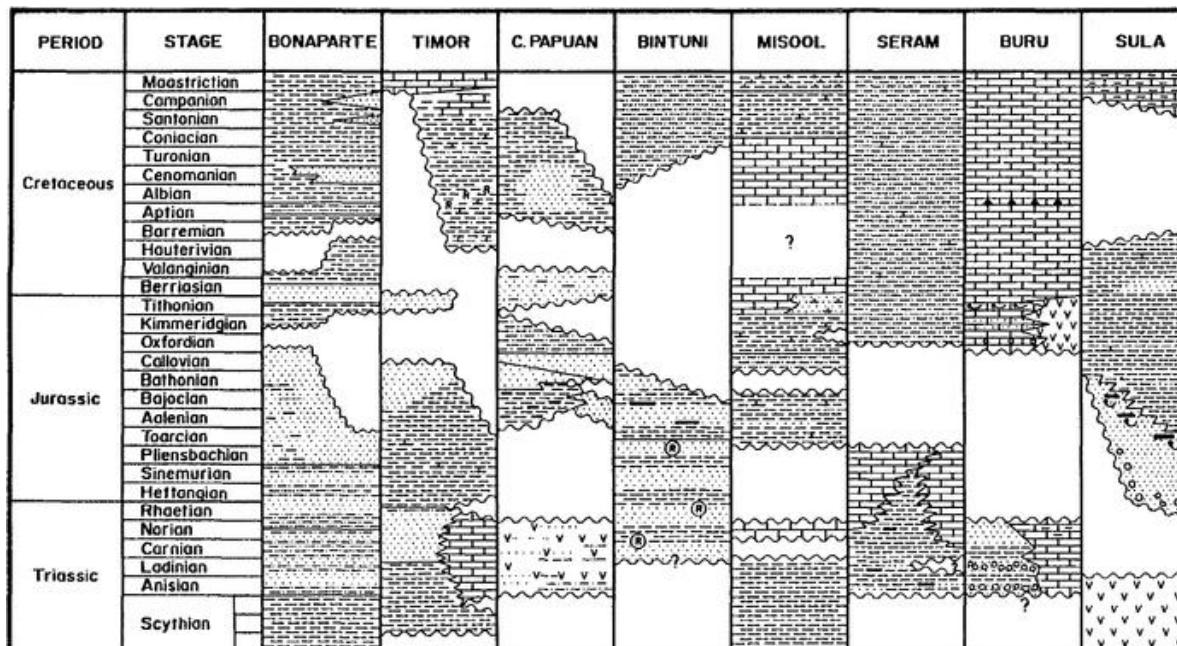


# Tema Específico 3.3

## Discordancias

## **Conceptos:**

- 1) Tipos de Discordancias y sus características de forma de origen (erosional, angular, non-conformidad, paraconformidad).
  - 2) Criterios para el reconocimiento en el campo de las diferentes discordancias.
  - 3) Implicaciones de las discordancias respecto a las divisiones en la escala del tiempo geológico; especialmente las discordancias mayores; es decir, como, o de que manera, las discordancias están relacionadas con las divisiones en la tabla del tiempo geológico..



## **Tema Específico 3.3**

### **Discordancias**

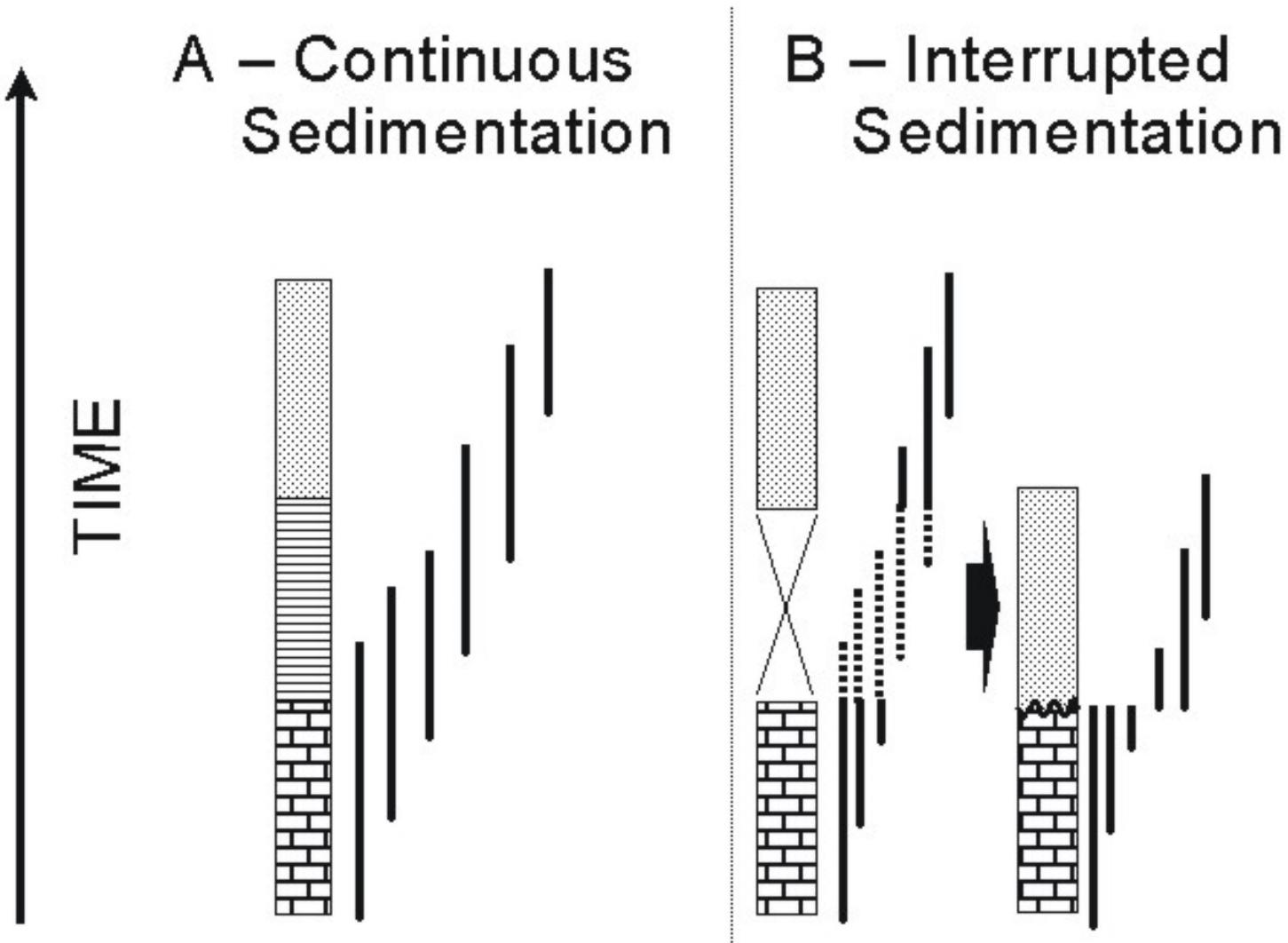
**Significado de las discordancias y sus relaciones temporales y espaciales**

El concepto de las discordancias es fundamental; una discordancia es una relación que representa un cambio en una secuencia de rocas. Son de particular importancia en la interpretación de la secuencia de eventos de una sucesión estratigráfica.

Puesto que una secuencia de rocas tiene un significado en el tiempo geológico que representa las condiciones existentes durante su deposición, una discordancia también es producto de las condiciones generadas durante un evento geológico, pero representado por un espacio vacío en el registro del tiempo geológico.

Las discordancias simplemente representan un cambio significativo en las condiciones geológicas en un tiempo determinado y constituyen una discontinuidad importante o un intervalo que representa un "tiempo perdido" y que no ha dejado materia (rocas) tangible en el registro estratigráfico.

De acuerdo con lo anterior, se reconocen categorías o grados de discordancias, mayores y menores según el hiato que represente.



## Tipos de Discordancias

-**discordancia erosional**: superficie discordante en donde los planos de la unidad de arriba y con los de la unidad de abajo son esencialmente paralelos y en donde el contacto esta marcado por una superficie irregular o erosionada.

-**discordancia angular**: los sedimentos mas jóvenes descansan sobre la superficie de erosión de estratos mas viejos deformados (basculados o plegados), es decir las rocas viejas tienen un ángulo diferente, comúnmente mayor al de los estratos de la unidad de arriba.

-**non-conformidad**: rocas estratificadas de la unidad superior sobre superficie de erosión de rocas no estratificadas (ígneas o metamórficas) de la unidad inferior.

-**paraconformidad**: las capas de la unidades arriba y debajo del contacto discordante son paralelas y no existe superficie de erosión, pero si existe un hiato (por no deposición) que separa las dos unidades.

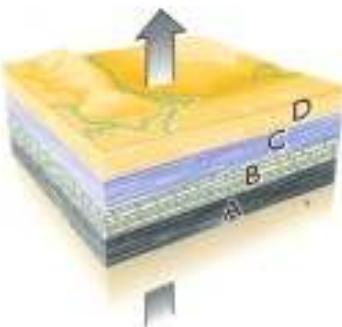
<https://www.youtube.com/watch?v=y90iJNrOPSQ>

<https://www.youtube.com/watch?v=K08Gcyq9jDI>

Sedimentation of beds A–D beneath the sea



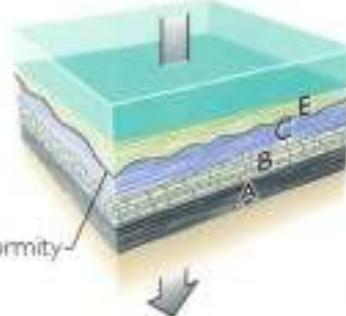
Uplift above sea level and exposure of D to erosion



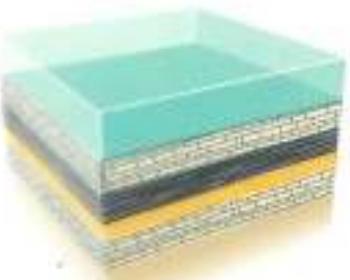
Continual erosion strips D away completely and exposes C to erosion



Subsidence below the sea and sedimentation of E over C; erosion surface of C preserved as an unconformity



Sediments deposited beneath the sea



Folding and deformation during mountain building; exposure to erosion



Surface is eroded to an uneven plane



Subsidence below sea level and younger sediments deposited on former erosion surfaces

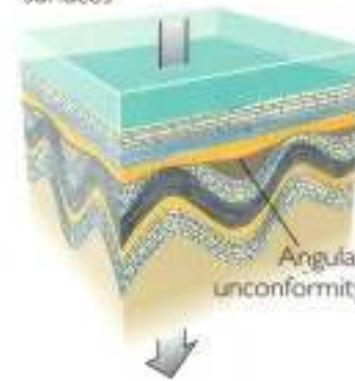
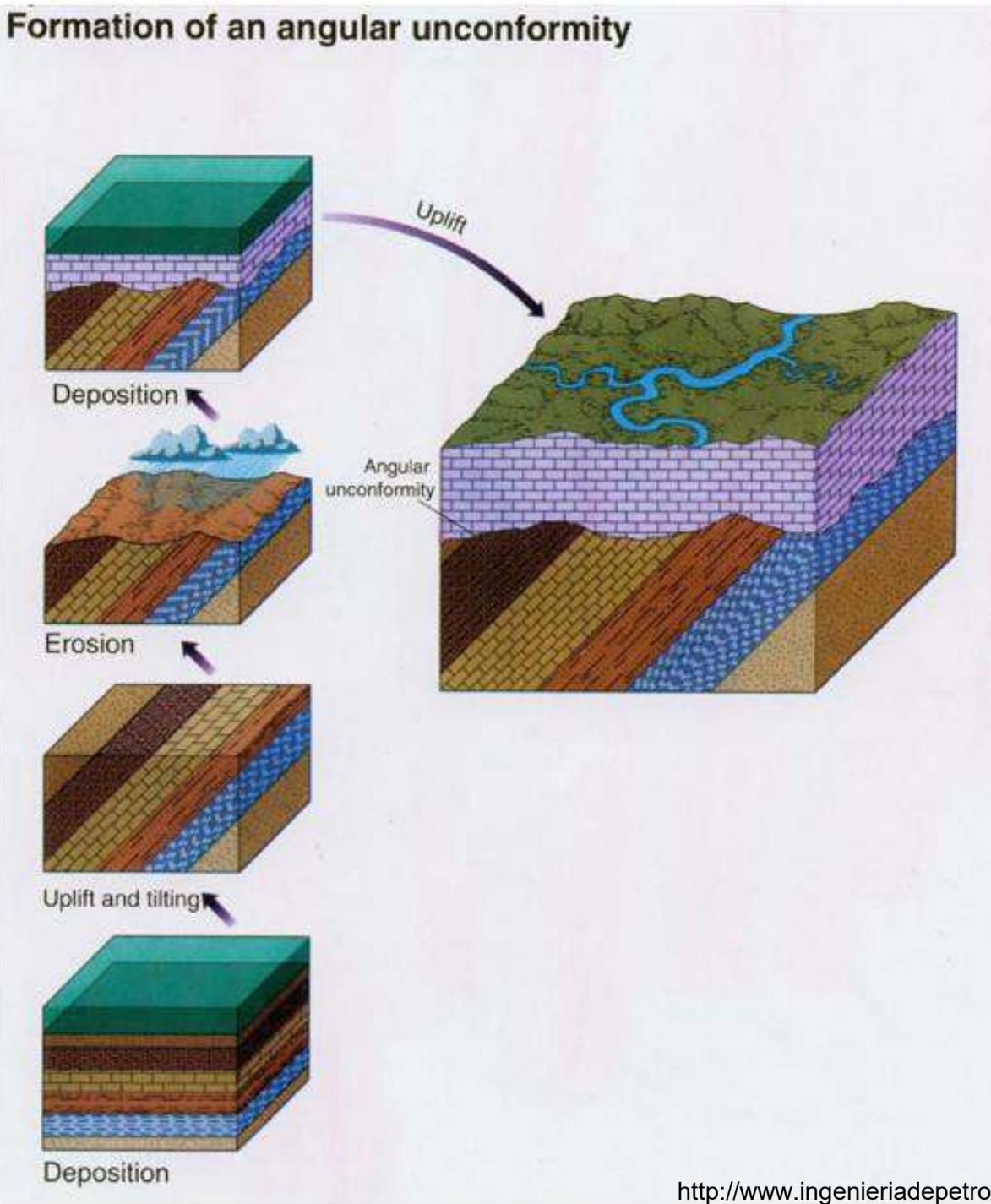


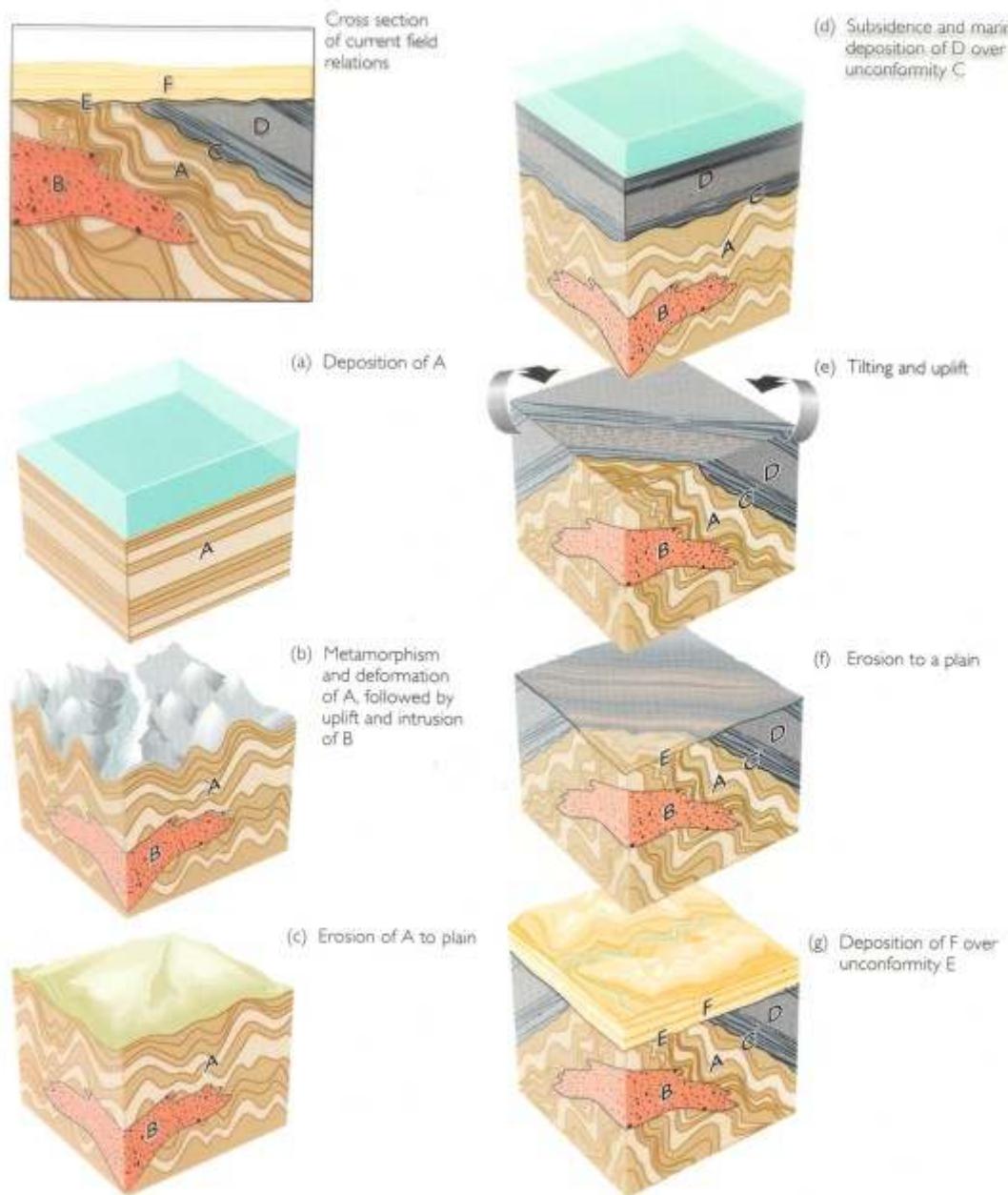
Figure 9.6, 9.7  
Press and Siever: *Understanding Earth*

OHT 43

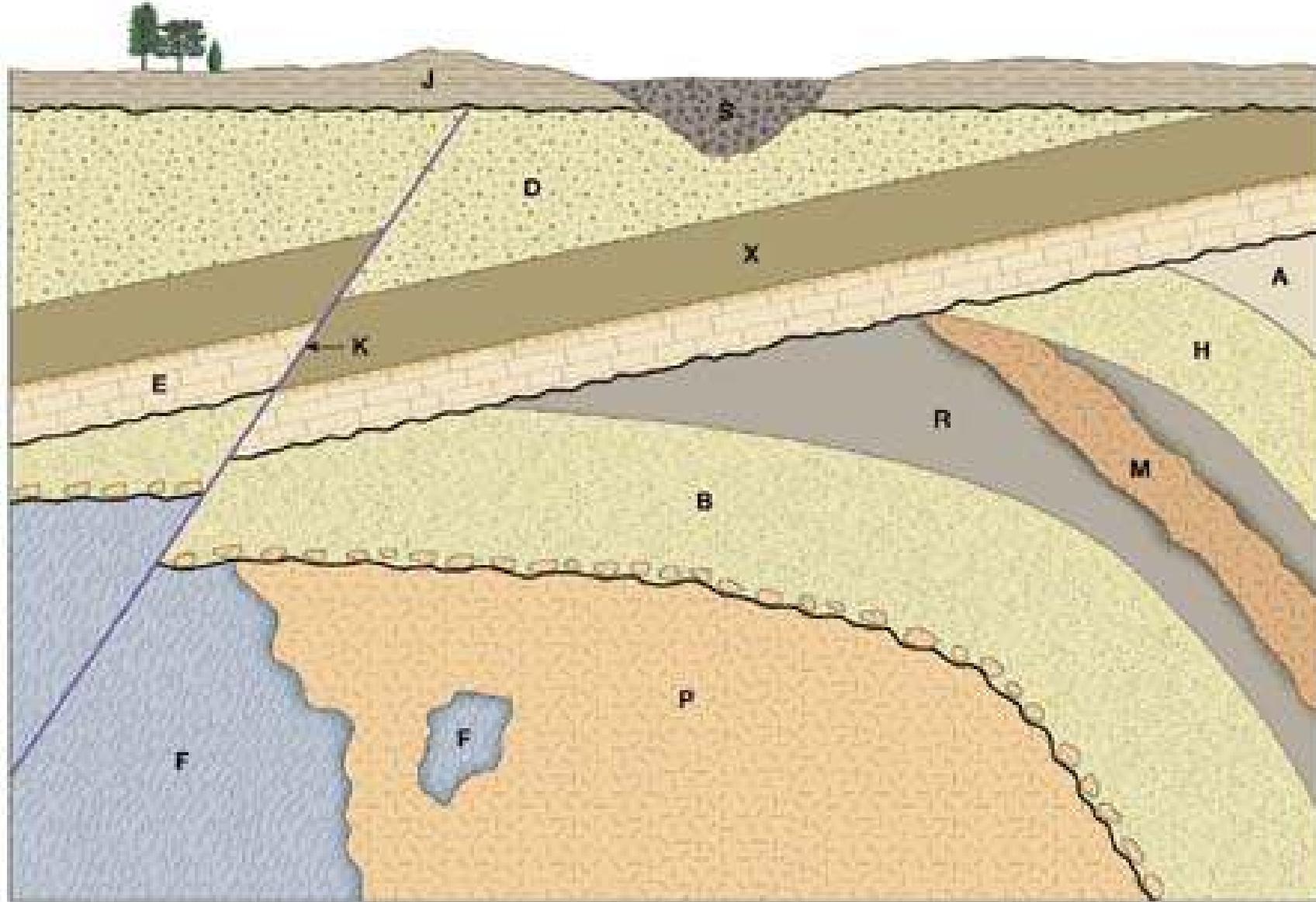
Copyright © 1994 W.H. Freeman and Company

## Formation of an angular unconformity





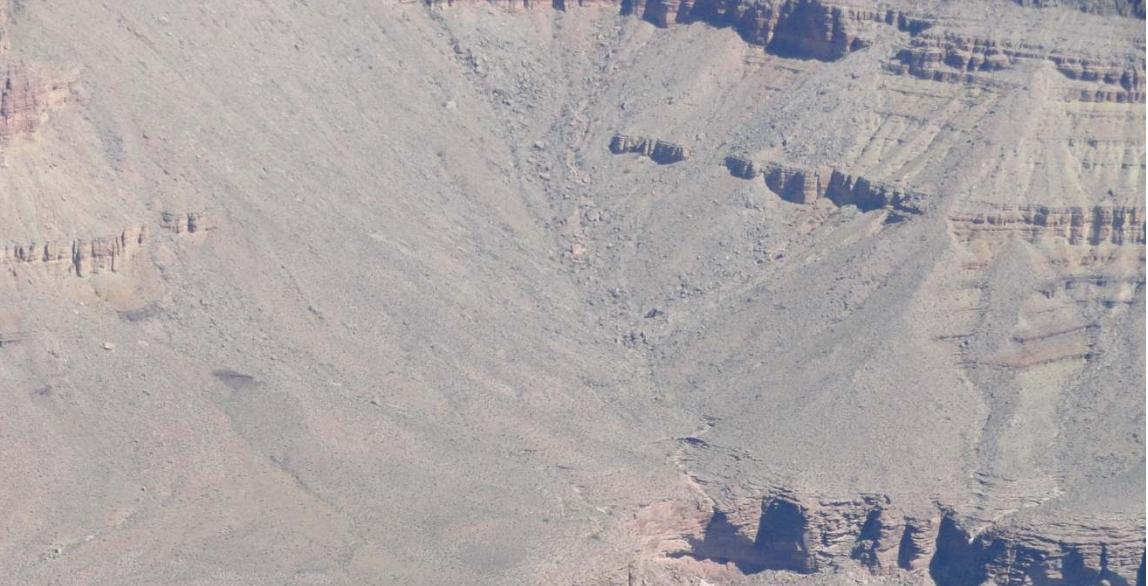
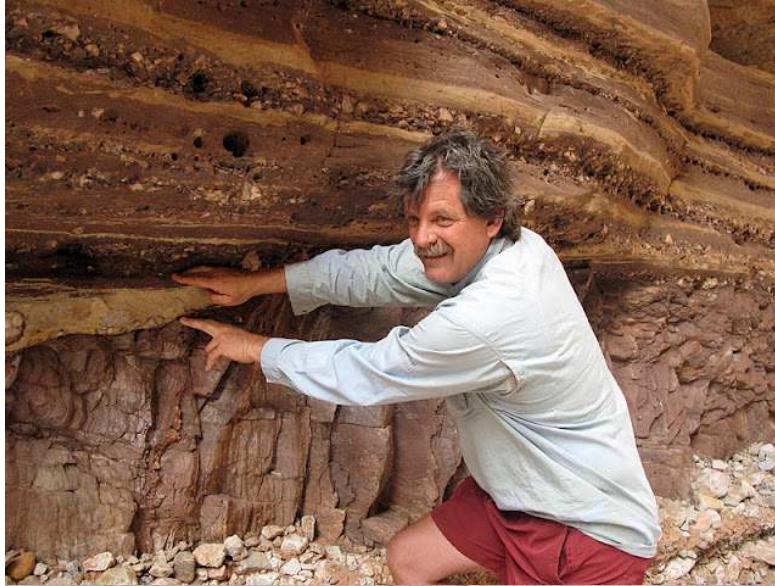
**Figure 9.10**  
Press and Siever: *Understanding Earth*



RECONOCIMIENTO EN EL CAMPO DE LAS  
DIFERENTES DISCORDANCIAS





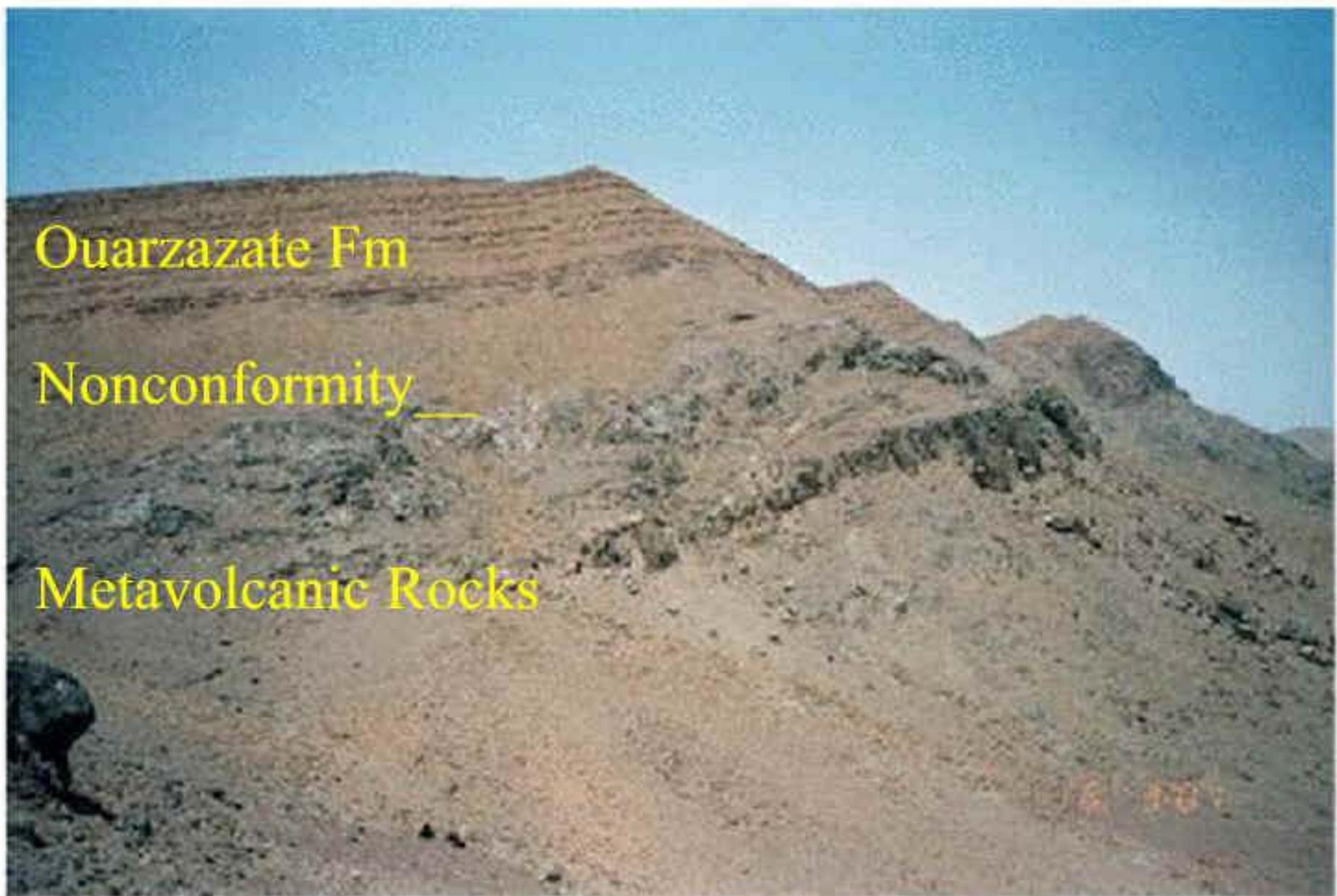


<http://written-in-stone-seen-through-my-lens.blogspot.com/2012/01/great-unconformity-of-grand-canyon-part.html>











07.16.2009



View of cliff section. Horizontal beds of Old Red Sandstone overly

vertical beds of Silurian greywackes

[http://www.bgs.ac.uk/scientific\\_issues/bcs100.html](http://www.bgs.ac.uk/scientific_issues/bcs100.html)



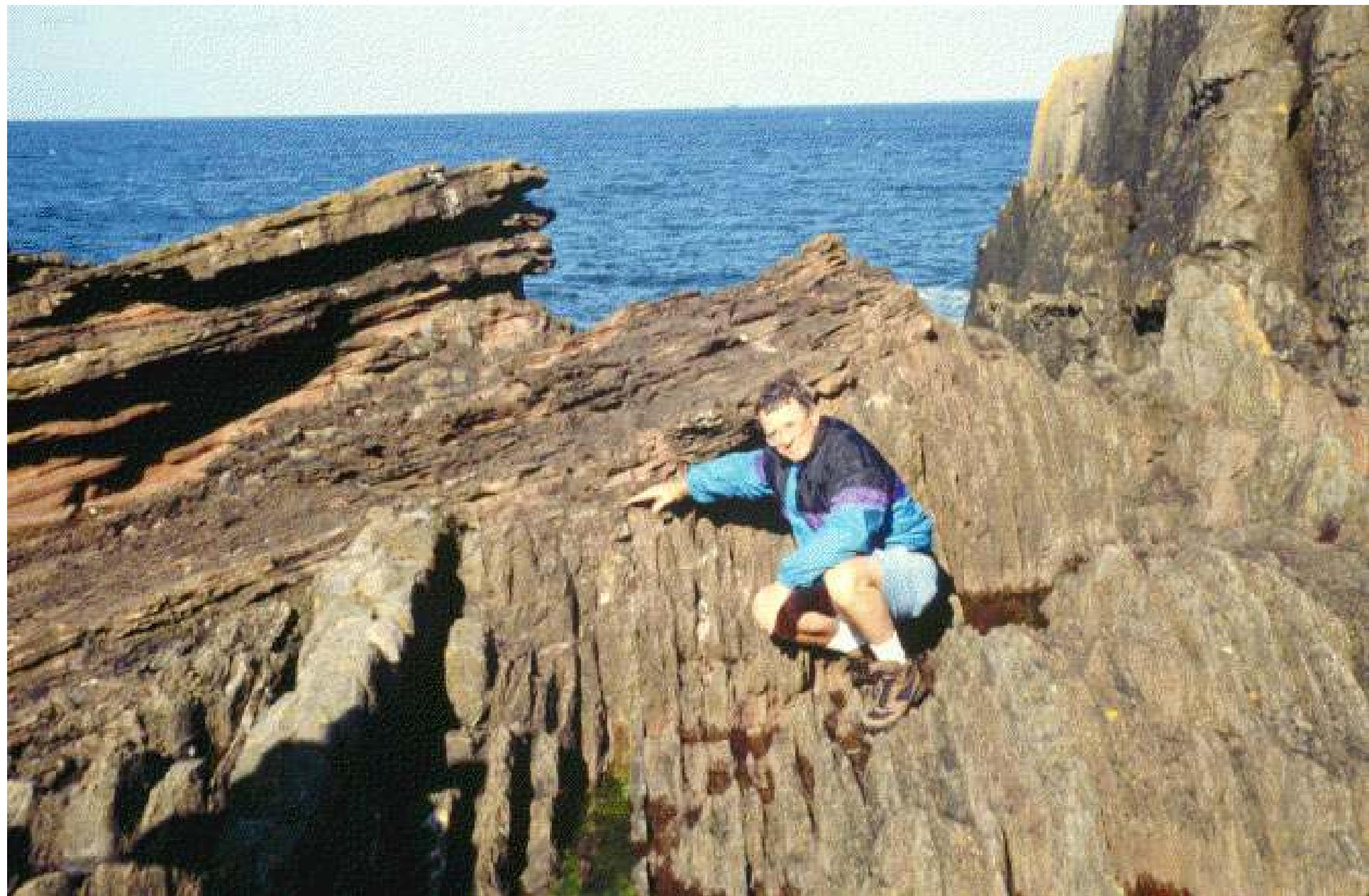
General view of the unconformity and the underlying rocks.

Note that the vertically bedded rocks exhibit pronounced  
differential weathering.

[http://www.biblicalcreation.org.uk/scientific\\_issues/bcs100.html](http://www.biblicalcreation.org.uk/scientific_issues/bcs100.html)



[http://www.biblicalcreation.org.uk/scientific\\_issues/bcs100.html](http://www.biblicalcreation.org.uk/scientific_issues/bcs100.html)







<http://science.jrank.org/pages/48233/unconformity.html>



<http://en.wikipedia.org/wiki/Unconformity>

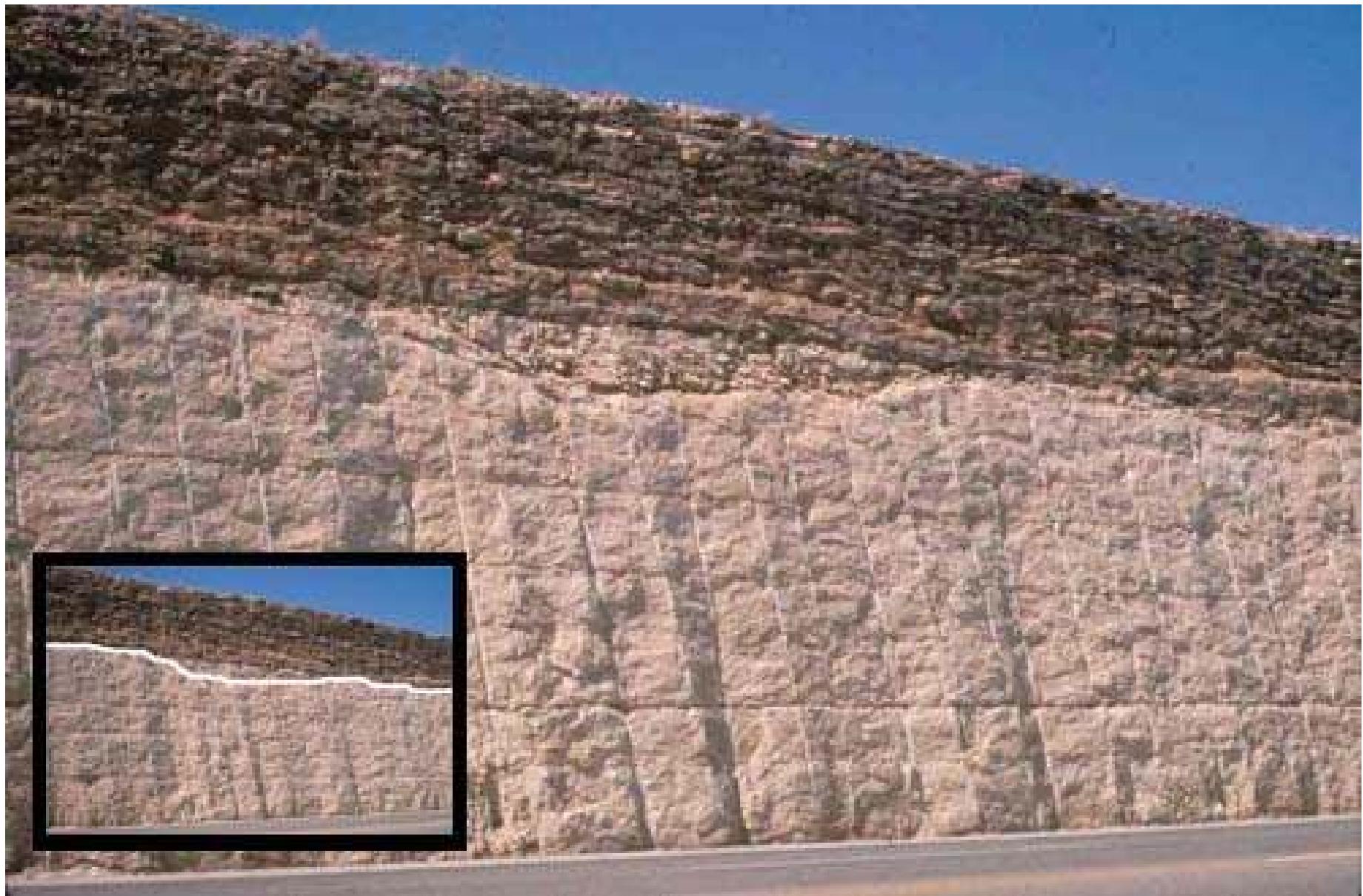




[http://newterra.chemeketa.edu/Faculty/fraa/structure\\_time/time%20unconformities.htm](http://newterra.chemeketa.edu/Faculty/fraa/structure_time/time%20unconformities.htm)







[http://newterra.chemeketa.edu/Faculty/fraa/structure\\_time/time%20unconformities.htm](http://newterra.chemeketa.edu/Faculty/fraa/structure_time/time%20unconformities.htm)

# Conglomerado basal





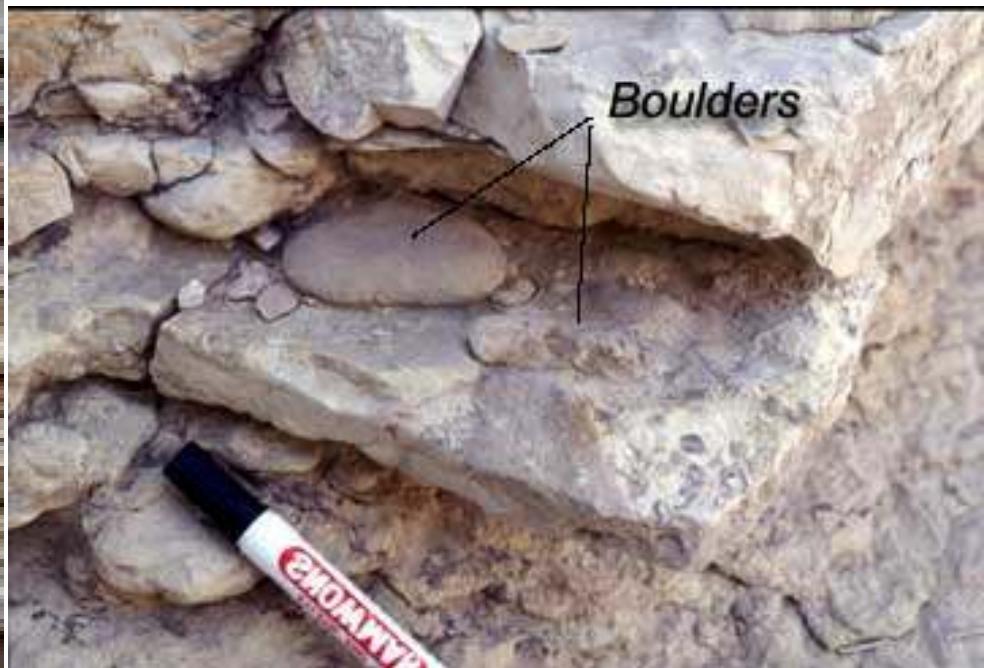
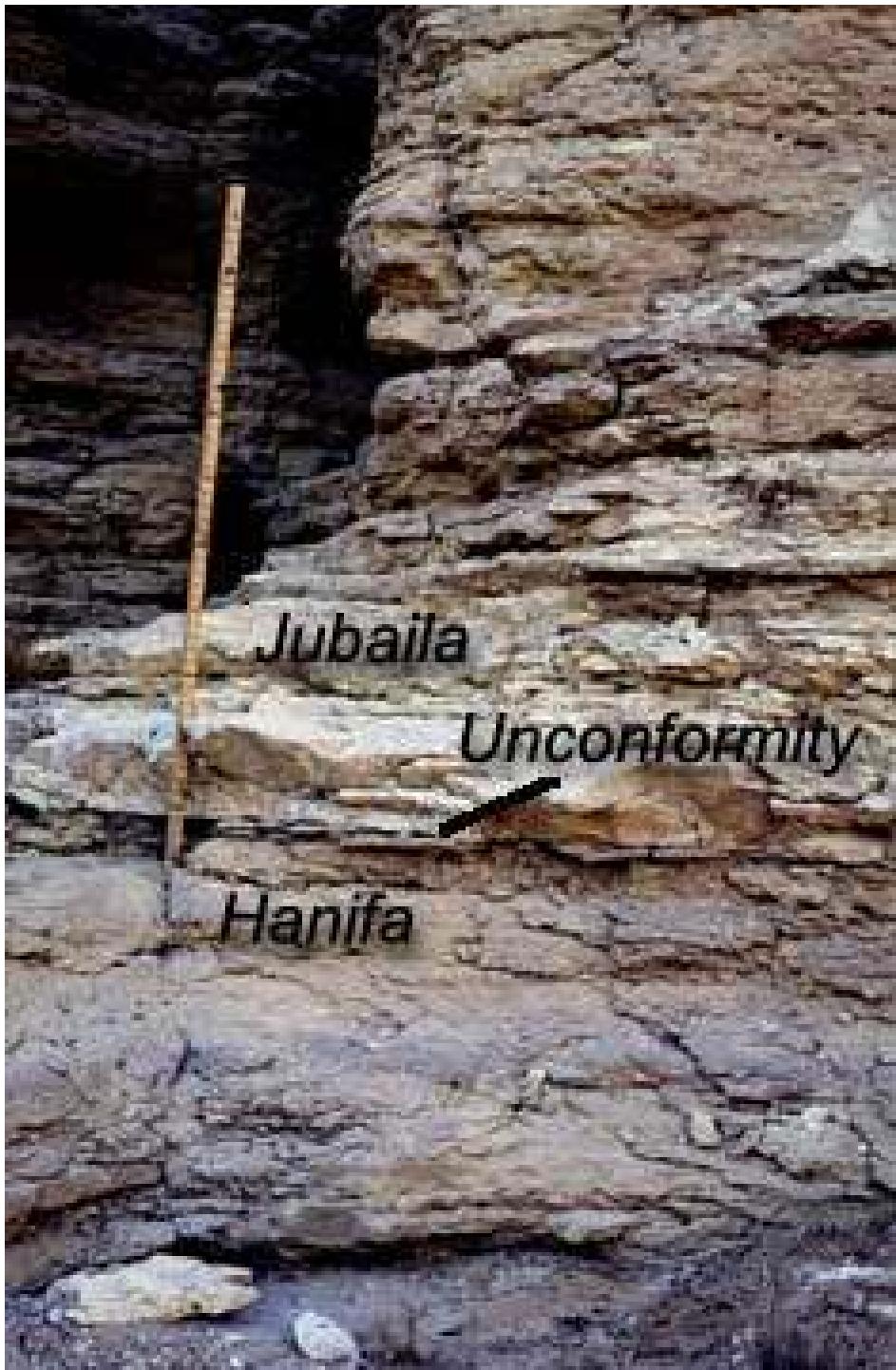
<http://all-geo.org/highlyallochthonous/2011/01/the-making-of-an-angular-unconformity-huttons-unconformity-at-siccar-point/>



<http://structuralgeo.wordpress.com/2014/08/25/the-caledonian-bedrock-layer-cake-in-s-norway/>



<http://geology1404.blogspot.mx/p/travels.html>





***Vertebrate burrows in a paleosol within the Jurassic-age Morrison formation.***



***Vertebrate burrows in a paleosol within the Jurassic-age Morrison formation.***



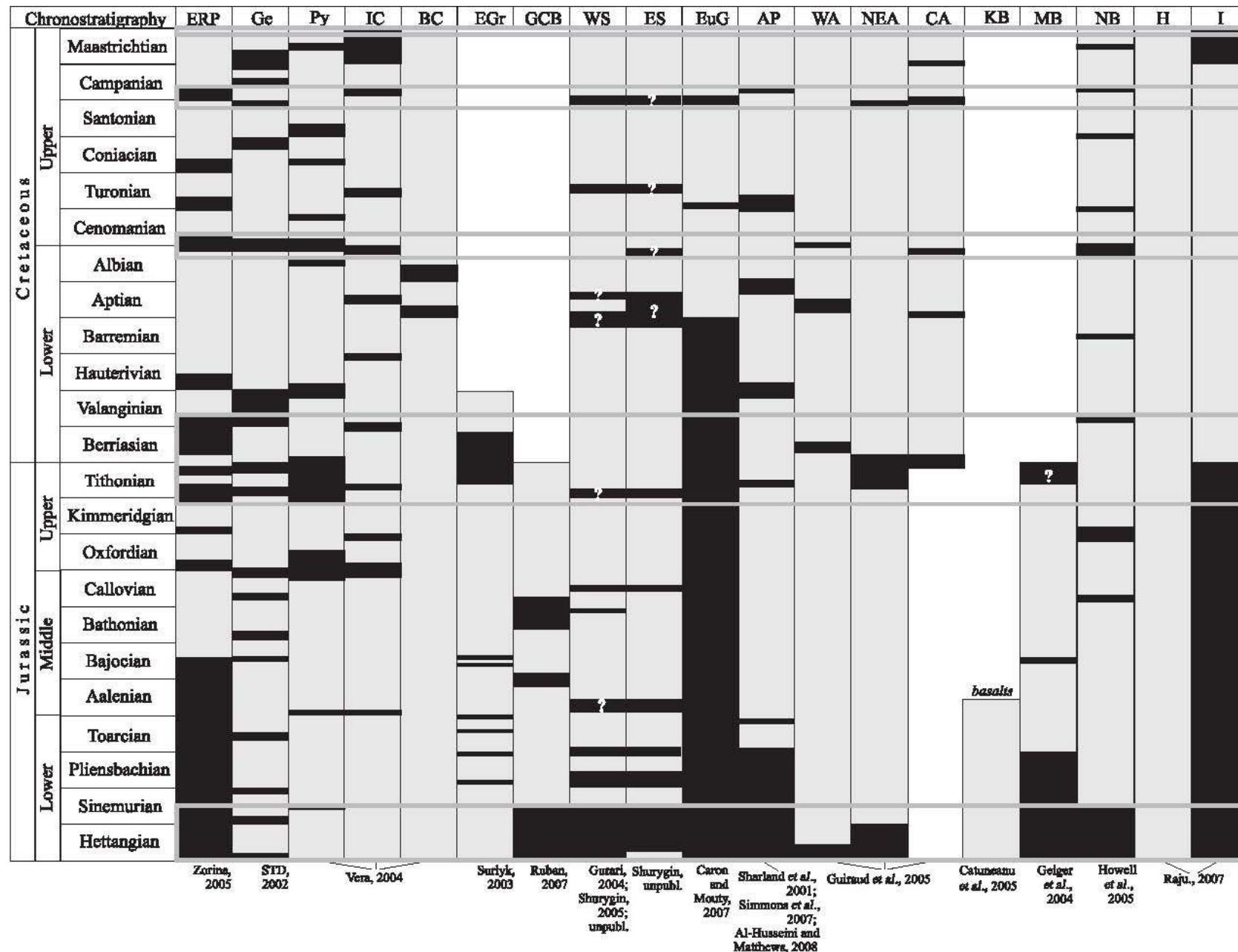
View of the cliff at Punakaiki on the east coast of the South Island of New Zealand. The arrow points at the Marshall Paraconformity, a gap assumed to represent 3 or more million years.



View of the Grand Canyon. The three arrows designate where major portions of the geologic column are missing between the layers. These gaps are paraconformities. From top to bottom the arrows point to gaps of approximately 6, 14, and 100 million years.

## **-Discordancias y hiatos**

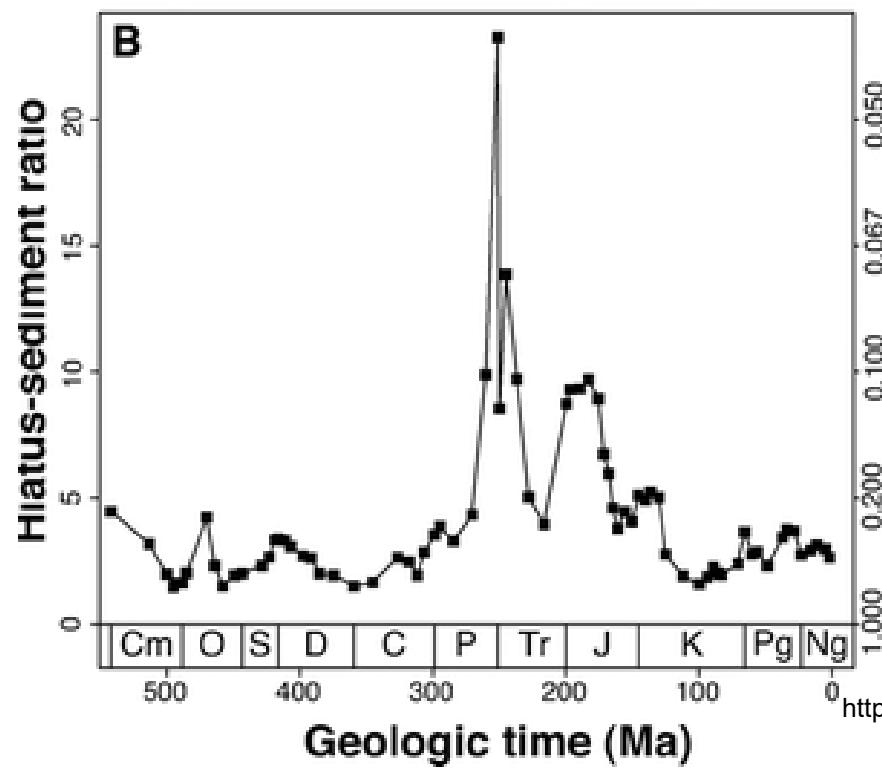
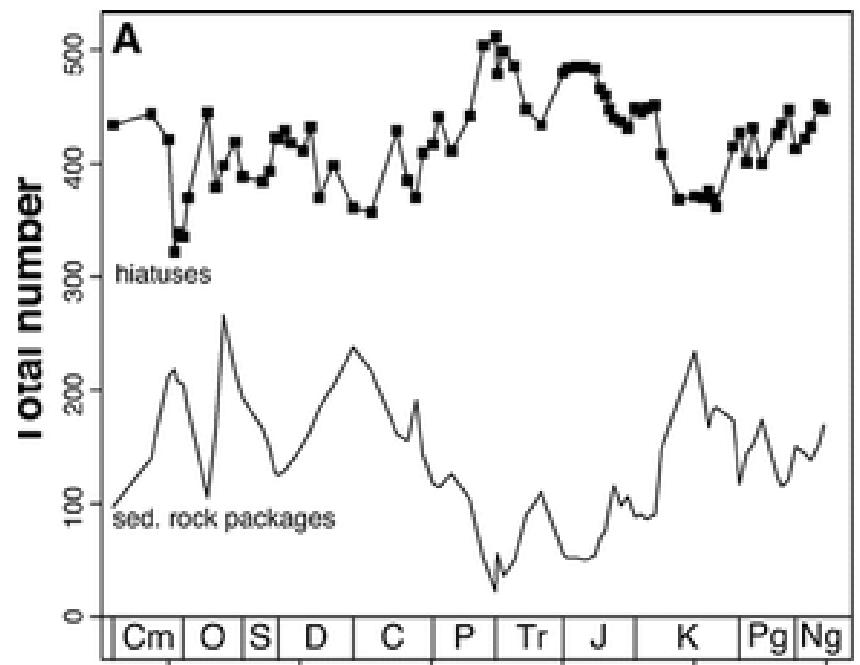
- Discordancias y correlaciones
- Discordancias y su continuidad lateral y vertical
- Discordancias y la tabla de tiempo geológico
- Discordancias y eventos tectónicos



The Jurassic–Cretaceous hiatuses in the studied regions. The considered intervals are highlighted as grey. No sufficient data are available for the rest intervals of some regions, which are shown by white. Bold dark-grey rectangles outline the common sedimentary breaks. See Fig. 1 for abbreviations.

## GEOLOGIC TIME CHART OF DALLAS AND TARRANT COUNTIES, TEXAS

Age		or	European Stage	Group		
					MA (million years ago)	Formations
Period	Series					
Quaternary		Holocene			0.01	Quaternary Terrace Deposits and Quaternary Alluvium
		Pleistocene				<i>Unconformity (exent unknown)</i>
<i>Unconformity</i>						
Cretaceous	Upper Cretaceous / Gulfian					Ozan Marl (Lower Tayler)
						<i>Unconformity</i>
		Santonian	Austin	82	Gober Chalk	
		Coniacian			Brownstown Marl	
		Turonian	Eagle Ford		Blossom Sand	
		Cenomanian			Austin Chalk	
					<i>Unconformity</i>	
			Woodbine	86	Arcadia Park Shale	
					Kamp Rach Limestone	
					Britton Shale	
					Tarrant Beds or Six Flags Limestone	
Cretaceous	Lower Cretaceous / Comanchian		Albian	92	Arlington Member	
					Lewisville Member	
					Dexter Member	
					Rush Creek Member	
			Washita	100	<i>Unconformity</i>	
					Grayson Marl	
					Main Street Limestone	
					Pawpaw	
Cretaceous	Lower Cretaceous / Comanchian		Fredricksburg	100	Weno Limestone	
					Denton Clay	
					Fort Worth Limestone	
					Duck Creek Limestone	
			<i>Unconformity</i>	100	<i>Unconformity</i>	
					Kiamichi	
					Goodland Limestone	
					Walnut Clay	
Cretaceous	Lower Cretaceous / Comanchian		<i>Unconformity</i>	100	<i>Unconformity</i>	
					Paluxy	



<b>Discordancias</b>	<b>Caracteristica Ppal.</b>	<b>Sup. de erosión</b>	<b>Congl. en la base de Unid. superior</b>	<b>Magnitud del hiato</b>
Erosional	Sup. erosión	X	X	++
Paraconformidad	Paralelismo entre unid superior e inferior			+
Non-conformidad	Rx estratificadas sobre no estratificadas	X	X	+++
Angular	Rx unid superior en ángulo sobre inferior	X	X	+++

-Discordancias y hiatos

**-Discordancias y correlaciones**

-Discordancias y su continuidad lateral y vertical

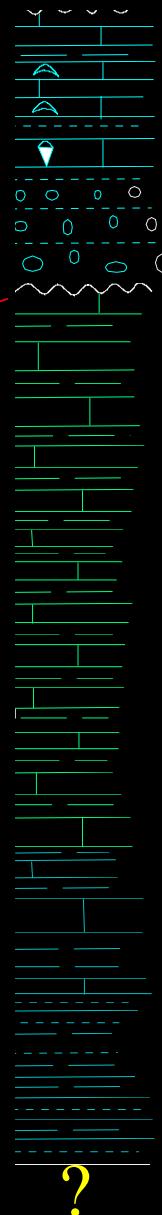
-Discordancias y la tabla de tiempo geológico

-Discordancias y eventos tectónicos

# Lampazos



# Sierra Los Chinos



Los Picachos

Lampazos

Agua Salada

STAGE	I	II	III	IV
Cenomanian				
A l b i a n Upper				
middle				
Lower	D C 2 U	E F 3 TF	G F 3 TF	H 3 TF
A p t i a n Clansagesian	B 1 TF			
Gargasian			E 2 D ?	
Bedoulian			NF	B 1 D 1 F ?
Barremian			C ?	E 1 D C 1 U F
Hauterivian			B	
Valanginian			F	
Berriasian				

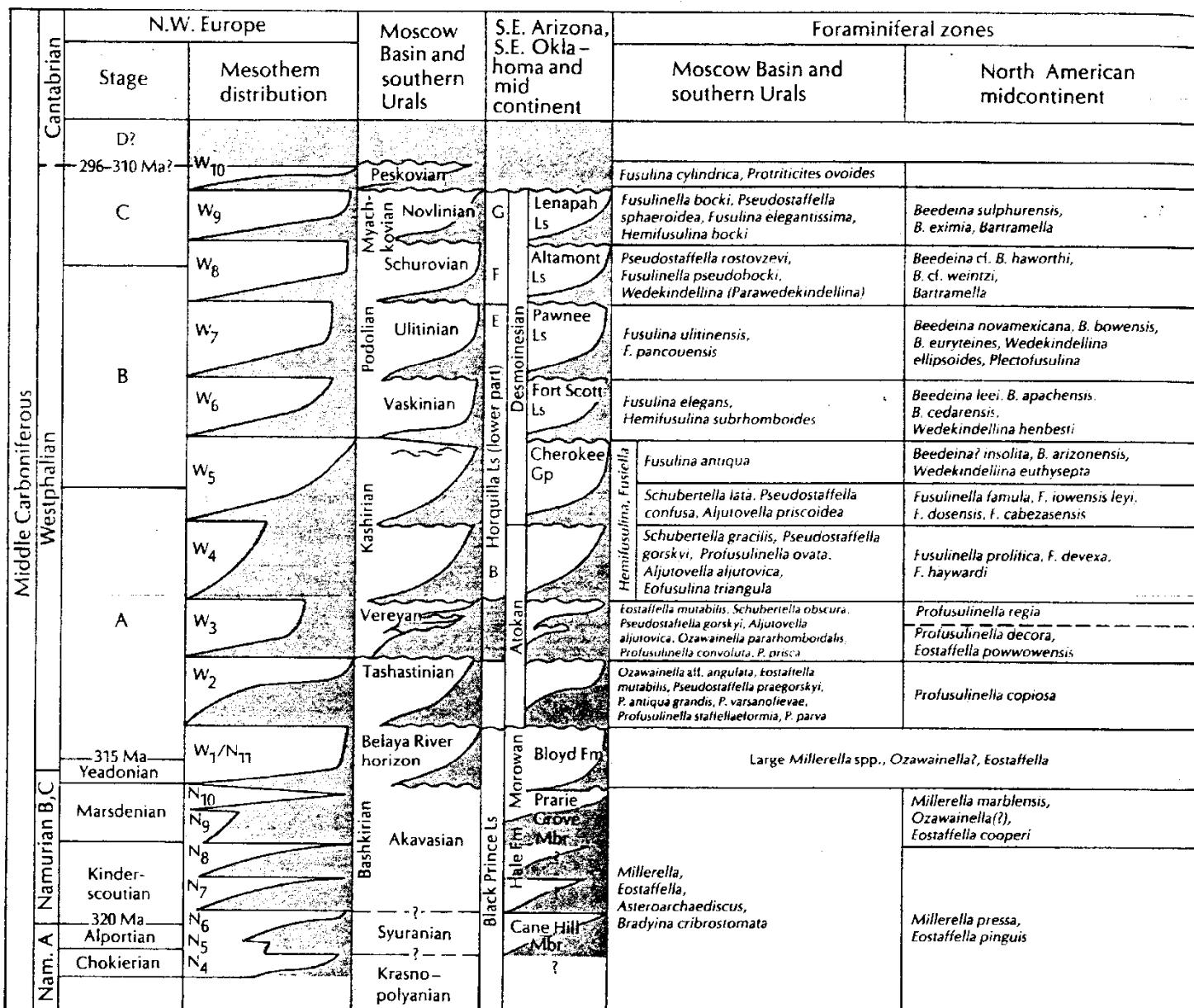
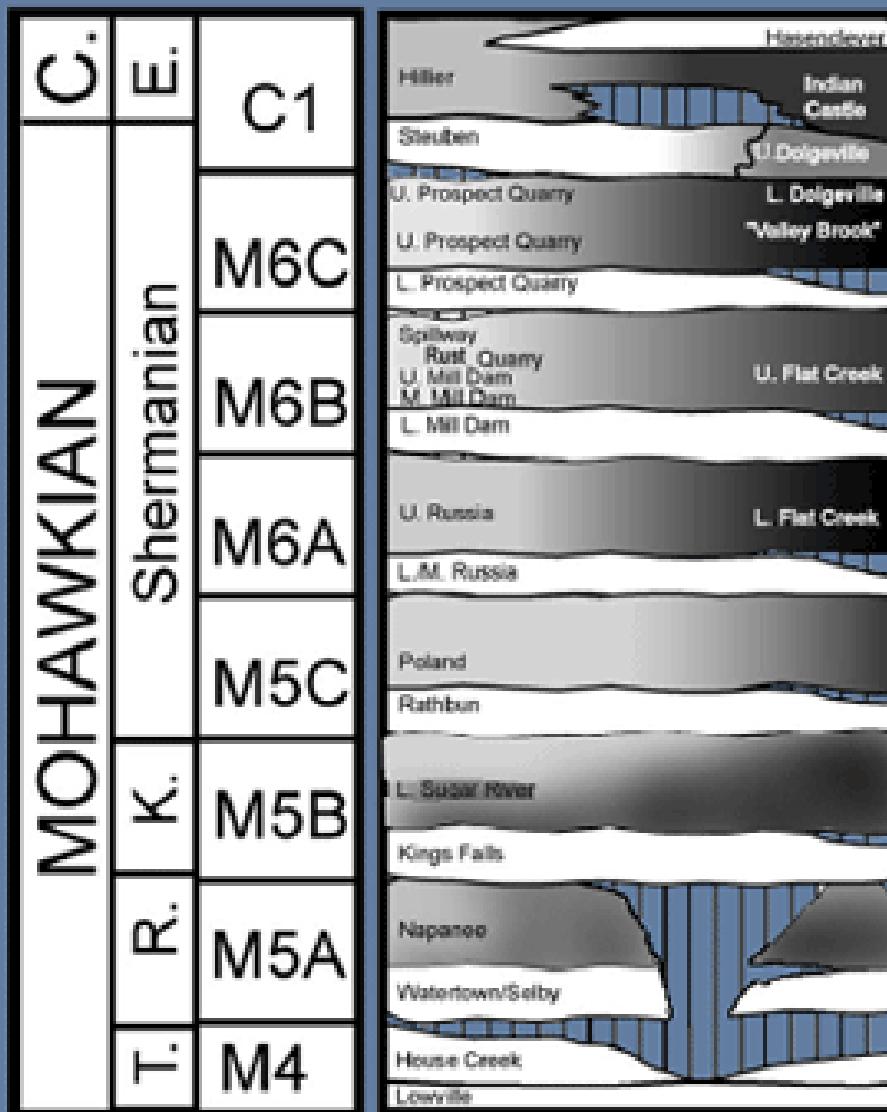


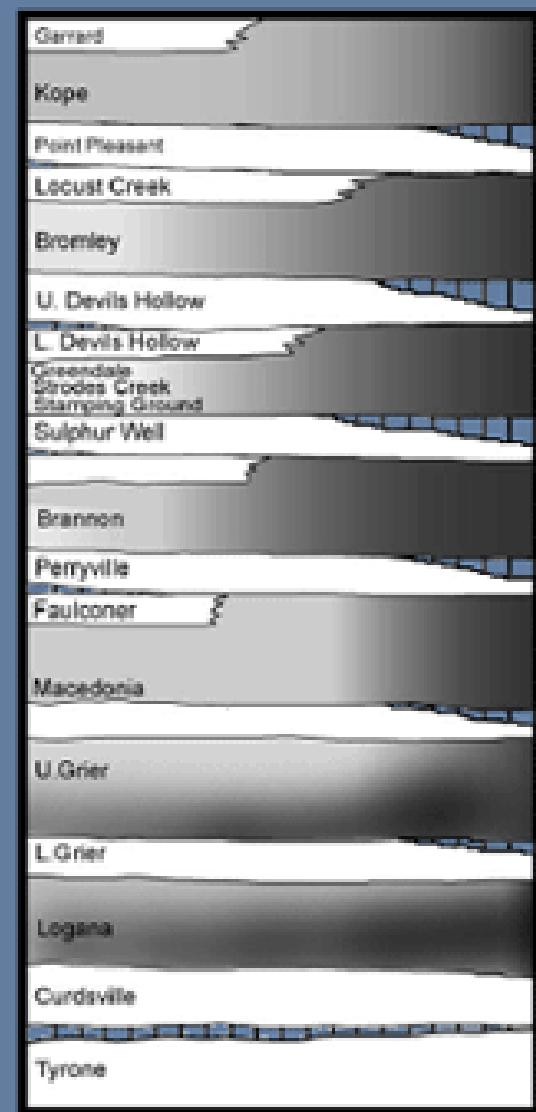
Figure 8.10

Correlation of Middle Carboniferous transgressive-regressive cycles that occurred in Europe, Russia, and North America. Fusulinid foraminiferal biostratigraphy establishes the correlation between the similar patterns of cyclic sedimentation and unconformities. (W, Westphalian; N, Namurian). From Ross and Ross(1985).

# New York



# Jessamine Dome



*Comparative sequence stratigraphy of two classic Upper Ordovician successions, Trenton Shelf (New York–Ontario) and Lexington Platform (Kentucky–Ohio):*

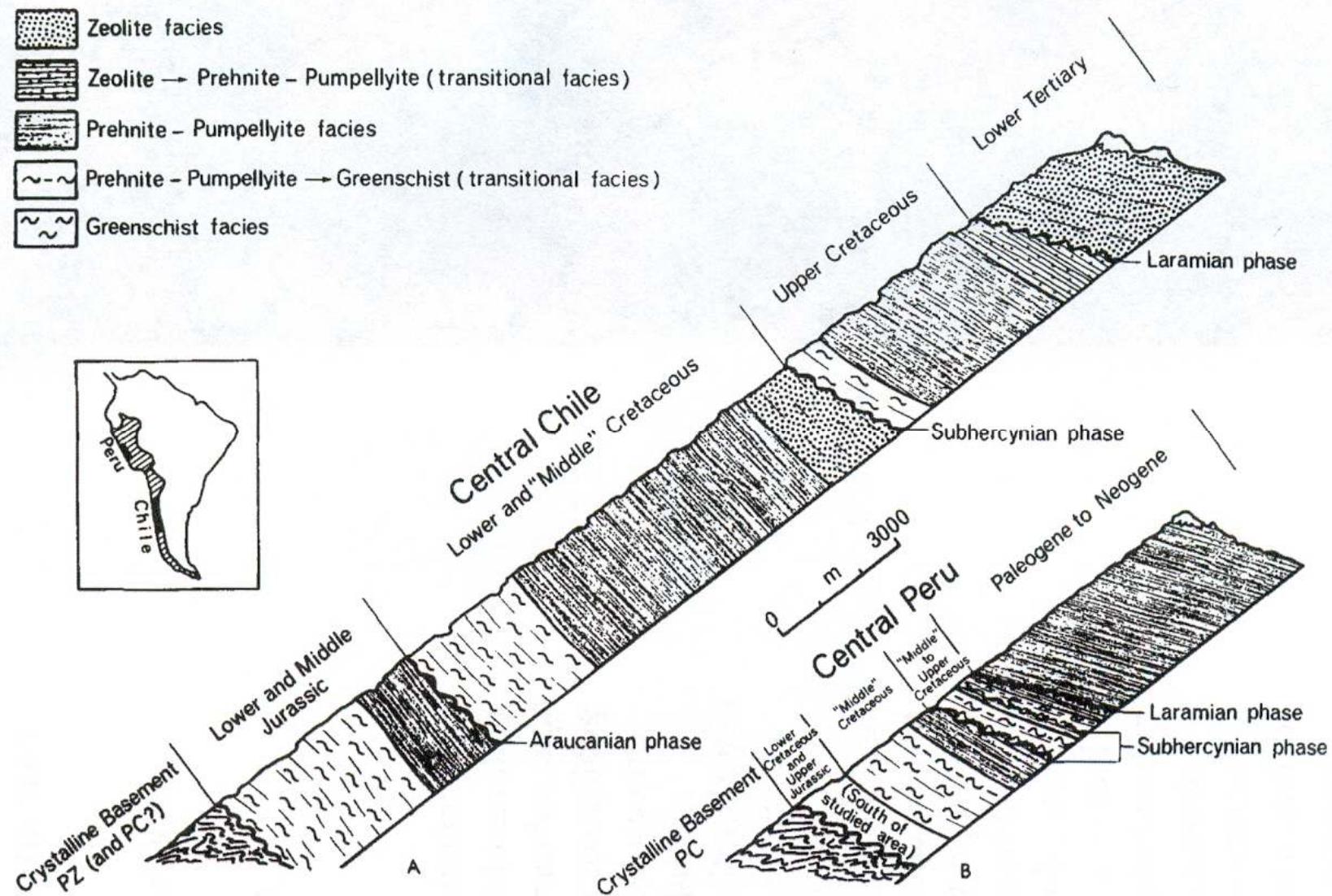
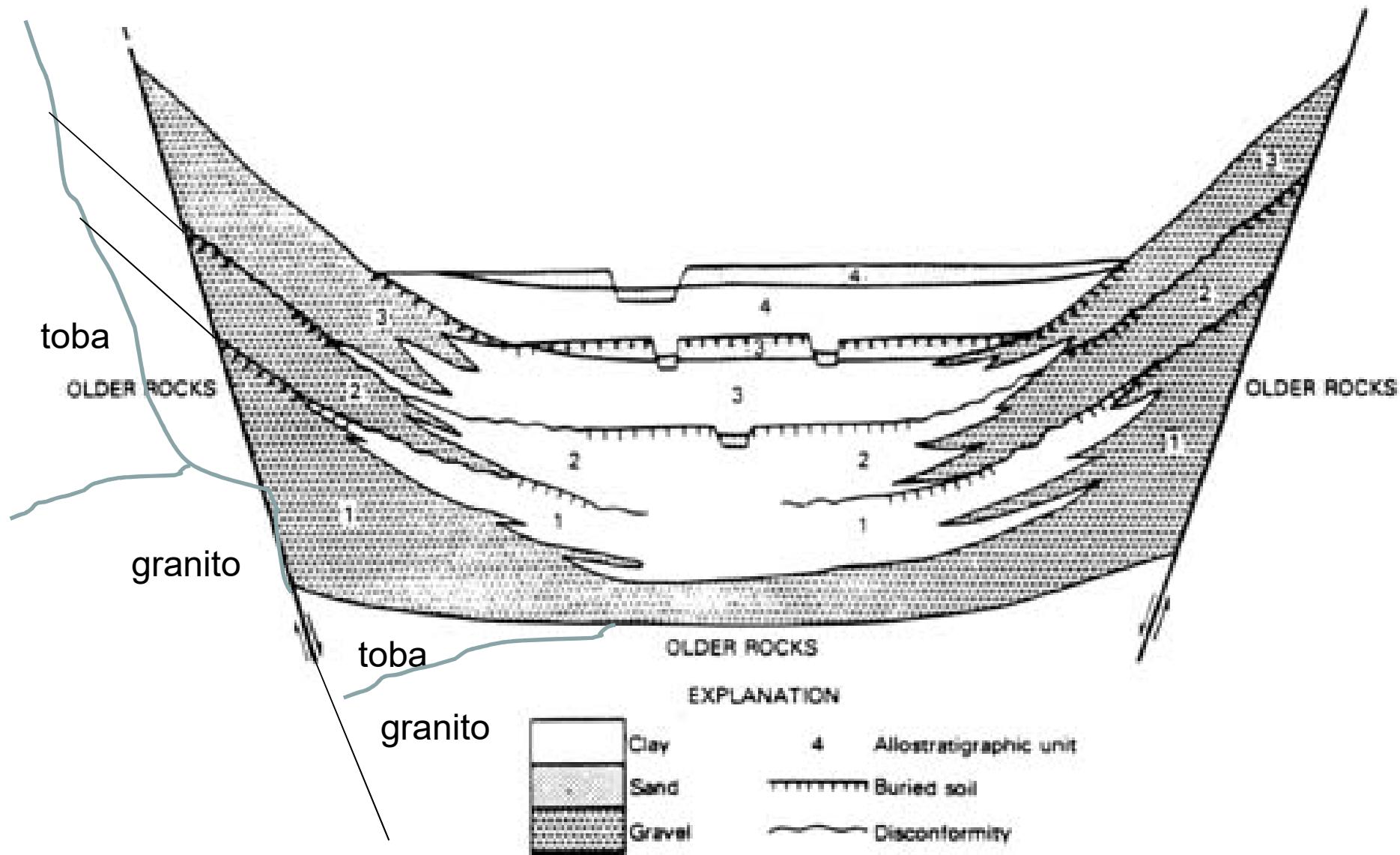
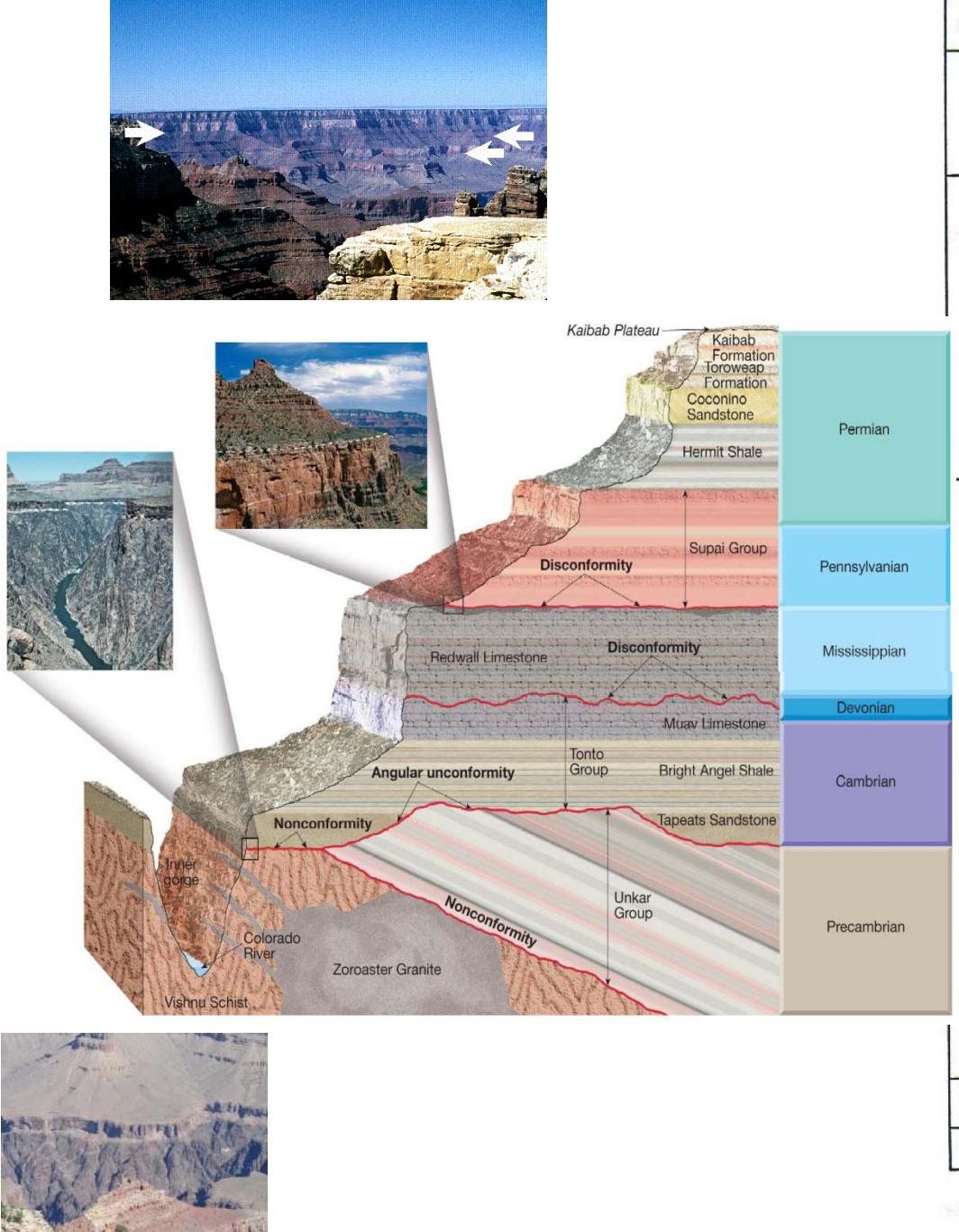


Fig. 1. Stratigraphical-structural units, metamorphic facies series and unconformities in the Andes. (A) Central Chile, (B) Central Per

- Discordancias y hiatos
- Discordancias y correlaciones
- Discordancias y su continuidad lateral y vertical**
- Discordancias y la tabla de tiempo geológico
- Discordancias y eventos tectónicos

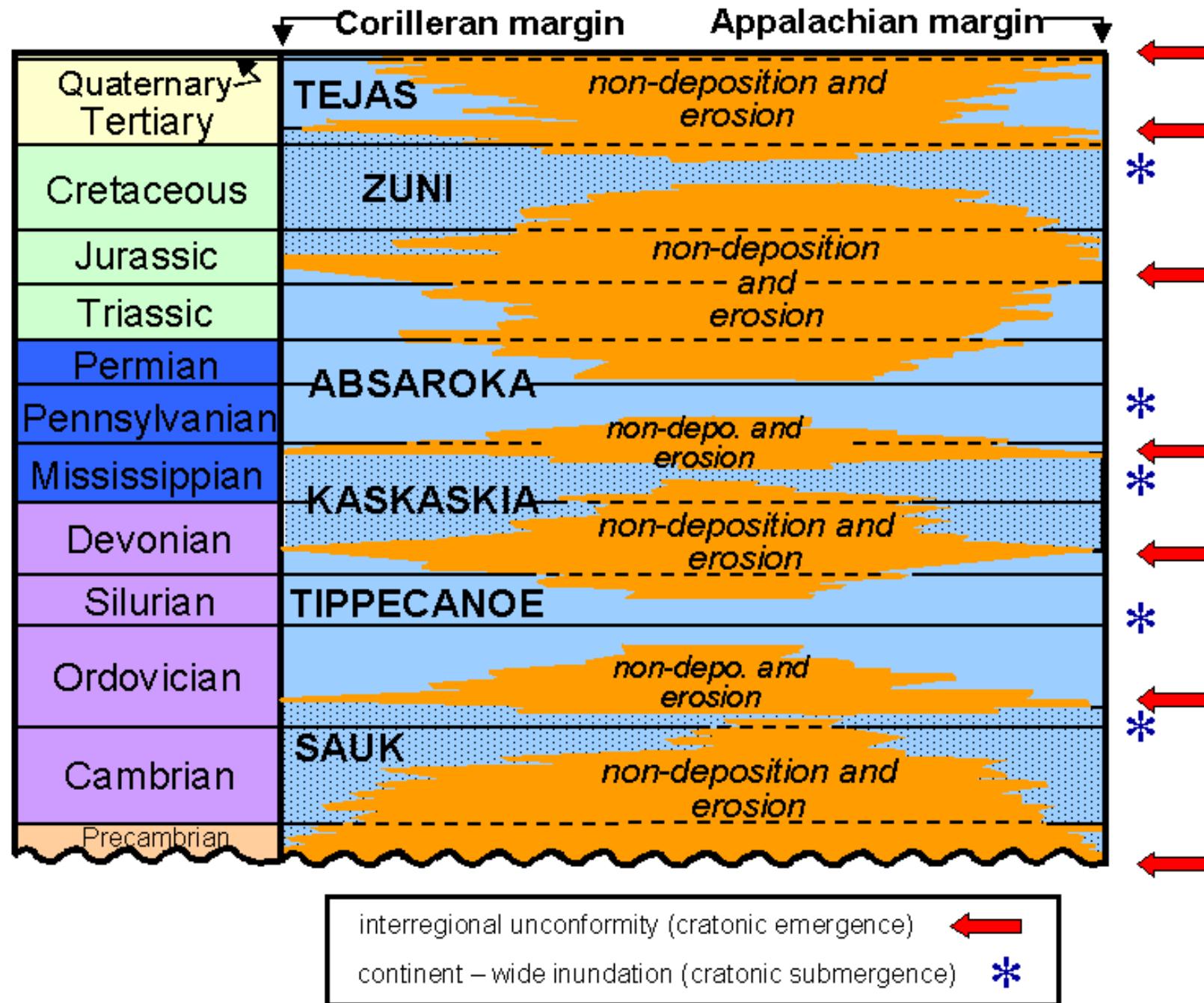


- Discordancias y hiatos
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DIVISIONS OF SHOWING DEVELOPMENT OF ERA PERIOD ROCKS		GEOLOGICAL PLANT AND TIME ANIMAL LIFE DOMINANT LIFE	
10,000,000 Years	QUATERNARY	TERTIARY	AGE of MAMMALS
100,000,000 Years	CENOZOIC		
200,000,000 Years		CRETACEOUS	
300,000,000 Years		JURASSIC	AGE of AMMONITES and
400,000,000 Years		TRIASSIC	AGE of REPTILES
500,000,000 Years		PERMIAN	AGE of AMPHIBIANS
600,000,000 Years		CARBON-IFEROUS	AGE of PLANTS
700,000,000 Years		DEVONIAN	AGE of FISHES and CORALS
800,000,000 Years		SILURIAN	AGE of INVERTEBRATES
900,000,000 Years		ORDOVICIAN	AGE of SEA-WEEDS
1,000,000,000 Years		CAMBRIAN	RISE of INVERTEBRATES
900,000,000 Years	PROTEROZOIC		AGE of PLANTS
500,000,000 Years	ARCHEAOZOIC	PRECAMBRIAN	AGE of ANCESTORAL LIFE

- Discordancias y hiatos
- Discordancias y correlaciones
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- Discordancias y la tabla de tiempo geológico
- Discordancias y eventos tectónicos**



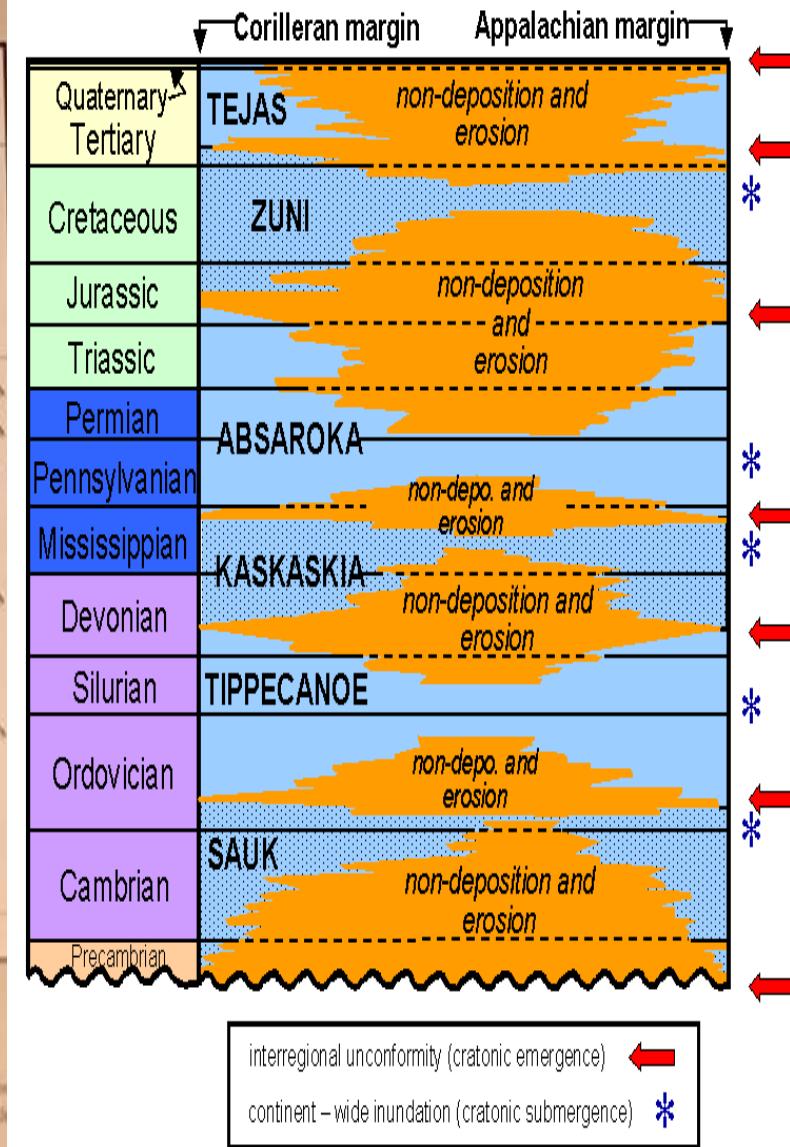
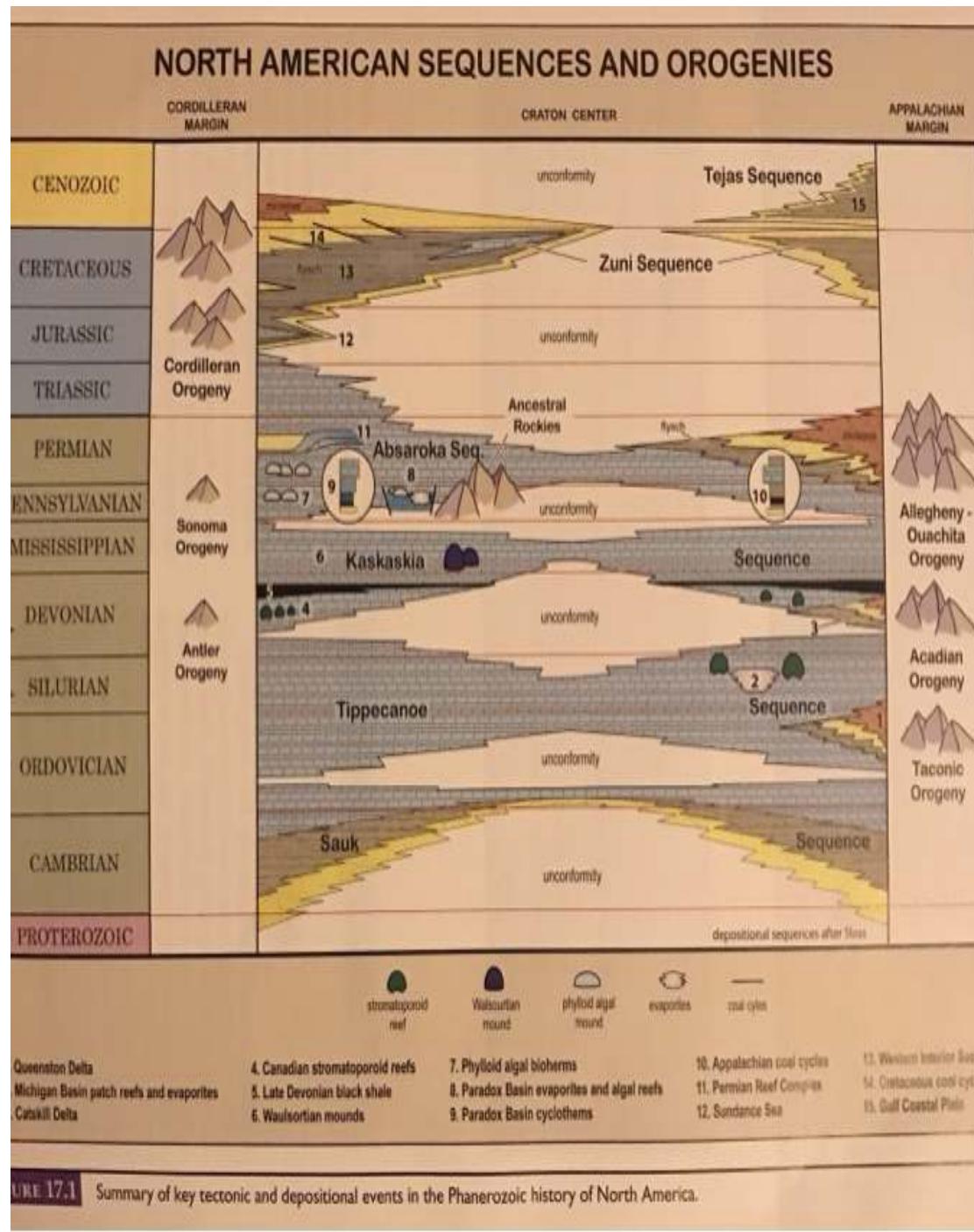
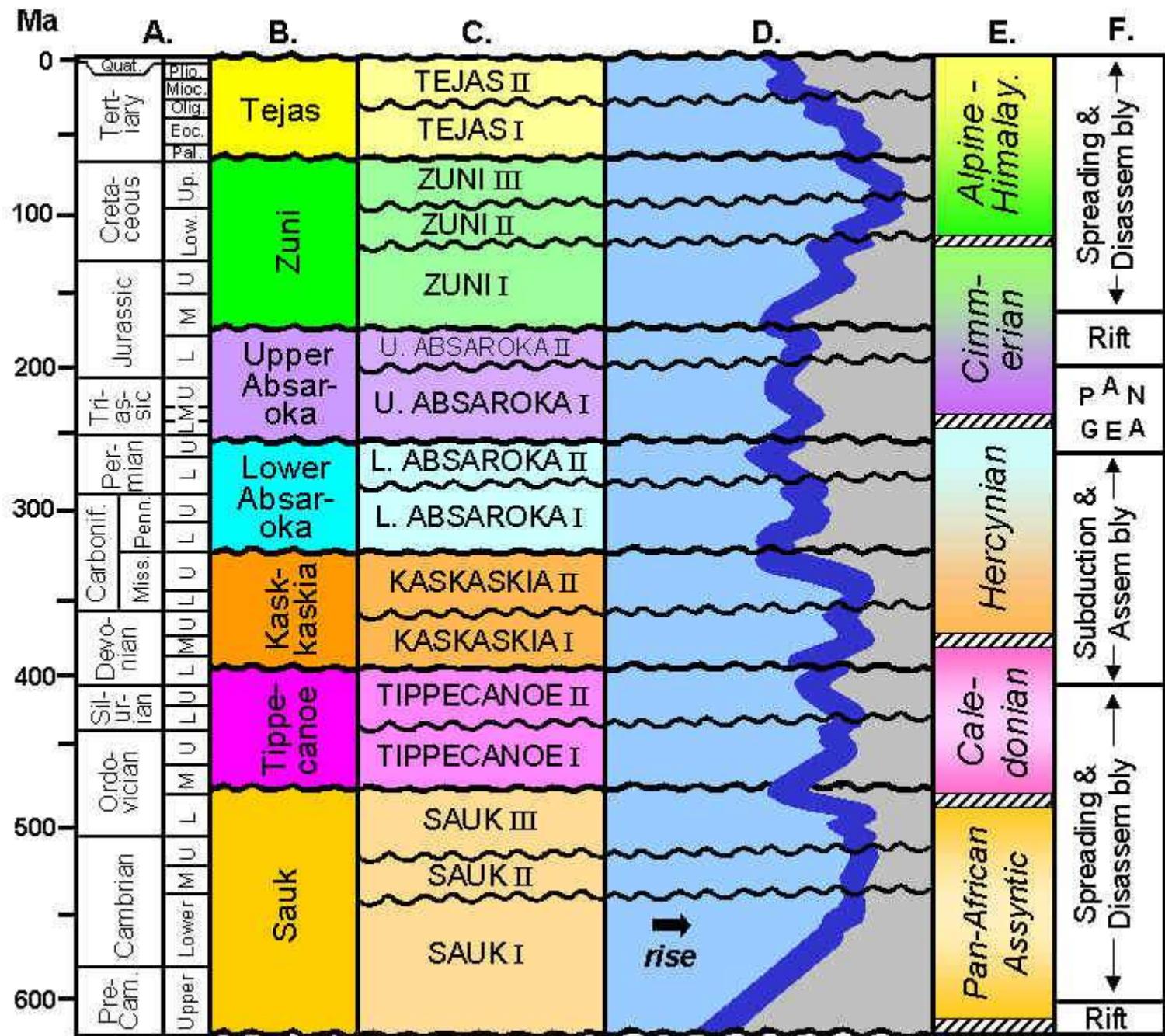
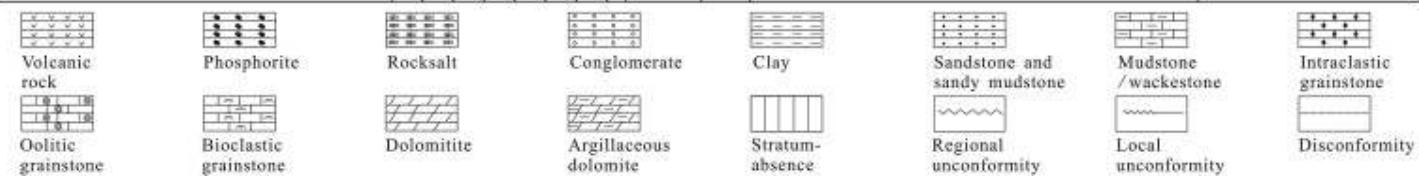


FIGURE 17.1 Summary of key tectonic and depositional events in the Phanerozoic history of North America.



Strata		sequence		Lithology	Thickness (m)	Basin sedimentary fill evolution and uplift stages		Tectonic setting
		2nd order	1st order					
	Triassic		IV			$T_g$	Clatonic inland depression	
	Permian	2			25-185	$T_{g2}$	Local angular unconformity	
C <sub>2</sub>	Xiaohaizhi Fm.		III		65-270		Uplift	Extension of the Paleo-Asian Ocean and the Paleo-Tethys Ocean
C <sub>1</sub>	Kalashayi Fm.	1			186-429		Cratonic inland depression, clastic shoreline, deltaic and shallow marine deposits	
D <sub>1</sub>	Bachu Fm.				15-192	$T_{g3}$	Regional angular unconformity	Intensive uplift and erosion
D <sub>1+2</sub>	Donghetang Fm.		2		200-600		Clatonic inland depression; clastic shoreline, fluvial and deltaic deposits	Closure of the South Tianshan Paleo-ocean and the Altyn Tagh trench-arc-basin system; Convergence of the Paleo-Asian Ocean
	Kezertage Fm.				300-700	$T_{g4}$	Parallel or minor angular unconformity	
S	Yimugantawu Fm.		II		100-600		Clatonic inland depression, Local uplift	
	Tataaiertage Fm.	1			100-800	$T_{g5}$	clastic shoreline, deltaic and shallow marine deposits	
	Kepingtage Fm.				43-1024	$T_{g5-1}$	Regional angular unconformity	Intensive uplift and erosion
O <sub>1</sub>	Sangtamu Fm.		4		45-102		Parallel unconformity	Closure of the North Kunlun and the Altyn Tagh Paleo-oceans
	Lianglitage Fm.				30-60	$T_{g5-2}$	Open carbonate platform, Local uplift shelf and slope deposits	
	Tumuxiuke Fm.				50-100		Red horizon, micrite limestone	
O <sub>2</sub>	Yijianfang Fm.		3		600-900	$T_{g5-3}$	Minor angular unconformity	Uplift and erosion
O <sub>3</sub>	Yingshan Fm.				250-400	$T_{g6}$	Restricted carbonate platform, dolomitic limestone	
	Penglaiba Fm.				291-1783	$T_{g7}$	Parallel and minor angular unconformity	
E <sub>3</sub>	Xiaqulitage Fm.	2			33-99		Restricted carbonate platform, dolomite, evaporate lagoon, gypsum, salt deposits	
E <sub>2</sub>	Awatake Fm.				75-412		Parallel unconformity	
	Shayilike Fm.				40-240		Divergent continental margin, carbonate platform; local extensional faults, shelf deposits	Archipelagic ocean environment
E <sub>1</sub>	Wusongger Fm.		1		8-35		Parallel and minor angular unconformity	
	Xiaoerbulake Fm.				66-330	$T_{g9}$	Basal unconformity	Rodinia Super-continent broke up
	Yuertushi Fm.				249-953			
	Sinian							
Pre-Sinian crystalline basement								

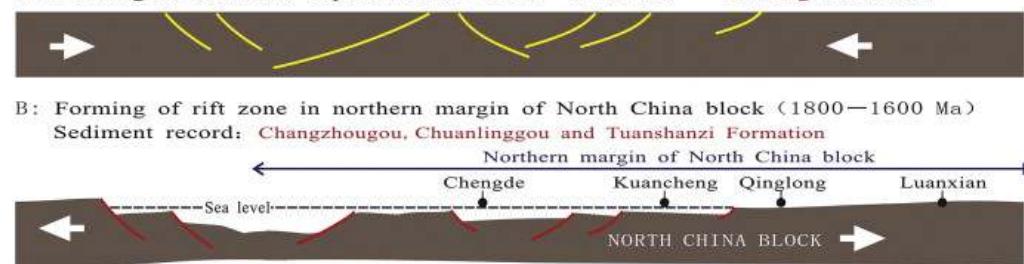


Generalized Paleozoic tectonostratigraphy of the Tarim Basin, showing the unconformity-bounded sequences and the evolution of deposition and basin dynamic setting. Note that there are three major angular unconformities ( $T_{g5-2}$ ,  $T_{g5}$  and  $T_{g3}$ ) formed during basin deforming stages.

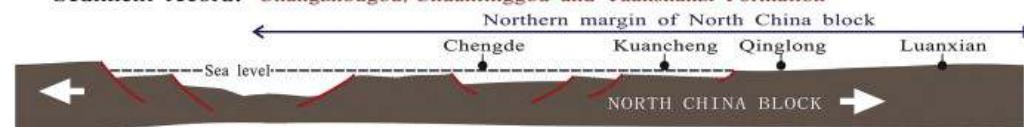
STRATA		ISOTOPIC AGE / Ma	CAUSES OF UNCONFORMITIES	TECTONIC SETTING
Emplacement System Formation				
NEO-PROTROZEOIC	QINGBAIKOU	Jingeryu	800 810–900 <sup>①</sup> 853 <sup>②</sup> 862 <sup>③</sup>	Breakup of Rodinia supercontinent
		Longshan	855 <sup>④</sup> 873 <sup>⑤</sup>	Continental collision Compression and uplift → Yuxian Uplift
	UNDETERMINED	Xiamaling	1000 1370 <sup>⑥</sup> 1380 <sup>⑦</sup> >1320 <sup>⑧</sup>	Active continental margin Compression and uplift → Qinyu Uplift
		Tieling	1400 1440 <sup>⑨</sup>	
		Hongshuizhuang		
		Wumishan		
		Yangzhuang		
		Gaoyuzhuang	1600 1380 <sup>⑩</sup> 1434 <sup>⑪</sup> 1560 <sup>⑫</sup>	Eustatic fluctuations → Luanxian Uplift
		Dahongyu	1625 <sup>⑬</sup> 1626 <sup>⑭</sup>	Eustatic fluctuations → Qinglong Uplift
		Tuanshanzi	1683 <sup>⑮</sup> 1823 <sup>⑯</sup>	Formation and expansion of oceanic crust → Xingcheng Uplift
		Chuanlinggou		
		Changzhougou	1805 <sup>⑰</sup>	Breakup of Columbia supercontinent → Lvliang Movement
MESOPROTROZEOIC	QIANXI GROUP OF ARCHEAN		Conformable contact	Angular unconformable contact
			Parallel unconformable contact	

Diagram showing Meso-Neoproterozoic sequences, positions of unconformities, and interpretations of tectonic settings in the northern margin of the North China Block.

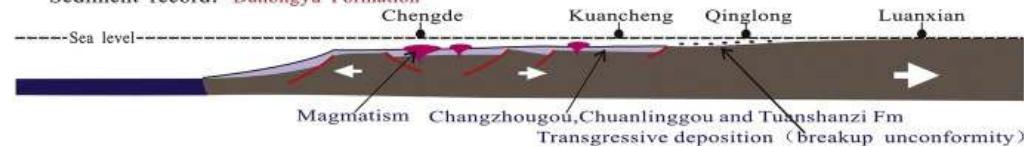
A: Forming of Columbia supercontinent (1900—1800 Ma) — Lvliang Movement



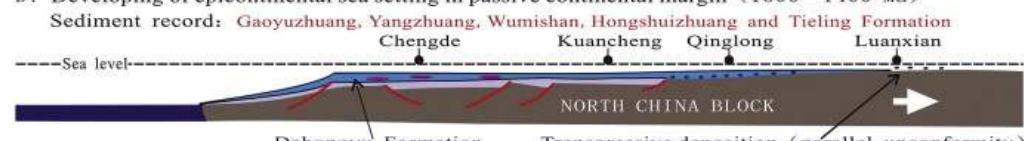
B: Forming of rift zone in northern margin of North China block (1800—1600 Ma)  
Sediment record: Changzhougou, Chuanlinggou and Tuanshanzi Formation



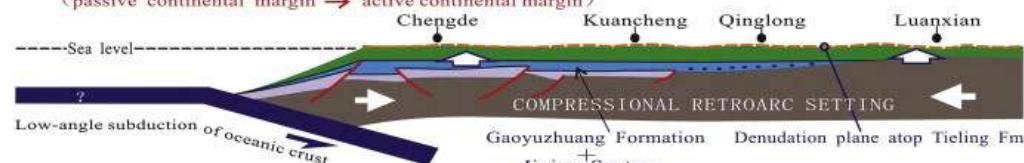
C: Evolving of northern margin of North China block to passive continental margin (1600—1500 Ma)  
Sediment record: Dahongyu Formation



D: Developing of epicontinental sea setting in passive continental margin (1500—1400 Ma)



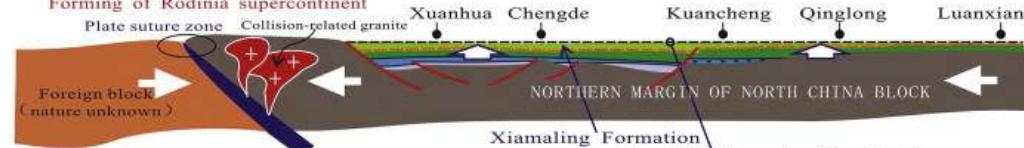
E: Transforming of nature in northern margin of North China block (~1400 Ma) — Qinyu Uplift  
(passive continental margin → active continental margin)



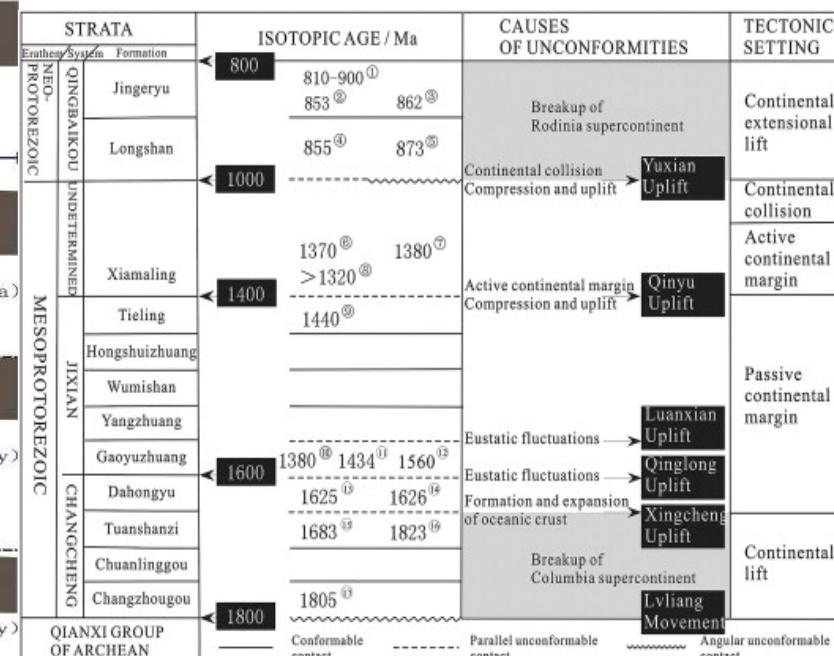
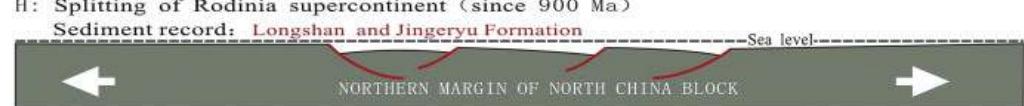
F: Setting of active continental margin in northern edge of North China block (~1350 Ma)



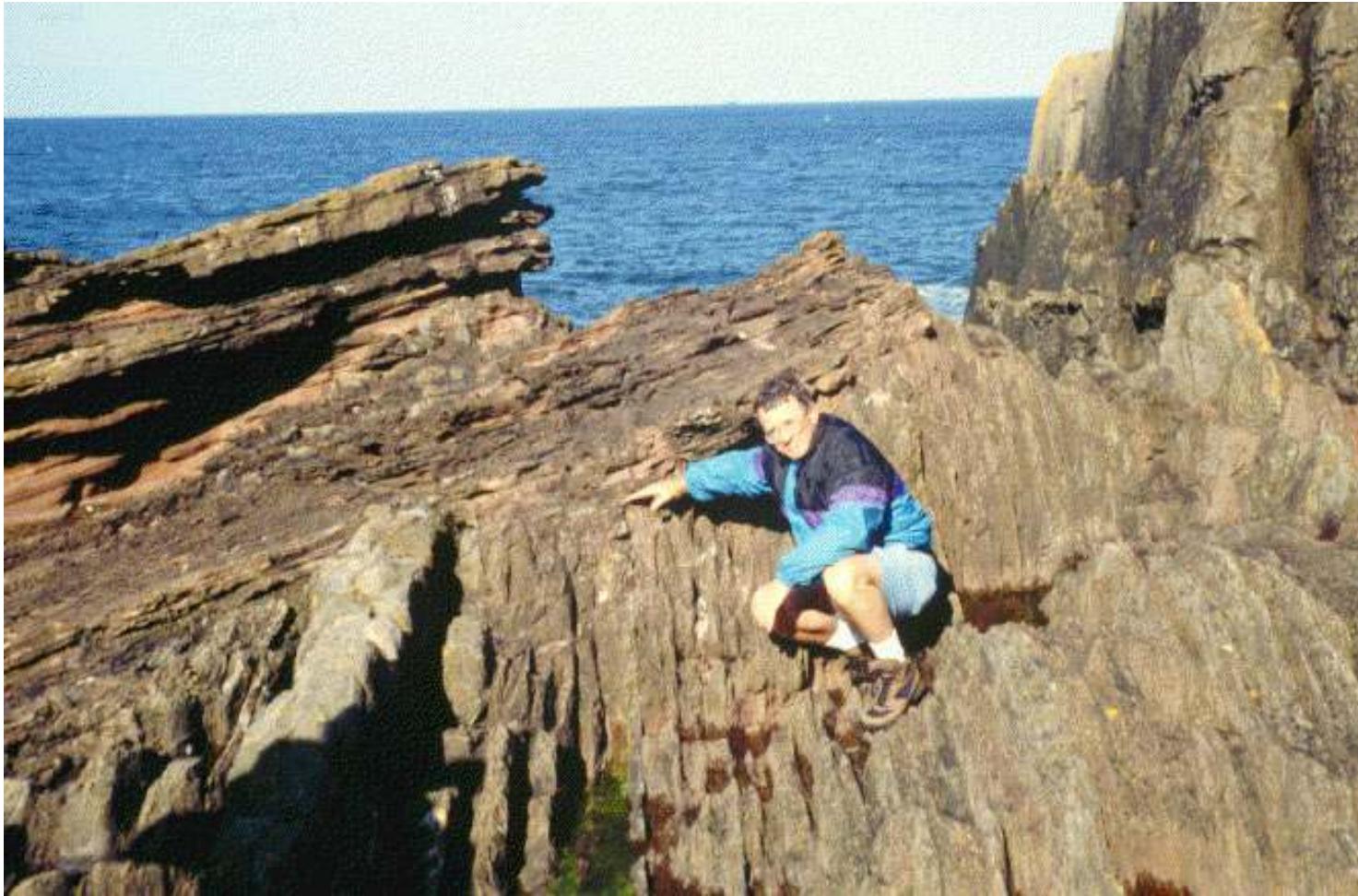
G: Colliding between North China block and adjacent (around 1200—1000 Ma) — Yuxian Uplift  
Forming of Rodinia supercontinent



H: Splitting of Rodinia supercontinent (since 900 Ma)



Sketch map showing Meso-Neoproterozoic tectonic evolution of the northern margin of North China Block.



<https://www.youtube.com/watch?v=JCEDCcHcpYE>