

Biostratigrafia applicata

e

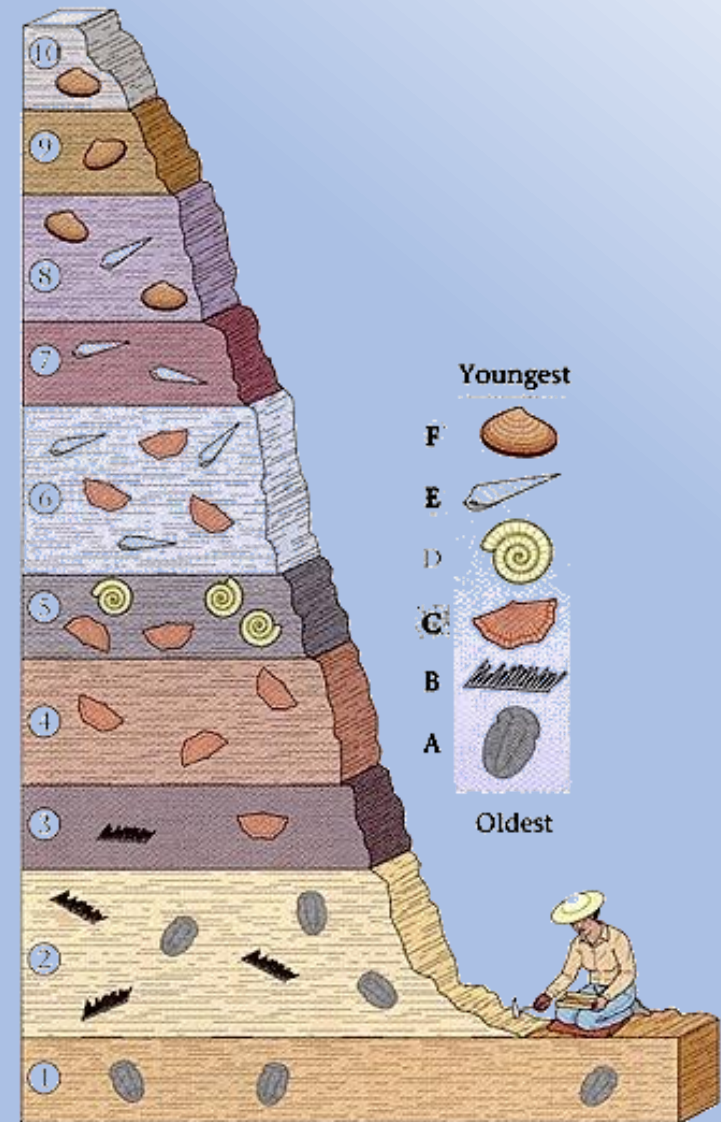
correlazioni stratigrafiche

Prof. Carlo Corradini

BIOSTRATIGRAFIA

La **biostratigrafia** è lo studio della distribuzione stratigrafica dei fossili.

Lo **scopo** della biostratigrafia è quello di organizzare gli strati in unità basate sul loro contenuto in fossili (**BIOZONE**)



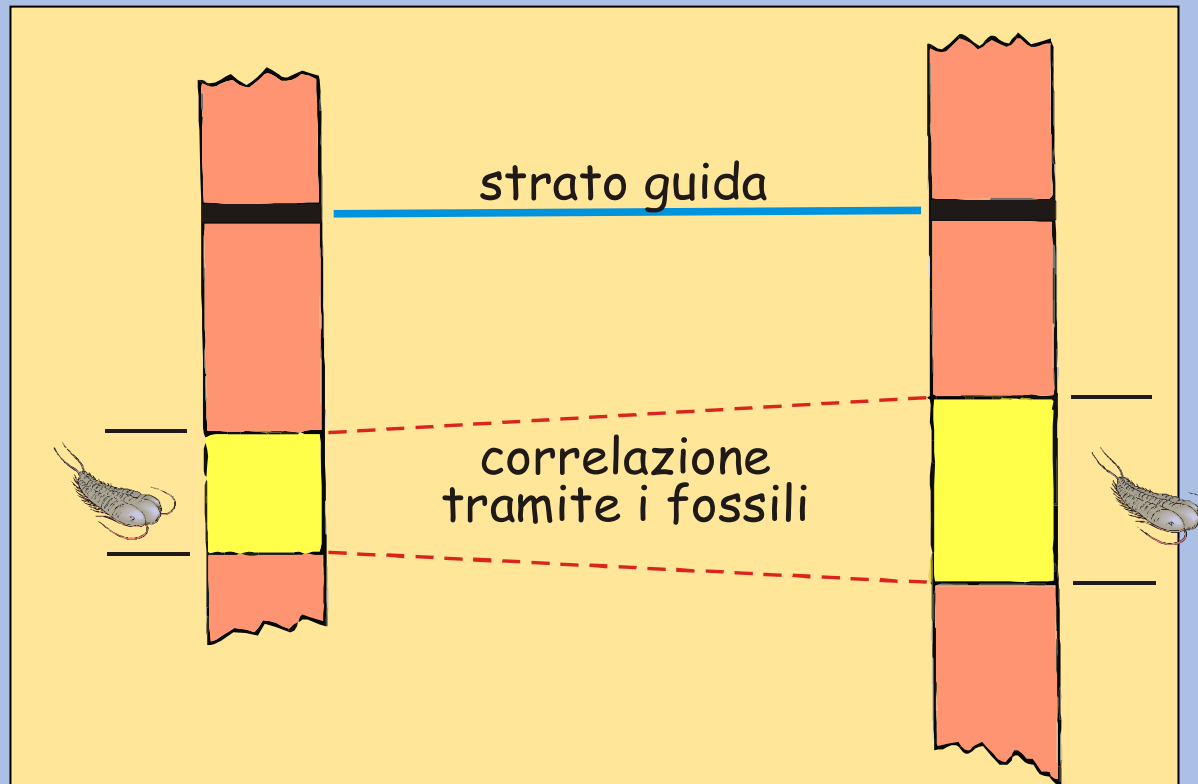
BIOSTRATIGRAFIA

Schema di Biozonazione, cioè una suddivisione del tempo geologico basata sui fossili.

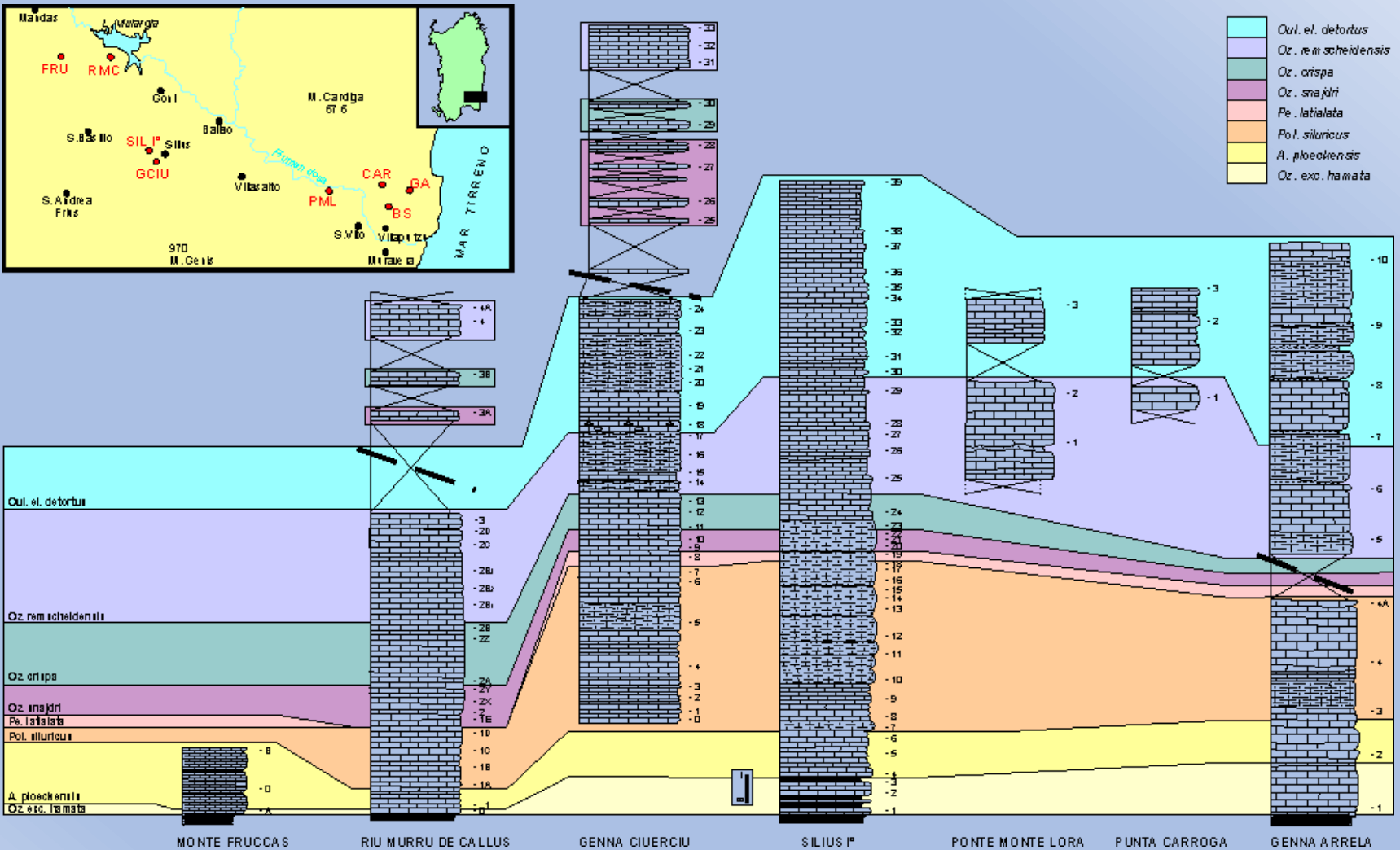
		GRAPTOLITES	CONODONTS	CHITINOZOANS	
SILURIAN	PRIDOLI	transgrediens	Oul. el. detortus	U. urna	
		bouceki			
		branikensis-lochkoviensis	O. eosteinhornensis i.Z.		
		parultimus-ultimus			
	LUDLOW	LUDFORDIAN	fragmentalis	O. crispa	A. cf. elongata
			kozlowskii	O. snajdri	
			inexpectatus	Pe. latialata	
			bohemicus		
		GORST.	linearis-leintwardinensis	P. siluricus	
			chimaera	A. ploeckensis	
			nilssonii-colonus	O. e. hamata	
				K. v. variabilis i.Z.	
	WENLOCK	HOMERIAN	lundgreni-testis	O. bohémica	C. pachycypha
			ludensis-gerhardi		
			praedeubeli-deubeli		
		SHEINWOODIAN	parvus-nassa	O. s. rhenana	C. subcyatha
			ramosus-ellesae		
			belophorus rigidus		
			riccartonensis		
			murchisoni		
centrifugus					
insectus			Pt. am. amorphognathoides		
lapworthi					
TELYCHIAN	spiralis	Pt. celloni	C. emmastensis		
	"tullbergi"				
	griestonensis				
	turriculatus-crispus	P. tenuis - D. staurognathoides			
	linnei				
	sedgwickii				
AERONIAN	leptotheca - convolutus	D. kentuckyiensis			
	triangulatus-pectinatus				
	cyphus				
RHUDDANIAN	vesiculosus	O.? nathani			
	ascensus - acuminatus				

CORRELARE

La **correlazione stratigrafica** è l'insieme delle procedure e delle metodologie attraverso le quali si dimostra la corrispondenza di parti geograficamente separate di una o più unità stratigrafiche.



CORRELARE

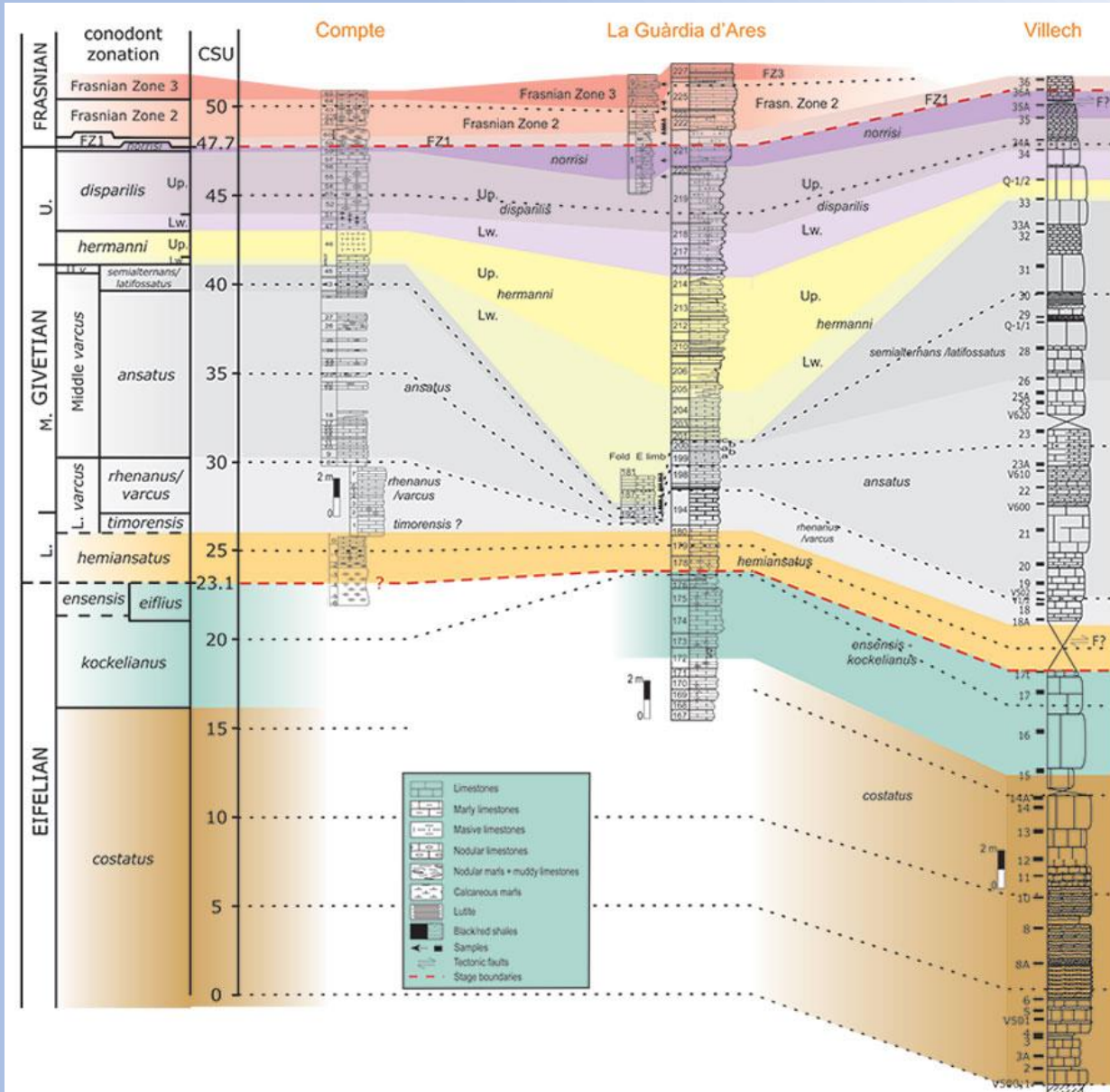


SCOPO DEL CORSO

Il Corso di "Biostratigrafia Applicata e Correlazioni stratigrafiche" fornisce informazioni riguardanti le tecniche di datazione dei corpi sedimentari tramite fossili usando metodologie e tecniche avanzate per correlare corpi rocciosi coevi distanti tra loro.

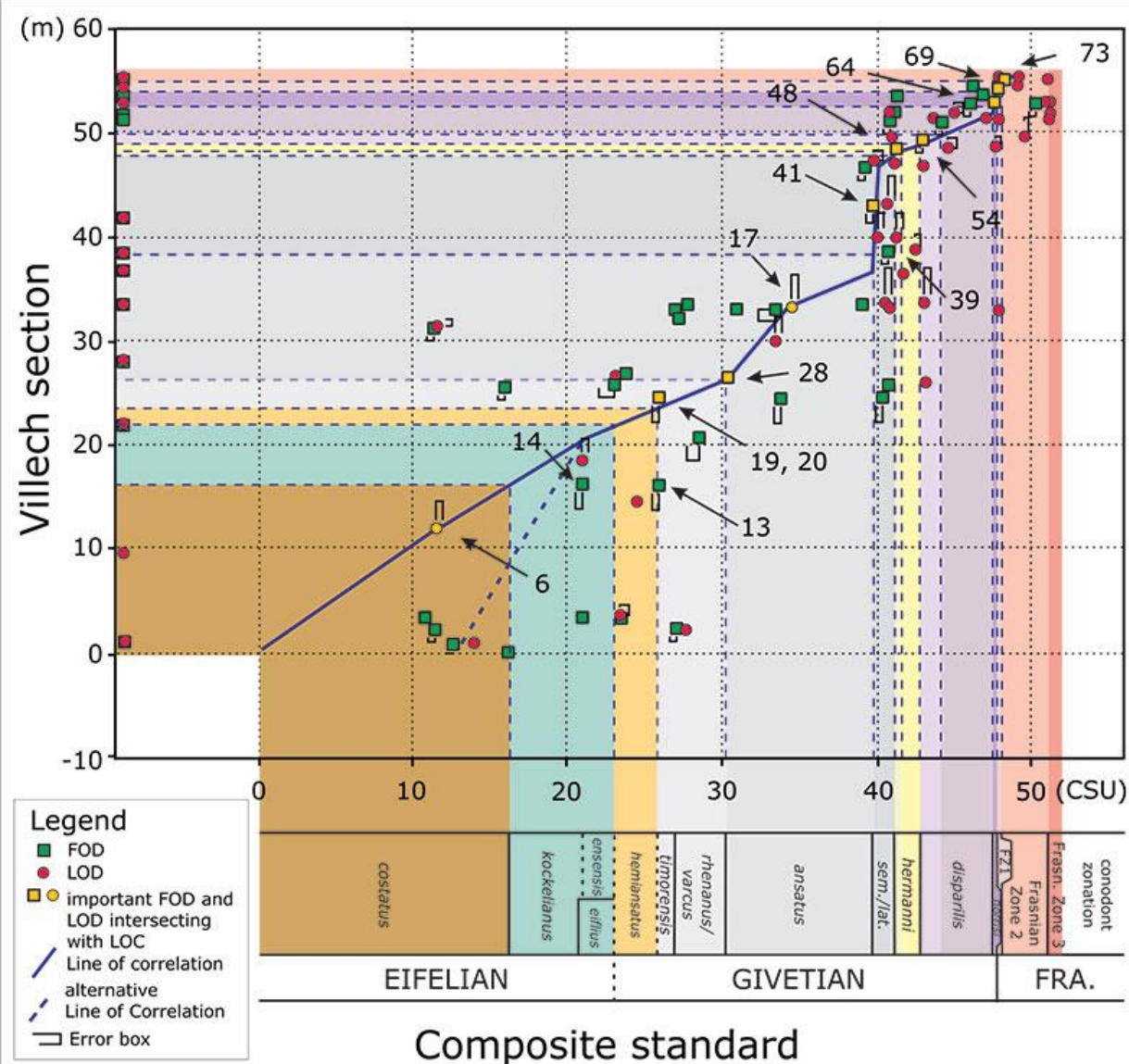
BIOSTRATIGRAFIA QUANTITATIVA

Il metodo delle Correlazioni Grafiche e applicazioni



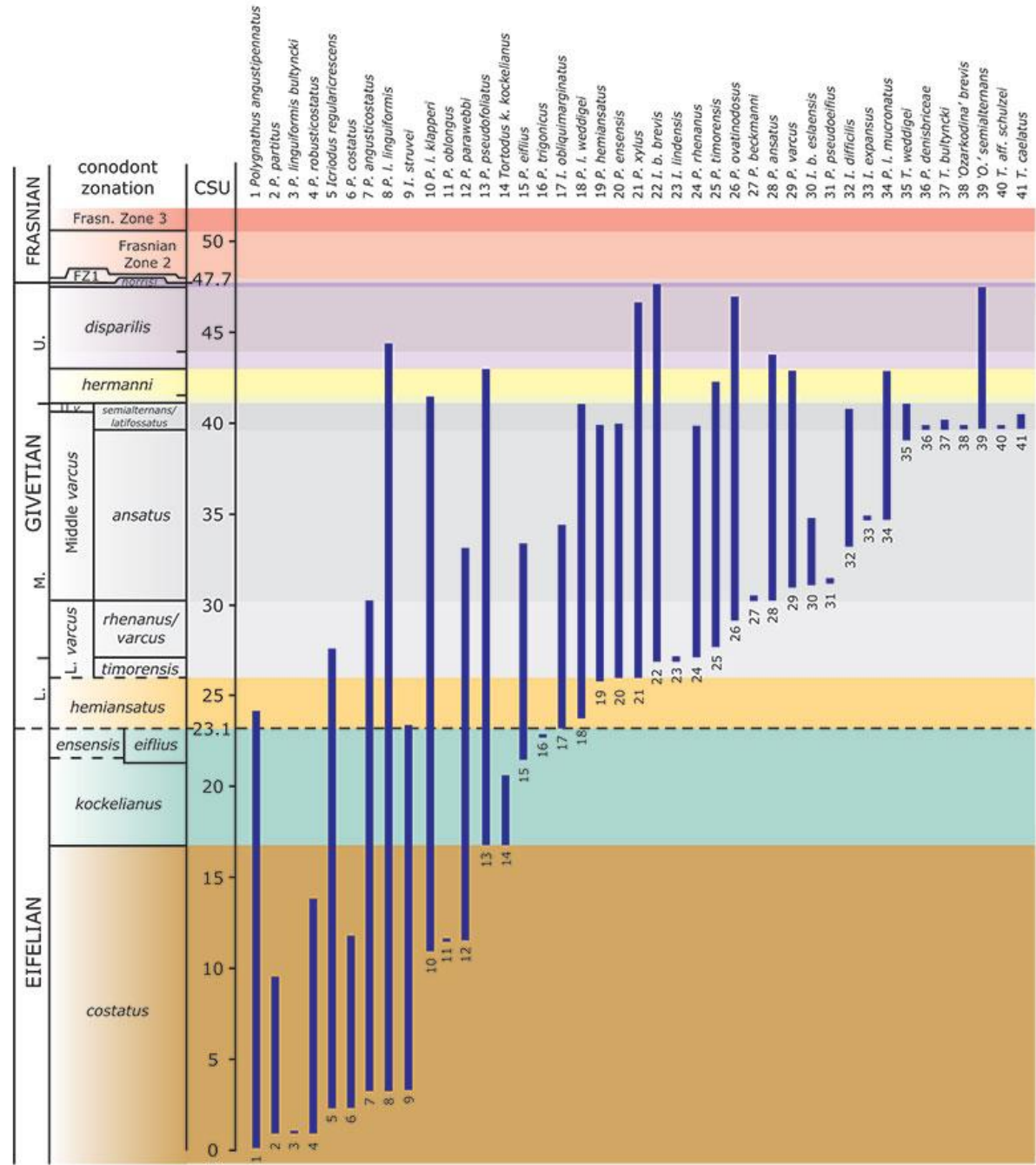
BIOSTRATIGRAFIA
QUANTITATIVA

Il metodo delle
Correlazioni Grafiche
e applicazioni



BIOSTRATIGRAFIA QUANTITATIVA

Il metodo delle Correlazioni Grafiche e applicazioni





INTERNATIONAL CHRONOSTRATIGRAPHIC CHART

www.stratigraphy.org

International Commission on Stratigraphy

v 2021/07



Eonothem / Eon		Era / System / Period		Series / Epoch	Stage / Age	GSSP	numerical age (Ma)
Phanerozoic	Cenozoic	Quaternary	Holocene	U/L	Meghalayan	present	0.000
				M	Northgrippian	0.0082	
				L/E	Greenlandian	0.0117	
				U/L	Upper	0.129	
				M	Chibanian	0.774	
		Pleistocene	Pliocene	Miocene	L/E	Calabrian	1.80
					Gelasian	2.58	
					Piacenzian	3.600	
					Zanclean	5.333	
					Messinian	7.246	
	Paleogene	Oligocene	Eocene	Tortonian	11.63		
				Serravallian	13.82		
				Langhian	15.97		
				Burdigalian	20.44		
				Aquitanian	23.03		
		Paleocene	Paleocene	Chatthian	27.82		
				Rupelian	33.9		
				Priabonian	37.71		
				Bartonian	41.2		
				Lutetian	47.8		
	Cretaceous	Cretaceous	Cretaceous	Ypresian	56.0		
				Thanetian	59.2		
				Selandian	61.6		
				Danian	66.0		
				Maastrichtian	72.1 ± 0.2		
Mesozoic	Upper	Cretaceous	Campanian	83.6 ± 0.2			
			Santonian	86.3 ± 0.5			
			Coniacian	89.8 ± 0.3			
			Turonian	93.9			
			Cenomanian	100.5			
	Lower	Cretaceous	Cretaceous	Albian	~ 113.0		
				Aptian	~ 125.0		
				Barremian	~ 129.4		
				Hauterivian	~ 132.6		
				Valanginian	~ 139.8		
Berriasian	~ 145.0						

Eonothem / Eon		Era / System / Period		Series / Epoch	Stage / Age	GSSP	numerical age (Ma)
Phanerozoic	Mesozoic	Jurassic	Upper	Tithonian	152.1 ± 0.9		
				Kimmeridgian	157.3 ± 0.1		
				Oxfordian	163.5 ± 1.0		
				Callovian	166.1 ± 1.2		
				Bathonian	168.3 ± 1.3		
		Middle	Jurassic	Jurassic	Bajocian	170.3 ± 1.4	
					Aalenian	174.1 ± 1.0	
					Toarcian	182.7 ± 0.7	
					Pliensbachian	190.8 ± 1.0	
					Sinemurian	199.3 ± 0.3	
	Lower	Jurassic	Jurassic	Hettangian	201.3 ± 0.2		
				Rhaetian	~ 208.5		
				Norian	~ 227		
				Carnian	~ 237		
				Ladinian	~ 242		
	Triassic	Upper	Triassic	Olenekian	247.2		
				Induan	251.2		
				Changhsingian	251.902 ± 0.024		
				Wuchiapingian	254.14 ± 0.07		
				Lopingian	259.51 ± 0.21		
		Middle	Triassic	Triassic	Capitanian	264.28 ± 0.16	
					Wordian	266.9 ± 0.4	
					Roadian	273.01 ± 0.14	
					Kungurian	283.5 ± 0.6	
					Artinskian	290.1 ± 0.26	
Lower	Triassic	Triassic	Sakmarian	293.52 ± 0.17			
			Asselian	298.9 ± 0.15			
			Gzhelien	303.7 ± 0.1			
			Kasimovian	307.0 ± 0.1			
			Moscovian	315.2 ± 0.2			
Paleozoic	Permian	Permian	Bashkirian	323.2 ± 0.4			
			Serpukhovian	330.9 ± 0.2			
			Visean	346.7 ± 0.4			
			Tournaisian	358.9 ± 0.4			
			Guadalupian	264.28 ± 0.16			
	Upper	Permian	Permian	Wordian	266.9 ± 0.4		
				Roadian	273.01 ± 0.14		
				Kungurian	283.5 ± 0.6		
				Artinskian	290.1 ± 0.26		
				Sakmarian	293.52 ± 0.17		
Cisuralian	Permian	Permian	Asselian	298.9 ± 0.15			
			Gzhelien	303.7 ± 0.1			
			Kasimovian	307.0 ± 0.1			
			Moscovian	315.2 ± 0.2			
			Bashkirian	323.2 ± 0.4			
Carboniferous	Carboniferous	Carboniferous	Serpukhovian	330.9 ± 0.2			
			Visean	346.7 ± 0.4			
			Tournaisian	358.9 ± 0.4			
			Guadalupian	264.28 ± 0.16			
			Roadian	273.01 ± 0.14			

Eonothem / Eon		Era / System / Period		Series / Epoch	Stage / Age	GSSP	numerical age (Ma)
Phanerozoic	Devonian	Upper	Devonian	Famennian	372.2 ± 1.6		
				Frasnian	382.7 ± 1.6		
				Givetian	387.7 ± 0.8		
				Eifelian	393.3 ± 1.2		
				Emsian	407.6 ± 2.6		
		Middle	Devonian	Devonian	Pragian	410.8 ± 2.8	
					Lochkovian	419.2 ± 3.2	
					Pridoli	423.0 ± 2.3	
					Ludlow	425.6 ± 0.9	
					Wenlock	427.4 ± 0.5	
	Lower	Devonian	Devonian	Homerian	430.5 ± 0.7		
				Sheinwoodian	433.4 ± 0.8		
				Telychian	438.5 ± 1.1		
				Aeronian	440.8 ± 1.2		
				Rhuddanian	443.8 ± 1.5		
	Silurian	Upper	Silurian	Hirnantian	445.2 ± 1.4		
				Katian	453.0 ± 0.7		
				Sandbian	458.4 ± 0.9		
				Darriwilian	467.3 ± 1.1		
				Dapingian	470.0 ± 1.4		
		Middle	Silurian	Silurian	Floian	477.7 ± 1.4	
					Tremadocian	485.4 ± 1.9	
					Stage 10	~ 489.5	
					Jiangshanian	~ 494	
					Paibian	~ 497	
Lower	Silurian	Silurian	Guzhangian	~ 500.5			
			Drumian	~ 504.5			
			Wuliuan	~ 509			
			Stage 4	~ 514			
			Stage 3	~ 521			
Ordovician	Ordovician	Ordovician	Stage 2	~ 529			
			Fortunian	541.0 ± 1.0			
			Stage 2	~ 521			
			Stage 3	~ 514			
			Stage 4	~ 509			
Paleozoic	Paleozoic	Paleozoic	Wuliuan	~ 504.5			
			Drumian	~ 509			
			Guzhangian	~ 497			
			Paibian	~ 494			
			Jiangshanian	~ 489.5			
Cambrian	Cambrian	Cambrian	Furongian	~ 489.5			
			Stage 10	~ 489.5			
			Stage 10	~ 489.5			
			Stage 10	~ 489.5			
			Stage 10	~ 489.5			
Paleozoic	Paleozoic	Paleozoic	Stage 10	~ 489.5			
			Stage 10	~ 489.5			
			Stage 10	~ 489.5			
			Stage 10	~ 489.5			
			Stage 10	~ 489.5			

Eonothem / Eon		Era / System / Period		Series / Epoch	Stage / Age	GSSP	numerical age (Ma)
Precambrian	Proterozoic	Neo-proterozoic	Neo-proterozoic	Ediacaran	541.0 ± 1.0		
				Cryogenian	~ 635		
				Tonian	~ 720		
				Stenian	1000		
				Ectasian	1200		
		Meso-proterozoic	Meso-proterozoic	Meso-proterozoic	Calymmian	1400	
					Statherian	1600	
					Orosirian	1800	
					Rhyacian	2050	
					Siderian	2300	
	Paleo-proterozoic	Paleo-proterozoic	Paleo-proterozoic	Neo-archean	2500		
				Meso-archean	2800		
				Paleo-archean	3200		
				Eo-archean	3600		
				Hadean	~ 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.ccgw.org)

Chart drafted by K.M. Cohen, D.A.T. Harper, P.L. Gibbard, N. Car (c) International Commission on Stratigraphy, July 2021

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/ICChart/ChronostratChart2021-07.pdf>



Programma del corso

INTRODUZIONE

Richiami di stratigrafia (Principi stratigrafici e Correlazioni)

BIOSTRATIGRAFIA

Fossile guida.

Biozona e metodi biostratigrafici.

Schemi di biozonazione e loro utilizzo

Principali gruppi di organismi utili in biostratigrafia nel Fanerozoico (Trilobiti, Graptoliti, Conodonti, Chitinozoi, Foraminiferi, Nannoplankton calcareo, Dinoflagellati, Spore e pollini).

CORRELAZIONI STRATIGRAFICHE

Correlazioni semplici tra sezioni stratigrafiche.

Il metodo delle **correlazioni grafiche**. Metodologia. Preparazione del dataset. Error box. Linea di correlazione. Costruzione della Composite Standard Section. Composite Standard Units.

Esempi ed *esercizi*

Programma del corso

PARTE PRATICA

Esercizio di datazione di campioni micropaleontologico

Una escursione ([Passo di Monte Croce Carnico – 22 ottobre](#))

METODI DIDATTICI

Lezioni frontali ed esercitazioni

Testi consigliati

Murphy M.A. & Salvador A., 1999. International Stratigraphic Guide - An abridged version. *Episodes*, 22: 255-272.

Gradstein F.M. (coord.), 2020. Evolution and biostratigraphy. *In*: Felix M. Gradstein F.M., Ogg J.G., Schmitz M.D. & Ogg G.M. (Eds) – The Geologic Timescale 2020, pp. 35-136.



ICS timescale
App per Android



Timescale Creator v8.0
www.timescalecreator.org

APPUNTI, DISPENSE (su alcuni argomenti), **PowerPoint** delle lezioni

Esame

Comprende due parti:

- Orale sugli argomenti trattati durante il corso
- Relazione sui campioni esaminati