

# GEOLOGIE GENERALĂ

▶ *an universitar 2019-2020* ◀

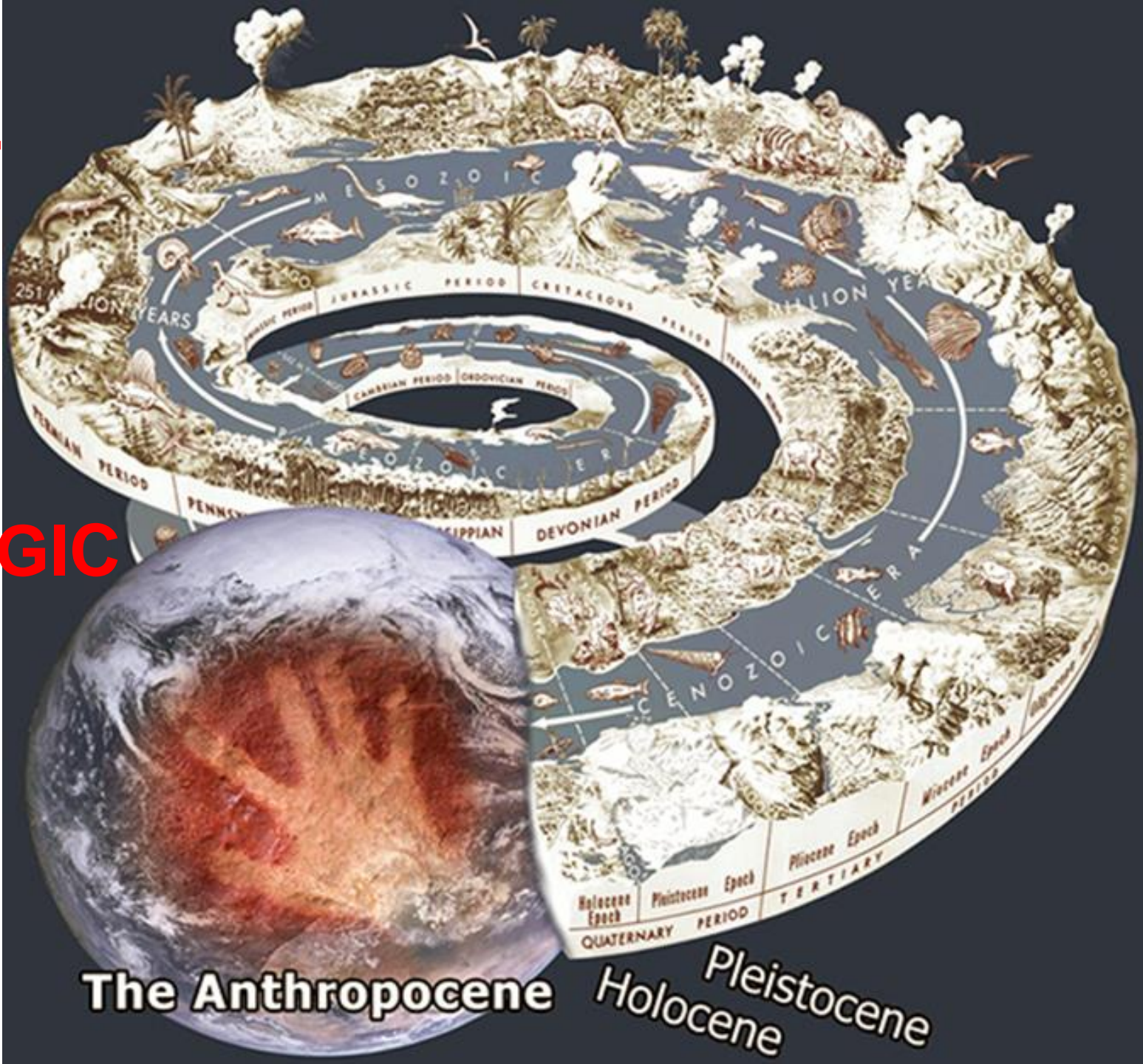
**TIMPUL GEOLOGIC**

*Glen canion*

2017 08 22

**TIMPUL**

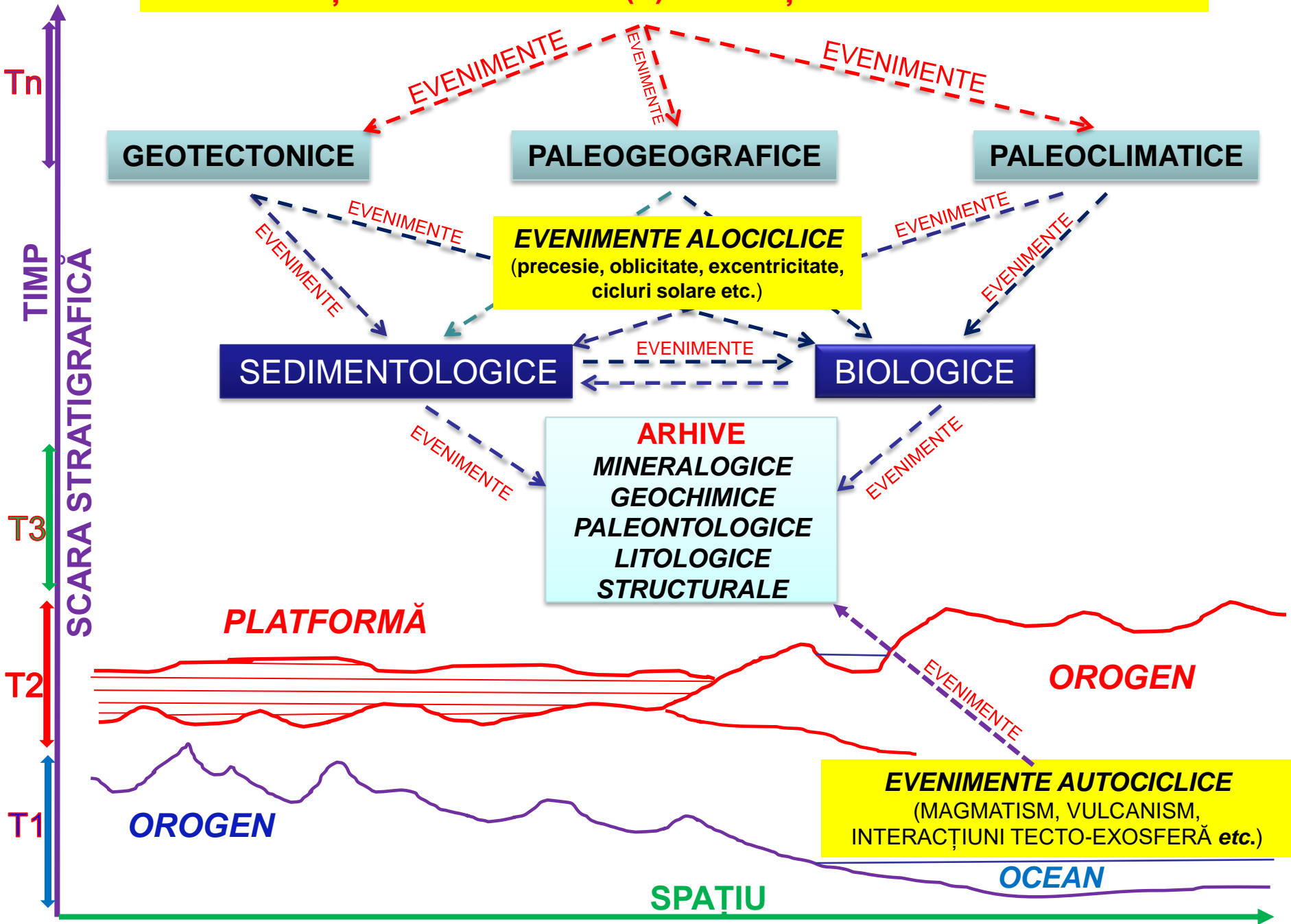
**GEOLOGIC**



**The Anthropocene**

**Holocene**  
**Pleistocene**  
**Miocene**

# 1. EVOLUȚIE GEOLOGICĂ ≈ (?)EVOLUȚIE PALEOGEOGRAFICĂ



# GEOCRONOLOGIE

**Geocronologia** este o ramură a stratigrafie care se ocupă cu datarea (stabilirea vârstei) depozitelor geologice și ierarhizarea cronologică a acestora, rezultând *unități geocronologice* (de timp), concretizate în unități cronostratigrafice.

**Datarea** se poate face relativ, aplicându-se corelările pornind de la principiul superpoziției geometrice a stratelor și evoluției organismelor biologice, sau în mod absolut, folosindu-se metode radiometrice.

<b>UNITĂȚI GEOCRONOLOGICE</b>	<b>UNITĂȚI CRONOSTRATIGRAFICE</b>
<b>EON</b>	<b>EONOTHEM</b>
<b>ERĂ</b>	<b>ERATHEM</b>
<b>PERIOADĂ</b>	<b>SISTEM</b>
<b>EPOCĂ</b>	<b>SERIE</b>
<b>VÂRSTĂ</b>	<b>ETAJ</b>
<b>CRON</b>	<b>CRONOZONĂ</b>



IUGS

# INTERNATIONAL CHRONOSTRATIGRAPHIC CHART

www.stratigraphy.org

International Commission on Stratigraphy

v 2020/03



Eonothem / Eon		Erathem / Era		Series / Epoch	Stage / Age	GSSP	numerical age (Ma)
Phanerozoic	Cenozoic	Quaternary	Holocene	UL	Meghalayan	▲	present
				M	Northgrippian	▲	0.0042
				L/E	Greenlandian	▲	0.0117
				L/E	Upper	▲	0.129
		Pleistocene	Chibanian	M	▲	0.774	
				L/E	▲	1.80	
			Pliocene	Calabrian	L/E	▲	0.774
					L/E	▲	1.80
				Zanclean	L/E	▲	2.58
					L/E	▲	3.600
	Neogene	Miocene	Messinian	L/E	▲	7.246	
				L/E	▲	11.63	
				L/E	▲	13.82	
				L/E	▲	15.97	
				L/E	▲	20.44	
		Oligocene	Priabonian	L/E	▲	23.03	
				L/E	▲	27.82	
			Rupelian	L/E	▲	33.9	
				L/E	▲	37.71	
				L/E	▲	41.2	
	Paleogene	Eocene	Lutetian	L/E	▲	47.8	
				L/E	▲	56.0	
				L/E	▲	59.2	
		Paleocene	Thanetian	L/E	▲	61.6	
				L/E	▲	66.0	
				L/E	▲	72.1 ± 0.2	
	Mesozoic	Cretaceous	Upper	Maastrichtian	L/E	▲	83.6 ± 0.2
					L/E	▲	86.3 ± 0.5
L/E					▲	89.8 ± 0.3	
L/E					▲	93.9	
L/E					▲	100.5	
Lower		Albian	L/E	▲	~ 113.0		
			L/E	▲	~ 125.0		
			L/E	▲	~ 129.4		
			L/E	▲	~ 132.6		
			L/E	▲	~ 139.8		

Eonothem / Eon		Erathem / Era		Series / Epoch	Stage / Age	GSSP	numerical age (Ma)	
Phanerozoic	Mesozoic	Jurassic	Upper	Tithonian	L/E	▲	152.1 ± 0.9	
					L/E	▲	157.3 ± 1.0	
					L/E	▲	166.5 ± 1.0	
			Middle	Oxfordian	L/E	▲	166.1 ± 1.2	
					L/E	▲	168.3 ± 1.3	
					L/E	▲	170.3 ± 1.4	
			Lower	Aalenian	L/E	▲	174.1 ± 1.0	
					L/E	▲	182.7 ± 0.7	
			Triassic	Upper	Toarcian	L/E	▲	190.8 ± 1.0
						L/E	▲	199.3 ± 0.3
		L/E				▲	201.3 ± 0.2	
		L/E				▲	~ 208.5	
		L/E				▲	~ 227	
		Paleozoic	Permian	Lopingian	L/E	▲	~ 237	
					L/E	▲	~ 242	
	L/E				▲	247.2		
	L/E				▲	251.2		
	L/E				▲	251.2		
	Carboniferous		Pennsylvanian	Upper	Changhsingian	L/E	▲	251.902 ± 0.024
						L/E	▲	254.14 ± 0.07
						L/E	▲	259.1 ± 0.5
						L/E	▲	265.1 ± 0.4
						L/E	▲	268.8 ± 0.5
	Ordovician		Upper	Wuchiapingian	L/E	▲	272.95 ± 0.11	
					L/E	▲	283.5 ± 0.6	
					L/E	▲	290.1 ± 0.26	
					L/E	▲	293.52 ± 0.17	
					L/E	▲	298.9 ± 0.15	
	Cambrian	Series 2	Guzhangian	L/E	▲	303.7 ± 0.1		
				L/E	▲	307.0 ± 0.1		
L/E				▲	315.2 ± 0.2			
L/E				▲	323.2 ± 0.4			
L/E				▲	330.9 ± 0.2			

Eonothem / Eon		Erathem / Era		Series / Epoch	Stage / Age	GSSP	numerical age (Ma)
Phanerozoic	Paleozoic	Devonian	Upper	Famennian	L/E	▲	372.2 ± 1.6
					L/E	▲	382.7 ± 1.6
					L/E	▲	387.7 ± 0.8
					L/E	▲	393.3 ± 1.2
					L/E	▲	407.6 ± 2.6
			Middle	Eifelian	L/E	▲	410.8 ± 2.8
					L/E	▲	419.2 ± 3.2
					L/E	▲	423.0 ± 2.3
					L/E	▲	425.6 ± 0.9
					L/E	▲	427.4 ± 0.5
		Lower	Pragian	L/E	▲	430.5 ± 0.7	
				L/E	▲	433.4 ± 0.8	
				L/E	▲	434.0 ± 0.8	
				L/E	▲	438.5 ± 1.1	
				L/E	▲	440.8 ± 1.2	
	Cambrian	Series 2	Upper	Katian	L/E	▲	443.8 ± 1.5
					L/E	▲	445.2 ± 1.4
					L/E	▲	453.0 ± 0.7
					L/E	▲	458.4 ± 0.9
					L/E	▲	467.3 ± 1.1
					L/E	▲	470.0 ± 1.4
					L/E	▲	477.7 ± 1.4
					L/E	▲	485.4 ± 1.9
					L/E	▲	~ 489.5
					L/E	▲	~ 494
					L/E	▲	~ 497
					L/E	▲	~ 500.5
					L/E	▲	~ 504.5
Precambrian	Proterozoic	Meso-proterozoic	Statherian	L/E	▲	~ 509	
				L/E	▲	~ 514	
				L/E	▲	~ 521	
				L/E	▲	~ 529	
				L/E	▲	~ 541.0 ± 1.0	
		Paleo-proterozoic	Siderian	L/E	▲	~ 541.0 ± 1.0	
				L/E	▲	~ 635	
				L/E	▲	~ 720	
				L/E	▲	1000	
				L/E	▲	1200	

Eonothem / Eon		Erathem / Era		Series / Epoch	Stage / Age	GSSP	numerical age (Ma)
Phanerozoic	Archean	Upper	Katian	L/E	▲	453.0 ± 0.7	
				L/E	▲	458.4 ± 0.9	
				L/E	▲	467.3 ± 1.1	
				L/E	▲	470.0 ± 1.4	
				L/E	▲	477.7 ± 1.4	
				L/E	▲	485.4 ± 1.9	
				L/E	▲	~ 489.5	
				L/E	▲	~ 494	
				L/E	▲	~ 497	
				L/E	▲	~ 500.5	
Precambrian	Proterozoic	Meso-proterozoic	Statherian	L/E	▲	~ 509	
				L/E	▲	~ 514	
				L/E	▲	~ 521	
				L/E	▲	~ 529	
				L/E	▲	~ 541.0 ± 1.0	
		Paleo-proterozoic	Siderian	L/E	▲	~ 541.0 ± 1.0	
				L/E	▲	~ 635	
				L/E	▲	~ 720	
				L/E	▲	1000	
				L/E	▲	1200	
Hadean	Lower	Eo-archean	L/E	▲	~ 1600		
			L/E	▲	~ 1800		
			L/E	▲	~ 2050		
			L/E	▲	~ 2300		
			L/E	▲	~ 2500		
			L/E	▲	~ 2800		
			L/E	▲	~ 3200		
			L/E	▲	~ 3600		
			L/E	▲	~ 4000		
			L/E	▲	~ 4600		

Units of all ranks are in the process of being defined by Global Boundary Stratotype Section and Points (GSSP) for their lower boundaries, including those of the Archean and Proterozoic, long defined by Global Standard Stratigraphic Ages (GSSA). Italic fonts indicate informal units and placeholders for unnamed units. Versioned charts and detailed information on ratified GSSPs are available at the website <http://www.stratigraphy.org>. The URL to this chart is found below.

Numerical ages are subject to revision and do not define units in the Phanerozoic and the Ediacaran; only GSSPs do. For boundaries in the Phanerozoic without ratified GSSPs or without constrained numerical ages, an approximate numerical age (~) is provided.

Ratified Subseries/Subepochs are abbreviated as U/L (Upper/Late), M (Middle) and L/E (Lower/Early). Numerical ages for all systems except Quaternary, upper Paleogene, Cretaceous, Triassic, Permian and Precambrian are taken from 'A Geologic Time Scale 2012' by Gradstein et al. (2012), those for the Quaternary, upper Paleogene, Cretaceous, Triassic, Permian and Precambrian were provided by the relevant ICS subcommissions.

Colouring follows the Commission for the Geological Map of the World ([www.cogm.org](http://www.cogm.org))



Chart drafted by K.M. Cohen, D.A.T. Harper, P.L. Gibbard, J.-X. Fan (c) International Commission on Stratigraphy, March 2020

To cite: Cohen, K.M., Finney, S.C., Gibbard, P.L. & Fan, J.-X. (2013; updated) The ICS International Chronostratigraphic Chart. Episodes 36: 199-204.

URL: <http://www.stratigraphy.org/ICSchart/ChronostratChart2020-03.pdf>

**Denumiri istorice preluate în denumirea unităților geocronologice și cronostratigrafice**



**IMPERIUL ROMAN ÎN 125 d.Hr.**

FRONTIERA IMPERIULUI

BAZĂ LEGIONARĂ

VII CLAUDIA LEGIUNE DESFĂȘURATĂ (125 d.Hr.)

BAZĂ NAVALĂ PRINCIPALĂ

GALATIA PROVINȚIE ROMANĂ

ORAȘ ROMAN

Via Appia Velas

DRUM PRINCIPAL

COLCHIS STAT-SATELIT ROMAN

CARPI, RUGI NAȚIUNE/TRIB BARBAR

6000 m  
2000 m  
1500 m  
1000 m  
400 m  
200 m  
0 m

0 250 500 750 1000 kilometri



(sursa: wikipedia.ro)

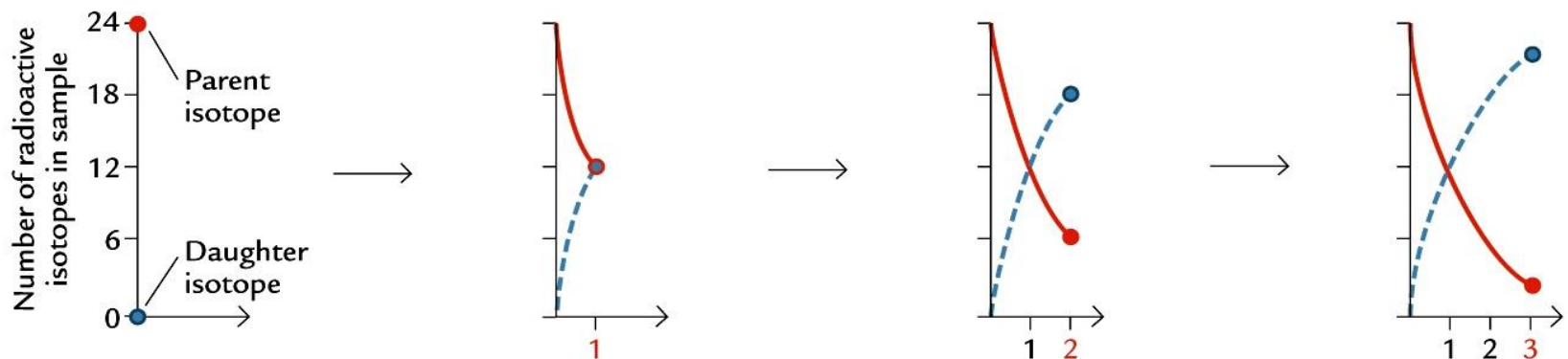
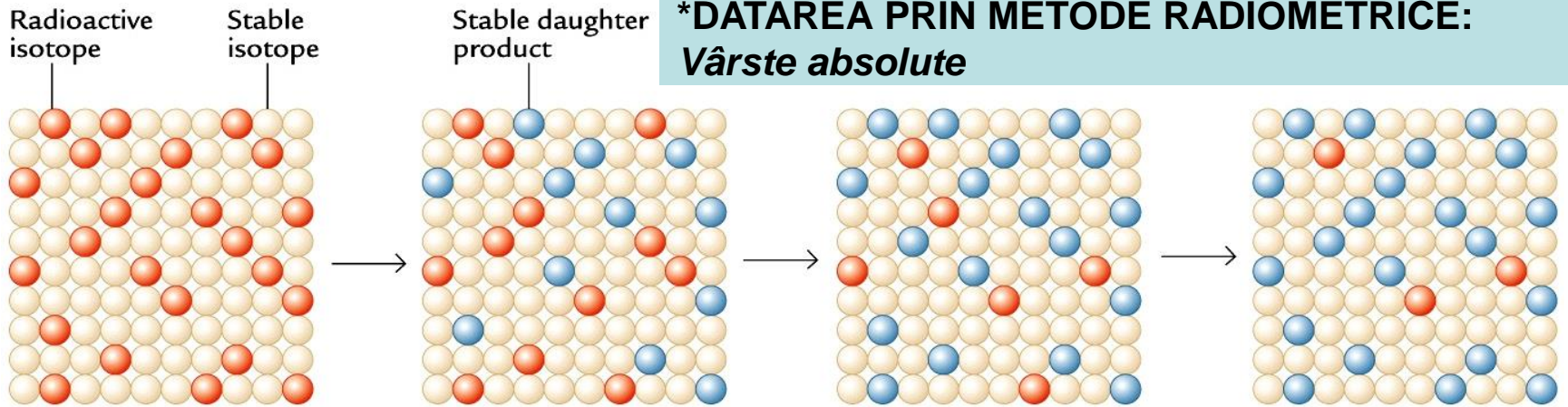
GRUPUS LINGVISTICE PROBABLE:	
GERMANIC	FINO-UGRIC
SLAVIC	CELTIC
DACIC	HANTO-SEMITIC
IRANIC	

<b>Au</b> DEPOZIT DE AUR	1. ALPES GRAIAE
<b>Ag</b> DEPOZIT DE ARGINT	2. ALPES COTTIAE
	3. ALPES MARITIMAE
	4. GERMANIA INFERIOR

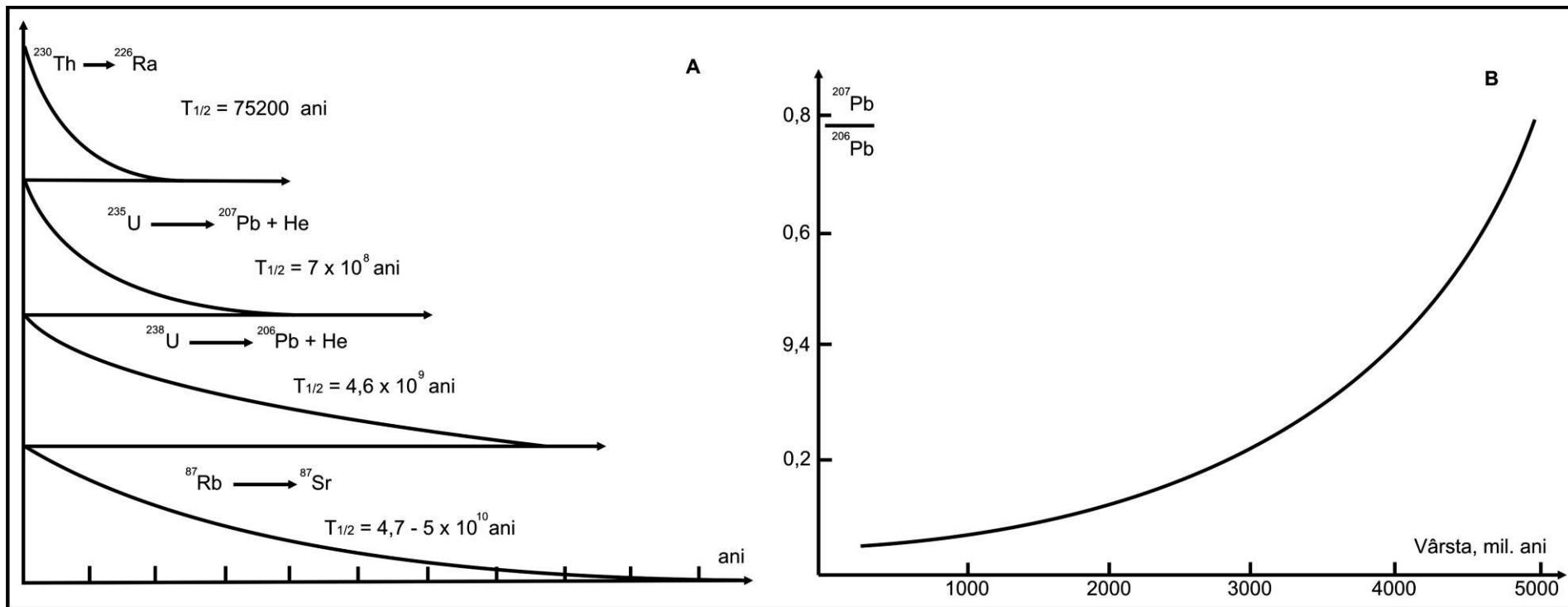
**\*CORELARE ÎN TIMP A EVENIMENTELOR NATURALE, DE ORICE TIP, PRESUPUNE DETERMINAREA VÂRSTEI PRODUSELOR NATURALE, ÎN CAZUL NOSTRU AL ROCILOR, CARE POARTĂ APRENTA PALEOEVENIMENTELOR: CONȚINUTUL ÎN ORGANISME FOSILE, IZOTOPI SPECIFICI, CHIMISMUL ȘI MINERALOGIA, STRUCTURA ȘI TEXTURA ROCILOR, PROPRIETĂȚILE FIZICE (DE EX. MAGNETICE), CARACTERISTICELE GENETICE ALE MINERALELOR / ROCILOR ETC.**

**\*DATAREA PRIN METODE RADIOMETRICE:  
*Vârste absolute***



Time (in half-lives)

(Sursa: www.palaeos.com)

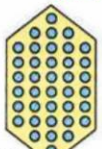


**A – Timpii de înjumătățire pentru seriile de izotopi radioactivi**

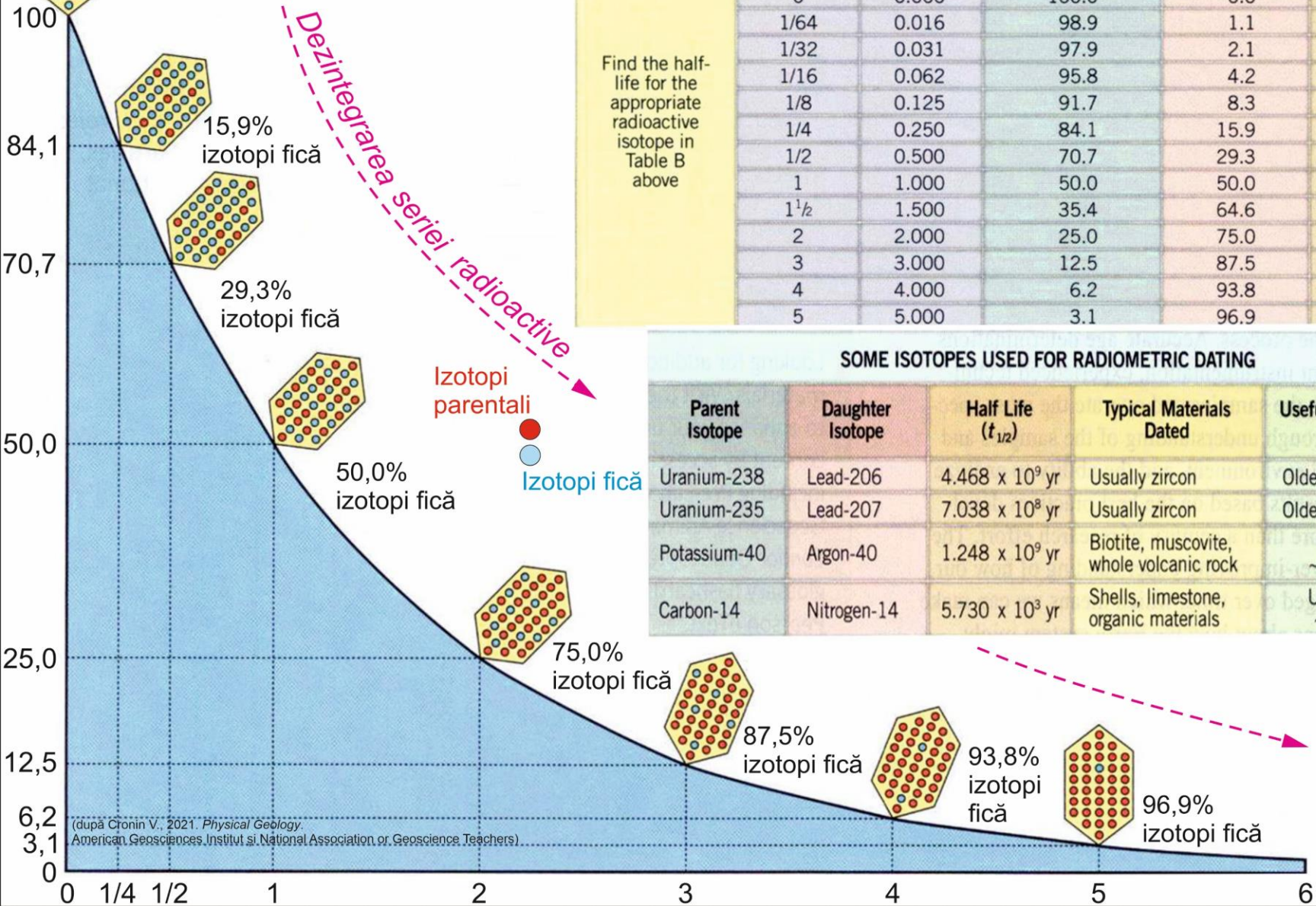
**B – Curba de determinare a vârstei absolute folosind raportul izotopilor de  $\text{Pb}^{207/206}$**



# SERIA DE DEZINTEGRARE



Cristal format 100% din izotopi parentali, instabili (radioactivi)



Half-Life of Radioactive Isotope ( $t_{1/2}$ )	Half-Lives Elapsed ( $n$ )		Percent of Radioactive Parent Isotope ( $P_t$ )	Percent of Stable Daughter Isotope ( $D_t$ )	Age of Specimen ( $t$ )
	As a Ratio	As a Decimal number	$P_t = \left(\frac{1}{2}\right)^n$	$D_t = \left(1 - \frac{1}{2}\right)^n$	$t = n \times t_{1/2}$
Find the half-life for the appropriate radioactive isotope in Table B above	0	0.000	100.0	0.0	$0.000 \times t_{1/2}$
	1/4	0.016	98.9	1.1	$0.016 \times t_{1/2}$
	1/32	0.031	97.9	2.1	$0.031 \times t_{1/2}$
	1/16	0.062	95.8	4.2	$0.062 \times t_{1/2}$
	1/8	0.125	91.7	8.3	$0.125 \times t_{1/2}$
	1/4	0.250	84.1	15.9	$0.250 \times t_{1/2}$
	1/2	0.500	70.7	29.3	$0.500 \times t_{1/2}$
	1	1.000	50.0	50.0	$1.000 \times t_{1/2}$
	1 1/2	1.500	35.4	64.6	$1.500 \times t_{1/2}$
	2	2.000	25.0	75.0	$2.000 \times t_{1/2}$
	3	3.000	12.5	87.5	$3.000 \times t_{1/2}$
4	4.000	6.2	93.8	$4.000 \times t_{1/2}$	
5	5.000	3.1	96.9	$5.000 \times t_{1/2}$	

## SOME ISOTOPES USED FOR RADIOMETRIC DATING

Parent Isotope	Daughter Isotope	Half Life ( $t_{1/2}$ )	Typical Materials Dated	Useful Dating Range
Uranium-238	Lead-206	$4.468 \times 10^9$ yr	Usually zircon	Older than ~10 Myr
Uranium-235	Lead-207	$7.038 \times 10^8$ yr	Usually zircon	Older than ~10 Myr
Potassium-40	Argon-40	$1.248 \times 10^9$ yr	Biotite, muscovite, whole volcanic rock	Older than ~100,000 yr
Carbon-14	Nitrogen-14	$5.730 \times 10^3$ yr	Shells, limestone, organic materials	Usually up to ~50,000 yr

(după Cronin V., 2021. *Physical Geology*. American Geosciences Institut și National Association of Geoscience Teachers)

**\*\*DATAREA  
PRIN  
METODE  
PALEONTOLOGICE**

(Sursa: <http://ro.wikipedia.org/>)

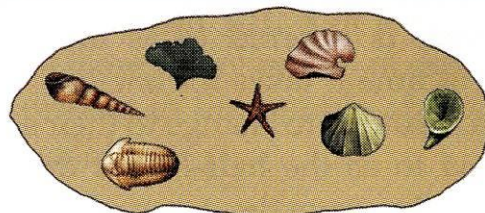
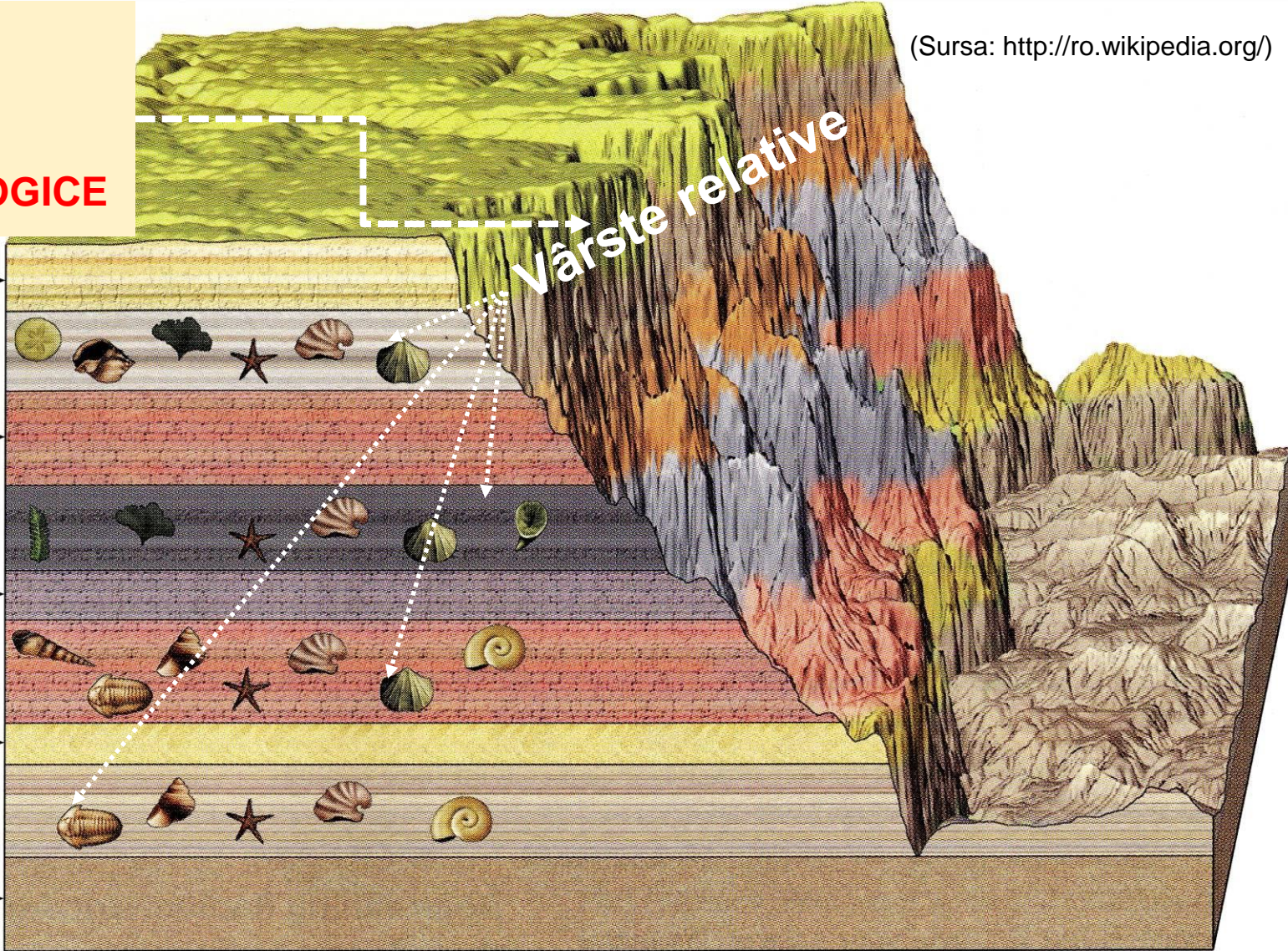
Vârste relative

Rock

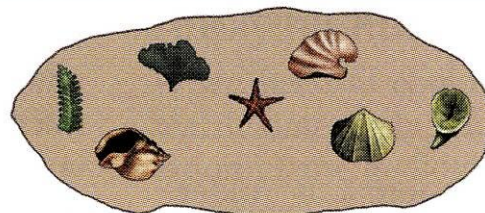
Rock

Rock

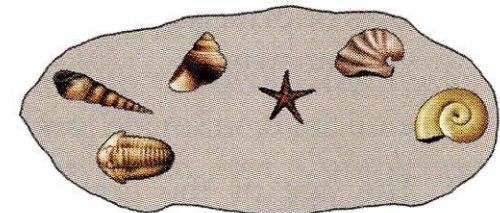
*Specii de  
organisme  
fosile  
animale și  
vegetale și  
asociații  
specifice unei  
diviziuni a  
timpului  
geologic*



Rock 1



Rock 2

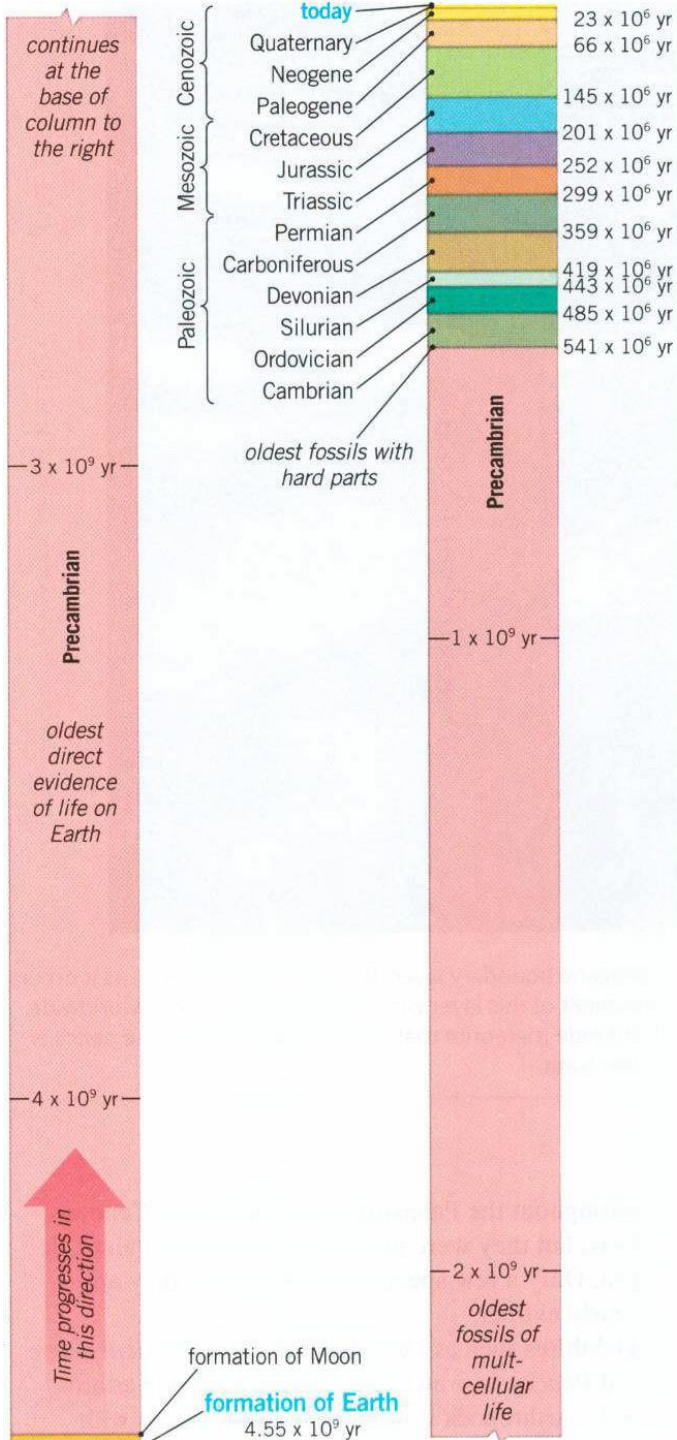


Rock 3

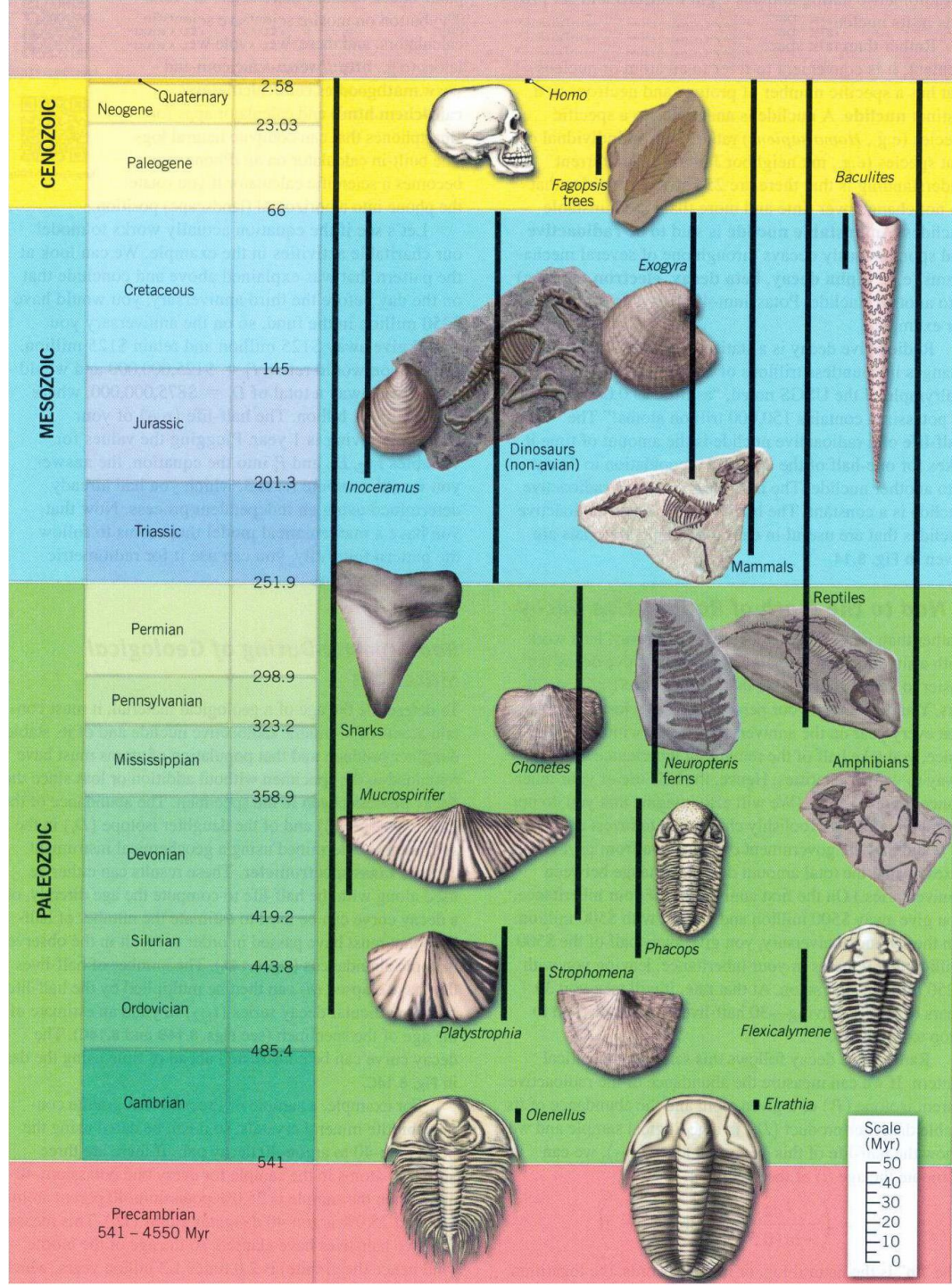
# METODE PALEONTOLOGICE

	vegetale						nevertebrate											vertebrate								
	Bacterii si cianoficee	Cloroficee	Rodoficee	Pteridofite	Ciuperci, muschi	Gimnosperme	Angiosperme	Foraminifere	Celenterate	Anelide	Songien	Arheociatide	Brahiopode	Trilobiti	Crustacee	Echinoderme	Briozoare	Cefalopode	Graptoliti	Gastropode	Bivalve	Pesti	Amfibieni	Reptile	Mamifere	Pasari
Neozoic																										
Cretacic																										
Jurasic																										
Triasic																										
Permian																										
Carbonifer																										
Devonian																										
Silurian																										
Ordovician																										
Cambrian																										
Precambrian																										

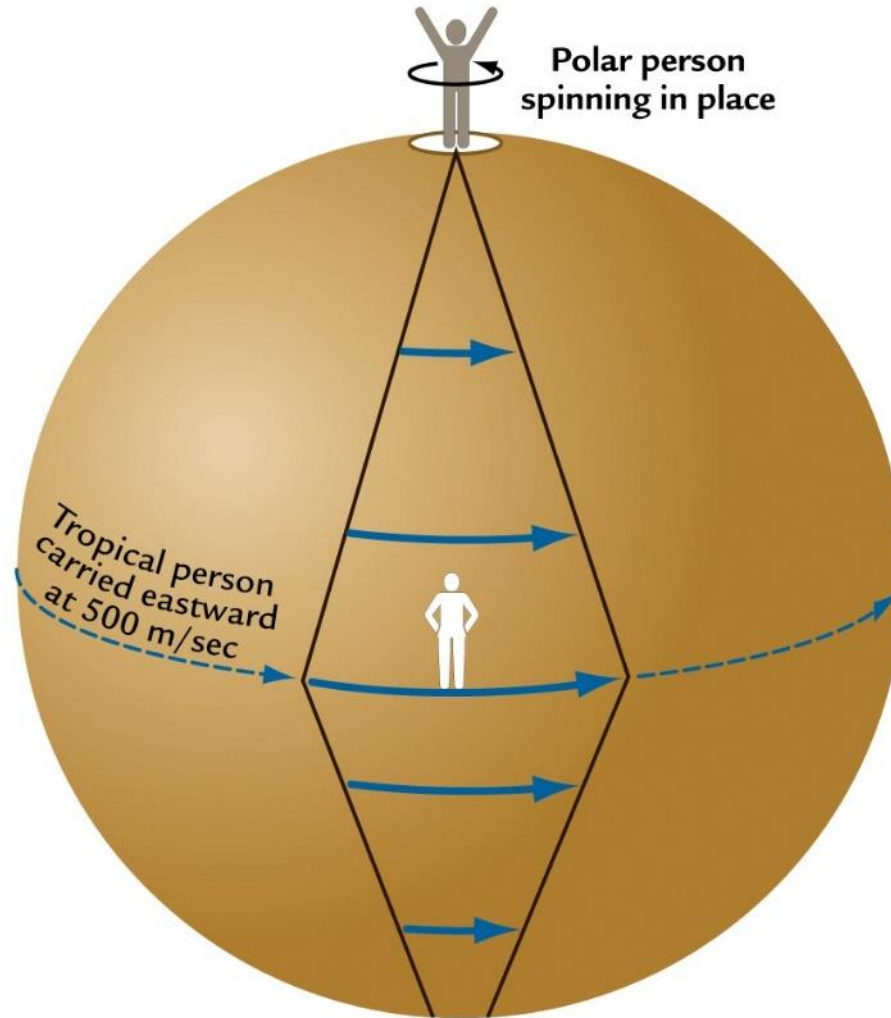
Distribuția stratigrafică a principalelor grupe taxonomice (Filipescu, 2002)



(după Cronin V., 2021. Physical Geology. American Geosciences Institut și National Association of Geoscience Teachers)



# **\*\*\* EVENIMENTE MAJORE ASOCIATE TIMPULUI GEOLOGIC**



**\*\*\* Material sintetic, util pentru examenul final**

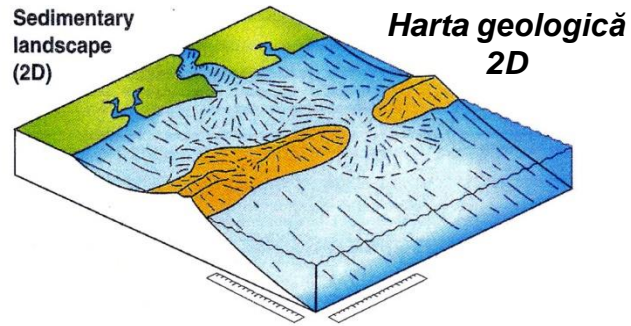


**UNITĂȚILE GEOCRONOLOGICE / CRONOSTRATIGRAFICE**

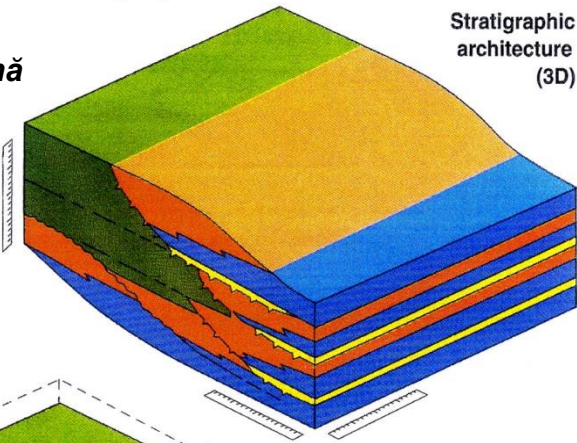
***PALEOEVENIMENTE SEMNIFICATIVE***

2017 08 15

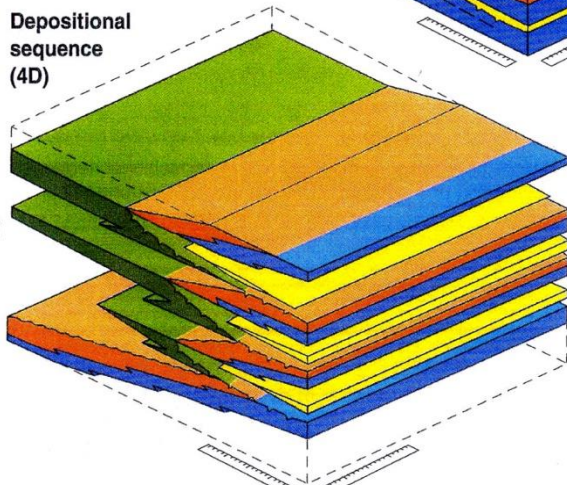
# \*ANALIZA EVENIMENTELOR ȘI REPREZENTAREA ACESTORA PE MATERIALELE CARTOGRAFICE 2D, 3D, 4D



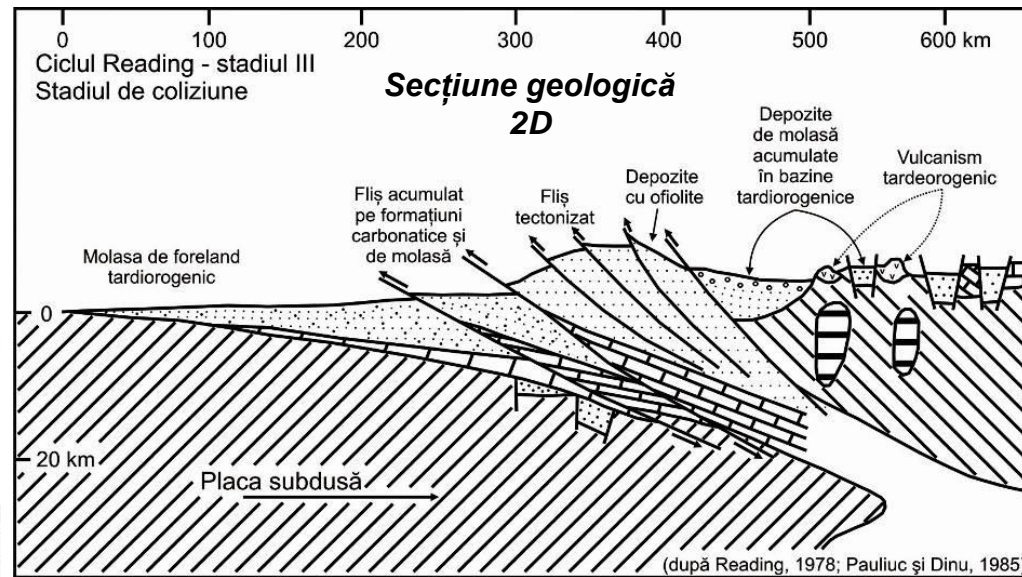
**Bloc diagramă 3D**



Depositional sequence (4D)



**Bloc diagramă 4D**

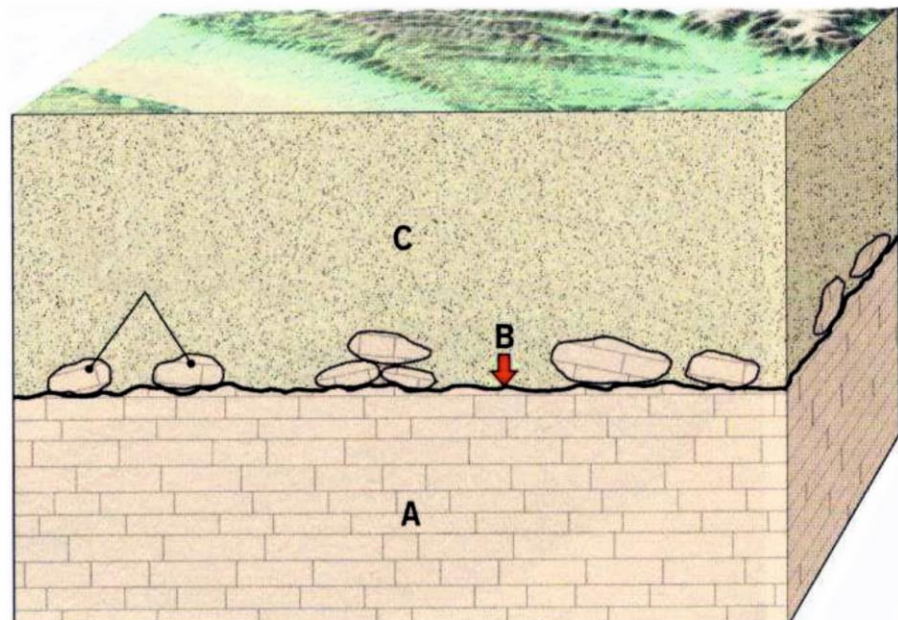
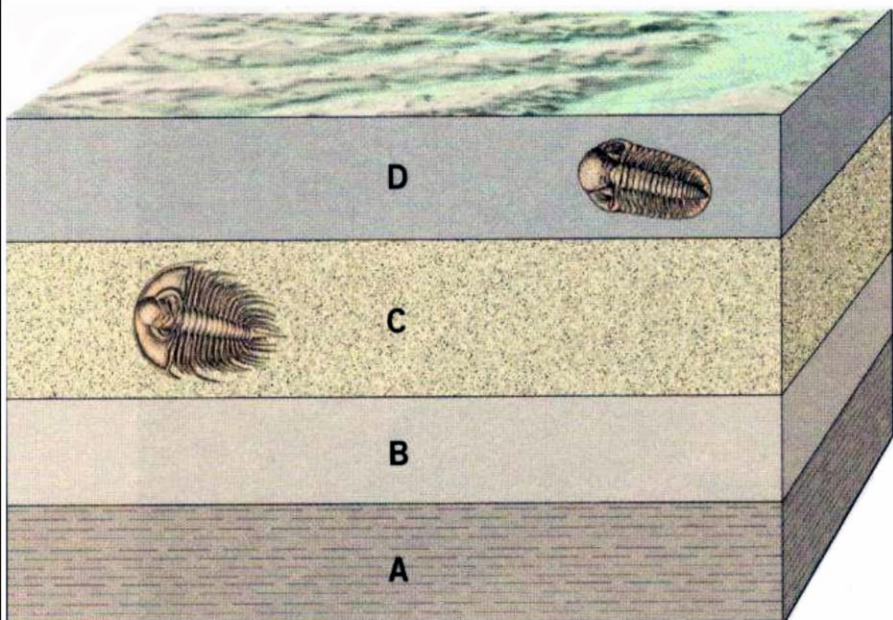


## Materialele cartografice permit diferite tipuri de analiză:

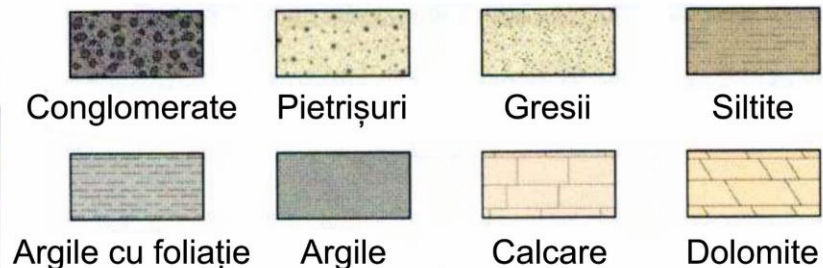
**2D** - raporturile dintre volumele de roci într-un plan - semnificații: evenimente genetice, evenimente tectonice etc.;

**3D** - raporturile dintre volumele de roci într-un spațiu - semnificații: evenimente genetice, evenimente tectonice, evenimente paleoclimatice, volumul afectat etc.;

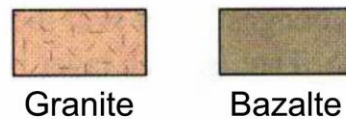
**4D** - raporturile dintre volumele de roci într-un spațiu - semnificații: suprafața și volumul din scoarța terestră afectat de evenimente ordonate în scara timpului etc.



**LEGENDA**  
**Roci sedimentare**



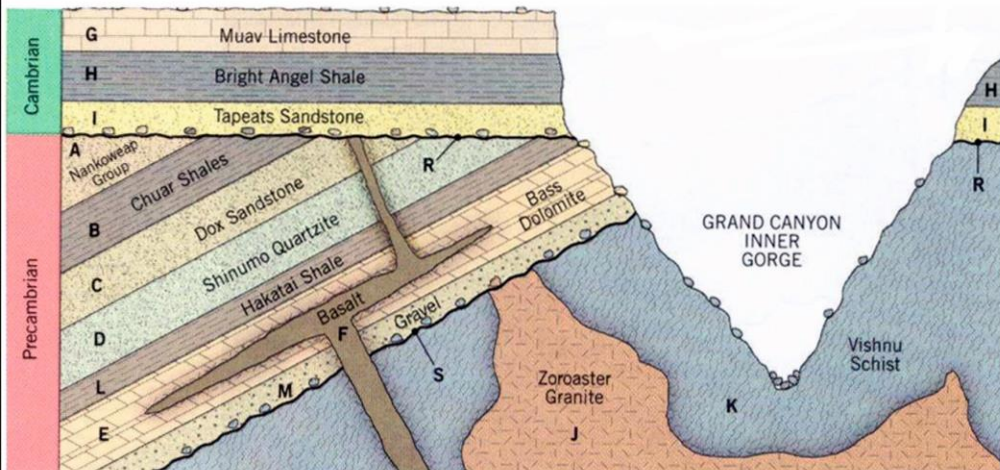
**Roci magmatice**



**Roci metamorfice**



**Alte semne convenționale**



(după Cronin V., 2021. *Physical Geology*. American Geosciences Institut și National Association of Geoscience Teachers)

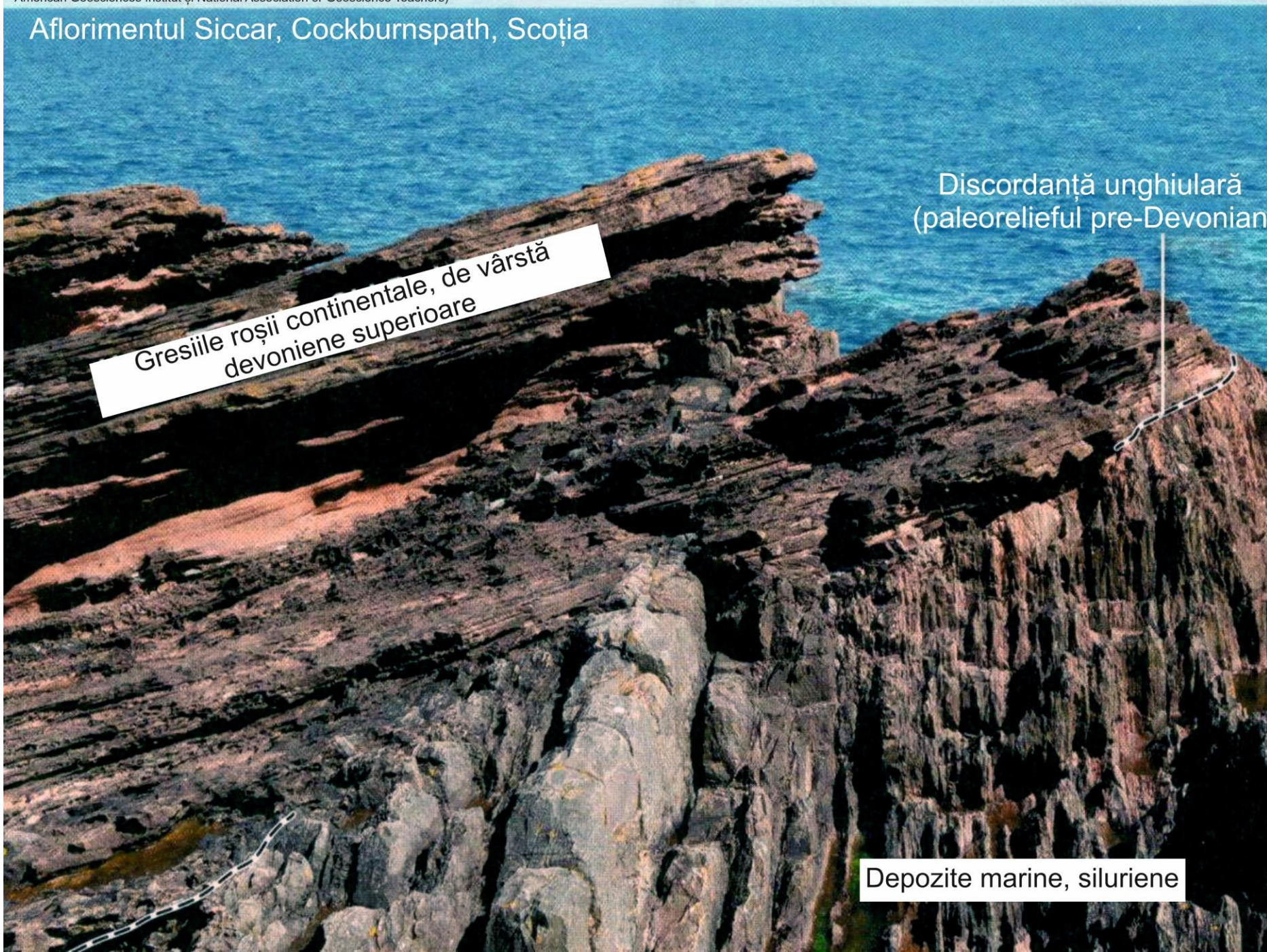


## Aflorimentul Siccar, Cockburnspath, Scoția

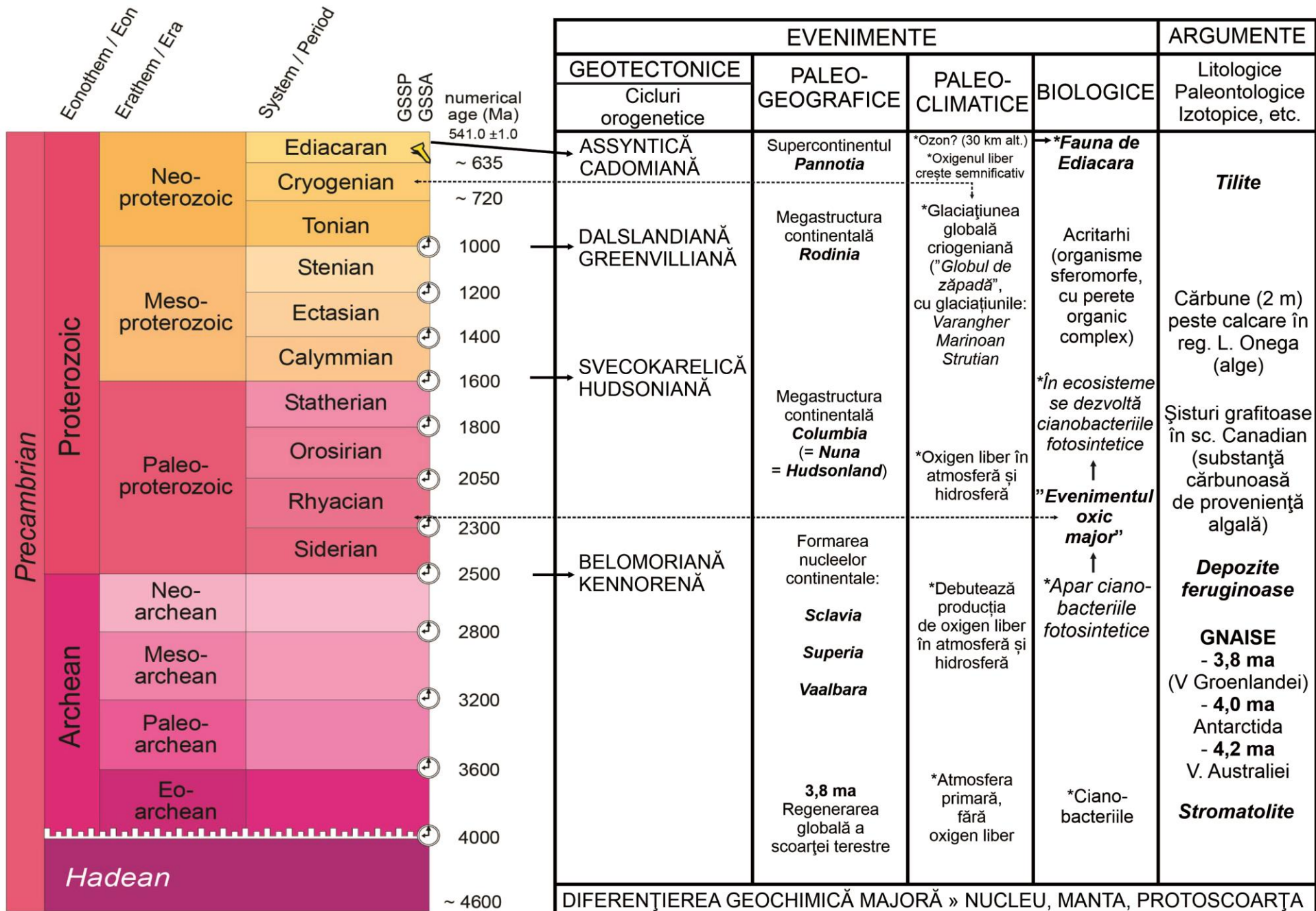
Gresiile roșii continentale, de vârstă devoniene superioare

Discordanță unghiulară  
(paleorelieful pre-Devonian)

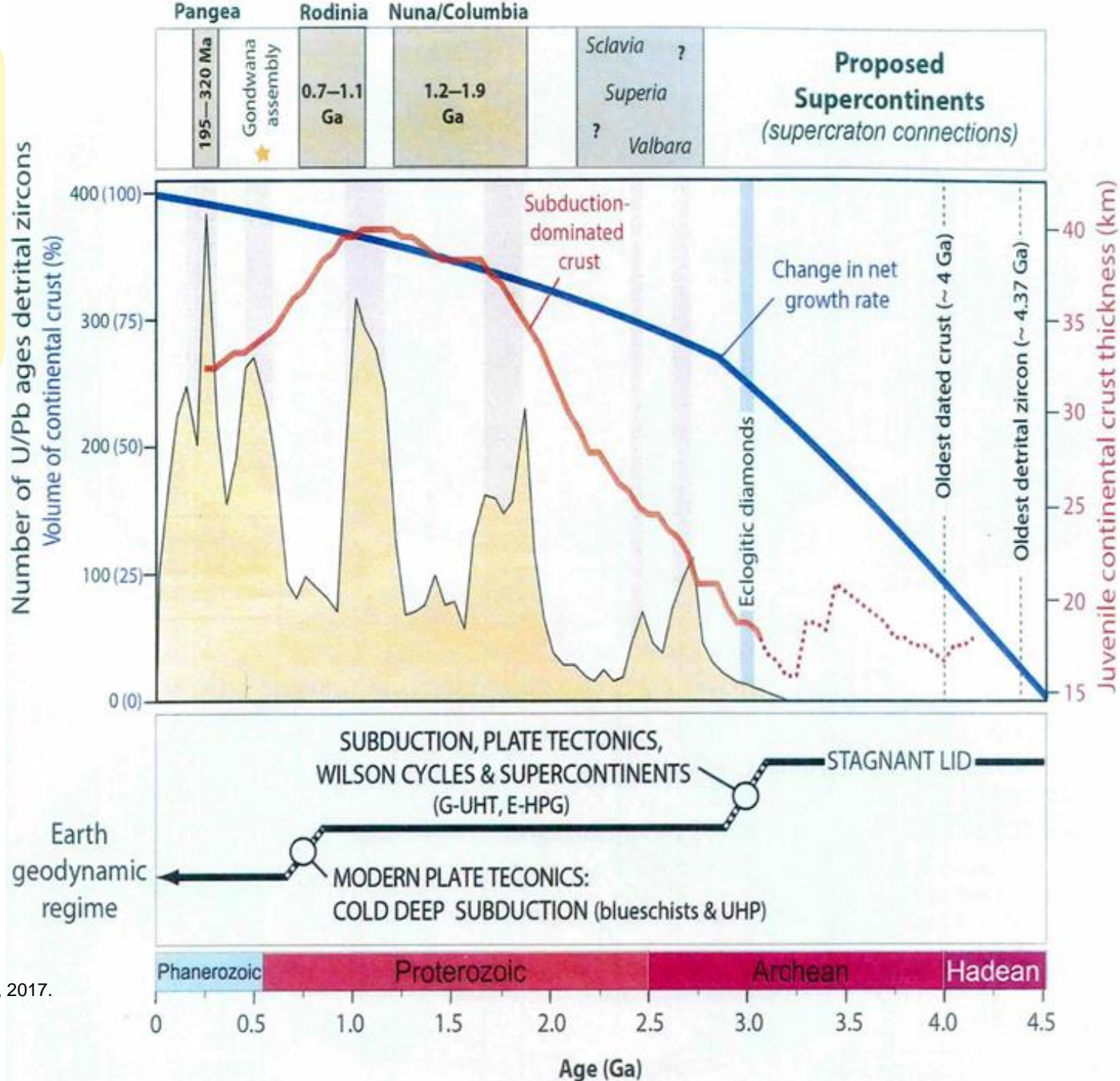
Depozite marine, siluriene



# PRECAMBRIAN (CRIPTOZOIC) (4600 – 541,0 Ma)

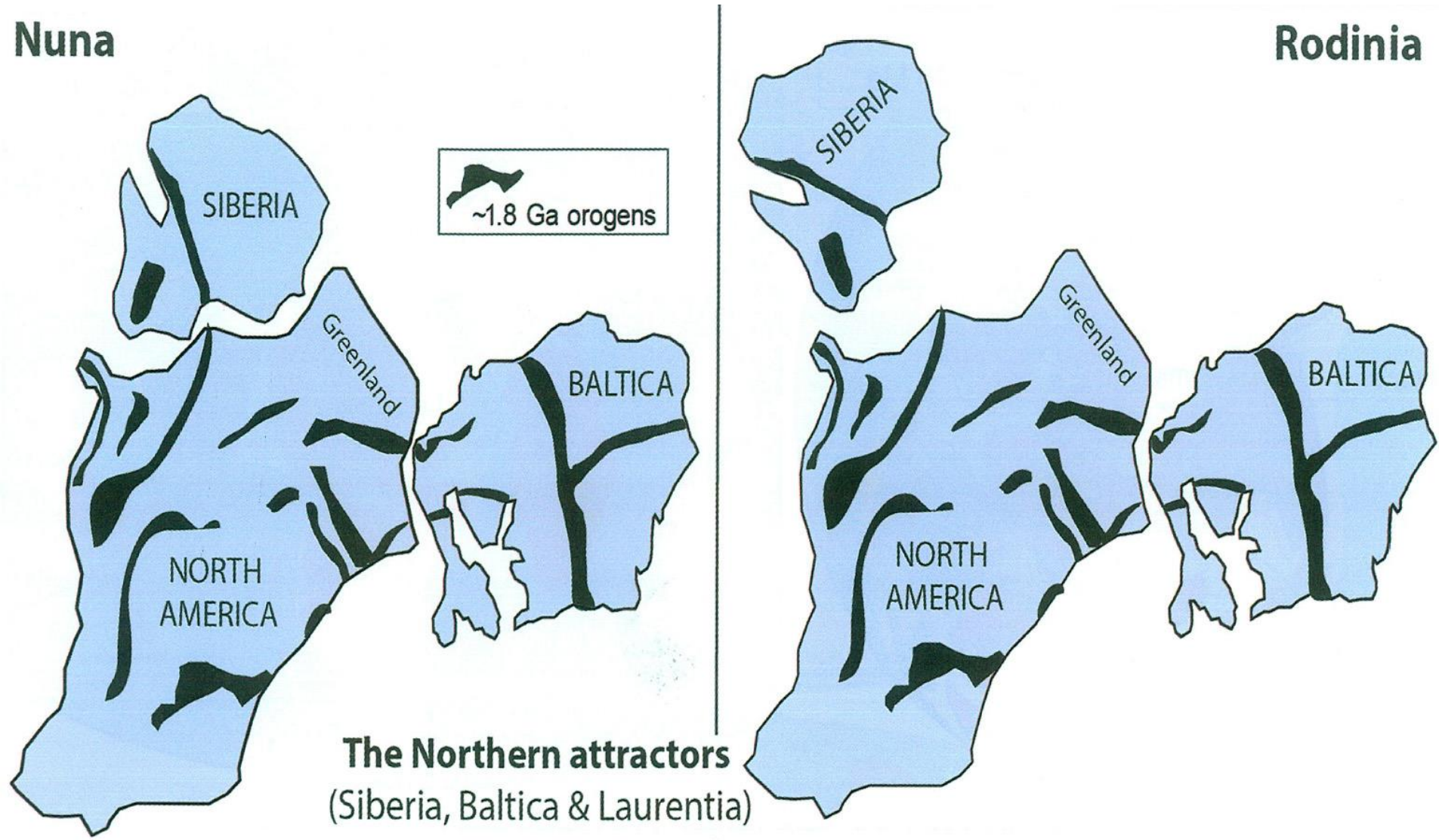


**REGIMUL  
GEODINAMIC  
AL GLOBULUI  
ȘI  
FORMAREA  
SCORȚEI  
CONTINENTALE  
ÎN  
PRECAMBRIAN**

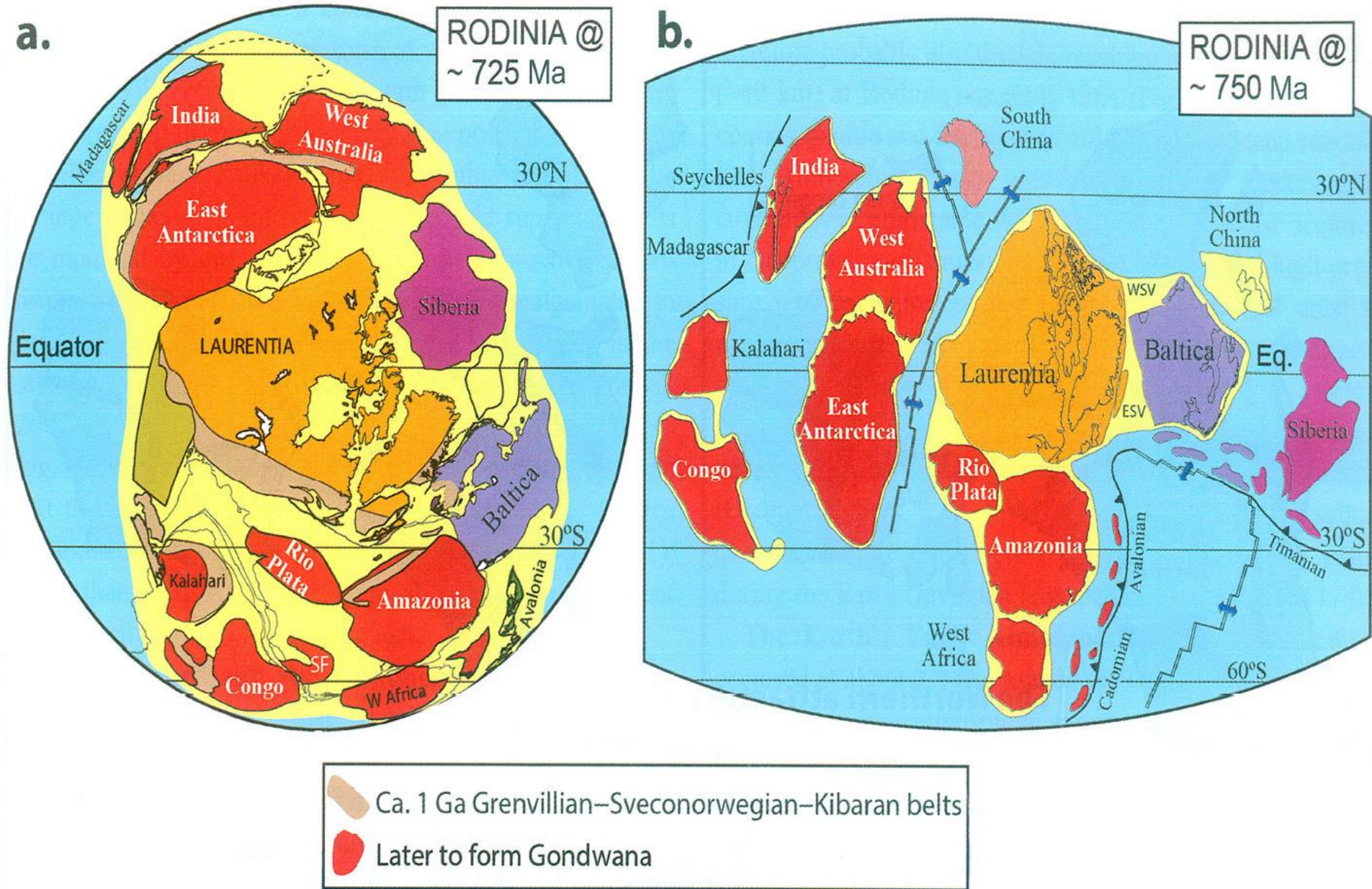


(Sursa: Torvsvik Trond & Cocks Robin, 2017. *Earth History and Palaeogeography*. Cambridge University Press)

# DINAMICA LITOSFERICĂ ȘI EVOLUȚIA PALEOGEOGRAFICĂ A GLOBULUI ÎN PRECAMBRIAN



(Sursa: Torvsvik Trond & Cocks Robin, 2017. *Earth History and Palaeogeography*. Cambridge University Press)



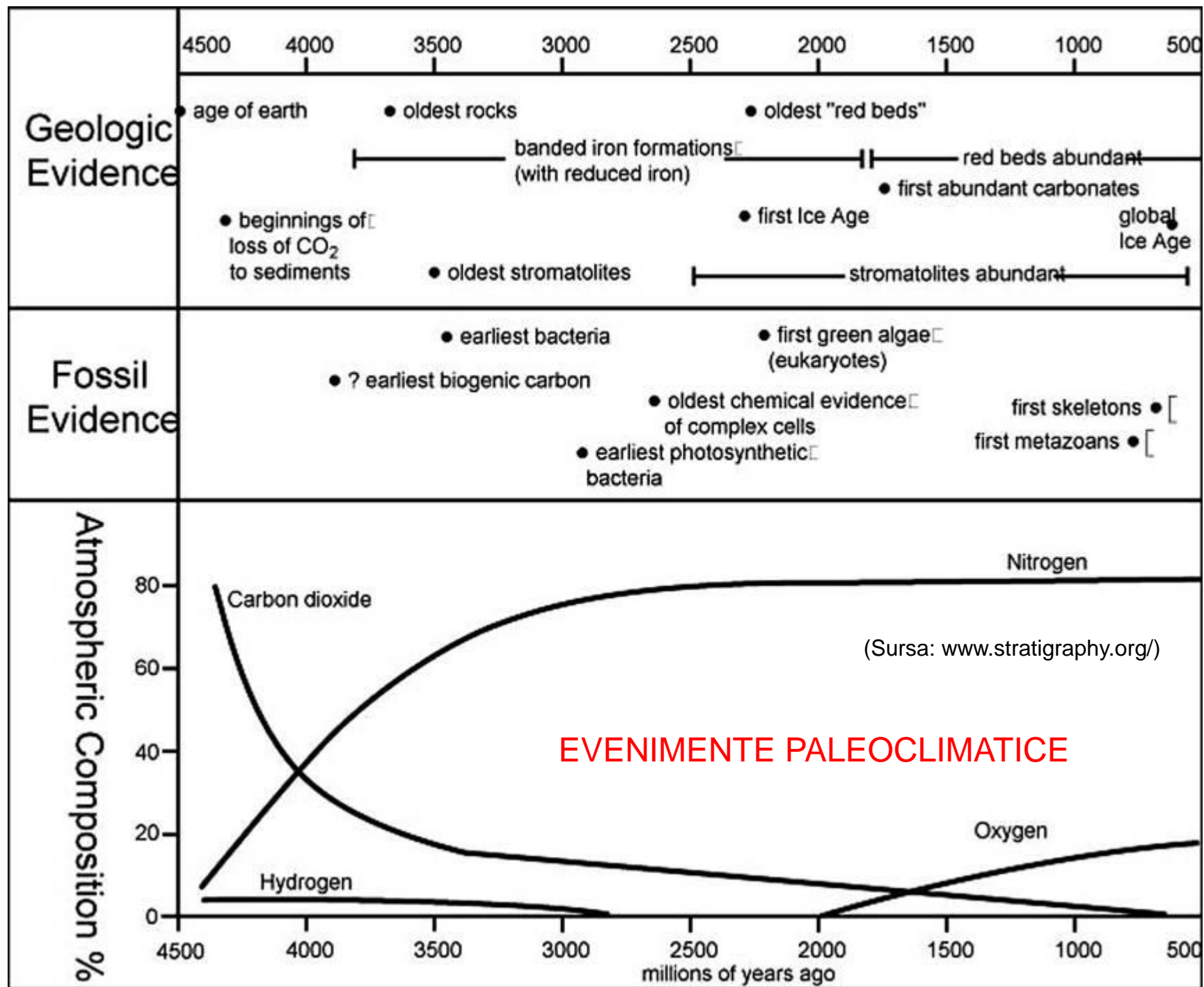
(Sursa: Torvsvik Trond & Cocks Robin, 2017. *Earth History and Palaeogeography*. Cambridge University Press)

## PANNOTIA – 545 Ma

Reasamblarea  
blocurilor  
continentelor  
după  
fragmentarea  
Rodinei (~725 Ma)



(Sursa: wikipedia/precambrian/paleogeografie)

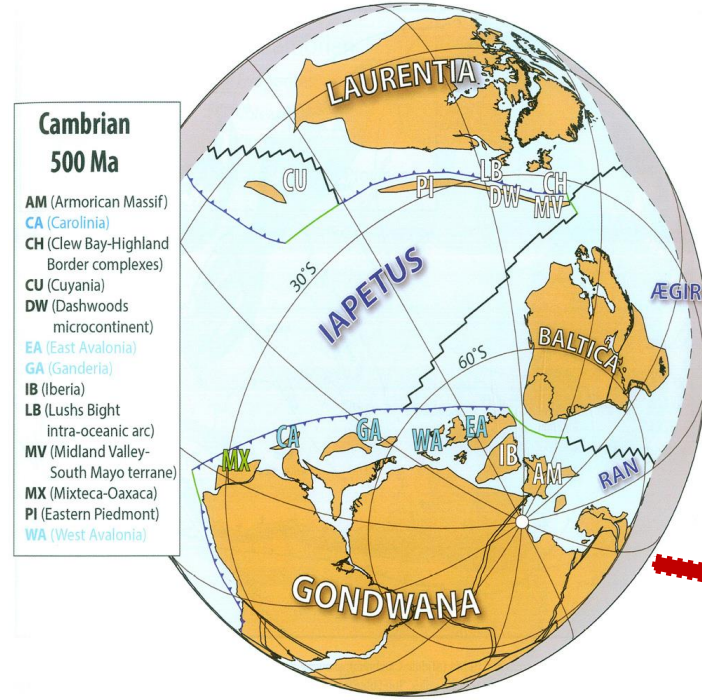


# PALEOZOIC (541,0 – 251,902 Ma)

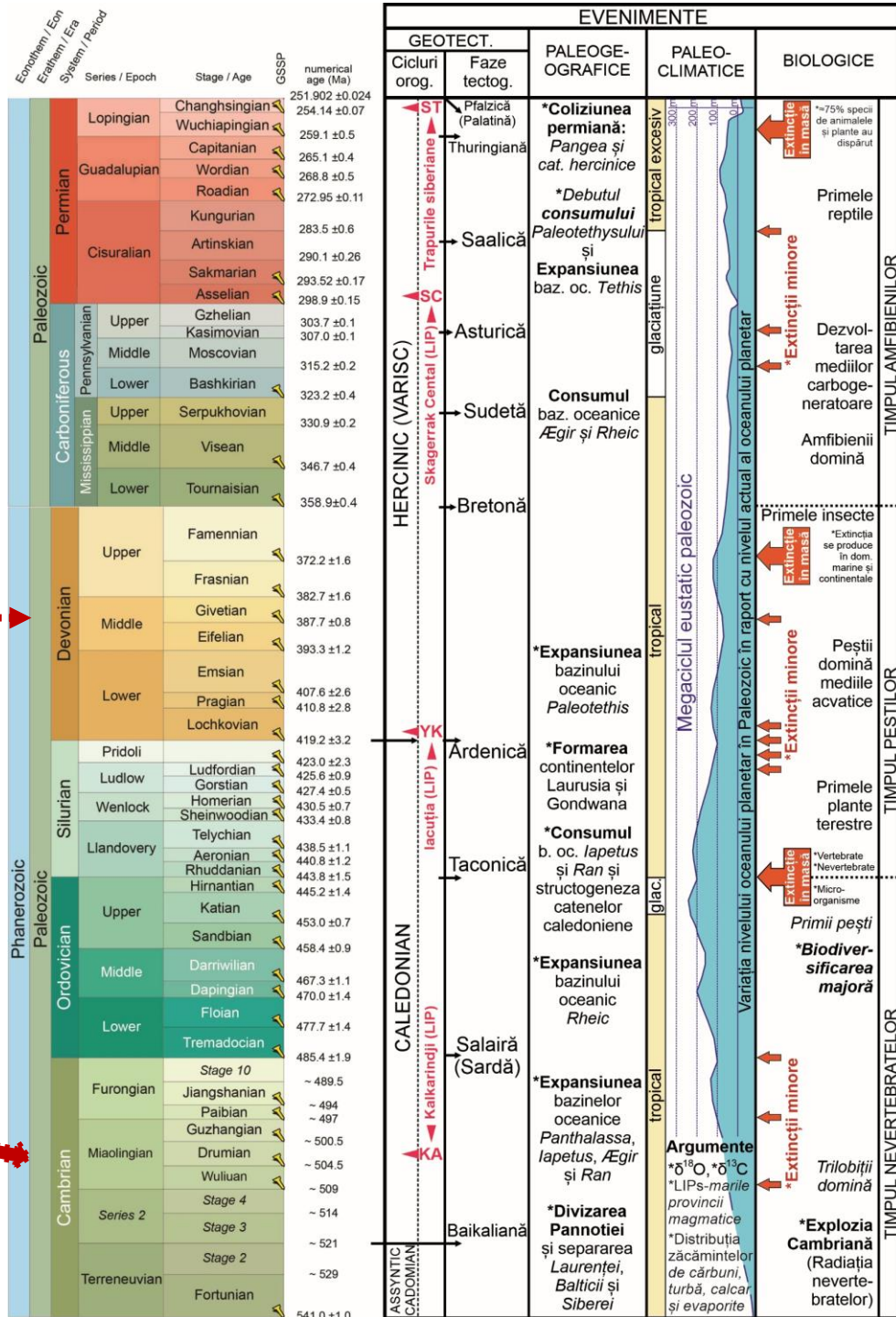
## General Scheme of Devonian Tectonics



(Sursa: Enciclopedia Geologică Britanică: <http://ro.wikipedia.org/>)

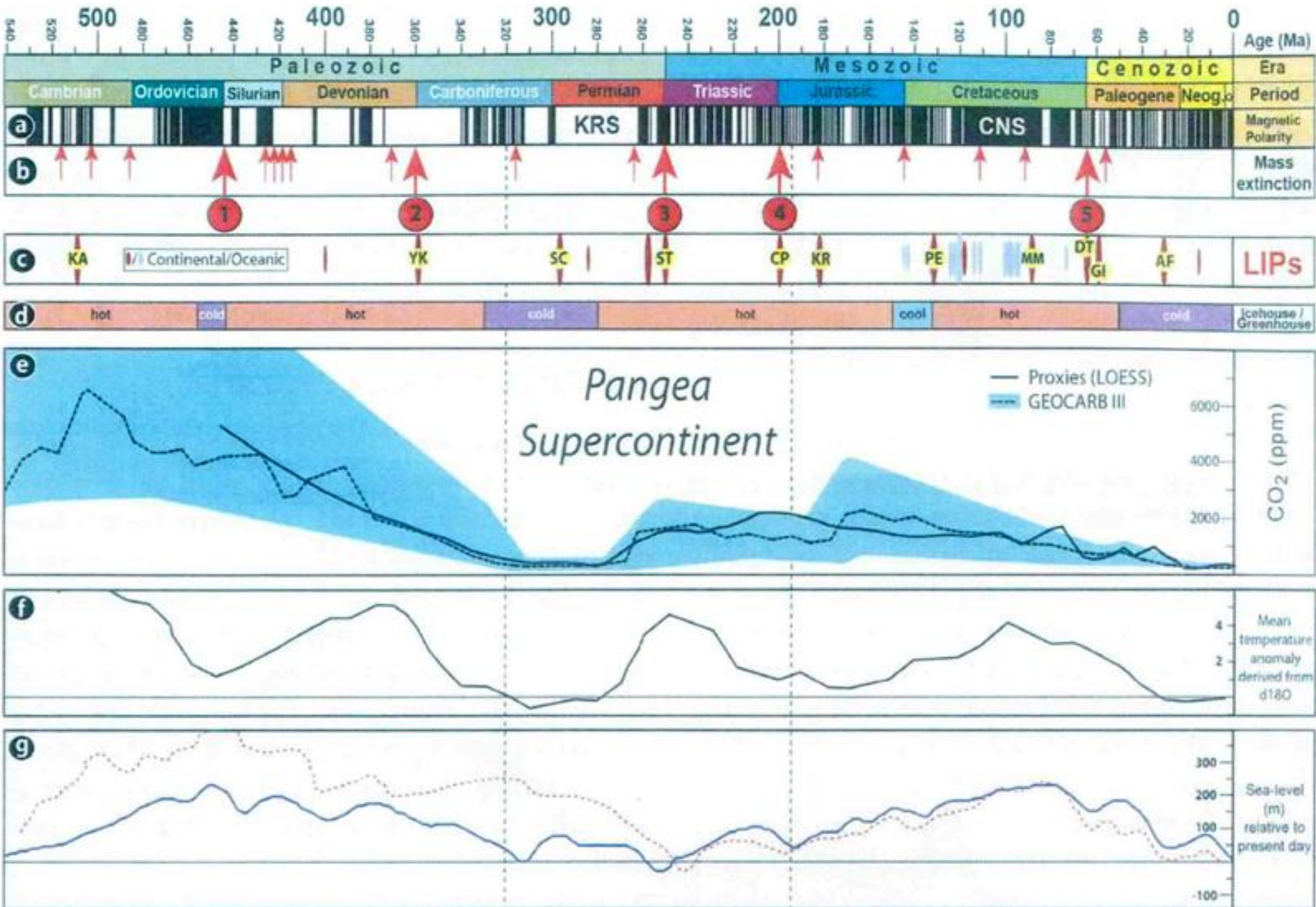


(Sursa: Torsvik Trond & Cocks Robin, 2017)





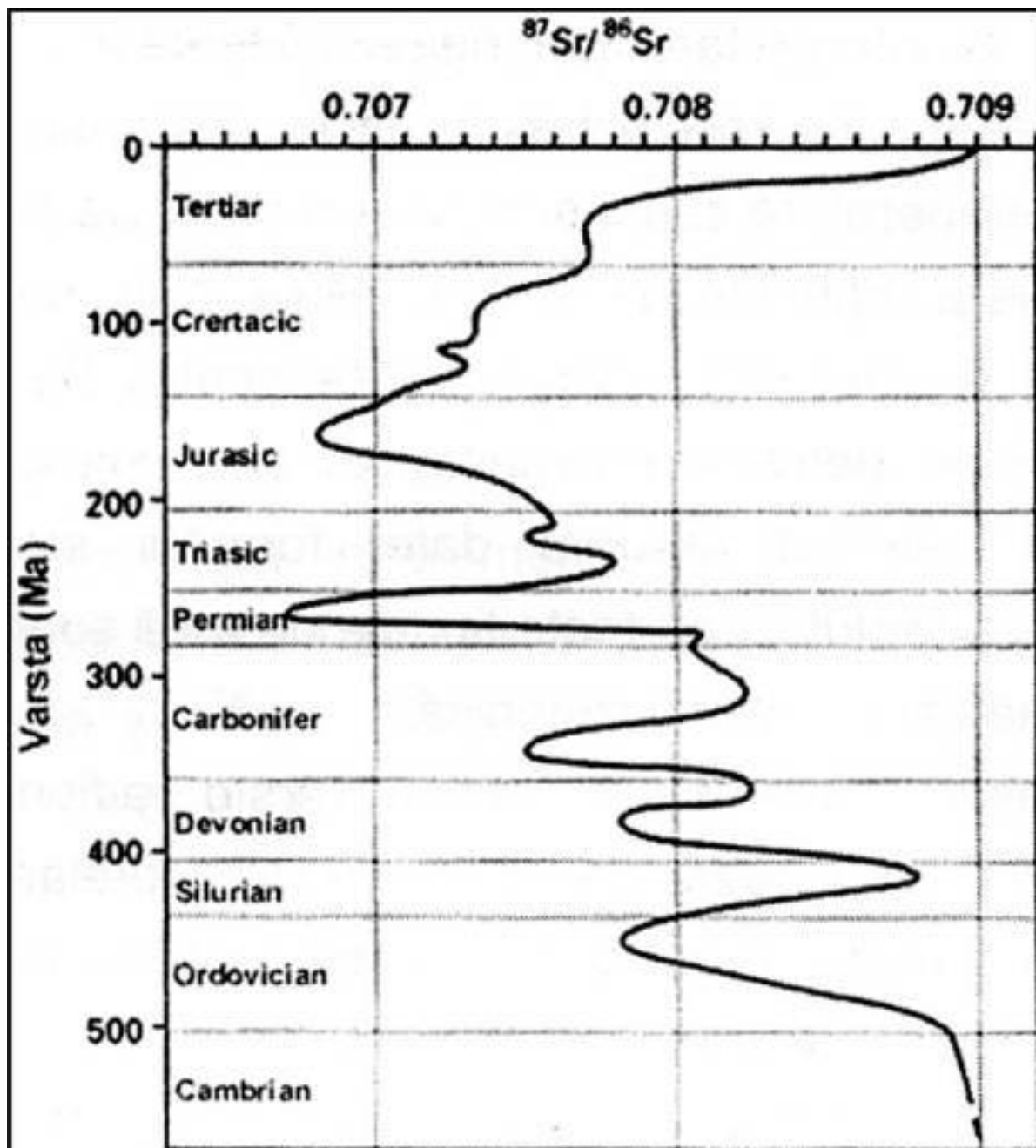
# ATMOSFERA: compoziție, paleoclimat, variația eustatică.



(Sursa: Torvsvik Trond & Cocks Robin, 2017. *Earth History and Palaeogeography*. Cambridge University Press)

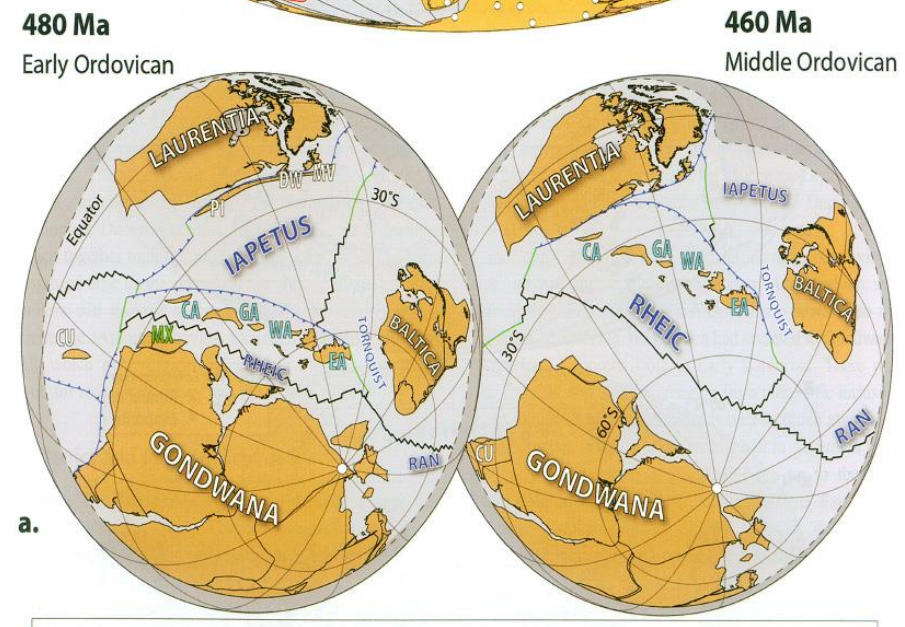
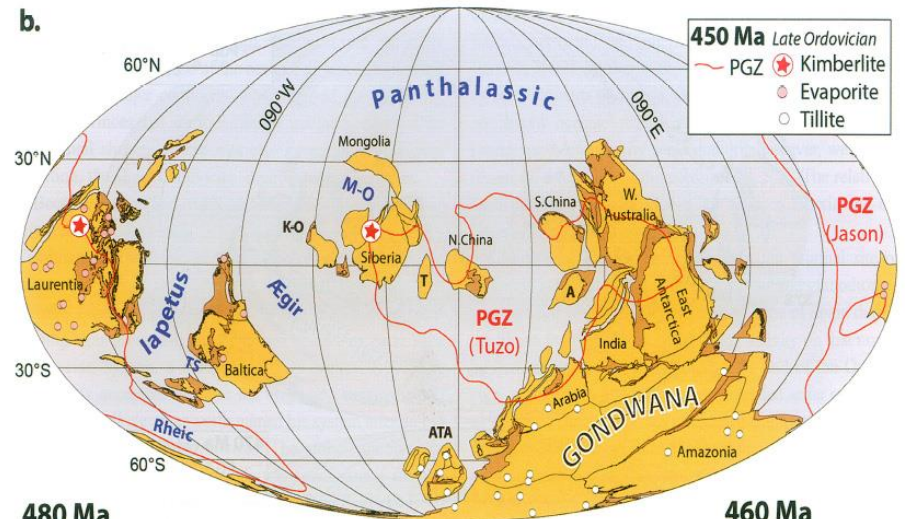
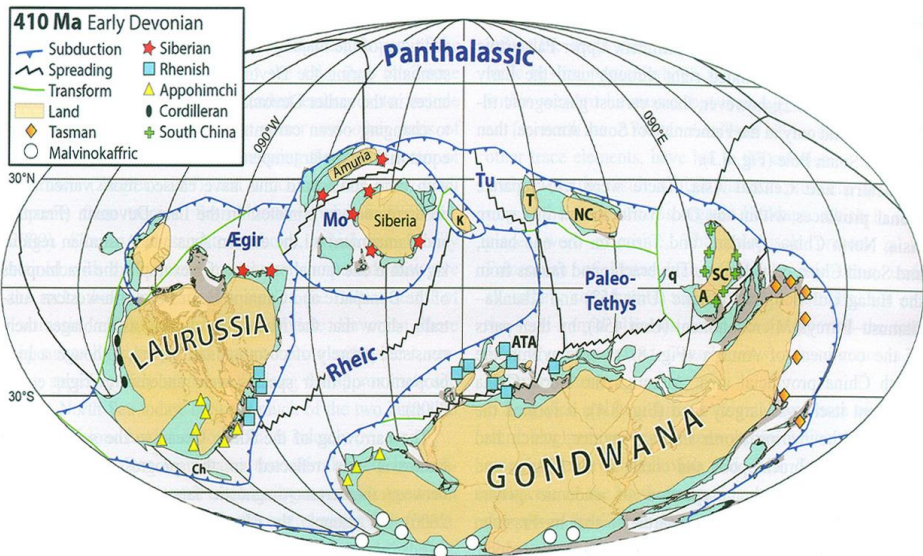
## SEMNIFICAȚII ALE EVENIMENTELOR GEOCHIMICE

Raportul izotopilor de  
stronțiu ( $^{87}\text{Sr}/^{86}\text{Sr}$ )  
reflectă favorabilitatea  
/ restrictivitatea  
biologică a  
paleomediilor  
phanerozoice



Curba izotopilor de stronțiu pentru Phanerozoic  
(după Faure, 1986; din Filipescu, 2002)

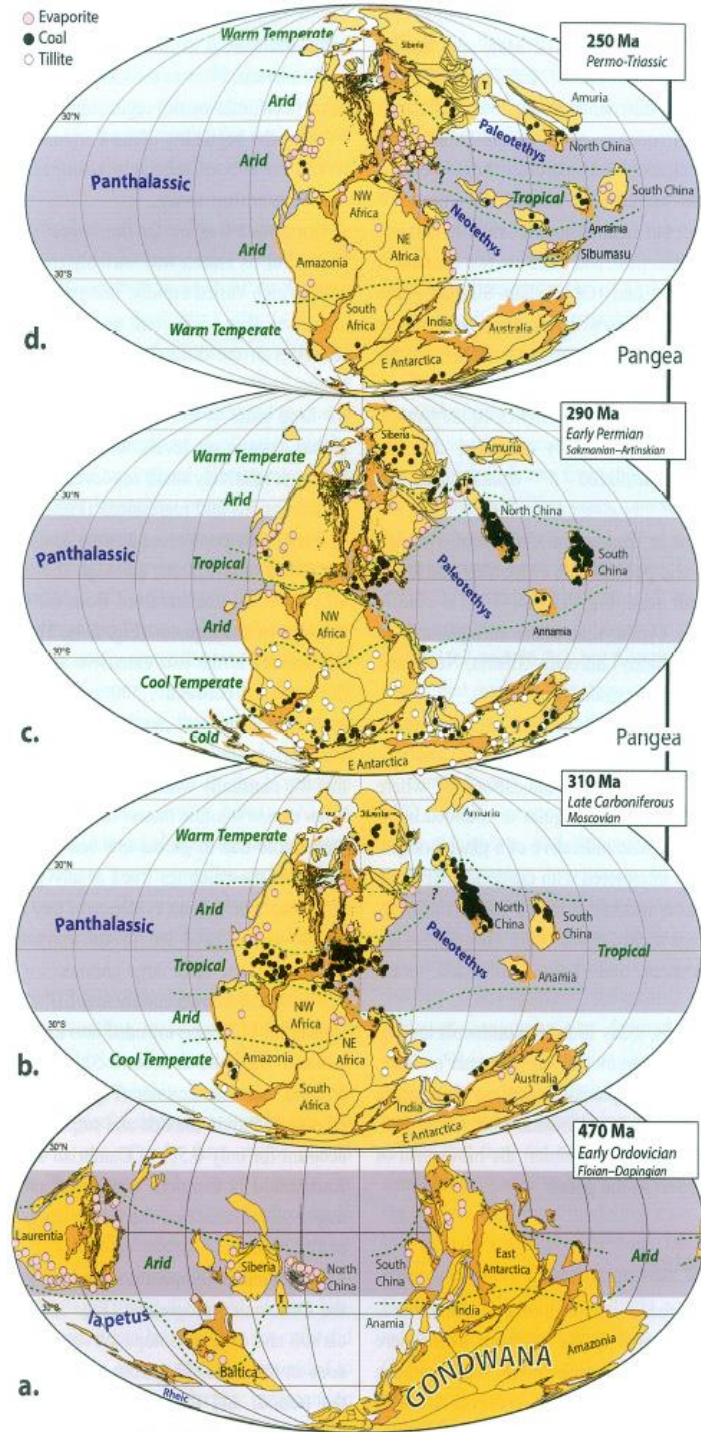
# PALEOTECTONICA



## CONSUMUL OCEANULUI IAPETUS ȘI FORMAREA CONTINENTULUI LAURSSIA

(Sursa: Torvsvik Trond & Cocks Robin, 2017)

Global distribution of brachiopod provinces in the Emsian at about 400 Ma. A, Annamia; ATA, Armorican Terrane Assemblage; Ch, Chileia Terrane; Mo, Mongol-Okhotsk Ocean; NC, North China; q, Quinling Terrane; SC, South China; T, Tarim; Tu, Turkestan Ocean. New diagram, including sites plotted from Boucot et al. (1969) and Boucot & Blodgett (2001).



(Sursa: Torvsvik Trond & Cocks Robin, 2017)



**Marea Britanie: Continentul roșu devonian**

(Sursa: Enciclopedia Geologică: <http://ro.wikipedia.org/>)

← **Semnificația litologiei în reconstrucția climatelor**

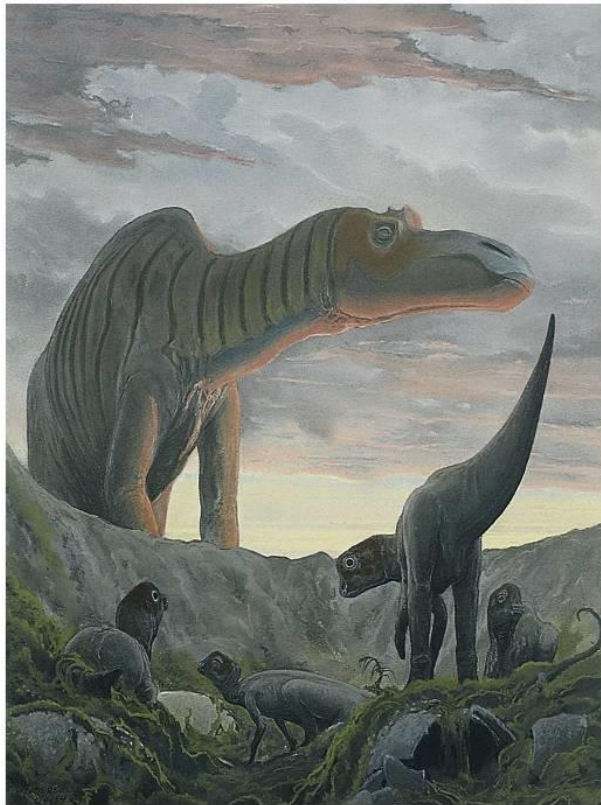




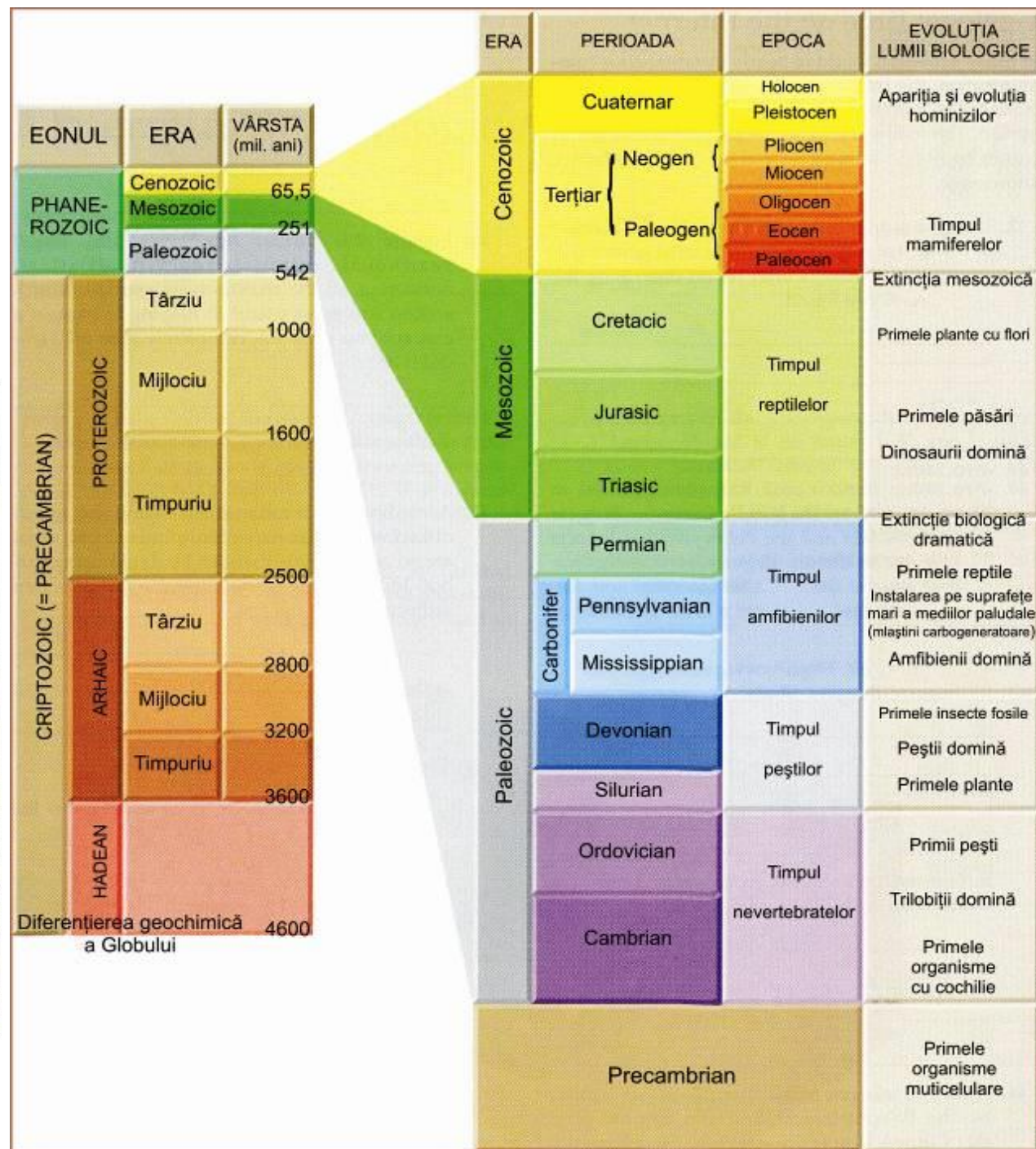
## Timpul mesozoic în

"economia"

Timpului geologic, cu localizarea unor evenimente majore din lumea biologică

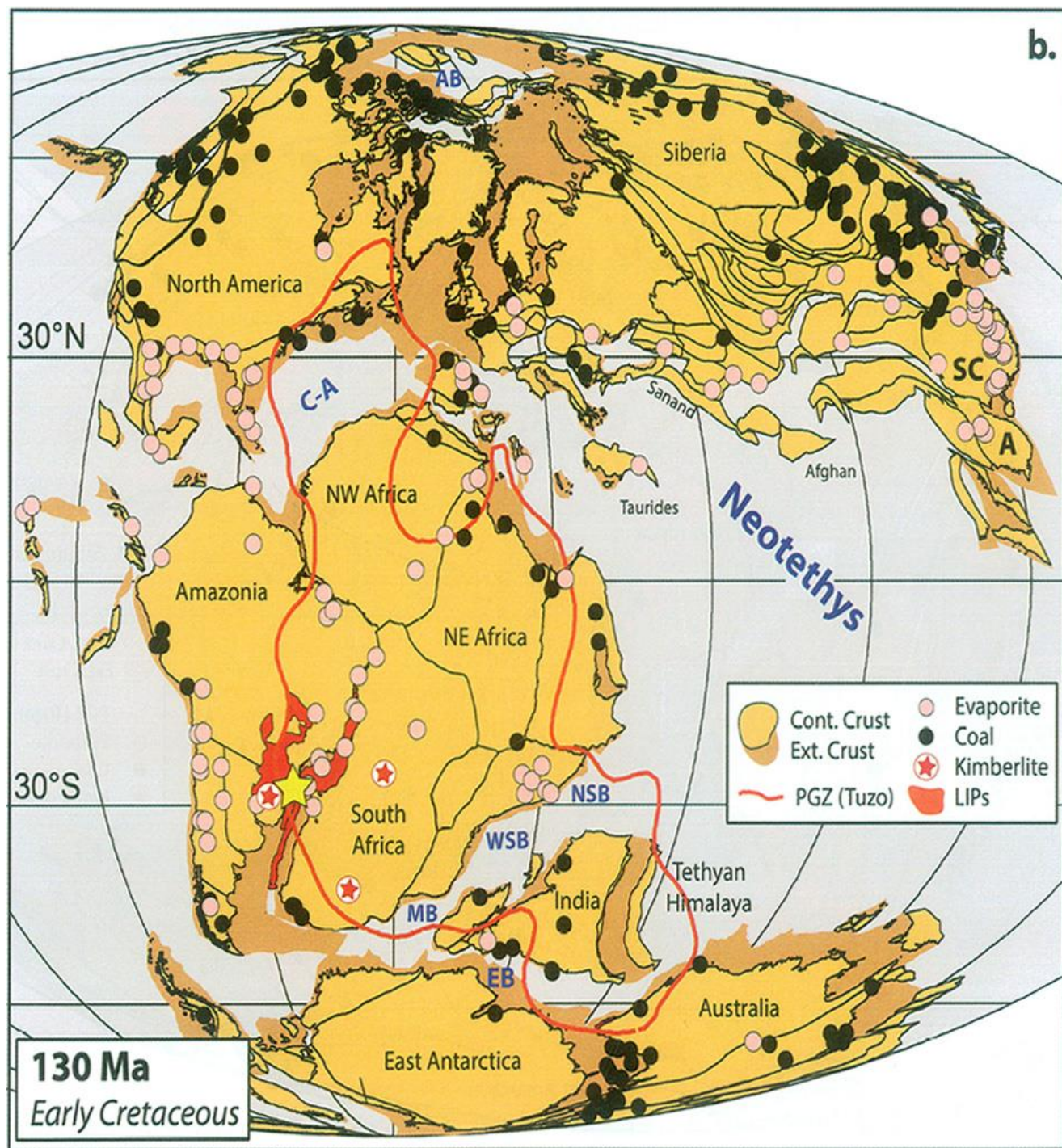


(sursa: wikipedia.ro)

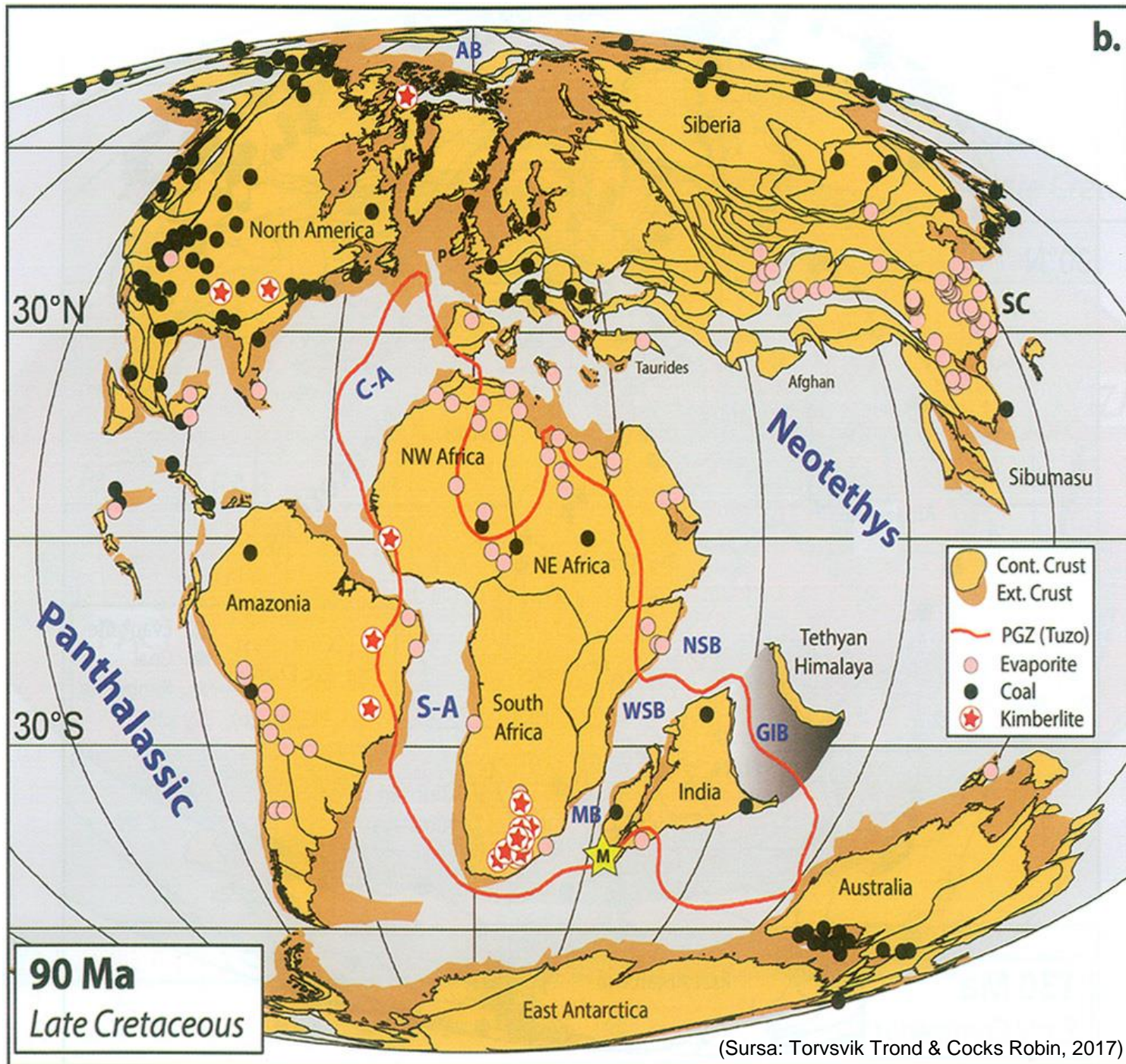


## Oceanul Tethys:

- \*intră în consum;*
- \*se configurează catenele orogenetice alpine;*
- \*se fragmentează Pangaea;*
- \*se edifică catena cimerică;*
- \*se evoluează spre geografia actuală (cu bazinele oceanice și blocurile continentale actuale).*



\*se configurează Atlanticul central și sudic;  
 \*se separă India din Gondwana;  
 \*se formează nucleele cristalino-mezozoice în Carpați;  
 \*se evoluează spre geografia actuală (cu bazinele oceanice și blocurile continentale actuale).





**\*ÎN LUMEA BIOLOGICĂ SE PRODUCE EXTINCȚIA MESOZOICĂ ȘI APAR PĂSĂRILE**

**Pterosaurus----->**

(Sursa: [www.palaeos.com](http://www.palaeos.com))

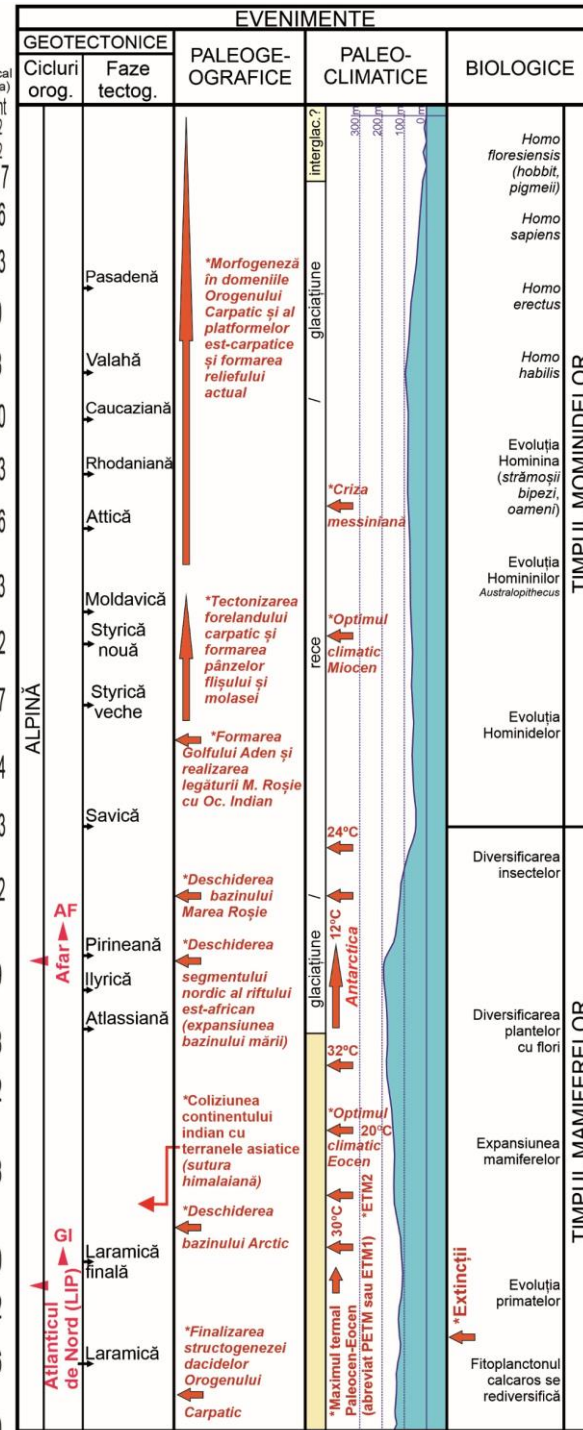


# CENOZOIC

(66,0 Ma – prezent – viitor?)

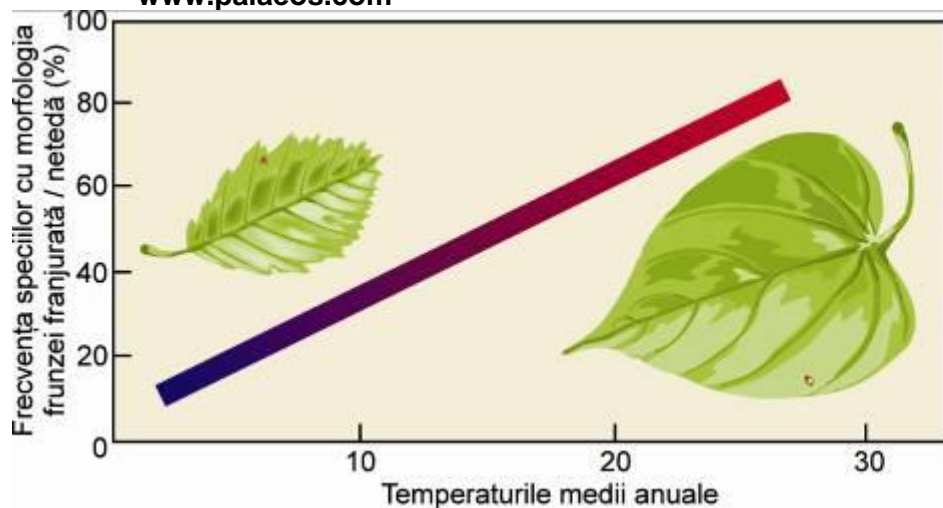
ICS		Paratethys			
Cuaternar	Holocen	mil. ani	Holocen		
	Pleistocen	0,011	Pleistocen		
		Tarantian		0,13	
		Ionian		0,78	
		Calabrian		1,81	
Pliocen	Gelasian	2,58	Romanian		
	Piacenzian	3,60	Dacian		
	Zanclean	5,33			
	Messinian	7,25			
Neogen	Miocen	11,61	Sarmațian		
				Tortonian	Meoțian
				Serravallian	
				Langhian	
	Eocen	15,97	Badenian		
				Burdigalian	
				Aquitanian	
				Aquitanian	

Epoch / Era / System / Period	Series / Epoch	Stage / Age	GSSP	
Cenozoic	Quaternary	Holocene	present	
		Pleistocene	Meghalayan	0.0042
			Northgrippian	0.0082
			Greenlandian	0.0117
		Pliocene	Upper	0.126
	Middle		0.773	
	Neogene	Miocene	Calabrian	1.80
			Gelasian	2.58
		Oligocene	Piacenzian	3.600
			Zanclean	5.333
			Messinian	7.246
			Tortonian	11.63
			Serravallian	13.82
			Langhian	15.97
			Burdigalian	20.44
			Aquitanian	23.03
	Paleogene	Eocene	Chatthian	27.82
			Rupelian	33.9
		Paleocene	Priabonian	37.8
			Bartonian	41.2
Lutetian			47.8	
Phanerozoic	Paleocene	Ypresian	56.0	
		Thanetian	59.2	
	Eocene	Selandian	61.6	
		Danian	66.0	



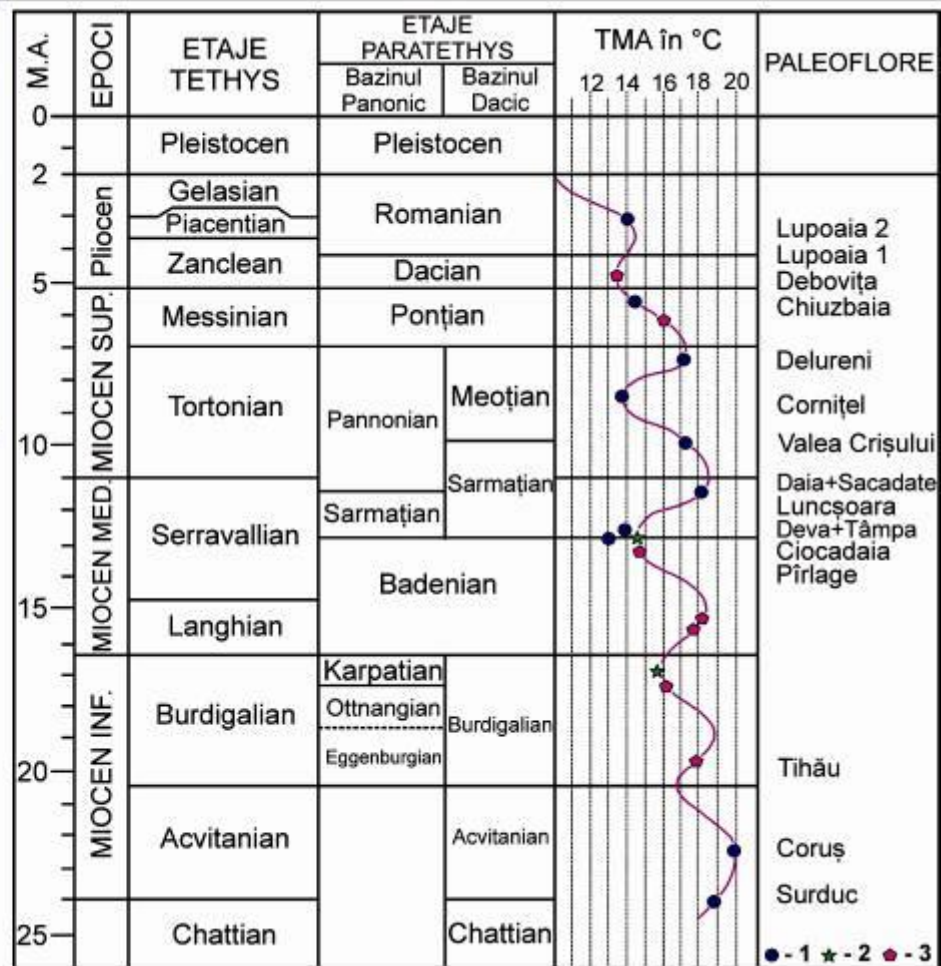
# SEMNIIFICAȚIILE ASOCIAȚIILOR PALEOVEGETALE ÎN STABILIREA "OSCIPLAȚIILOR" PALEOCLIMATICE ÎN NEOGEN

www.palaeos.com

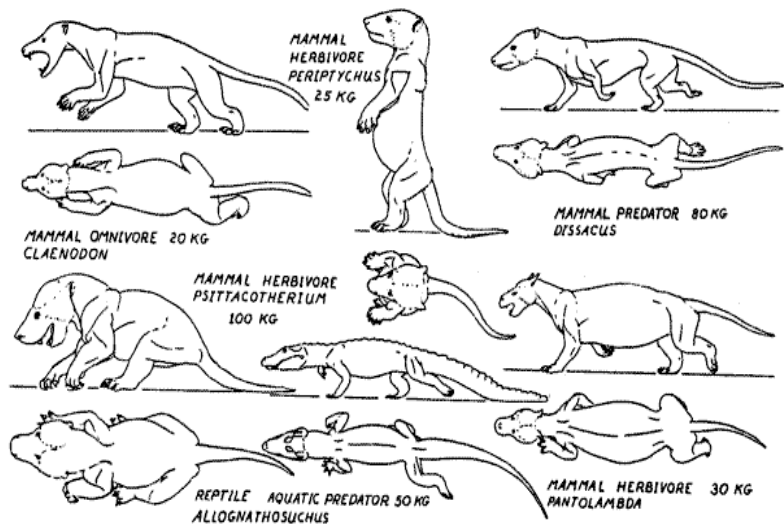


\*Marginea franjurată ► *climate temperate reci.*

\*Marginea netedă ► *climate calde.*



(după Cârciumar, Givulescu, Petrescu)



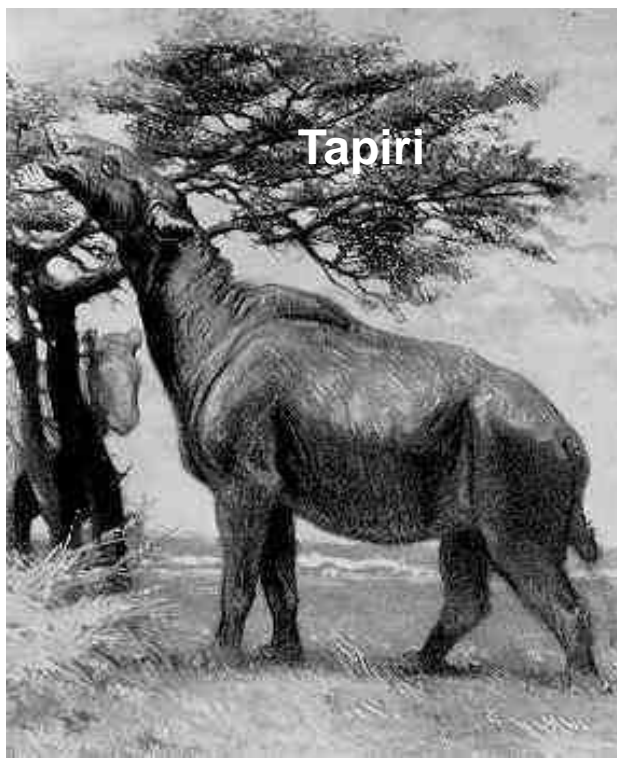
## VIAȚA ÎN PALEOCEN

## PALEOGENUL TIMPUL MAMIFERELOR

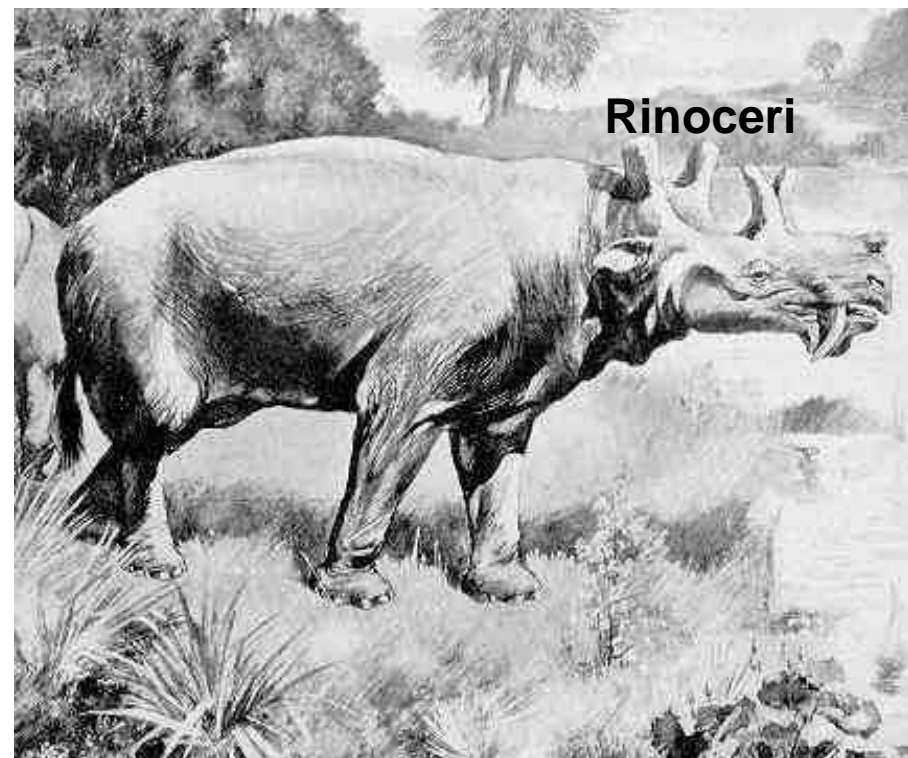


(Sursa: [www.palaeos.com](http://www.palaeos.com))

**VIAȚA ÎN  
EOCEN**



**Tapiri**



**Rinoceri**

(Sursa: [www.palaeos.com](http://www.palaeos.com))



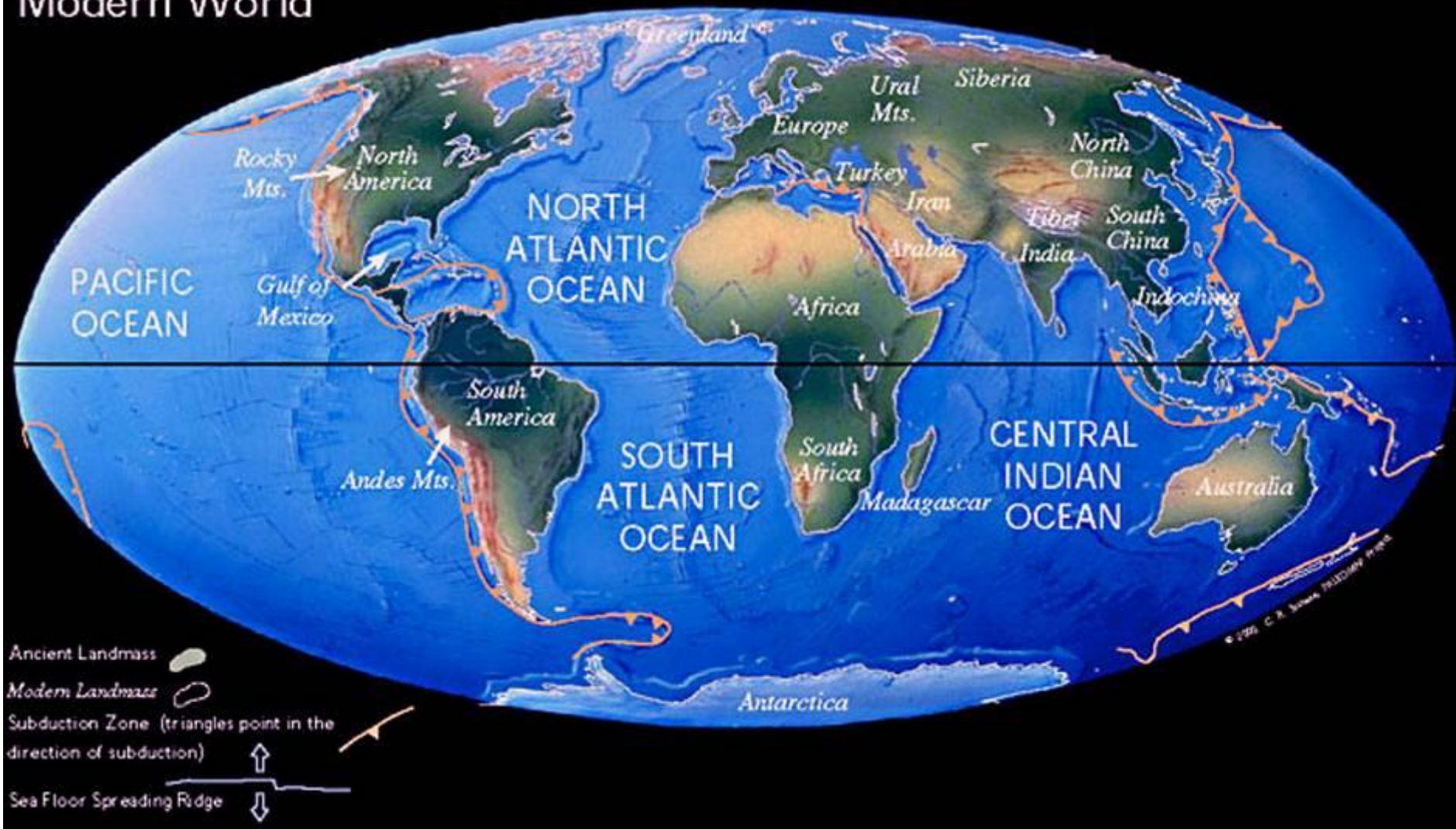
**Mesohippus**



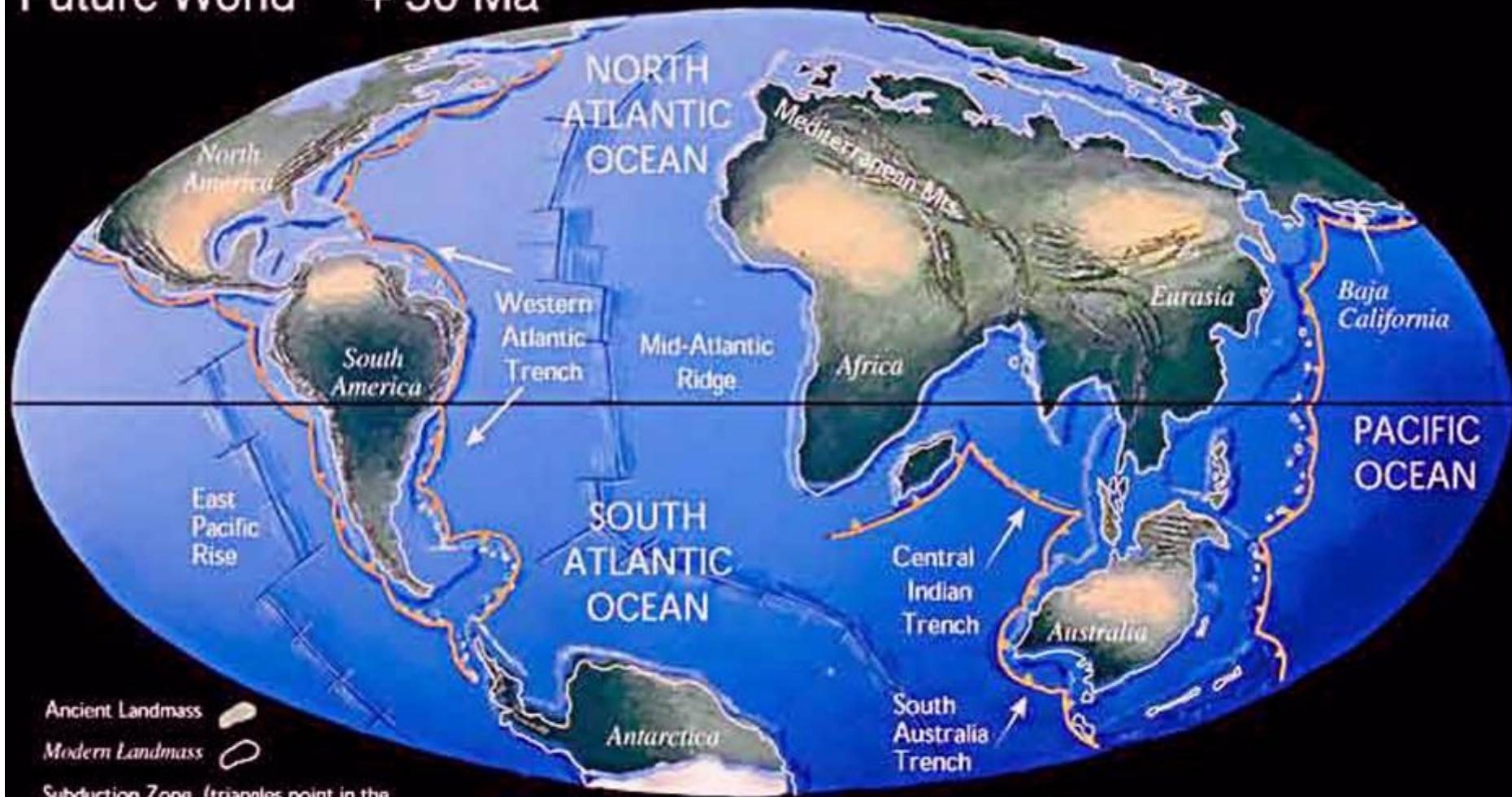
**Mesonyx**



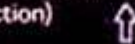
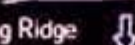
**DIN ACTUAL ..... PESTE 250 mil. ani ..... ÎN VIITORUL GEOLOGIC**

**Modern World**

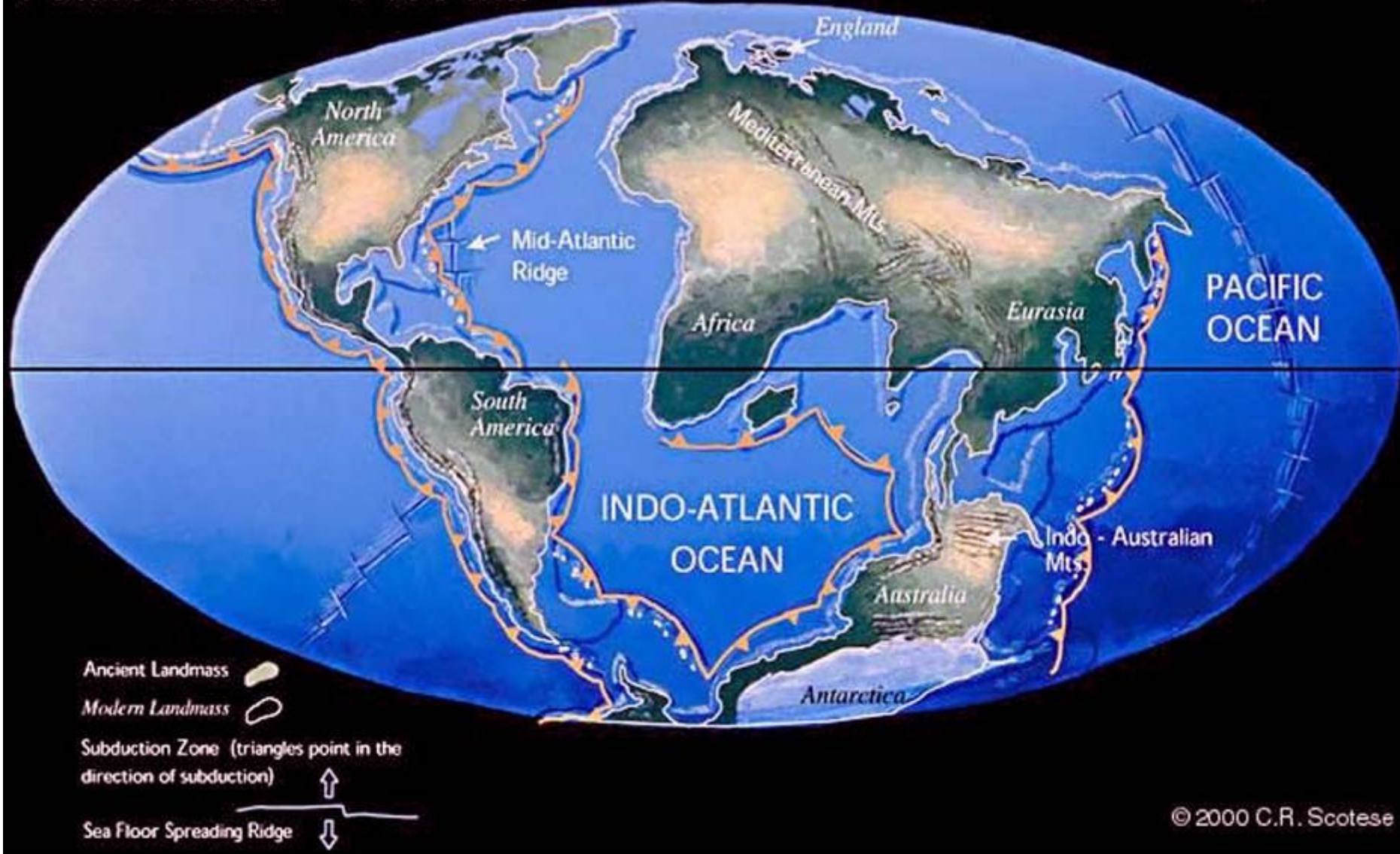


# Future World + 50 Ma



- Ancient Landmass 
- Modern Landmass 
- Subduction Zone (triangles point in the direction of subduction) 
- Sea Floor Spreading Ridge 

# Future World + 150 Ma




(Sursa: [www.palaeos.com](http://www.palaeos.com))



# Future World + 250 Ma



- Ancient Landmass 
- Modern Landmass 
- Subduction Zone (triangles point in the direction of subduction) 
- Sea Floor Spreading Ridge 

© 2000 C.F. Scotese

(Sursa: [www.palaeos.com](http://www.palaeos.com))

**PEISAJE GEOLOGICE CU SEMNIFICAȚII ÎN  
DESCIFRAREA EVOLUȚIEI GEOSISTEMULUI**

# EXEMPLIFICĂRI PRIVIND PALEOEVENIMENTE



**CALIFORNIA**  
**SIERRA NEVADA**  
**HOT CREEK**  
**ACTIVITATE POSTPAROXISMALĂ**

2017 08 15

## b. MAGMATICE-VULCANICE



Vulcanism exploziv (700 mii ani)  
-activitate postvulcanică-





**\*\*Ultimele erupții au avut loc în urmă cu 700000 ani**  
**\*\*\*În prezent, în calderă au loc manifestări postvulcanice,**  
**cu depuneri de roci cu săruri**





## RELIEF FORMAT PE CORPURI MAGMATICE BATHOLITICE



**CALIFORNIA**

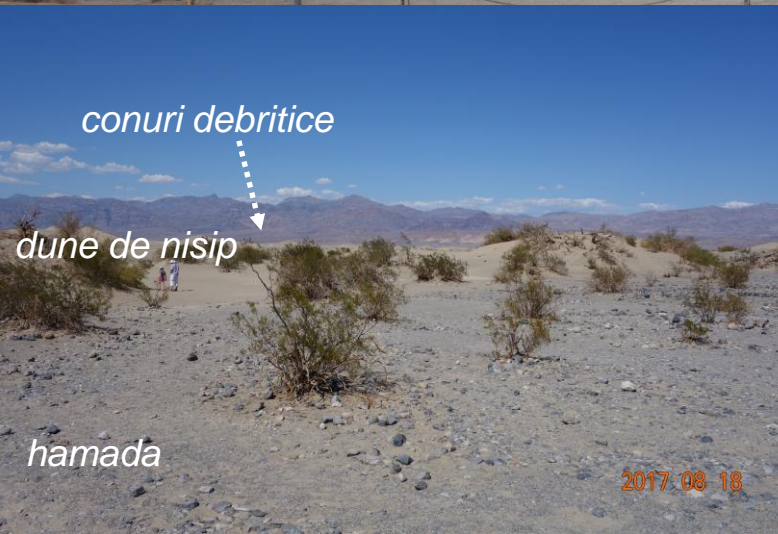
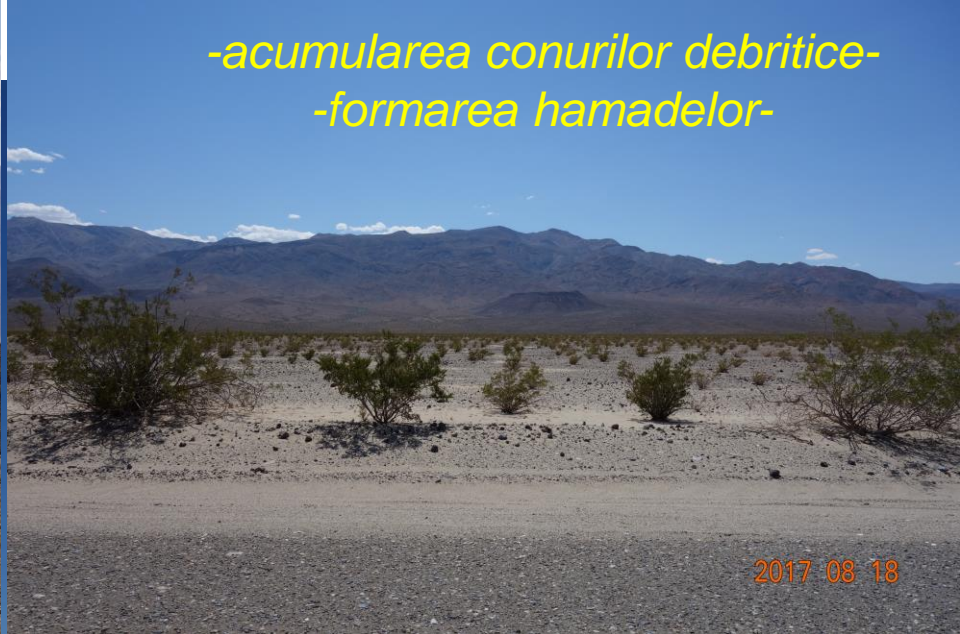
**YOSEMITE PARK**

**BATHOLITE MAGMATICE MESOZOICE**

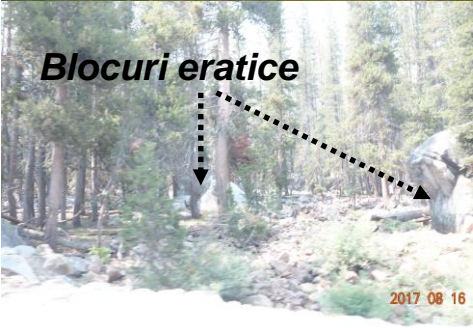
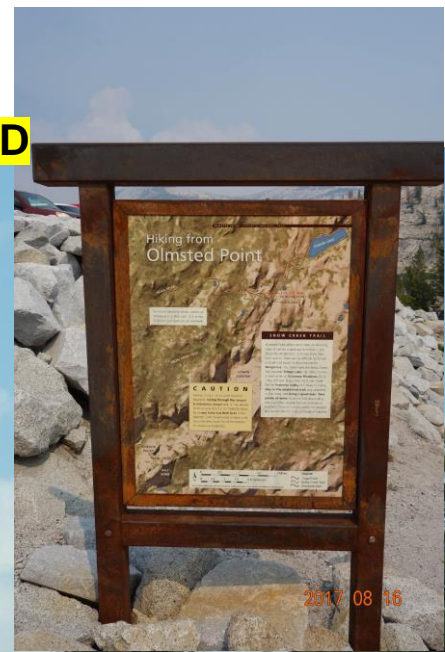
**ROCA: GRANITE/GRANODIORITE/DIORITE**

2017 08 14

# Medii de sedimentare continentale din climate calde-aride



**CALIFORNIA  
YOSEMITE PARK  
PUNCTUL GLACIAR OLMSTED**





Din "VALEA MORTII"  
PRIN DEPOZITE  
VULCANICE ȘI  
PIROCLASTICE  
SPRE "BADLANDS"  
(CALIFORNIA)



**CALIFORNIA**  
**PUNCTUL ZABRISKIE**  
**PĂMÂNTURI RELE (BADLANDS)**  
**MEDII DEPOZIȚIONALE ARIDE, DEBRITICE**



2017 08 18

# PUNCTUL ZABRISKIE



2017 08 18

# PUNCTUL ZABRISKIE



2017 08 18

**ARIZONA**  
**CANIONUL ANTILOPE**  
**DEPOZITE JURASICE**



**FORMAȚIUNEA NAVAJO**



DUNE DE NISIP, CU  
STRATIFICAȚIE  
ÎNCRUCIȘATĂ  
TRANSFORMATE PRIN  
PROCESE DIAGENETICE ÎN  
STRATE GRESII



2017 08 23



2017 08 23



2017 08 23



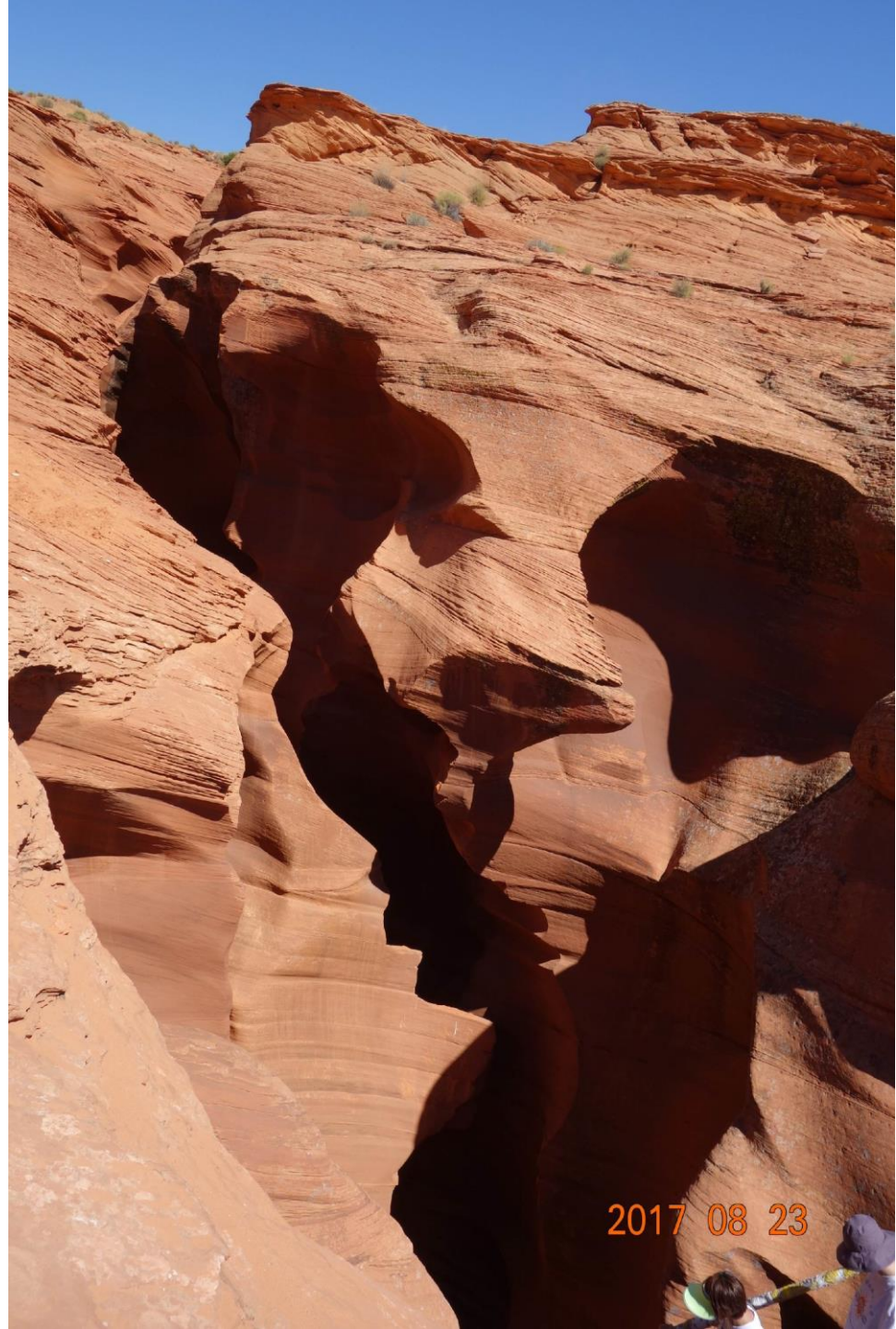


INTRAREA ÎN SEGMENTUL  
SUBTERAN AL CANYONULUI  
ANTYLOPE



2017 08 23

**INTRAREA ÎN SEGMENTUL  
SUBTERAN AL  
CANYONULUI ANTILPE**





2017 08 23



2017 08 23





2017 08 23



2017 08 23





2017 08 23



2017 08 23





2017 08 23



2017 08 23



2017 08 23





2017 08 23





2017 08 23

# SFÂRȘIT

