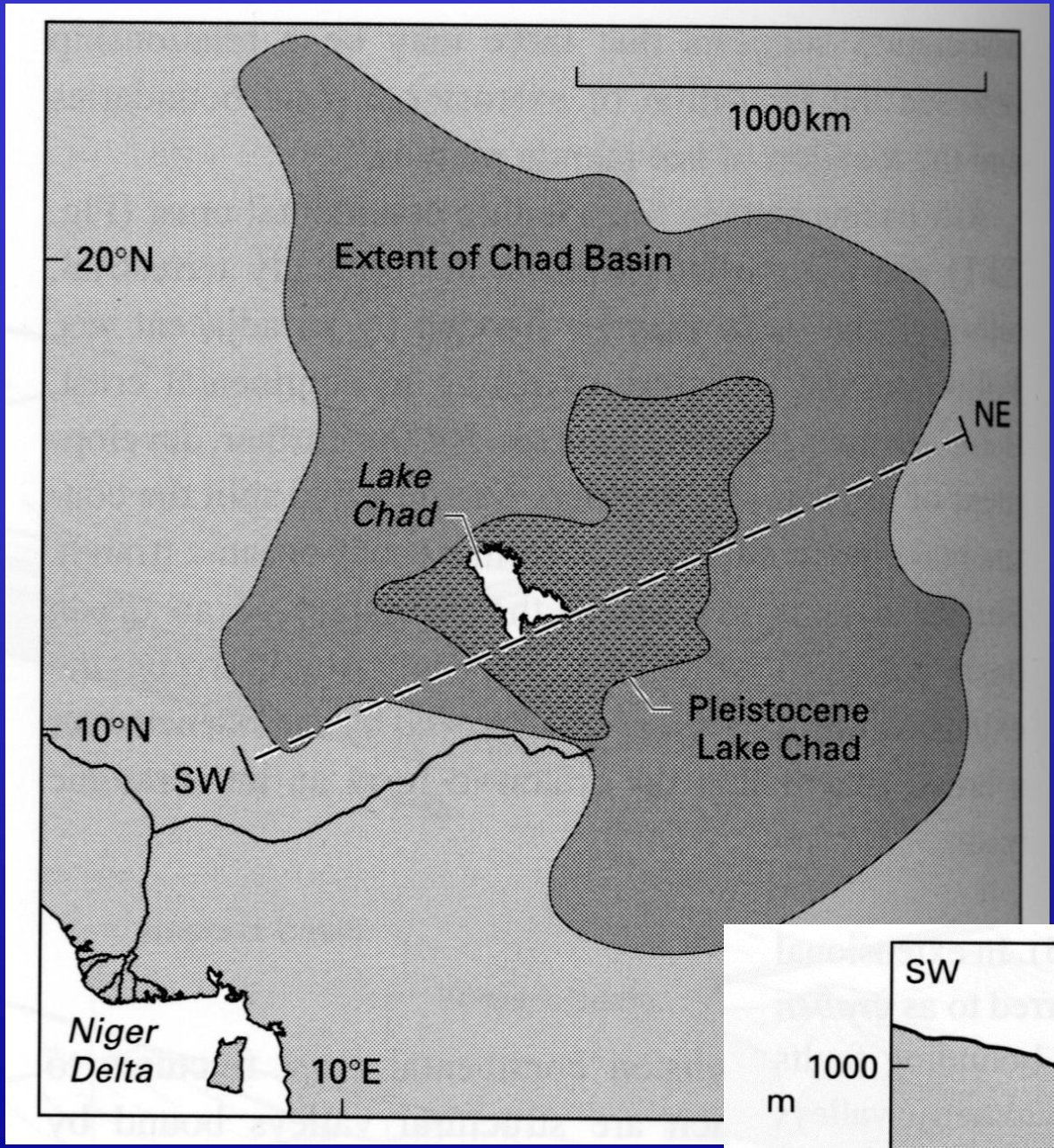
Minor
Important
Dominant

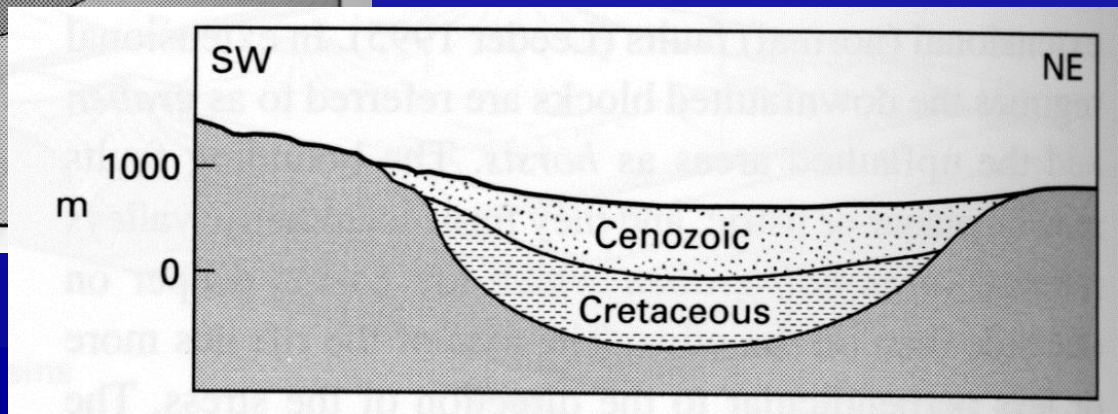
A. Crustal thinning
B. Mantle-lithosphere thickening

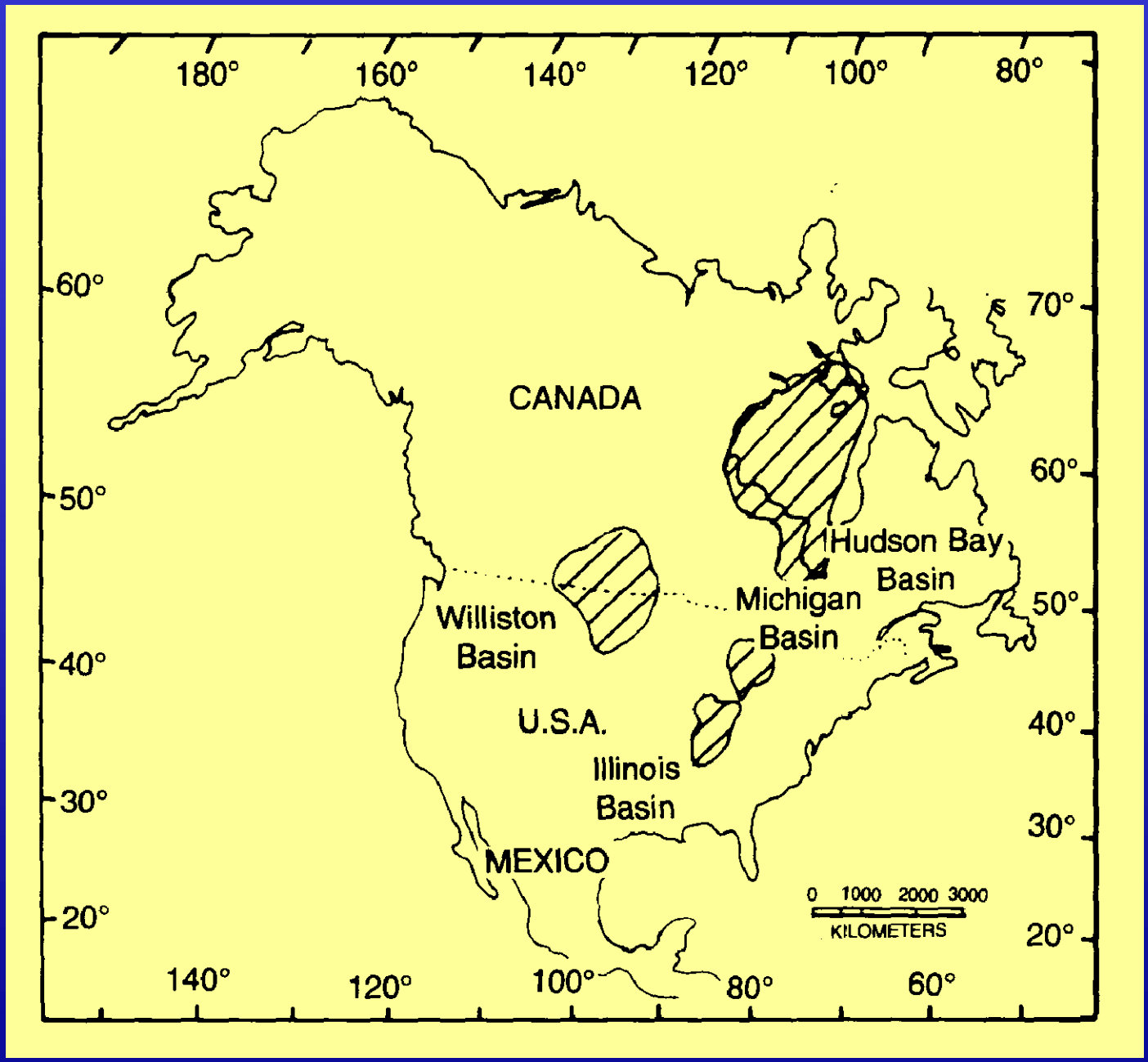
BASIN TYPE		A	B	C	D	E	F	G
Divergent	Terrestrial rift valleys	■						■
	Proto-oceanic rift troughs		■					
	Continental rises and terraces			■				
	Continental embankments			■				
Intraplate	Intracratonic basins		■					
	Continental platform							
	Active ocean basins		■					
	Oceanic islands, aseismic ridges/plateaux							
	Dormant ocean basins		■					
Convergent	Trenches			■	■	■	■	
	Trench-slope basins			■				
	Forearc basins	■						
	Intra-arc basins	■						
	Backarc basins		■					
	Retroarc foreland basins				■			
	Remnant ocean basins		■	■				
	Peripheral foreland basins				■			
	Piggyback basins							
	Foreland intermontane basins							
Transform	Transtensional basins	■	■					
	Transpressional basins				■			
	Transrotational basins							
Hybrid	Intracontinental wrench basins				■			
	Aulacogens							
	Impactogens							
	Successor basins		■	■				

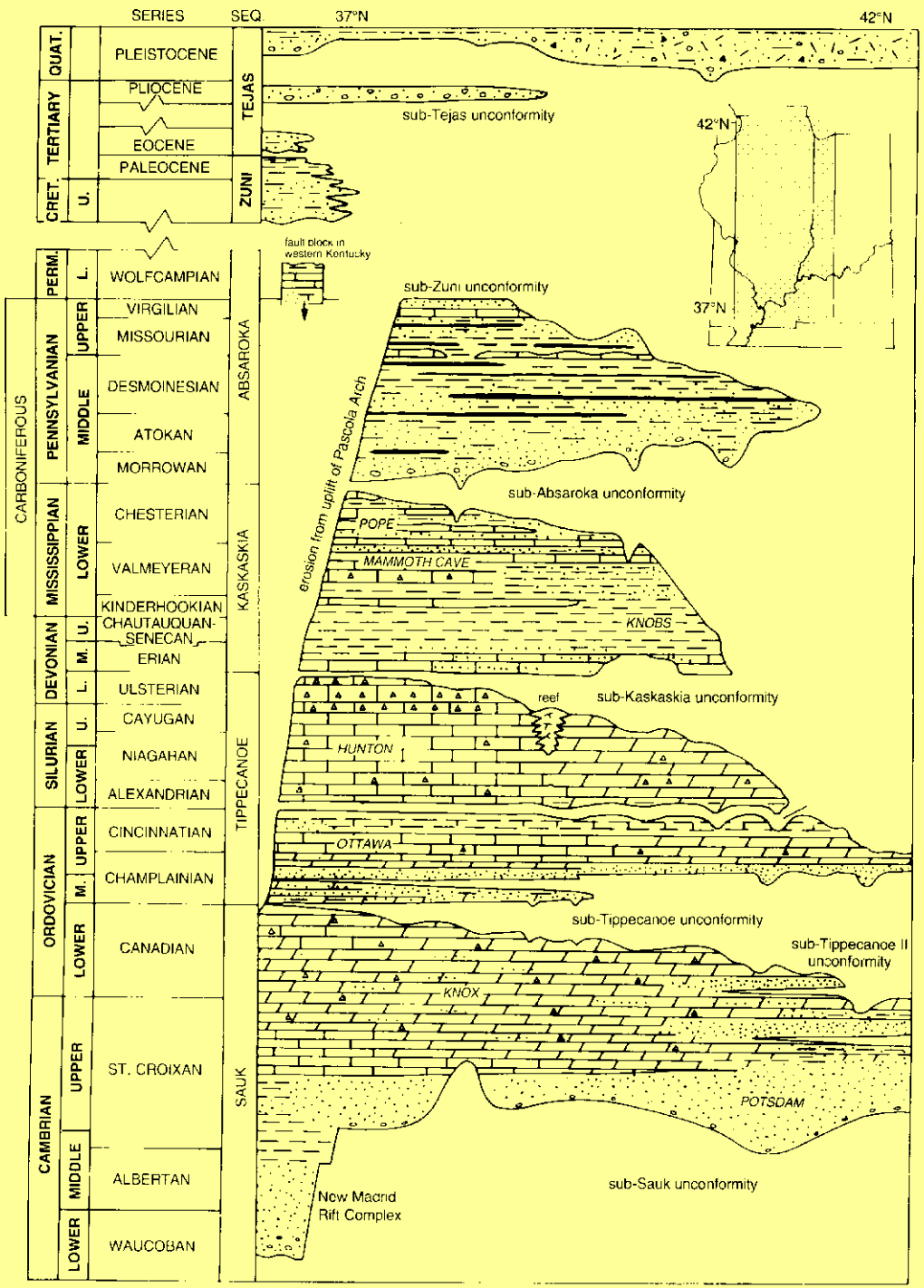

Haggar
Tibesti
Red Sea
Jebel Marra
L. Chad
Gulf of Aden
Afar
Ziway-Shala
Chew Bahir
Ngaoundere
Benue Trough
L. Turkana
L. Mobutu
L. Edward
L. Kivu
L. Victoria
L. Tanganika
L. Rukwa
L. Malawi
L. Kariba
Updomings
Lavas
Faults

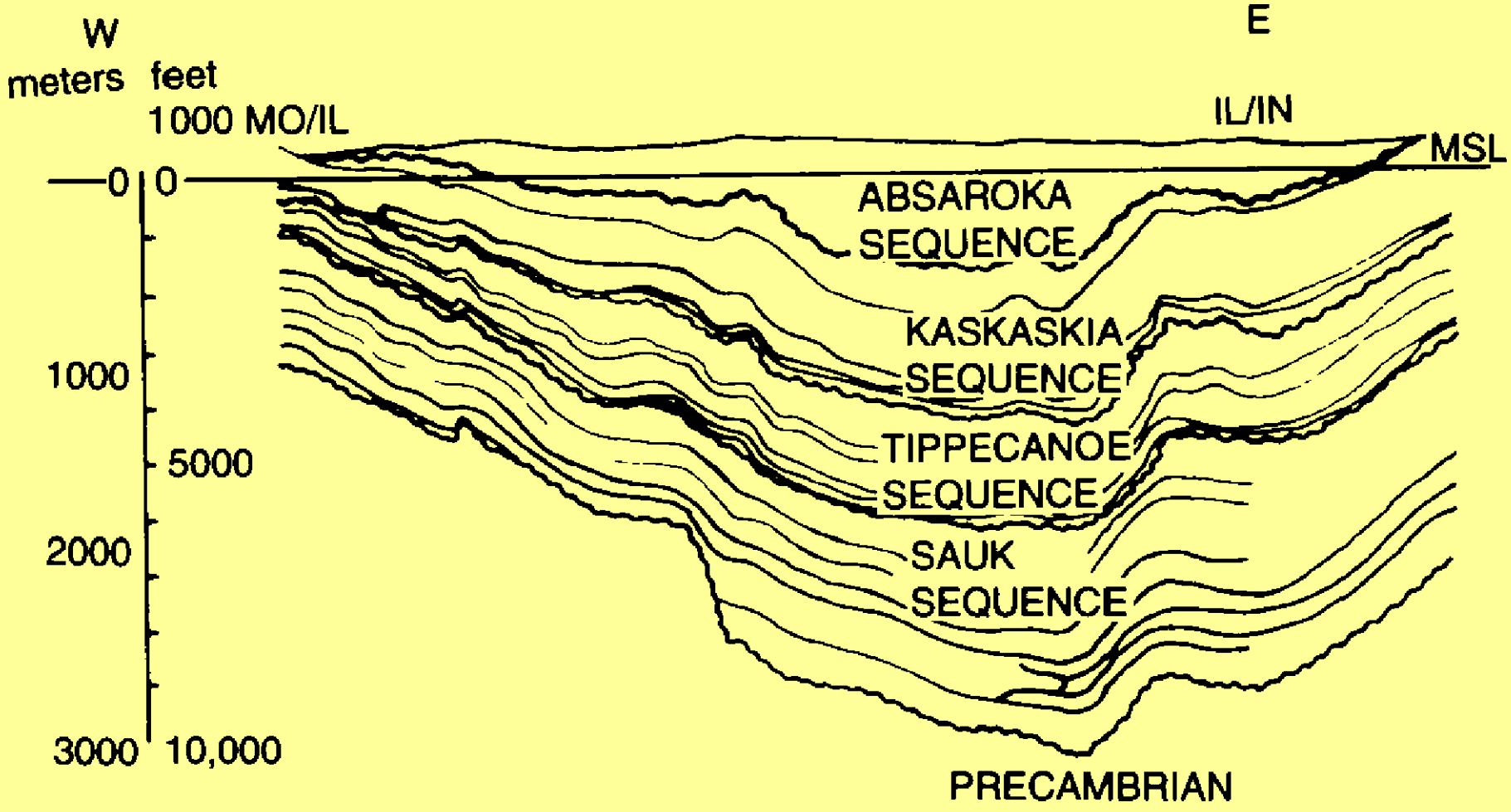

AHAGGAR MASSIF
TIBESTI MTS.
20°N
Air
1000
2000
IULLEMMEDEN BASIN
1000
15°
3000
CHAD BASIN
3000
JOS VOLANICS
BORNU BASIN
ZAMBUK RIDGE
10°
5000
BENUE TROUGH
2000
DAHOMEY BASIN
10000
CAMEROON VOLCANICS
5° CHAIN F.Z.
NIGER DELTA
CHARCOT F.Z.
0 km 200
Depth of floor below sea level
ASCENSION F.Z.
5°E
10

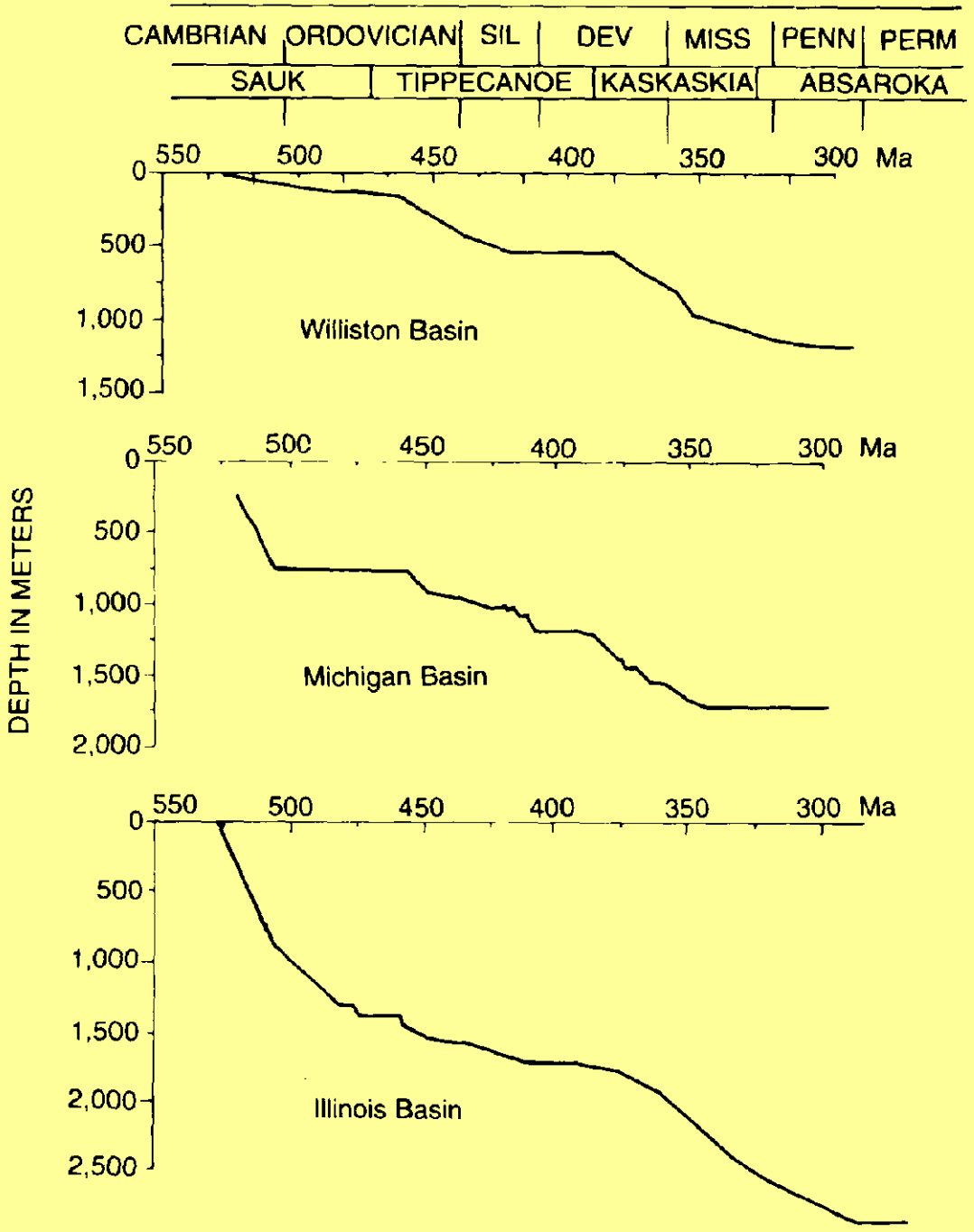

1000 km
20°N
Extent of Chad Basin
NE
Lake
Chad
Pleistocene
Lake Chad
10°N
SW
Niger
Delta
10°E

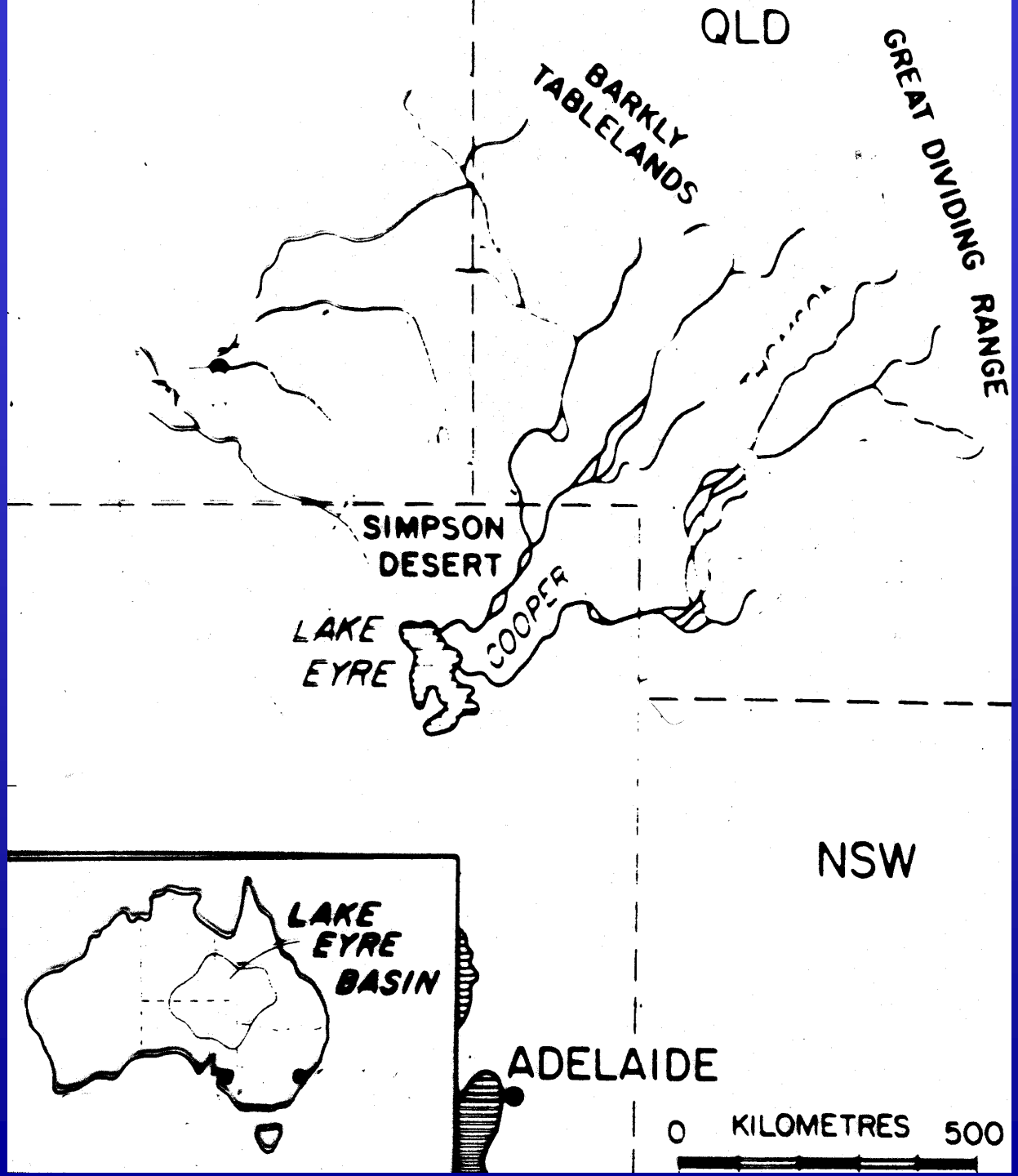

SW
NE
1000
m
0
Cenozoic
Cretaceous

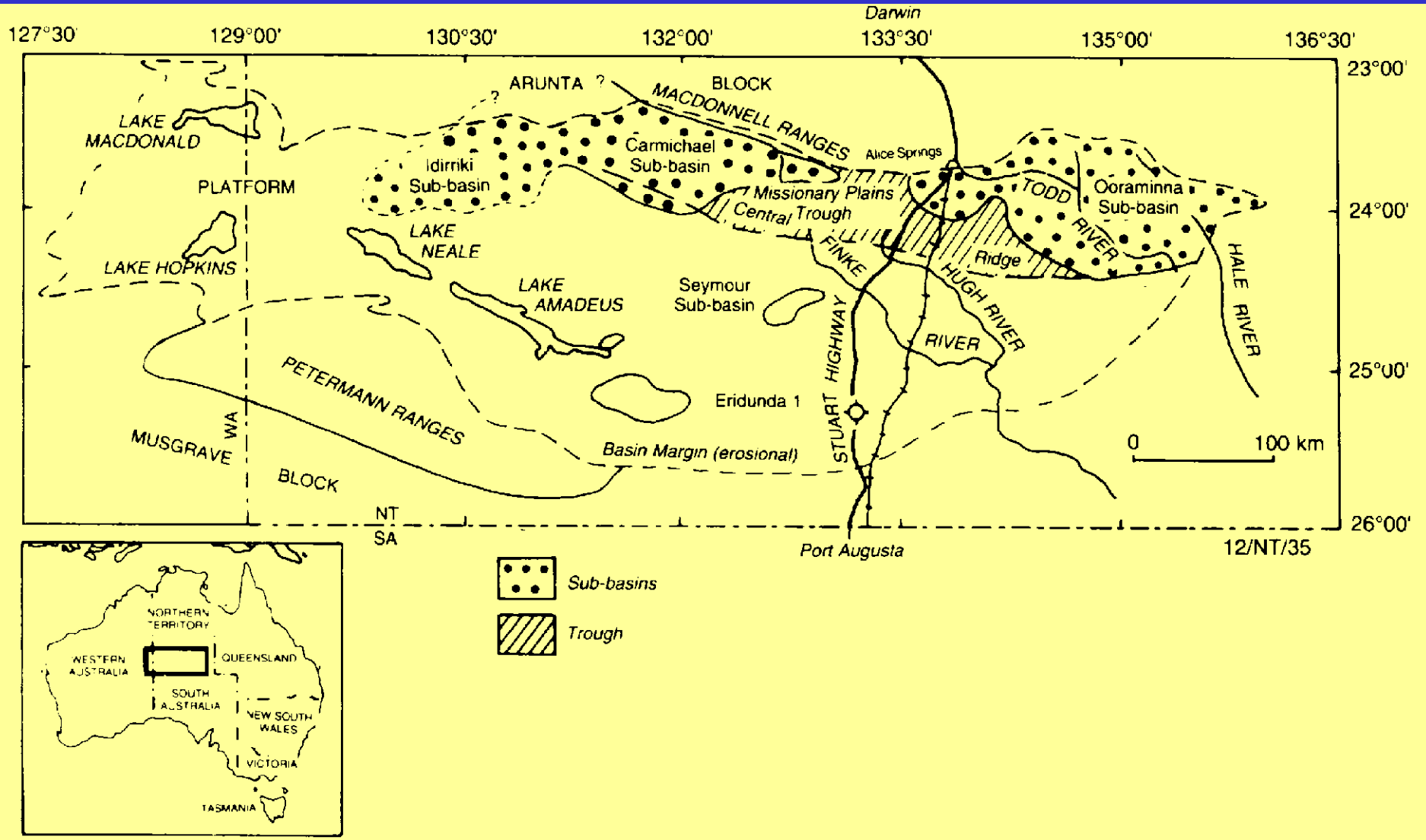

180°
160°
140°
120°
100°
80°
60°
50°
40°
30°
20°
70°
60°
50°
40°
30°
20°
CANADA
Hudson Bay
Basin
Michigan
Basin
Williston
Basin
U.S.A.
Illinois
Basin
MEXICO
0 1000 2000 3000
KILOMETERS
140°
120°
100°
80°
60°

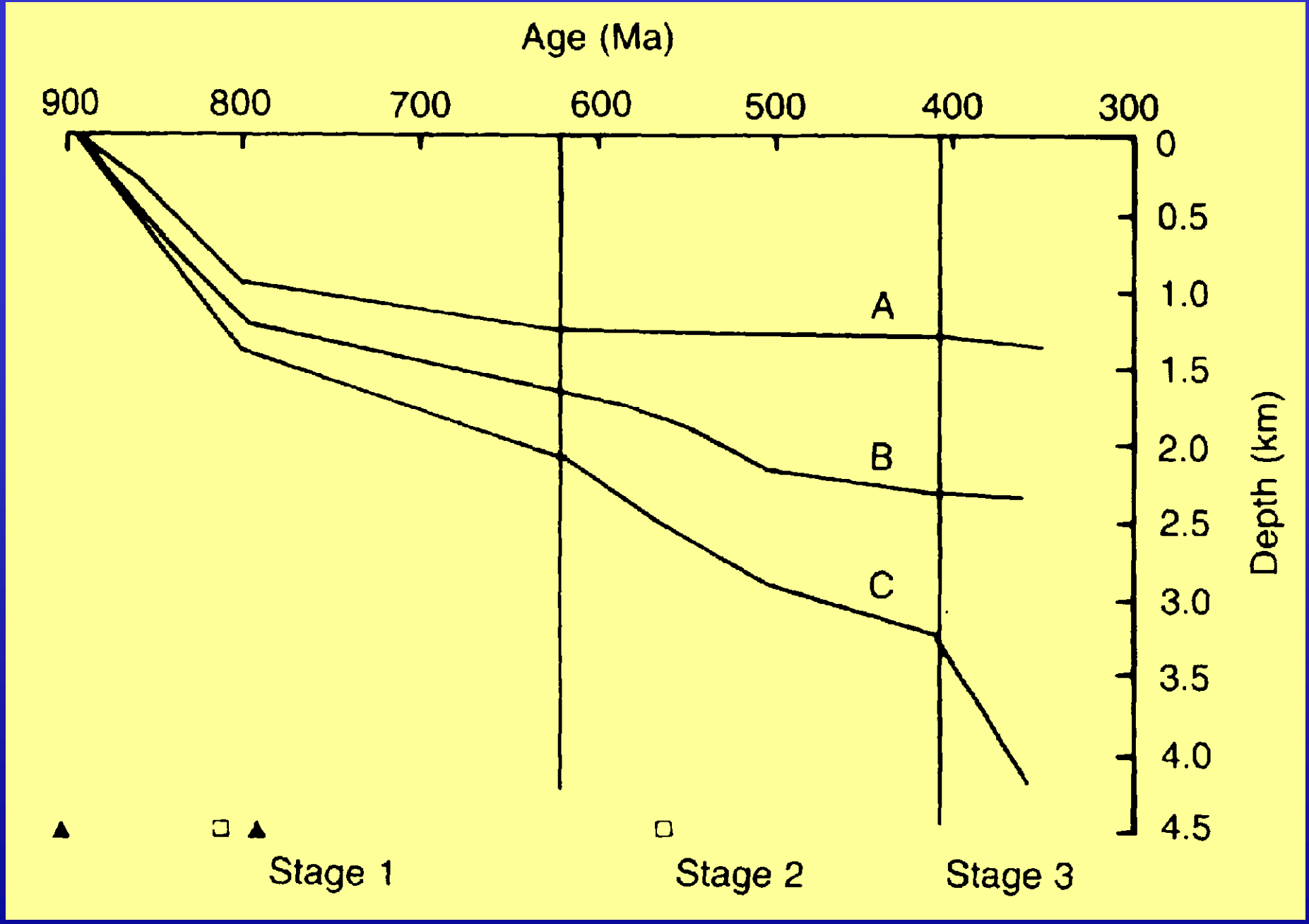

SERIES
SEQ.
37°N
42°N
QUAT.
TERTIARY
CRET.
PLEISTOCENE
PLIOCENE
EOCENE
PALEOCENE
U.
TEJAS
ZUNI
sub-Tejas unconformity
fault block in western Kentucky
sub-Zuni unconformity
PERM.
L.
WOLFCAMPIAN
CARBONIFEROUS
PENNSYLVANIAN
UPPER
VIRGILIAN
MISSOURIAN
MIDDLE
DESMOINESIAN
ATOKAN
MORROWAN
ABSAROKA
MISSISSIPPIAN
LOWER
CHESTERIAN
VALMEYERAN
KINDERHOOKIAN
KASKASKIA
DEVONIAN
M.
U.
CHAUTAUQUAN-SENECAN
ERIAN
L.
ULSTERIAN
SILURIAN
U.
CAYUGAN
NIAGARAN
LOWER
ALEXANDRIAN
TIPPECANOE
ORDOVICIAN
UPPER
CINCINNATIAN
M.
CHAMPLAINIAN
LOWER
CANADIAN
CAMBRIAN
UPPER
ST. CROIXAN
MIDDLE
ALBERTAN
LOWER
WAUCOBAN
SAUK
erosion from uplift of Pascola Arch
sub-Absaroka unconformity
POPE
MAMMOTH CAVE
KNOBS
reef
sub-Kaskaskia unconformity
HUNTON
OTTAWA
sub-Tippecanoe unconformity
sub-Tippecanoe II unconformity
KNOX
POTSDAM
sub-Sauk unconformity
New Madrid Rift Complex

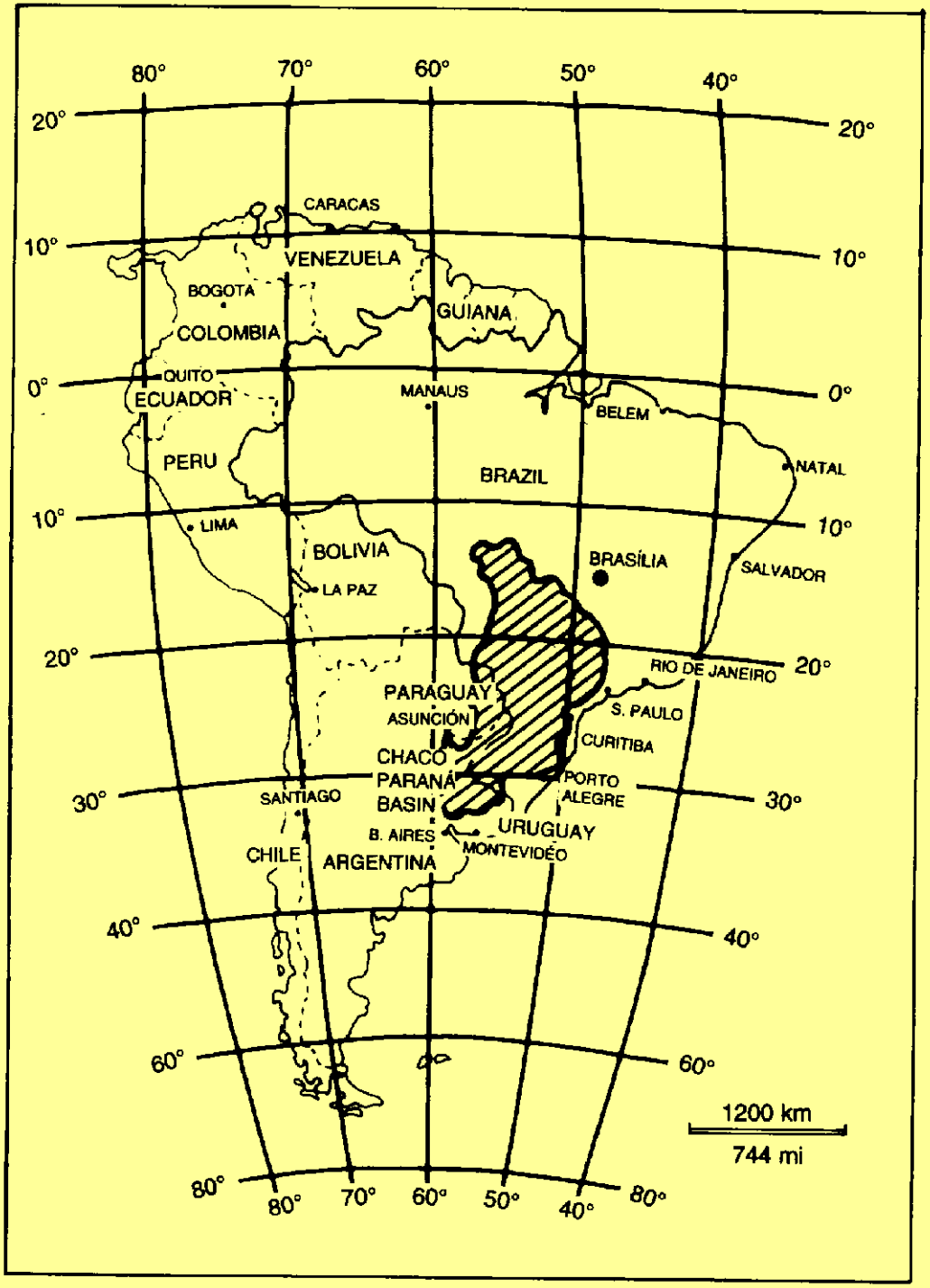

W
E
meters
feet
1000
MO/IL
IL/IN
MSL
0
0
ABSAROKA
SEQUENCE
KASKASKIA
SEQUENCE
1000
TIPPECANOE
SEQUENCE
5000
2000
SAUK
SEQUENCE
3000
10,000
PRECAMBRIAN

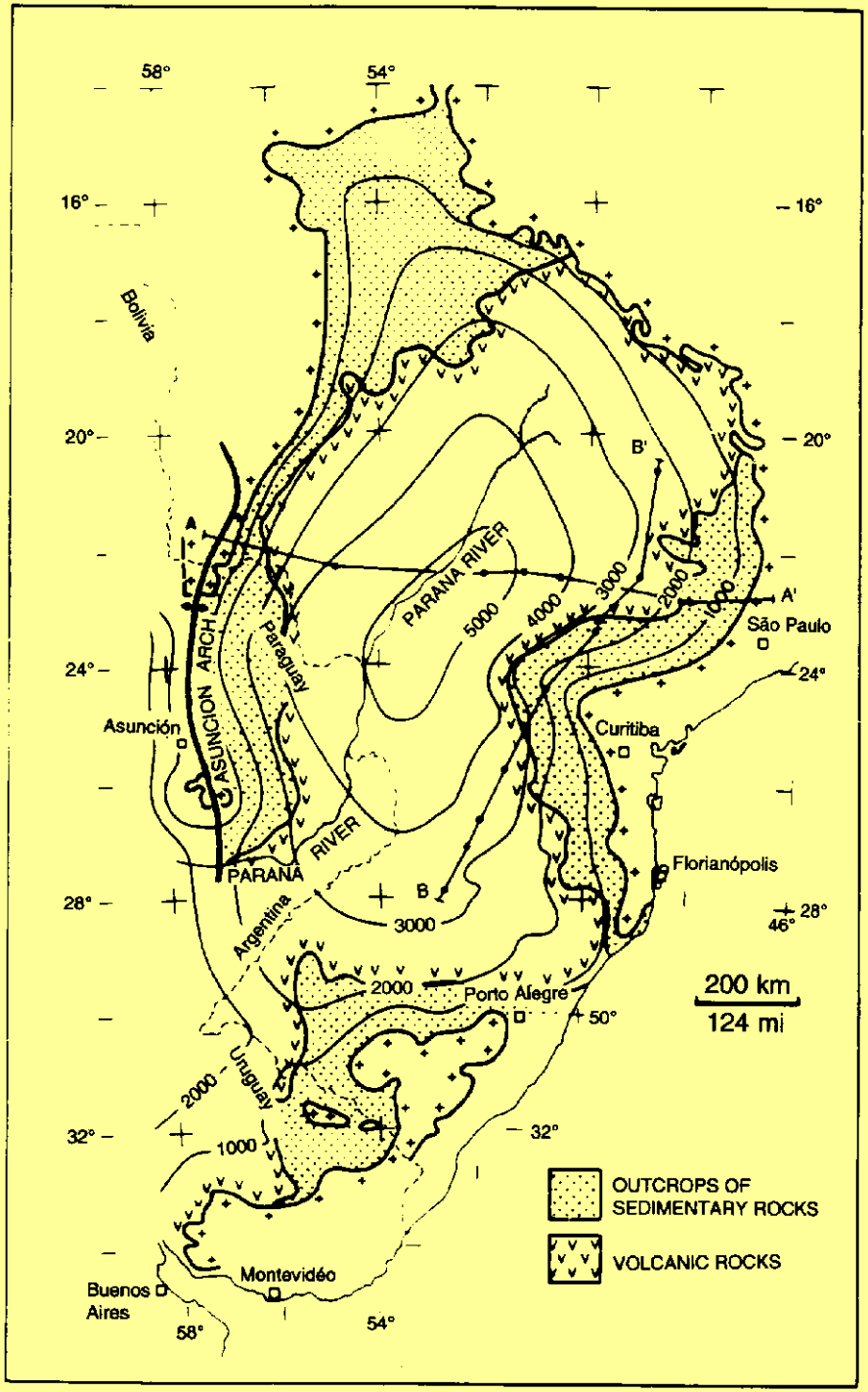

CAMBRIAN
ORDOVICIAN
SIL
DEV
MISS
PENN
PERM
SAUK
TIPPECANOE
KASKASKIA
ABSAROKA
550
500
450
400
350
300
Ma
0
500
1,000
1,500
Williston Basin
550
500
450
400
350
300
Ma
0
500
1,000
1,500
2,000
DEPTH IN METERS
Michigan Basin
550
500
450
400
350
300
Ma
0
500
1,000
1,500
2,000
2,500
Illinois Basin

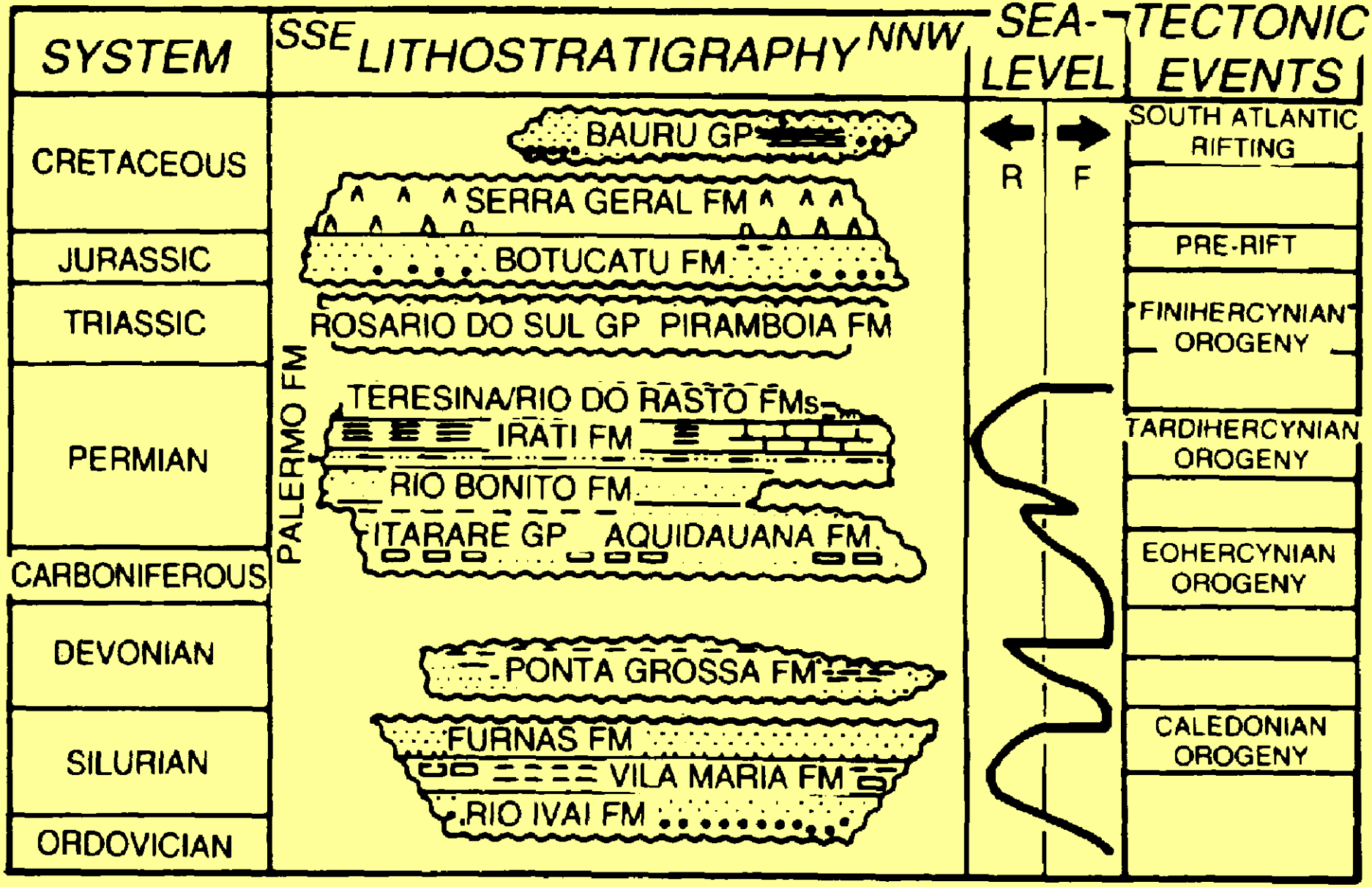

QLD
BARKLY TABLELANDS
GREAT DIVIDING RANGE
SIMPSON DESERT
LAKE EYRE
COOPER
NSW
LAKE EYRE BASIN
ADELAIDE
0 KILOMETRES 500

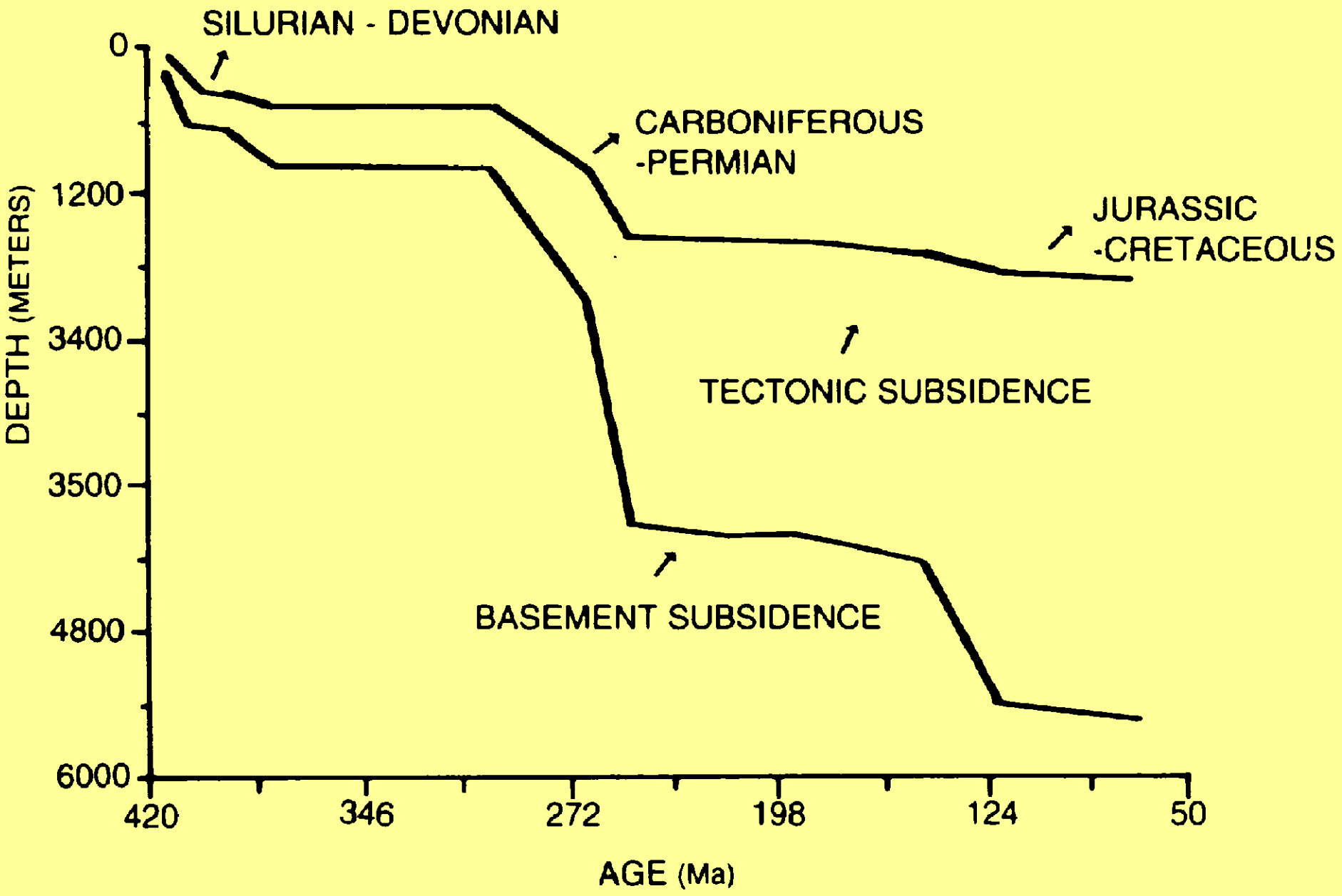

Darwin
127°30'
129°00'
130°30'
132°00'
133°30'
135°00'
136°30'
23°00'
24°00'
25°00'
26°00'
ARUNTA ?
BLOCK
MACDONNELL RANGES
Alice Springs
LAKE MACDONALD
PLATFORM
Idirriki Sub-basin
Carmichael Sub-basin
Missionary Plains Trough
Central
TODD RIVER
Ooraminna Sub-basin
LAKE NEALE
FINKE
Ridge
HALE RIVER
LAKE HOPKINS
LAKE AMADEUS
Seymour Sub-basin
HUGH RIVER
RIVER
PETERMANN RANGES
Eridunda 1
STUART HIGHWAY
0
100 km
MUSGRAVE BLOCK
WA
Basin Margin (erosional)
NT
SA
Port Augusta
12/NT/35
Sub-basins
Trough
NORTHERN TERRITORY
WESTERN AUSTRALIA
QUEENSLAND
SOUTH AUSTRALIA
NEW SOUTH WALES
VICTORIA
TASMANIA

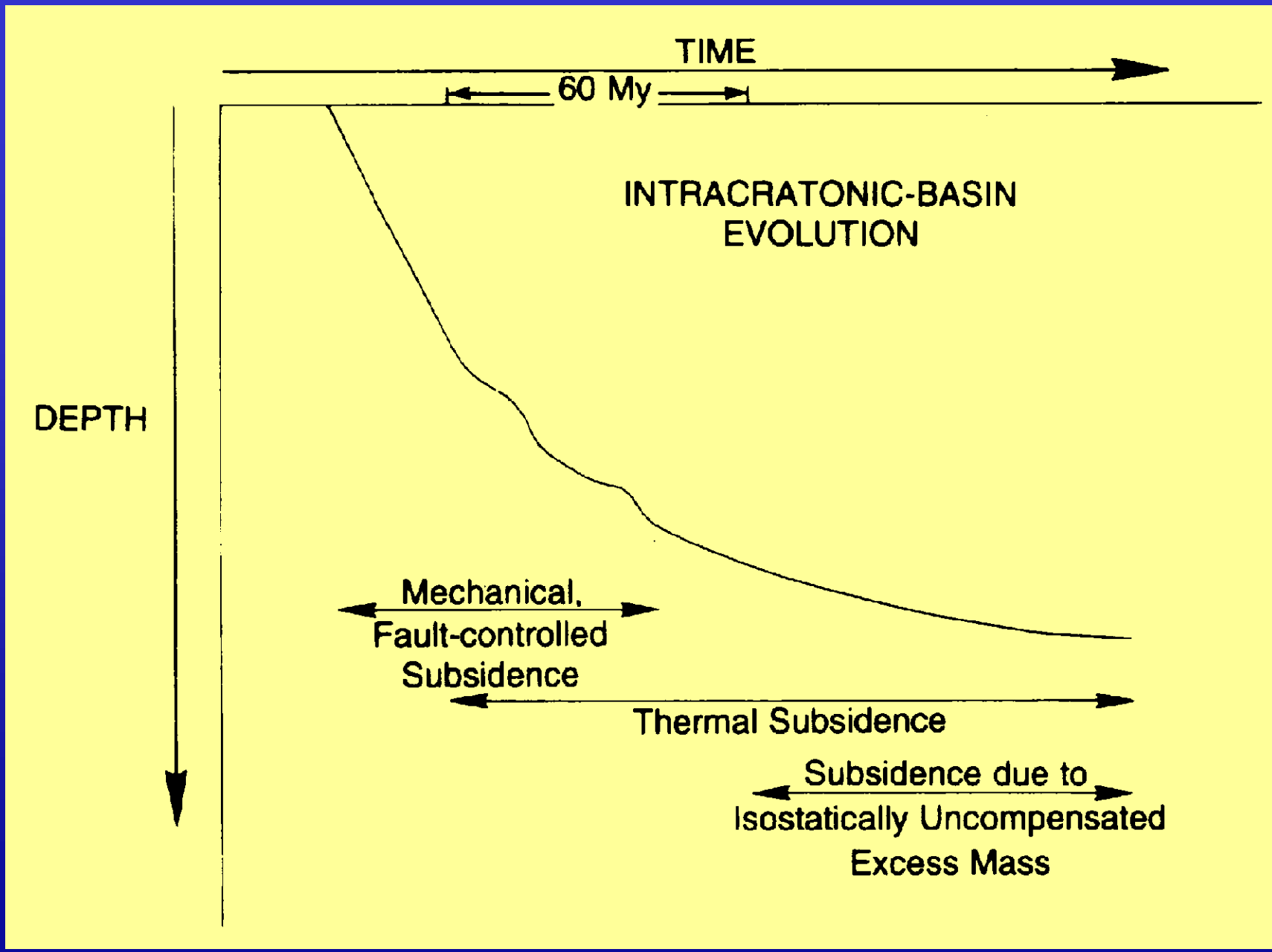

Age (Ma)
900
800
700
600
500
400
300
0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
4.0
4.5
Depth (km)
A
B
C
Stage 1
Stage 2
Stage 3


80°
70°
60°
50°
40°
20°
10°
0°
CARACAS
VENEZUELA
BOGOTA
COLOMBIA
GUIANA
QUITO
ECUADOR
MANAUS
BELEM
PERU
BRAZIL
NATAL
LIMA
BOLIVIA
LA PAZ
BRASÍLIA
SALVADOR
RIO DE JANEIRO
PARAGUAY
ASUNCIÓN
S. PAULO
CURITIBA
CHACO
PARANÁ
BASIN
PORTO
ALEGRE
SANTIAGO
B. AIRES
URUGUAY
MONTEVIDÉO
CHILE
ARGENTINA
1200 km
744 mi


58°
54°
16°
Bolivia
20°
B'
A'
São Paulo
24°
Asunción
ASUNCION ARCH
Paraguay
PARANA RIVER
5000
4000
3000
2000
1000
Curitiba
PARANA
RIVER
Florianópolis
B
28°
46°
Argentina
3000
2000
Porto Alegre
50°
200 km
124 mi
Uruguay
2000
1000
32°
OUTCROPS OF SEDIMENTARY ROCKS
VOLCANIC ROCKS
Montevidéo
Buenos Aires
58°
54°


SYSTEM
SSE LITHOSTRATIGRAPHY NNW
SEA-LEVEL
TECTONIC EVENTS
CRETACEOUS
JURASSIC
TRIASSIC
PERMIAN
CARBONIFEROUS
DEVONIAN
SILURIAN
ORDOVICIAN
BAURU GP
SERRA GERAL FM
BOTUCATU FM
ROSARIO DO SUL GP
PIRAMBOIA FM
PALERMO FM
TERESINA/RIO DO RASTO FMs
IRATI FM
RIO BONITO FM
ITARARE GP
AQUIDAUANA FM
PONTA GROSSA FM
FURNAS FM
VILA MARIA FM
RIO IVAI FM
R
F
SOUTH ATLANTIC RIFTING
PRE-RIFT
FINIHERCYNIAN OROGENY
TARDIHERCYNIAN OROGENY
EOHERCYNIAN OROGENY
CALEDONIAN OROGENY


SILURIAN - DEVONIAN
CARBONIFEROUS
-PERMIAN
JURASSIC
-CRETACEOUS
TECTONIC SUBSIDENCE
BASEMENT SUBSIDENCE
DEPTH (METERS)
0
1200
3400
3500
4800
6000
420
346
272
198
124
50
AGE (Ma)


TIME
60 My
INTRACRATONIC-BASIN
EVOLUTION
DEPTH
Mechanical,
Fault-controlled
Subsidence
Thermal Subsidence
Subsidence due to
Isostatically Uncompensated
Excess Mass