

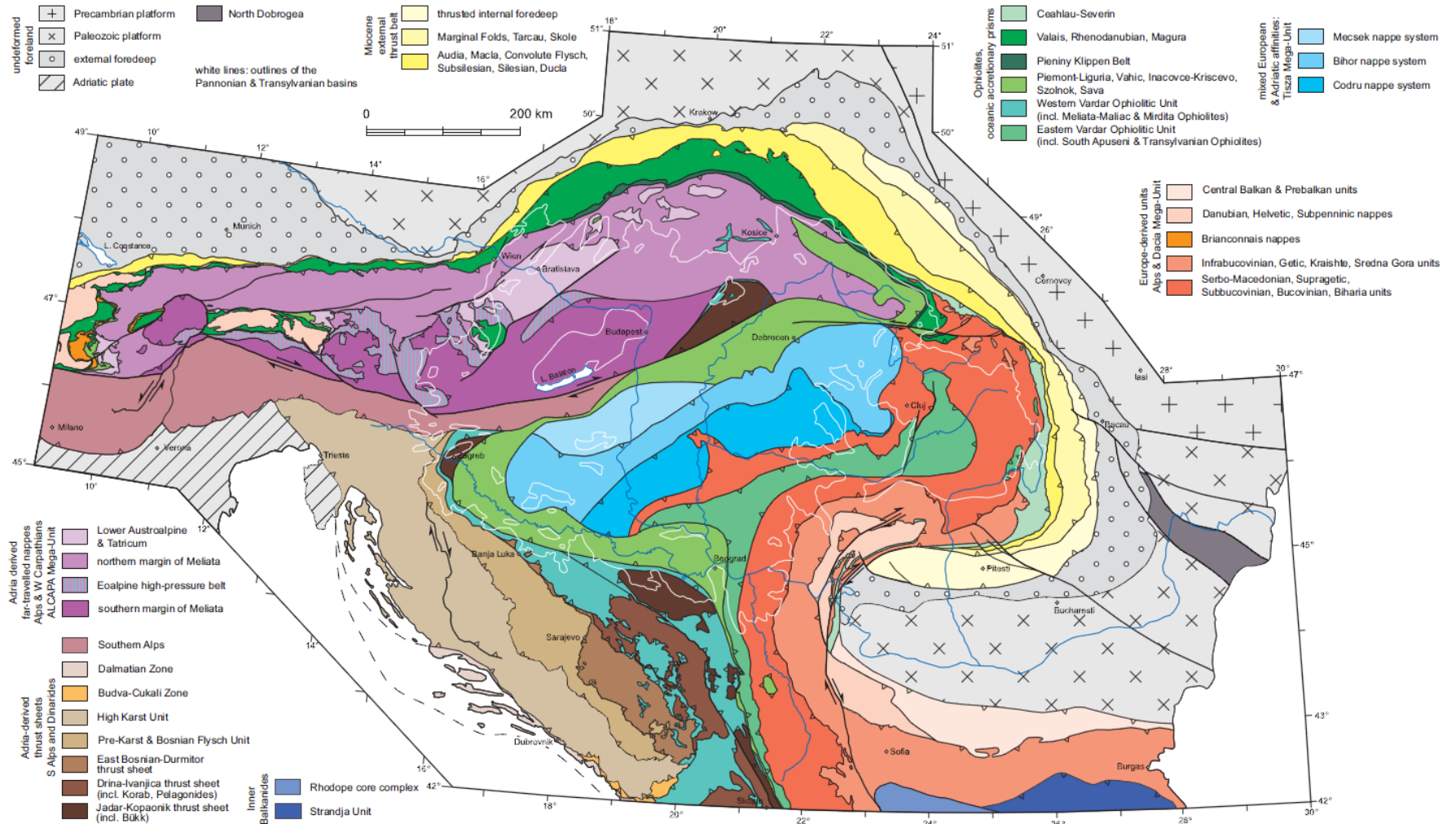


General stratigraphy of the bauxite deposits in the Dinarides

Igor Vlahović

MAJOR TECTONIC UNITS OF THE ALPS, CARPATHIANS AND DINARIDES

S.M. Schmid, D. Bernoulli, B. Fügenschuh, L. Matenco, S. Schefer, R. Schuster, M. Tischler and K. Ustaszewski



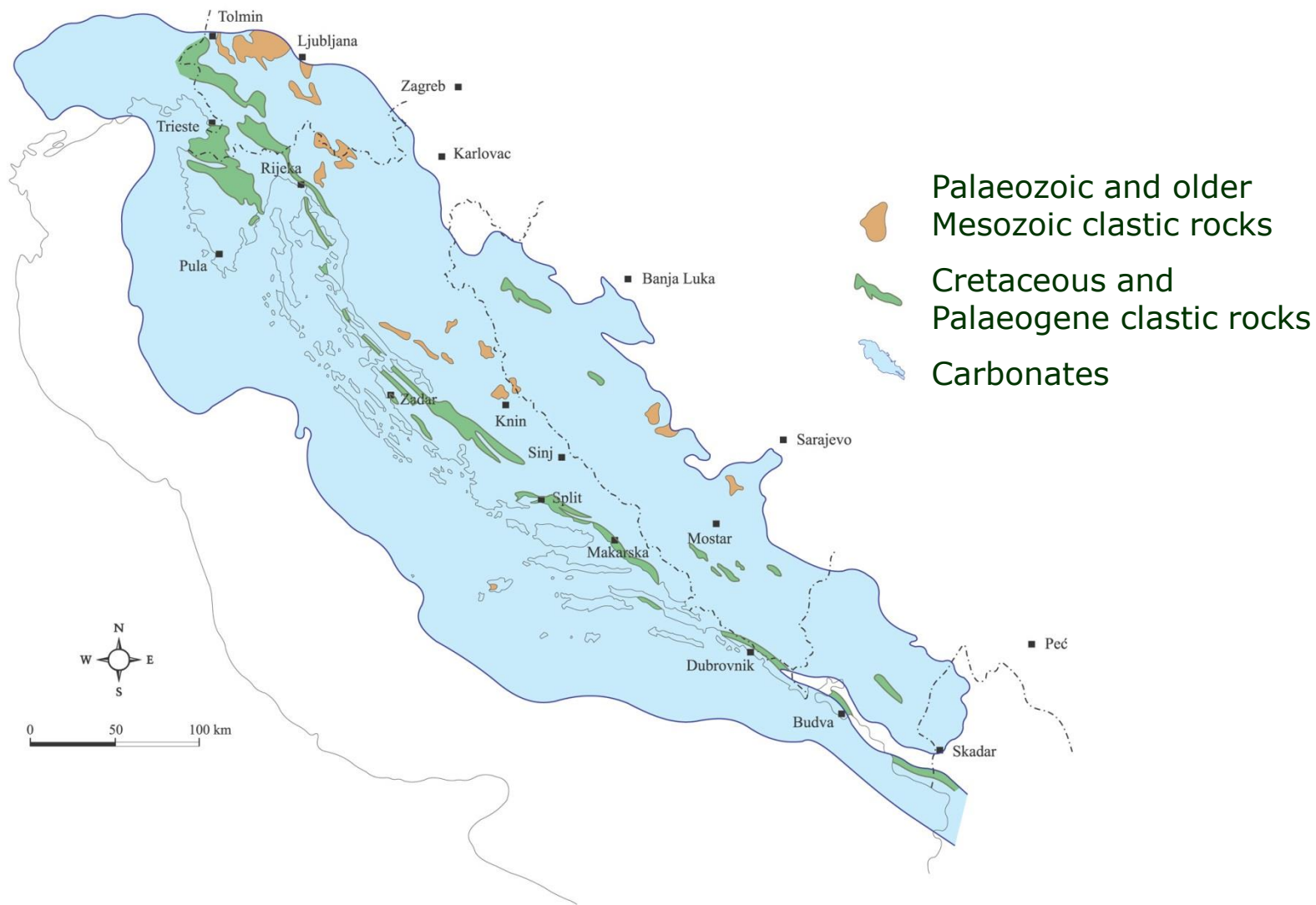
Schmid et al., 2008



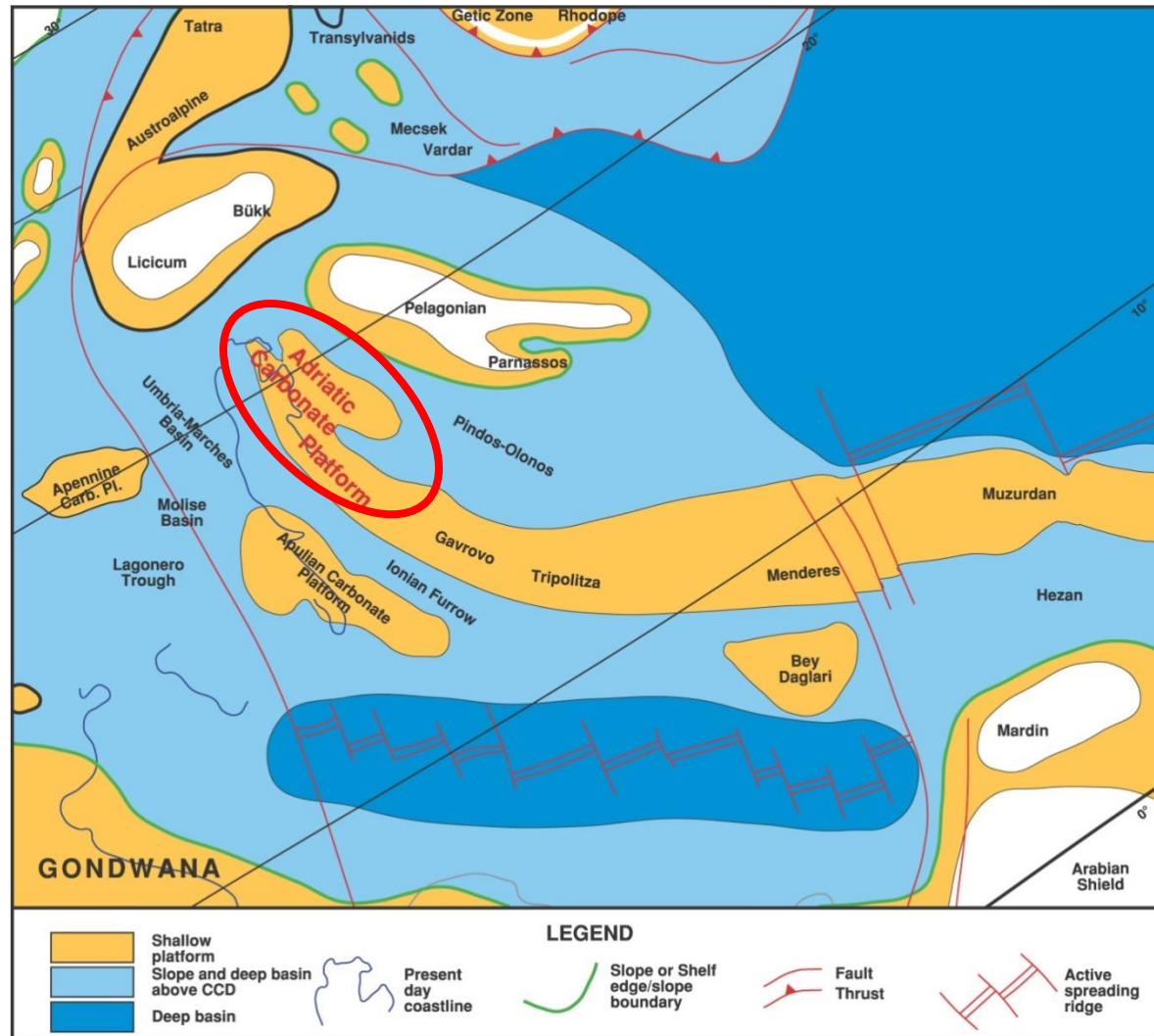


Adriatic Carbonate Platform (AdCP)



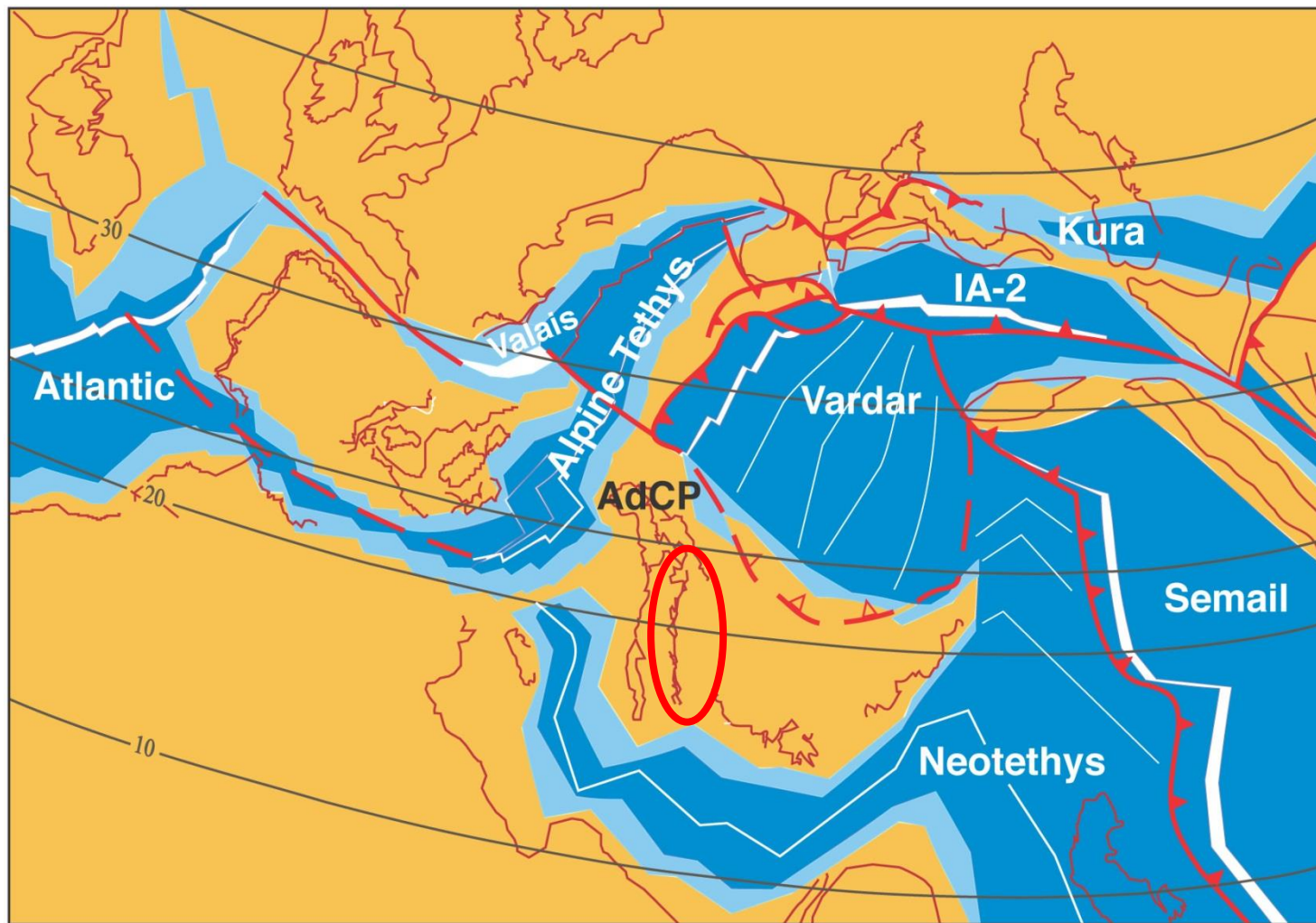


Aptian Paleogeography 1

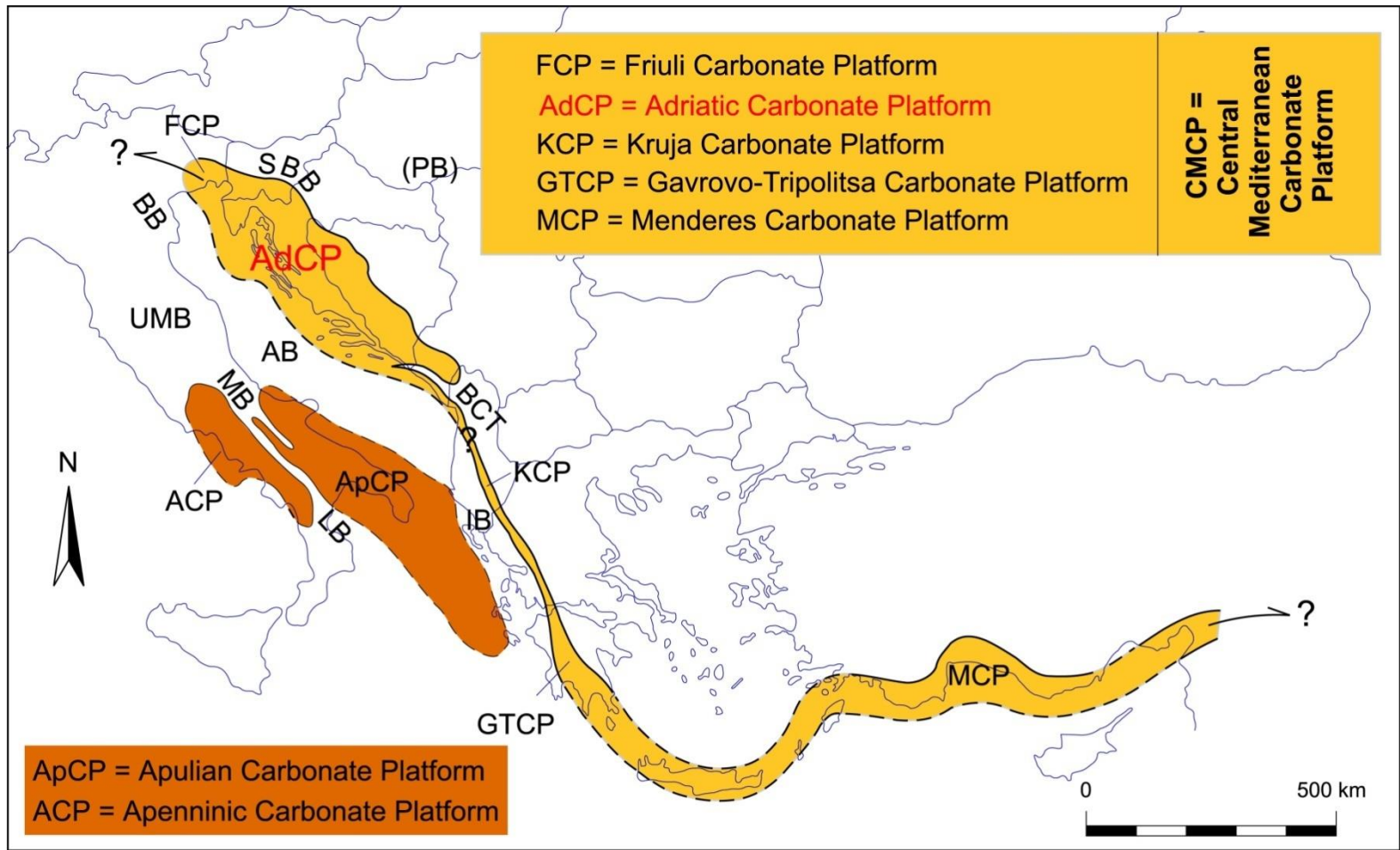


After Masse et al. (1993) in Dercourt et al. (1993)

Aptian Paleogeography 2



After Stampfli & Mosar (1999)



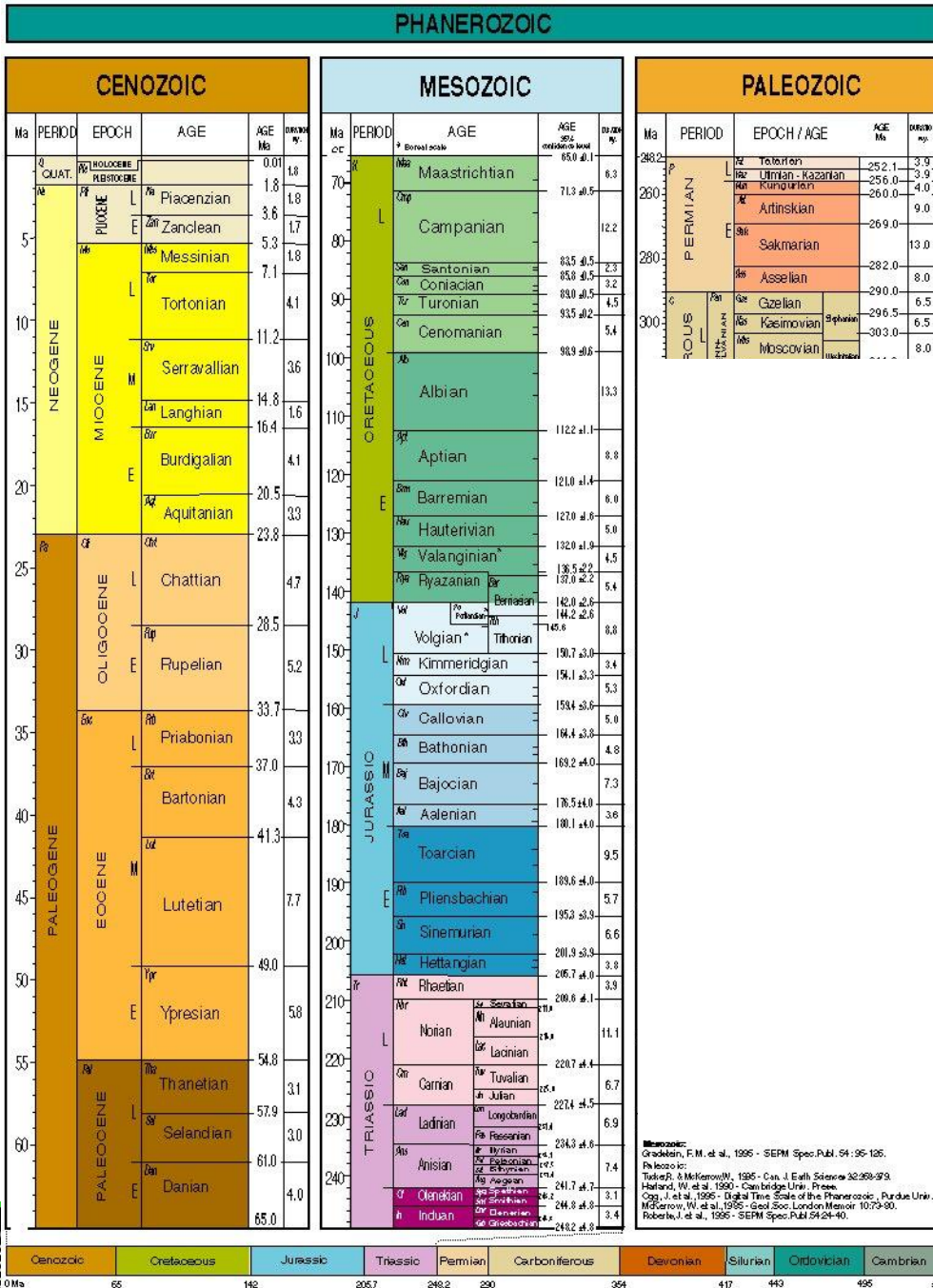
AB = Adriatic Basin
 BB = Belluno Basin
 IB = Ionian Basin

UMB = Umbria-Marche Basin
 MB = Molise Basin
 LB = Lagonegro Basin

SBB = Slovenian-Bosnian basin
 BCT = Budva-Cukali Trough
 PB = Pannonian Basin

Vlahović et al., 2005

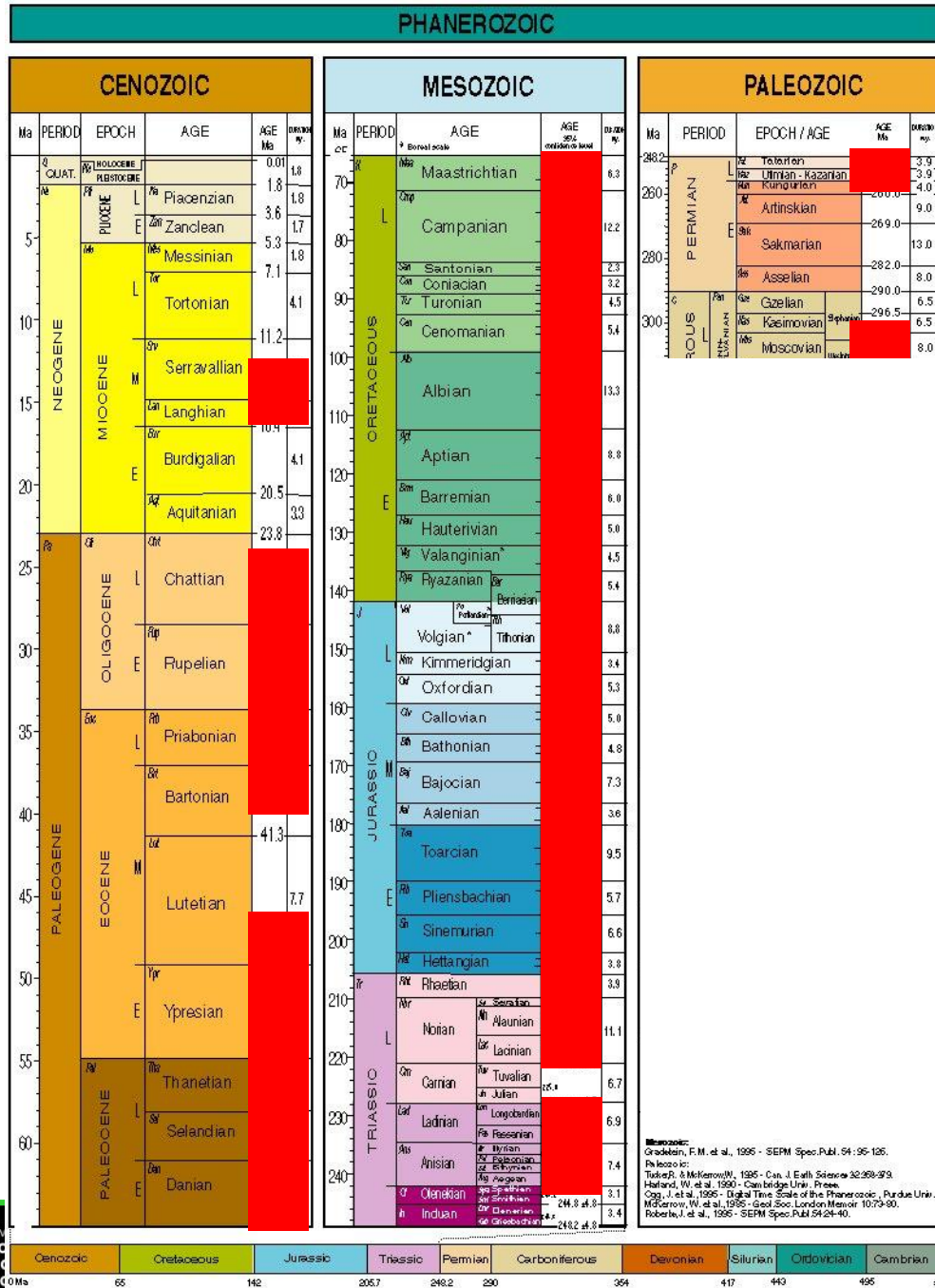




Stratigraphic range of outcrops in the External Dinarides

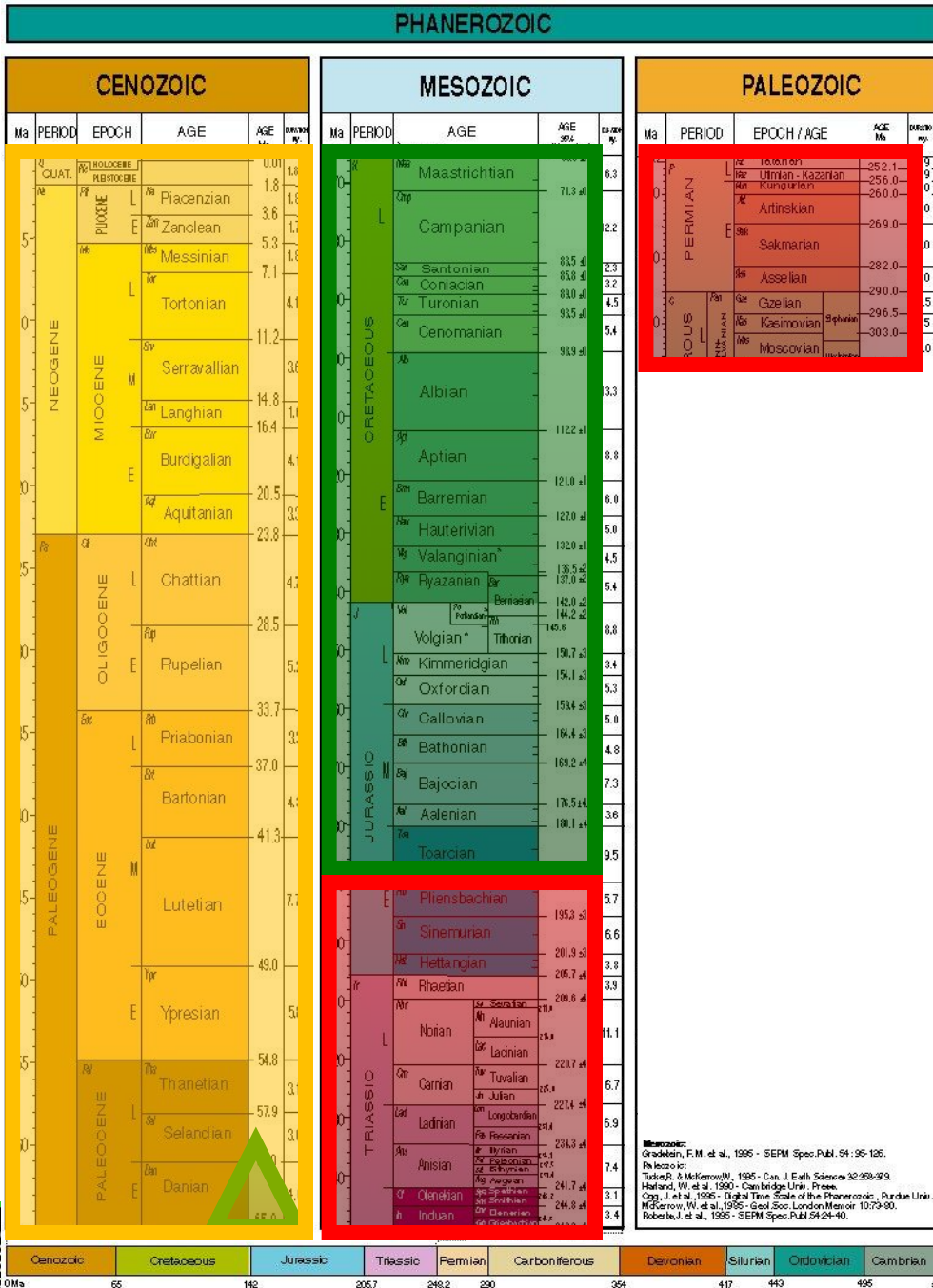
Mesozoic:
Gradstein, F.M. et al., 1995 - SEPM Spec. Publ. 54: 95-125.
Paleozoic:
Tucker & McKerrow, 1995 - Can. J. Earth Sciences 32: 939-973.
Holland, W. et al., 1995 - Cambridge Univ. Press.
Cogg, J. et al., 1995 - Digital Time Scale of the Phanerozoic, Purdue Univ.
McKerrow, W. et al., 1995 - Geol. Soc. London Memoir 1073-80.
Roberts, J. et al., 1995 - SEPM Spec. Publ. 54: 26-40.





Carbonate deposits
(predominantly
shallow-marine) in the
External Dinarides





Overlying Deposits



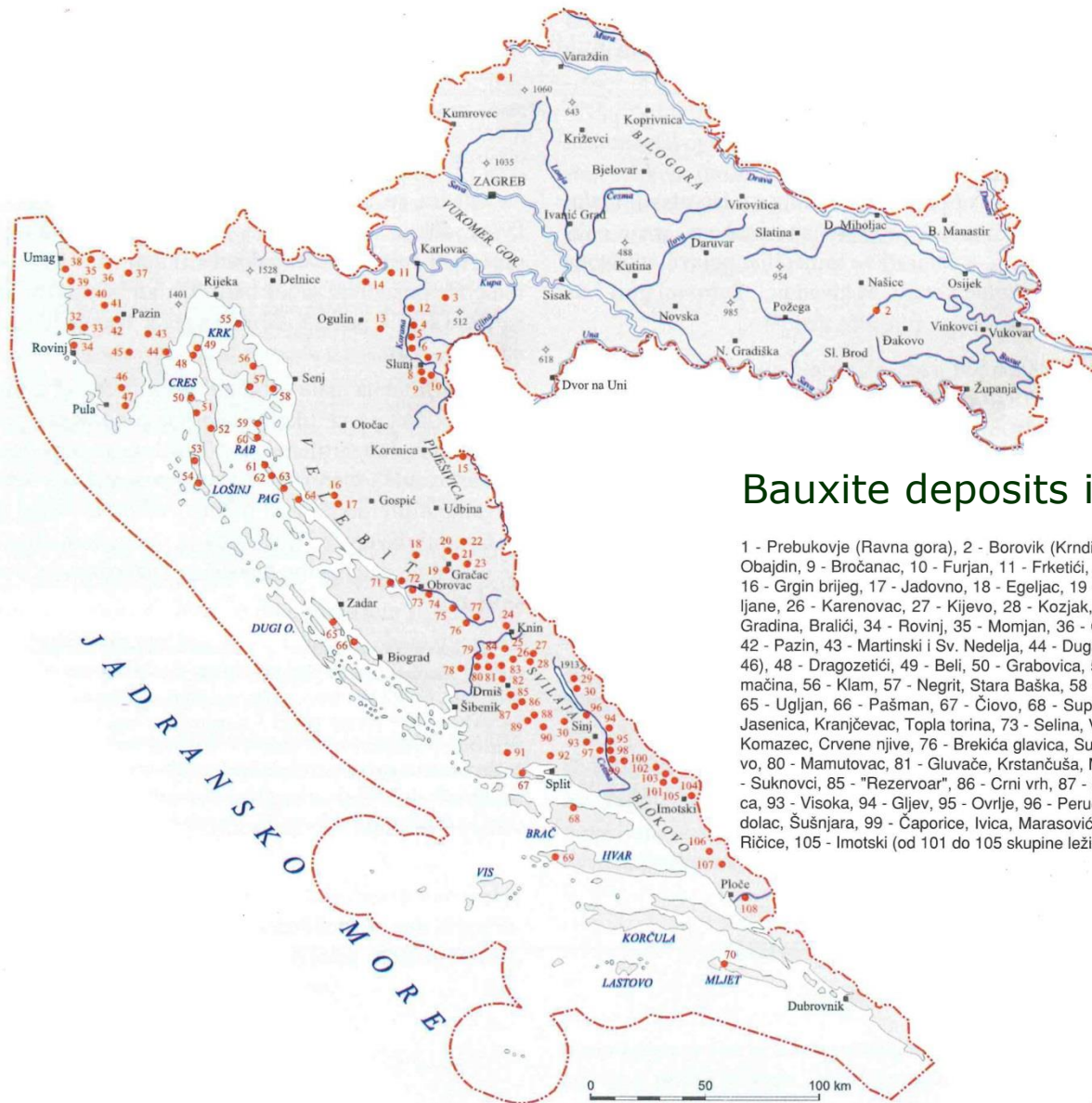
Adriatic Carbonate Platform



AdCP basement

Mesozoic: Gradstein, F.M. et al., 1995 - SEPM Spec. Publ. 54:95-125.
 Paleozoic: Tucker & McKerrow, 1995 - Can. J. Earth Sciences 32:939-973.
 Holland, W. et al., 1995 - Cambridge Univ. Press.
 Ogg, J. et al., 1995 - Digital Time Scale of the Phanerozoic, Purdue Univ.
 McKerrow, W. et al., 1995 - Geol. Soc. London Memoir 107:3-80.
 Roberts, J. et al., 1995 - SEPM Spec. Publ. 54:26-40.





Bauxite deposits in Croatia

1 - Prebukovje (Ravna gora), 2 - Borovik (Krnjija), 3 - Kokirevo, 4 - Veljun-most, 5 - Blagaj, 6 - Nikšić, 7 - Marindolsko brdo, 8 - Obajdin, 9 - Bročanac, 10 - Furjan, 11 - Frketići, 12 - Gazibare, Živkovići, 13 - Mejašići, Rebrovići, 14 - Bosiljevo, 15 - Veliki Skočaj, 16 - Grgin brijeg, 17 - Jadovno, 18 - Egeljac, 19 - Vrace, 20 - Rudopolje, 21 - Kijani, 22 - Mazin, 23 - Labusi, 24 - Martići, 25 - Ramljane, 26 - Karenovac, 27 - Kijevo, 28 - Kozjak, 29 - Crvene grede, Lupoglav, 30 - Debelo brdo, 31 - Ogorje, 32 - Funtana, 33 - Gradina, Bralići, 34 - Rovinj, 35 - Momjan, 36 - Grožnjan, 37 - Sovinjak, 38 - Petrovija, 39 - Brtonigla, 40 - Vižinada, 41 - Karolja, 42 - Pazin, 43 - Martinski i Sv. Nedelja, 44 - Duga luka, 45 - Barban, 46 - Glavica, 47 - Šišan (od 35-47 sve su skupine ležišta, osim 46), 48 - Dragozetići, 49 - Beli, 50 - Grabovica, 51 - Martinšćica, 52 - uvala Koromačna, 53 - rt i brdo Osor, 54 - Čunski, 55 - Gromačina, 56 - Klam, 57 - Negrit, Stara Baška, 58 - Baška, 59 - Sorine, 60 - Kampor, 61 - Lun, 62 - Trimalj, 63 - Novalja, 64 - Caska, 65 - Ugljan, 66 - Pašman, 67 - Čiovo, 68 - Supetar, 69 - Milna, 70 - Polača, 71 - Vinjerac, 72 - Rovanjka, Dračevac, Čukovac, Jasenica, Kranjčevac, Topla torina, 73 - Selina, V. Gradina, Stari gaj, Juričina, Kruševo, 74 - Crvena zemlja, Kljakovača, 75 - Balići, Komazec, Crvene njive, 76 - Brekića glavica, Subotići, Peslač, Obruč, Graonja, 77 - Kučajska glava, 78 - Laškovica, 79 - Kumano, 80 - Mamutovac, 81 - Gluvače, Krstančuša, Marići, Dujčići, Tošići, Jukići i dr., 82 - Kalun, 83 - Lukovača, Rajića doci, Galeba, 84 - Suknovci, 85 - "Rezervoar", 86 - Crni vrh, 87 - Sedramić, 88 - Kljaci, 89 - Kunci, Vinovo, 90 - Ramljane, 91 - Prapatnica, 92 - Blača, 93 - Visoka, 94 - Gljeve, 95 - Ovrle, 96 - Peruča-1 do Peruča-7, 97 - Košute, 98 - Jabuka, Kosmač, Grab, Krkine ograde, Šipića dolac, Šušnjara, 99 - Čaporice, Ivica, Marasovići, Crveni klanac, 100 - Jagodnik, 101 - Mrnjavci, 102 - Svib, 103 - Studenci, 104 - Ričice, 105 - Imotski (od 101 do 105 skupine ležišta), 106 - Zekulići, Majići, 107 - Plana, Lučka, 108 - Glušci, Kolojan.

Marković, 2002





Institut za geološka istraživanja
Zavod za geologiju

STJEPAN MARKOVIĆ

HRVATSKE MINERALNE SIROVINE



Zagreb - MMII

Marković, 2002

PODINA	KROVINA	ORUDNJEJJE	LOKALITET	STAROST	NAPOMENA
malm	—	boksitične gline, glinoviti boksiti (?)	Bosanci, Bosiljevo	pleistocen	
baden	plioc. - pleist.	boksitične gline	Borovik (Krndija)	pliocen - pleistocen	
eocen - oligocen senon cenoman - turon malm apt	sr. miocen	glinoviti boksiti	- Krške ograde, Grab (dio) (Trilj) - Košute, Čaporica, Ivica, Crveni klanac (sve Trilj) - Peruča - Grab (dio) (Trilj) - Meašići, Rebrovići (Tounj)	neogen	X. horizont
d. i sr. eocen turon - senon	eocen - oligoc.	glinoviti boksiti	- Košute (SZ od Trilja) - Kosmač (JI od Trilja)	?	krovina: breče neutvrđene starosti
g. eocen - d. oligocen	d. oligocen g. eocen	boksit	Dujići (SZ od Drniša)	g. eocen, d. oligocen	"intraprominski" bx, pretaloženo
sr. eocen d. i sr. eocen paleocen, d. eocen turon - senon cenoman - turon			- Suknovci (Okalj) Obrovac, Ervenik, Promina (u najširem smislu), Moseč, Sinj	g. eocen	krovina: Promina naslage IX. horizont
sr. eocen, g. eocen	g. eocen sr. eocen	boksit, boksitični vapnenac	Mamutovo brdo (Studenci)	sr. eocen, g. eocen	"intraprominski" bx, pretaloženo
d. i sr. eocen paleocen, d. eocen senon		boksit	Studenci - Imotski	sr. eocen	krovina: Promina naslage
cenoman - turon d. i sr. eocen	sr. eocen	glinoviti boksiti	- Kučajska glava (Ervenik) Lukovača (Promina pl.) - Promina pl. (tragovi)	sr. eocen	VIII. horizont krovina: Jelar naslage
senon turon - senon cenoman - turon	d. eocen, paleocen	boksit	Istra, Bukovica, Promina - Drniš, Sinj, Studenci - Imotski, Cres, Lošinj, Krk, Rab, Pag i dr.	g. kreda / paleogen	VII. horizont krovina: Kozina naslage i foraminiferski vapnenici
cenoman - turon	senon	boksit	- Gazibare, Živkovići (Krnjak) - Kučevica, Frketići (Z od Duge Rese)	senon	VI. horizont
alb	cenoman - turon	glinoviti boksiti	Debelo brdo (Dinara) Ogorje, Zelovo (Svilaja)	d. kreda / g. kreda	
apt barem	alb	tragovi boksitičnih tvorevina, gline	Baderna, Bale i dr. (Istra), otoci	barem / alb	V. horizont
malm	neokom	glinoviti boksiti	Kijevo, Kozjak (Svilaja), Lupoglav (Dinara), Mljet	malm / neokom	IV. horizont
kimeridž	titon	glinoviti boksiti, boksitične gline, gline	Funtana, Gradine, Bralići, Kloštar, Rovinj (sve Istra)	malm	III. horizont
anizik	sr. eocen	boksit	Prebukovje (Ravna gora)	?	
ladinik anizik	lijas	- boksitične gline i dr. glinovite stijene - boksitične stijene	- Martići (ili Marići - Knin), Sutina (JI Svilaja) - Jabuka (Trilj)	sr. trijas / lijas	
anizik	—	boksit, glinoviti boksiti, boksitične gline	Kokirevo, Veljun, Obajdin (Slunj)	trijas (?)	II. horizont
ladinik anizik	karnik	boksit, glinoviti boksiti, boksitične gline	- Bročanac (Slunj), Grgin brijeg, Vrace, ... (Lika) - Veliki Skočaj (Pišešćica)	sr. trijas / g. trijas	
anizik	ladinik	tragovi boksitičnih tvorevina	okolica Gračaca	anizik / ladinik	I. horizont
d. trijas	anizik	boksitično-željezovite breče	Sutina (JI Svilaja)	d. trijas / anizik	neistraženo, normalno je kontinuitet

10 Stratigraphic horizons:

X – L. Jurassic–E, OI / M₂

IX – L. Cretaceous–Pc–E_{1,2} / E_{2,3}–OI₁

VIII – L. Cretaceous–E_{1,2} / E₂

VII – L. Cretaceous / Pc, E₁

VI – L. Cretaceous

V – E. Cretaceous

IV – L. Jurassic / E. Cretaceous

III – L. Jurassic

II – M. / L. Triassic

I – M. Triassic

Marković, 2002

PODINA	KROVINA	ORUDNJEJJE	LOKALITET	STAROST	NAPOMENA
malm	—	boksitične gline, glinoviti boksiti (?)	Bosanci, Bosiljevo	pleistocen	
baden	plioc. - pleist.	boksitične gline	Borovik (Krndija)	pliocen - pleistocen	
eocen - oligocen senon cenoman - turon malm apt	sr. miocen	glinoviti boksiti	- Krčke ograde, Grab (dio) (Trilj) - Košute, Čaporica, Ivica, Crveni klanac (sve Trilj) - Peruća - Grab (dio) (Trilj) - Meašići, Rebrovići (Tounj)	neogen	X. horizont
d. i sr. eocen turon - senon	eocen - oligoc.	glinoviti boksiti	- Košute (SZ od Trilja) - Kosmač (JI od Trilja)	?	krovina: breče neutvrđene starosti
g. eocen - d. oligocen	d. oligocen g. eocen	boksit	Dujići (SZ od Drniša)	g. eocen, d. oligocen	"intraprominski" bx, pretaloženo
sr. eocen d. i sr. eocen paleocen, d. eocen turon - senon cenoman - turon			- Suknovci (Okalj) Obrovac, Ervenik, Promina (u najširem smislu), Moseč, Sinj	g. eocen	krovina: Promina naslage
sr. eocen, g. eocen	g. eocen sr. eocen	boksit, boksitični vapnenac	Mamutovo brdo (Studenci)	sr. eocen, g. eocen	"intraprominski" bx, pretaloženo
d. i sr. eocen paleocen, d. eocen senon		boksit	Studenci - Imotski	sr. eocen	krovina: Promina naslage
cenoman - turon d. i sr. eocen	sr. eocen	glinoviti boksiti	- Kučajska glava (Ervenik) Lukovača (Promina pl.) - Promina pl. (tragovi)	sr. eocen	VIII. horizont krovina: Jelar naslage
senon turon - senon cenoman - turon	d. eocen, paleocen	boksit	Istra, Bukovica, Promina - Drniš, Sinj, Studenci - Imotski, Cres, Lošinj, Krk, Rab, Pag i dr.	g. kreda / paleogen	VII. horizont krovina: Kozina naslage i foraminiferski vapnenici
cenoman - turon	senon	boksit	- Gazibare, Živkovići (Krnjak) - Kučevica, Frketiči (Z od Duge Rese)	senon	VI. horizont
alb	cenoman - turon	glinoviti boksiti	Debelo brdo (Dinara) Ogorje, Zelovo (Svilaja)	d. kreda / g. kreda	
apt barem	alb	tragovi boksitičnih tvorevina, gline	Baderna, Bale i dr. (Istra), otoci	barem / alb	V. horizont
malm	neokom	glinoviti boksiti	Kijevo, Kozjak (Svilaja), Lupoglav (Dinara), Mljet	malm / neokom	IV. horizont
kimeridž	titon	glinoviti boksiti, boksitične gline, gline	Funtana, Gradine, Bralići, Kloštar, Rovinj (sve Istra)	malm	III. horizont
anizik	sr. eocen	boksit	Prebukovje (Ravna gora)	?	
ladinik anizik	lijas	- boksitične gline i dr. glinovite stijene - boksitične stijene	- Martići (ili Marići - Knin), Sutina (JI Svilaja) - Jabuka (Trilj)	sr. trijas / lijas	
anizik	—	boksit, glinoviti boksiti, boksitične gline	Kokirevo, Veljun, Obajdin (Slunj)	trijas (?)	II. horizont
ladinik anizik	karnik	boksit, glinoviti boksiti, boksitične gline	- Bročanac (Slunj), Grgin brijeg, Vrace, ... (Lika) - Veliki Skočaj (Piješivica)	sr. trijas / g. trijas	
anizik	ladinik	tragovi boksitičnih tvorevina	okolica Gračaca	anizik / ladinik	I. horizont
d. trijas	anizik	boksitično-željezovite breče	Sutina (JI Svilaja)	d. trijas / anizik	neistraženo, normalno je kontinuitet

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VIII – L. Cretaceous–E_{1,2} / E₂

VII – L. Cretaceous / Pc, E₁

VI – L. Cretaceous

V – E. Cretaceous

IV – L. Jurassic / E. Cretaceous

III – L. Jurassic

II – M. / L. Triassic

I – M. Triassic

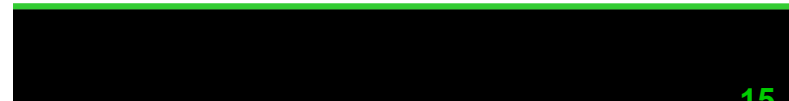
Marković, 2002

Eonothem / Eon		Erathem / Era		System / Period		Series / Epoch	Stage / Age	GSSP	numerical age (Ma)		
Phanerozoic	Cenozoic	Quaternary	Holocene	U/L	Meghalayan			present			
				M	Northgrippian			0.0042			
				L/E	Greenlandian			0.0082			
					Upper			0.0117			
		Pleistocene	Middle					0.126			
								0.781			
								1.80			
			Calabrian						2.58		
									2.58		
									2.58		
		Pliocene	Piacenzian					3.600			
			Zanclean					5.333			
		Neogene	Miocene	Messinian				7.246			
				Tortonian				11.63			
	Serravallian						13.82				
	Langhian						15.97				
	Burdigalian						20.44				
	Aquitanian						23.03				
	Oligocene			Chattian					27.82		
				Rupelian					33.9		
				Eocene	Priabonian					37.8	
					Bartonian					41.2	
	Lutetian						47.8				
	Paleocene	Ypresian					56.0				
		Thanetian					59.2				
		Selandian					61.6				
		Danian					66.0				
		Mesozoic	Cretaceous	Upper	Maastrichtian				72.1 ± 0.2		
	Campanian							83.6 ± 0.2			
Santonian							86.3 ± 0.5				
Coniacian							89.8 ± 0.3				
Turonian							93.9				
Cenomanian								100.5			
	Albian							~ 113.0			
	Aptian							~ 125.0			
	Barremian							~ 129.4			
	Hauterivian							~ 132.9			
Lower	Valanginian							~ 139.8			
	Berriasian							~ 145.0			

Eonothem / Eon		Erathem / Era		System / Period		Series / Epoch	Stage / Age	GSSP	numerical age (Ma)	
Phanerozoic	Mesozoic	Jurassic	Upper	Tithonian				152.1 ± 0.9		
				Kimmeridgian				157.3 ± 1.0		
				Oxfordian				163.5 ± 1.0		
			Middle	Callovian					166.1 ± 1.2	
				Bathonian					168.3 ± 1.3	
				Bajocian					170.3 ± 1.4	
				Aalenian					174.1 ± 1.0	
			Lower	Toarcian					182.7 ± 0.7	
				Pliensbachian					190.8 ± 1.0	
				Sinemurian					199.3 ± 0.3	
		Hettangian					201.3 ± 0.2			
		Triassic	Upper	Rhaetian				~ 208.5		
				Norian				~ 227		
				Carnian				~ 237		
			Middle	Ladinian					247.2	
	Anisian							251.2		
	Olenekian							251.902 ± 0.024		
	Lower		Induan					254.14 ± 0.07		
			Changhsingian					259.1 ± 0.5		
			Wuchiapingian					265.1 ± 0.4		
			Capitanian					268.8 ± 0.5		
	Paleozoic	Permian	Lopingian				272.95 ± 0.11			
			Guadalupian				283.5 ± 0.6			
			Wordian				290.1 ± 0.26			
			Roadian				293.52 ± 0.17			
			Kungurian				298.9 ± 0.15			
		Cisuralian	Sakmarian					303.7 ± 0.1		
			Asselian					307.0 ± 0.1		
			Gzhelian					315.2 ± 0.2		
			Kasimovian					323.2 ± 0.4		
Moscovian							330.9 ± 0.2			
Carboniferous	Pennsylvanian	Upper				346.7 ± 0.4				
		Middle				358.9 ± 0.4				
		Lower								
	Mississippian	Upper					303.7 ± 0.1			
		Middle					307.0 ± 0.1			
Lower					315.2 ± 0.2					

I – M. Triassic

Anisian / Ladinian



I – M. Triassic



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ZAVOD ZA GEOLOGIJU
ZAGREB, SACHSOVA 2

Gračac Area



Eonothem / Eon		Eratthem / Era		System / Period		Series / Epoch	Stage / Age	GSSP	numerical age (Ma)
Phanerozoic	Cenozoic	Quaternary	Holocene	U/L	Meghalayan	present		0.0042	
				M	Northgripian	0.0082			
				L/E	Greenlandian	0.0117			
			Pleistocene	Upper			0.126		
				Middle			0.781		
				Calabrian			1.80		
		Neogene	Pliocene		Piacenzian			3.600	
					Zanclean			5.333	
			Miocene		Messinian			7.246	
					Tortonian			11.63	
					Serravallian			13.82	
					Langhian			15.97	
	Paleogene	Oligocene		Burdigalian			20.44		
				Aquitanian			23.03		
				Chattian			27.82		
				Rupelian			33.9		
			Eocene		Priabonian			37.8	
					Bartonian			41.2	
				Lutetian			47.8		
		Paleocene		Ypresian			56.0		
				Thanetian			59.2		
				Selandian			61.6		
				Danian			66.0		
			Mesozoic	Cretaceous	Upper		Maastrichtian		
						Campanian			83.6 ± 0.2
		Santonian						86.3 ± 0.5	
		Coniacian						89.8 ± 0.3	
		Turonian						93.9	
Lower		Cenomanian					100.5		
		Albian					~ 113.0		
		Aptian					~ 125.0		
		Barremian					~ 129.4		
		Hauterivian					~ 132.9		
	Valanginian			~ 139.8					
	Berriasian			~ 145.0					

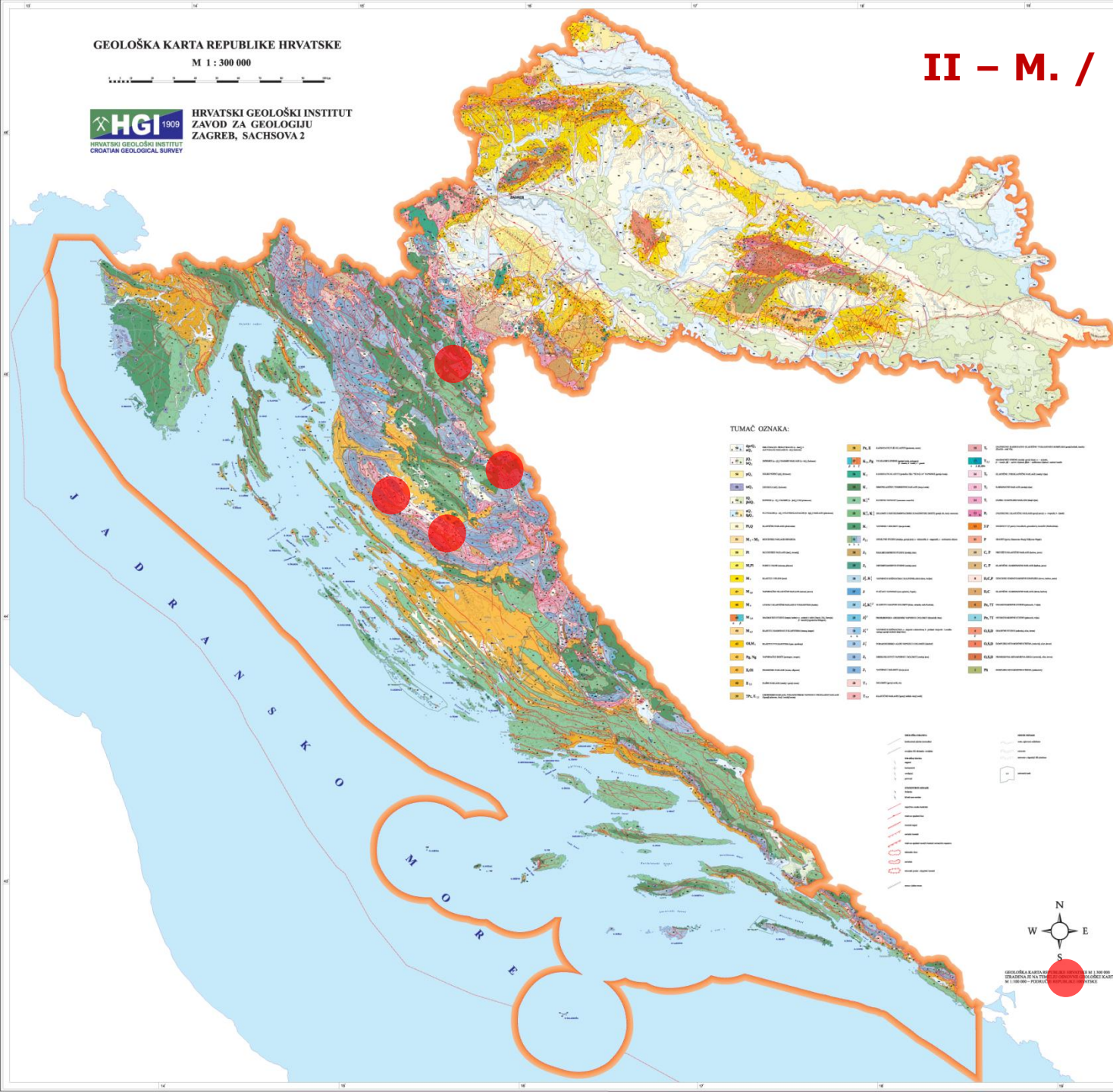
Eonothem / Eon		Eratthem / Era		System / Period		Series / Epoch	Stage / Age	GSSP	numerical age (Ma)
Phanerozoic	Mesozoic	Jurassic	Upper		Tithonian			152.1 ± 0.9	
					Kimmeridgian			157.3 ± 1.0	
					Oxfordian			163.5 ± 1.0	
			Middle		Callovian			166.1 ± 1.2	
					Bathonian			168.3 ± 1.3	
					Bajocian			170.3 ± 1.4	
			Lower		Aalenian			174.1 ± 1.0	
					Toarcian			182.7 ± 0.7	
					Pliensbachian			190.8 ± 1.0	
		Triassic	Upper		Sinemurian			199.3 ± 0.3	
					Hettangian			201.3 ± 0.2	
					Rhaetian			~ 208.5	
			Middle		Norian				
					Carnian				
					Ladinian			242	
			Lower		Anisian			247.2	
					Olenekian			251.2	
					Induan			251.902 ± 0.024	
	Paleozoic	Permian		Changhsingian			254.14 ± 0.07		
				Lopingian			259.1 ± 0.5		
			Guadalupian		Wuchiapingian			259.1 ± 0.5	
					Capitanian			265.1 ± 0.4	
					Wordian			268.8 ± 0.5	
			Carboniferous	Pennsylvanian		Roadian			272.95 ± 0.11
					Kungurian			283.5 ± 0.6	
					Artinskian			290.1 ± 0.26	
		Mississippian			Sakmarian			293.52 ± 0.17	
					Asselian			298.9 ± 0.15	
					Cisuralian				

II – M. / L. Triassic

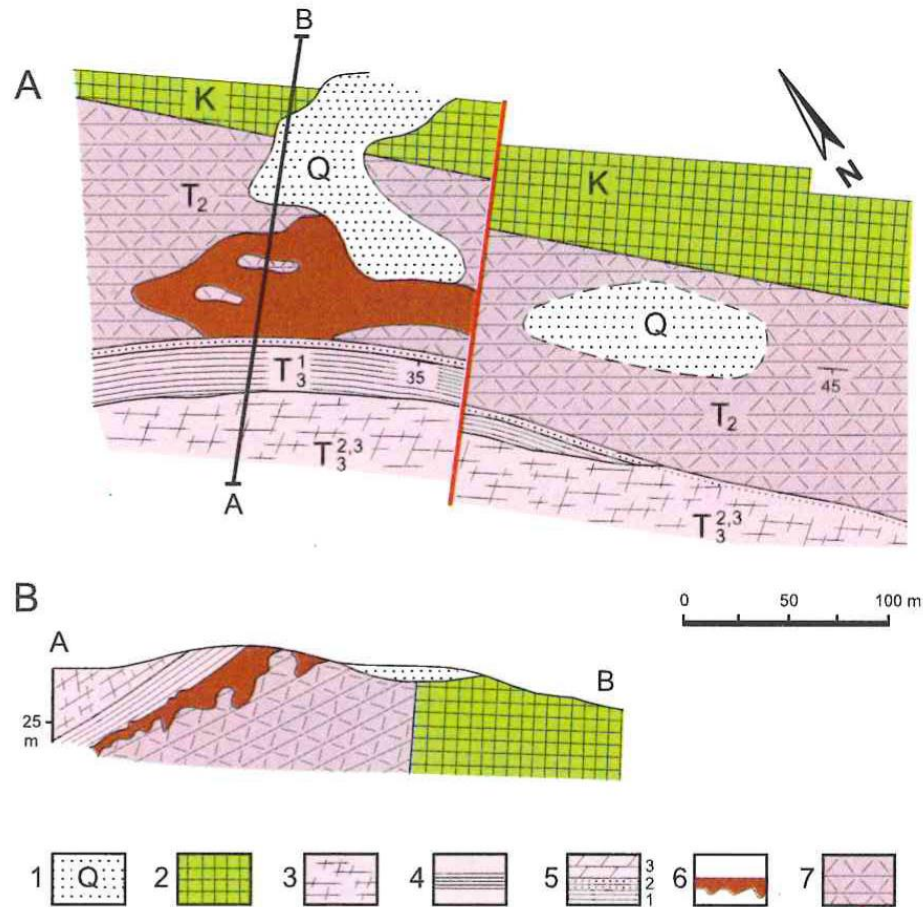
Anisian–Ladinian / Norian

II – M. / L. Triassic

Slunj
Lika
Velebit
Plješevica
Montenegro

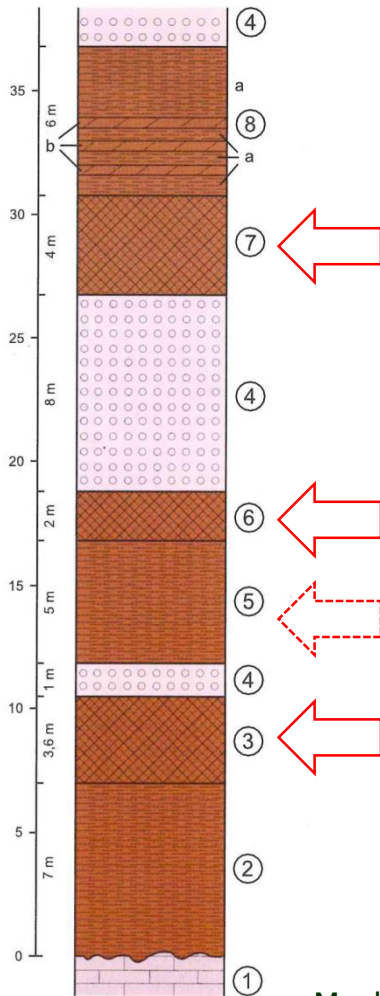


Bročanac deposit near Slunj

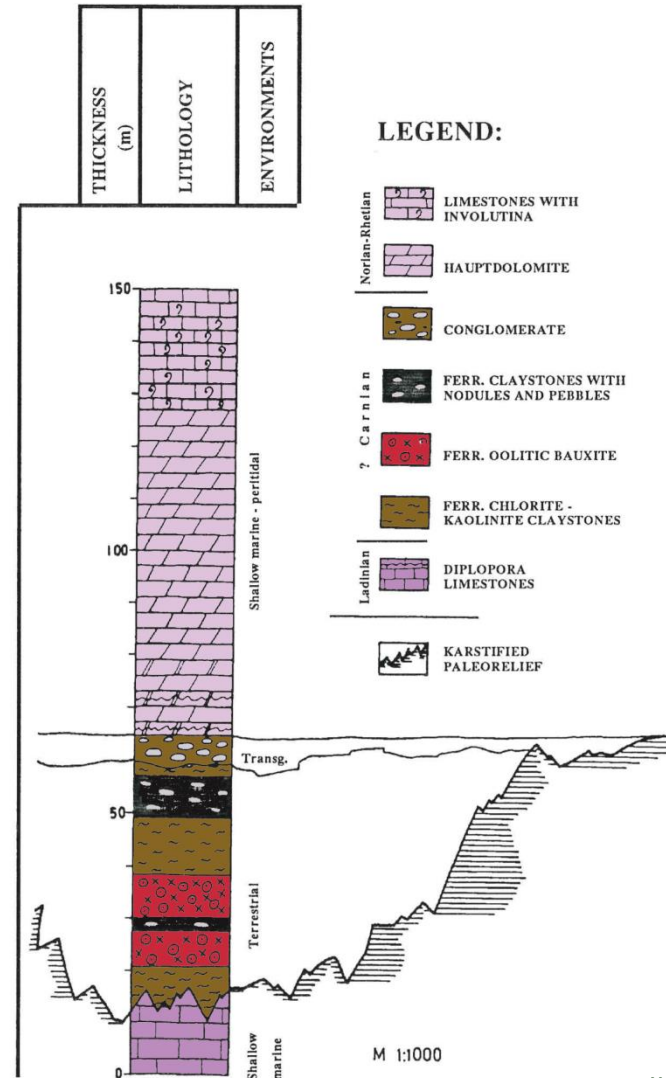


Marković, 2002

Vrace deposit near Gračac



Marković, 2002



Tišljar et al., 1991

Eonothem / Eon		Eratthem / Era		System / Period		Series / Epoch	Stage / Age	GSSP	numerical age (Ma)
Phanerozoic	Cenozoic	Quaternary	Holocene	U/L	Meghalayan	present	present	present	0.0042
				M	Northgripian	0.0082	0.0082		
				L/E	Greenlandian	0.0117	0.0117		
			Pleistocene	Upper		0.126	0.126		
				Middle		0.781	0.781		
				Calabrian		1.80	1.80		
		Pliocene	Gelasian		2.58	2.58			
			Piacenzian		3.600	3.600			
		Neogene	Miocene	Zanclean		5.333	5.333		
				Messinian		7.246	7.246		
			Tortonian		11.63	11.63			
			Serravallian		13.82	13.82			
			Langhian		15.97	15.97			
			Burdigalian		20.44	20.44			
	Aquitanian			23.03	23.03				
	Oligocene		Chattian		27.82	27.82			
			Rupelian		33.9	33.9			
	Eocene		Priabonian		37.8	37.8			
		Bartonian		41.2	41.2				
		Lutetian		47.8	47.8				
		Ypresian		56.0	56.0				
	Paleocene	Thanetian		59.2	59.2				
		Selandian		61.6	61.6				
		Danian		66.0	66.0				
	Mesozoic	Cretaceous	Upper	Maastrichtian		72.1 ± 0.2	72.1 ± 0.2		
				Campanian		83.6 ± 0.2	83.6 ± 0.2		
				Santonian		86.3 ± 0.5	86.3 ± 0.5		
				Coniacian		89.8 ± 0.3	89.8 ± 0.3		
Turonian					93.9	93.9			
Cenomanian					100.5	100.5			
Albian					~ 113.0	~ 113.0			
Lower		Aptian		~ 125.0	~ 125.0				
		Barremian		~ 129.4	~ 129.4				
		Hauterivian		~ 132.9	~ 132.9				
		Valanginian		~ 139.8	~ 139.8				
		Berriasian		~ 145.0	~ 145.0				

Eonothem / Eon		Eratthem / Era		System / Period		Series / Epoch	Stage / Age	GSSP	numerical age (Ma)
Phanerozoic	Mesozoic	Jurassic	Upper	Tithonian		~ 145.0	~ 145.0		
				Kimmeridgian		~ 173.3 ± 1.0	~ 173.3 ± 1.0		
				Oxfordian		163.5 ± 1.0	163.5 ± 1.0		
			Middle	Callovian		166.1 ± 1.2	166.1 ± 1.2		
				Bathonian		168.3 ± 1.3	168.3 ± 1.3		
				Bajocian		170.3 ± 1.4	170.3 ± 1.4		
				Aalenian		174.1 ± 1.0	174.1 ± 1.0		
		Toarcian		182.7 ± 0.7	182.7 ± 0.7				
		Lower	Pliensbachian		190.8 ± 1.0	190.8 ± 1.0			
			Sinemurian		199.3 ± 0.3	199.3 ± 0.3			
			Hettangian		201.3 ± 0.2	201.3 ± 0.2			
		Triassic	Upper	Rhaetian		~ 208.5	~ 208.5		
				Norian		~ 227	~ 227		
			Middle	Carnian		~ 237	~ 237		
	Ladinian				~ 242	~ 242			
	Lower		Anisian		247.2	247.2			
			Olenekian		251.2	251.2			
			Induan		251.902 ± 0.024	251.902 ± 0.024			
	Paleozoic	Permian	Lopingian		254.14 ± 0.07	254.14 ± 0.07			
			Changhsingian		259.1 ± 0.5	259.1 ± 0.5			
			Wuchiapingian		265.1 ± 0.4	265.1 ± 0.4			
		Carboniferous	Guadalupian	Wordian		268.8 ± 0.5	268.8 ± 0.5		
				Roadian		272.95 ± 0.11	272.95 ± 0.11		
			Cisuralian	Kungurian		283.5 ± 0.6	283.5 ± 0.6		
				Artinskian		290.1 ± 0.26	290.1 ± 0.26		
	Pennsylvanian	Upper	Sakmarian		293.52 ± 0.17	293.52 ± 0.17			
			Asselian		298.9 ± 0.15	298.9 ± 0.15			
		Lower	Gzhelian		303.7 ± 0.1	303.7 ± 0.1			
Kasimovian				307.0 ± 0.1	307.0 ± 0.1				
Moscovian				315.2 ± 0.2	315.2 ± 0.2				
Mississippian	Upper	Bashkirian		323.2 ± 0.4	323.2 ± 0.4				
		Serpukhovian		330.9 ± 0.2	330.9 ± 0.2				
	Lower	Visean		346.7 ± 0.4	346.7 ± 0.4				
Tournaisian			358.9 ± 0.4	358.9 ± 0.4					

III – L. Jurassic

E. Kimmeridgian / L. Tithonian

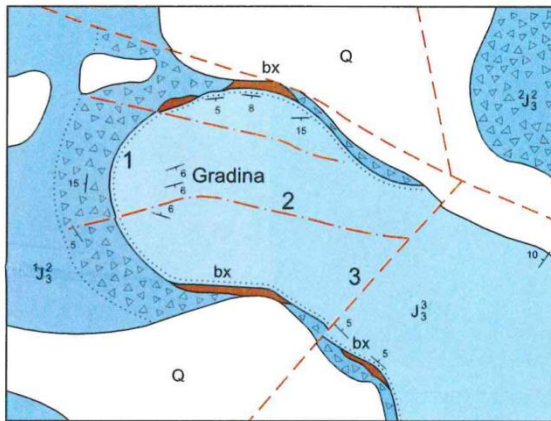
III – L. Jurassic

*Funtana
Gradine
Rovinj*

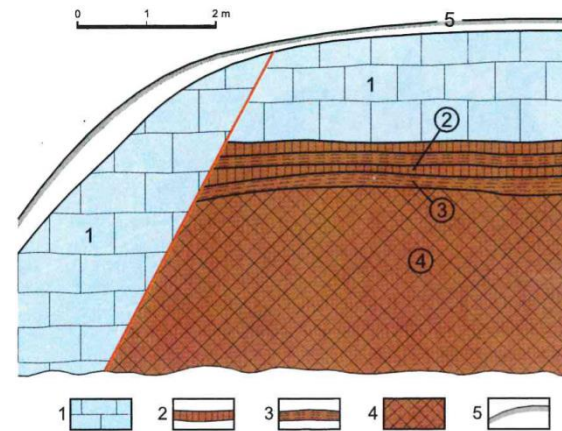
Montenegro



Gradina deposit near Vrsar



Rovinj I deposit



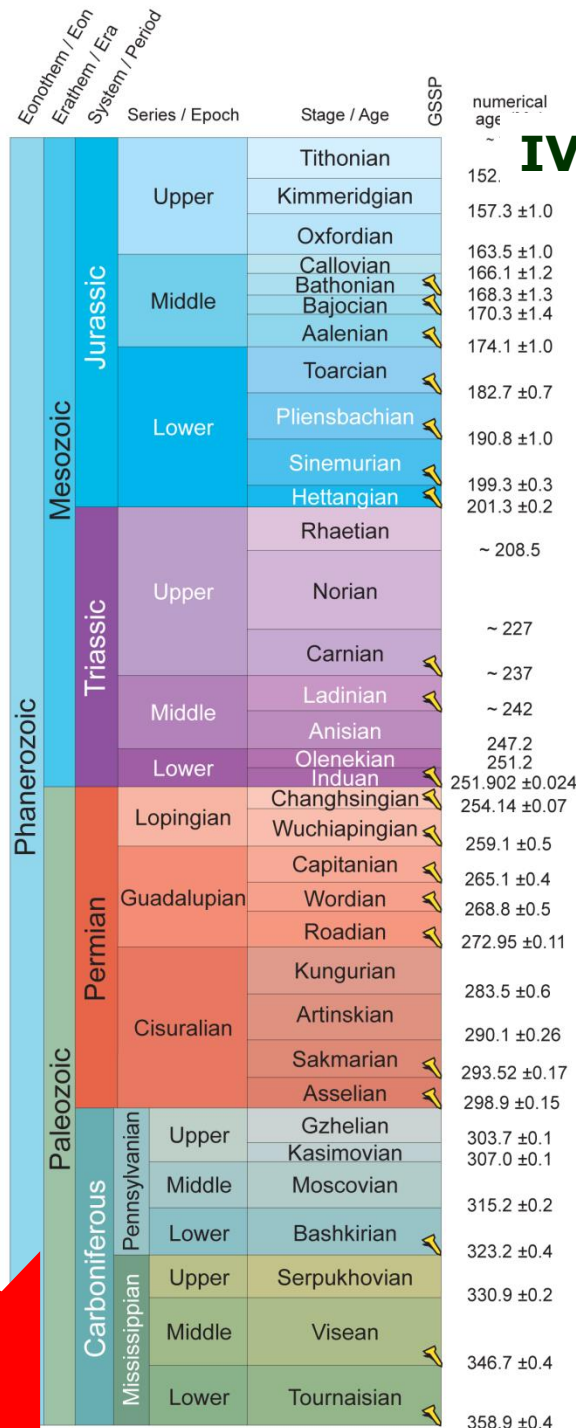
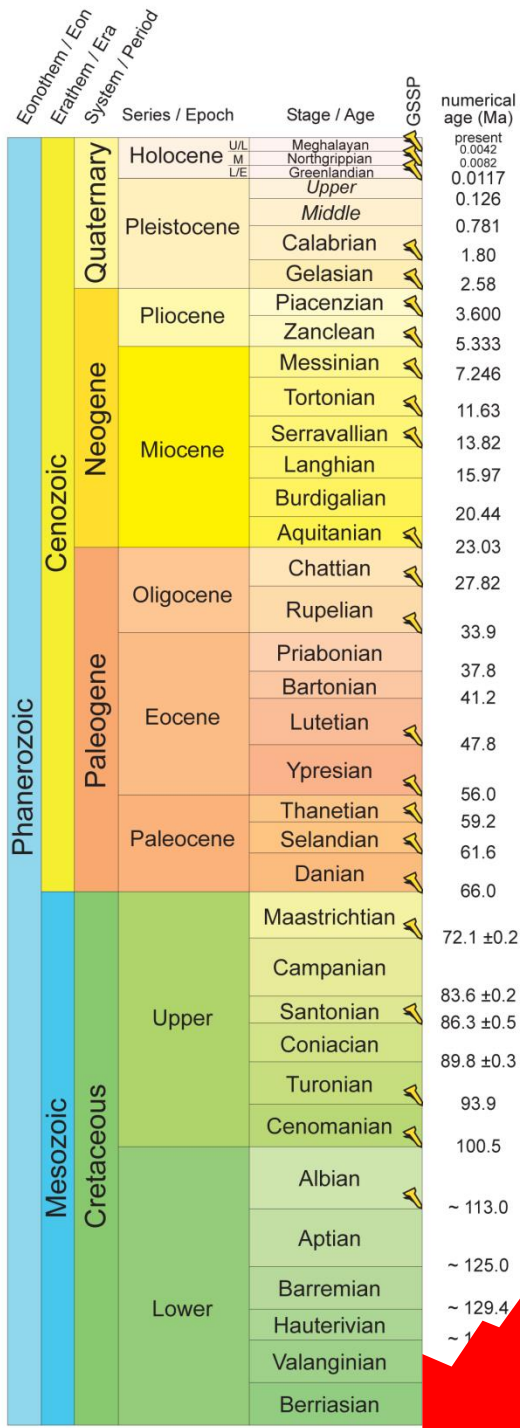
Marković, 2002

Rovinj I deposit



Rovinj I deposit



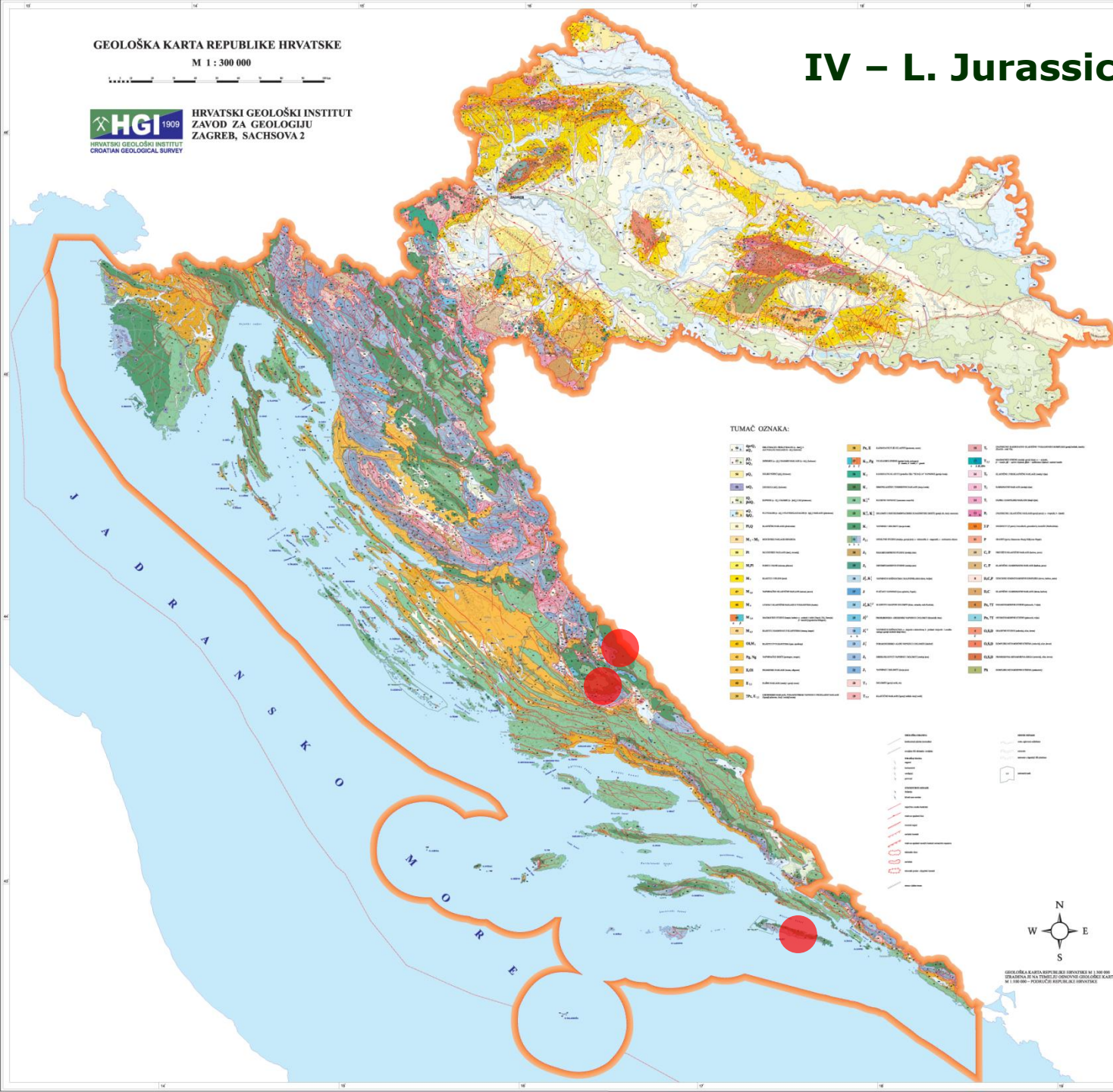


IV – L. Jurassic / E. Cretaceous

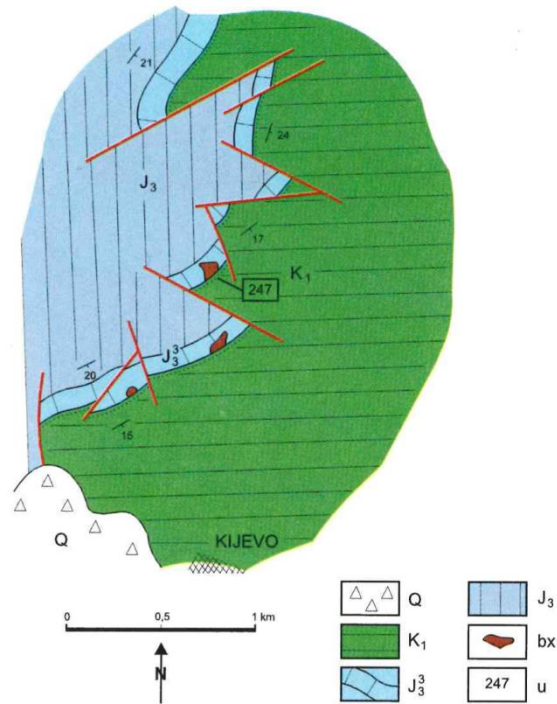
L. Tithonian / Valanginian–Hauterivian–Barremian–Aptian

IV – L. Jurassic / E. Cretaceous

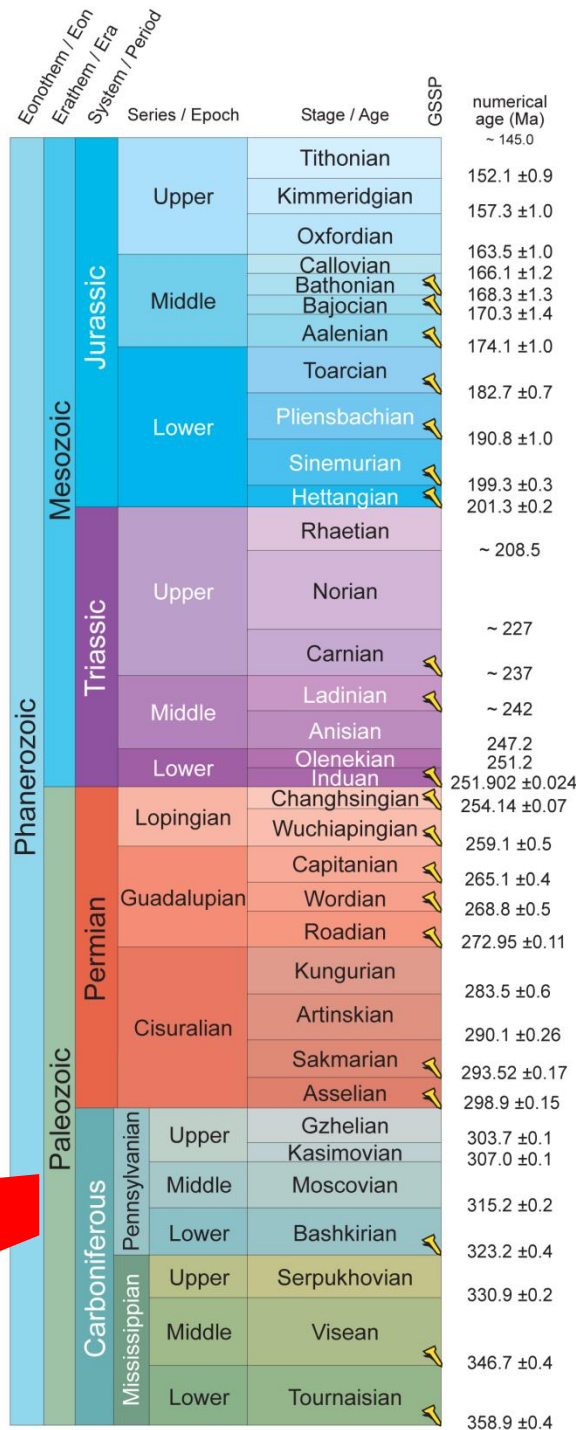
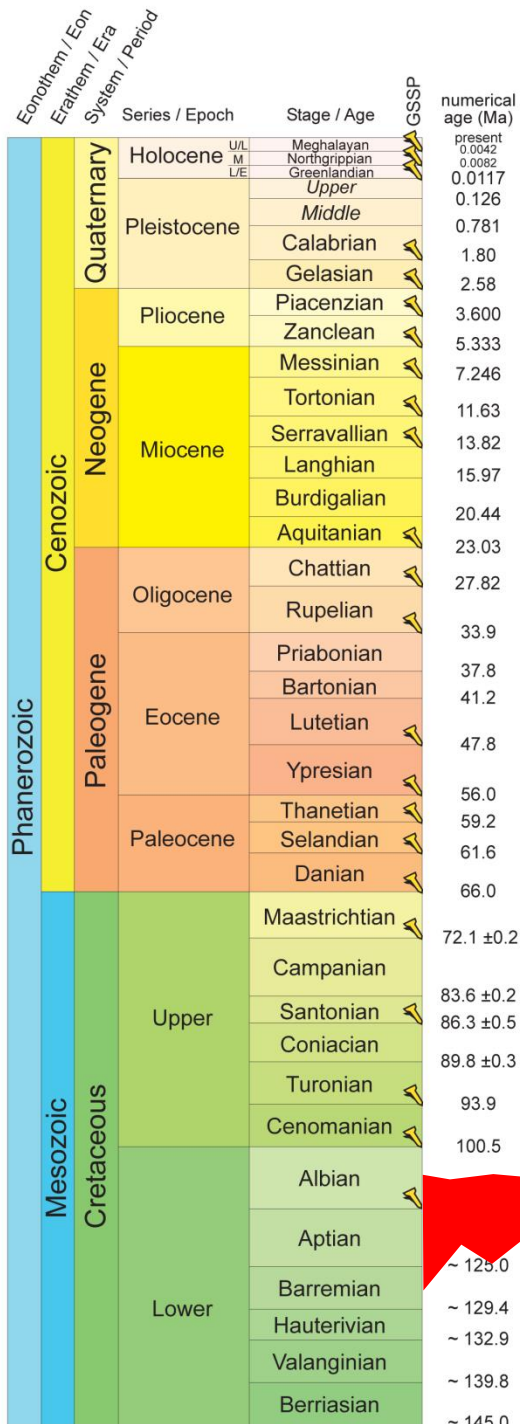
*Svilaja
Dinara
Mljet*



Kijevo deposit



Marković, 2002



V – E. Cretaceous

Barremian–E. Aptian / L. Albian

Baderna Bale



Eonothem / Eon		Erathem / Era		System / Period		Series / Epoch	Stage / Age	GSSP	numerical age (Ma)	
Phanerozoic	Cenozoic	Quaternary	Holocene	U/L	Meghalayan	present			present	
				M	Northgripian	0.0042			0.0042	
				L/E	Greenlandian	0.0082			0.0082	
			Pleistocene	Upper				0.0117		0.0117
				Middle				0.126		0.126
				Calabrian				0.781		0.781
		Neogene	Pliocene	Piacenzian				1.80		1.80
				Zanclean				2.58		2.58
			Miocene	Messinian				3.600		3.600
				Tortonian				5.333		5.333
		Serravallian				7.246		7.246		
		Langhian				11.63		11.63		
		Burdigalian				13.82		13.82		
		Aquitanian				15.97		15.97		
	Paleogene	Oligocene	Chatthian				20.44		20.44	
			Rupelian				23.03		23.03	
		Eocene	Priabonian				27.82		27.82	
			Bartonian				33.9		33.9	
			Lutetian				37.8		37.8	
			Ypresian				41.2		41.2	
		Paleocene	Thanetian				47.8		47.8	
			Selandian				56.0		56.0	
			Danian				59.2		59.2	
			Maastrichtian				61.6		61.6	
	Mesozoic	Cretaceous	Upper	Campanian				66.0		66.0
				Santonian				72.1 ± 0.2		72.1 ± 0.2
				Coniacian				83.6 ± 0.2		83.6 ± 0.2
				Turonian				86		86
Cenomanian						100.5		100.5		
Albian						~ 113.0		~ 113.0		
Lower			Aptian				~ 125.0		~ 125.0	
			Barremian				~ 129.4		~ 129.4	
			Hauterivian				~ 132.9		~ 132.9	
			Valanginian				~ 139.8		~ 139.8	
Berriasian				~ 145.0		~ 145.0				

Eonothem / Eon		Erathem / Era		System / Period		Series / Epoch	Stage / Age	GSSP	numerical age (Ma)
Phanerozoic	Mesozoic	Jurassic	Upper	Tithonian					152.1 ± 0.9
				Kimmeridgian					157.3 ± 1.0
				Oxfordian					163.5 ± 1.0
			Middle	Callovian					166.1 ± 1.2
				Bathonian					168.3 ± 1.3
				Bajocian					170.3 ± 1.4
		Lower	Aalenian					174.1 ± 1.0	
			Toarcian					182.7 ± 0.7	
			Pliensbachian					190.8 ± 1.0	
			Sinemurian					199.3 ± 0.3	
			Hettangian					201.3 ± 0.2	
		Triassic	Upper	Rhaetian					~ 208.5
				Norian					~ 227
				Carnian					~ 237
	Middle		Ladinian					~ 242	
			Anisian					247.2	
	Lower		Olenekian					251.2	
			Induan					251.902 ± 0.024	
			Lopingian					254.14 ± 0.07	
			Wuchiapingian					259.1 ± 0.5	
			Changhsingian					259.1 ± 0.5	
	Paleozoic	Permian	Capitanian					265.1 ± 0.4	
			Wordian					268.8 ± 0.5	
			Roadian					272.95 ± 0.11	
			Kungurian					283.5 ± 0.6	
			Artinskian					290.1 ± 0.26	
			Sakmarian					293.52 ± 0.17	
		Carboniferous	Pennsylvanian	Asselian					298.9 ± 0.15
Gzhelian							303.7 ± 0.1		
Mississippian			Kasimovian					307.0 ± 0.1	
			Moscovian					315.2 ± 0.2	
Paleozoic	Carboniferous	Bashkirian					323.2 ± 0.4		
		Serpukhovian					330.9 ± 0.2		
	Mississippian	Visean					346.7 ± 0.4		
		Tournaisian					358.9 ± 0.4		

VI – L. Cretaceous

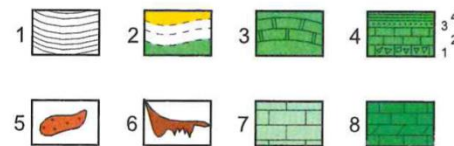
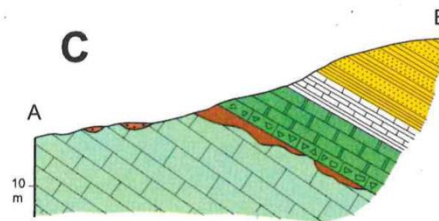
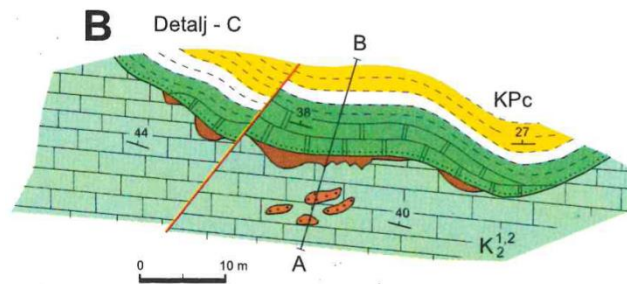
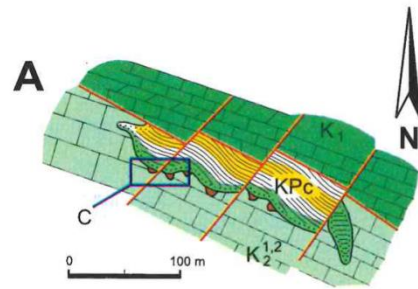
Cenomanian–Turonian / 'Senonian'

Kordun

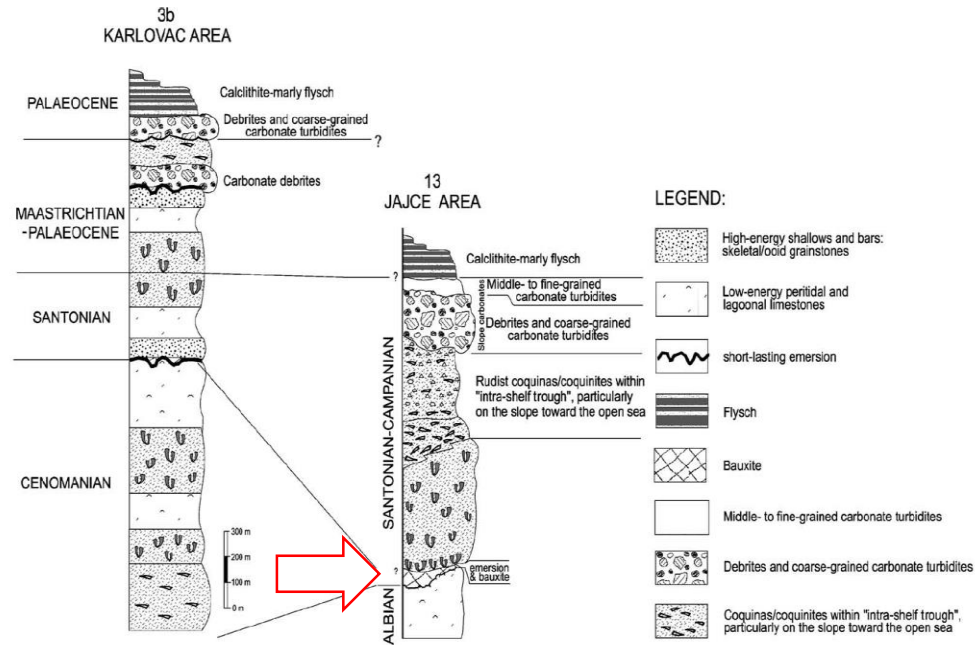
Jajce (BH)
Čardak (BH)



Gazibare-Živkovići deposit

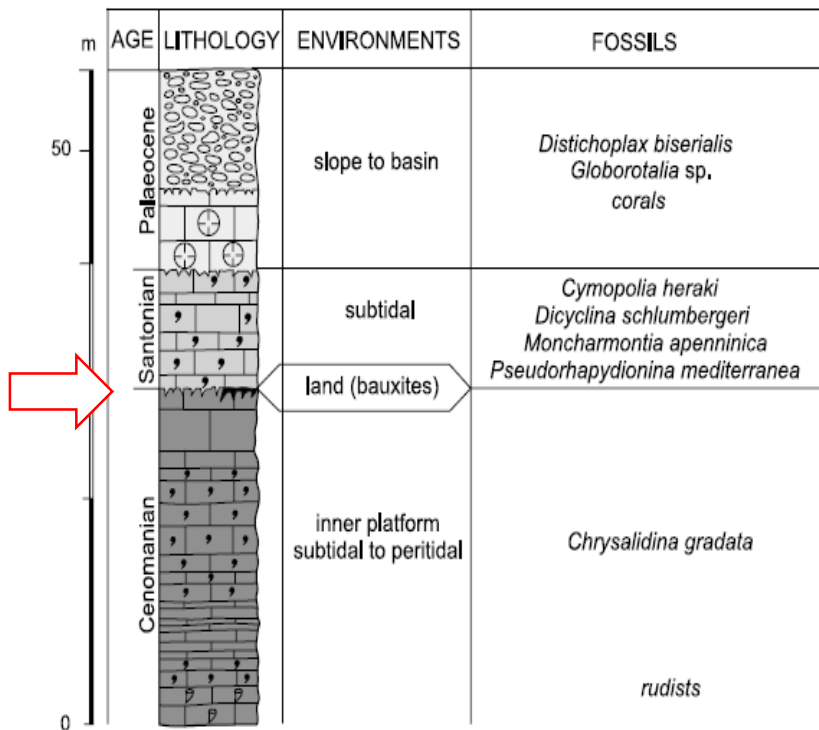


Marković, 2002

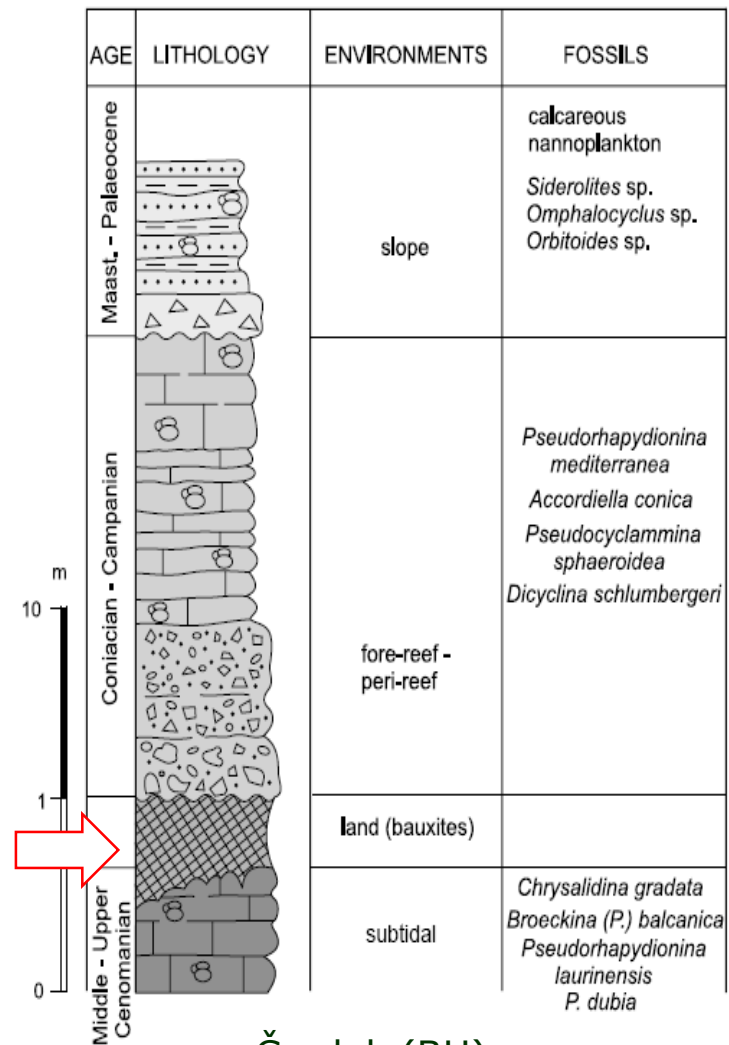


Jajce (BH)

Vlahović et al., 2005

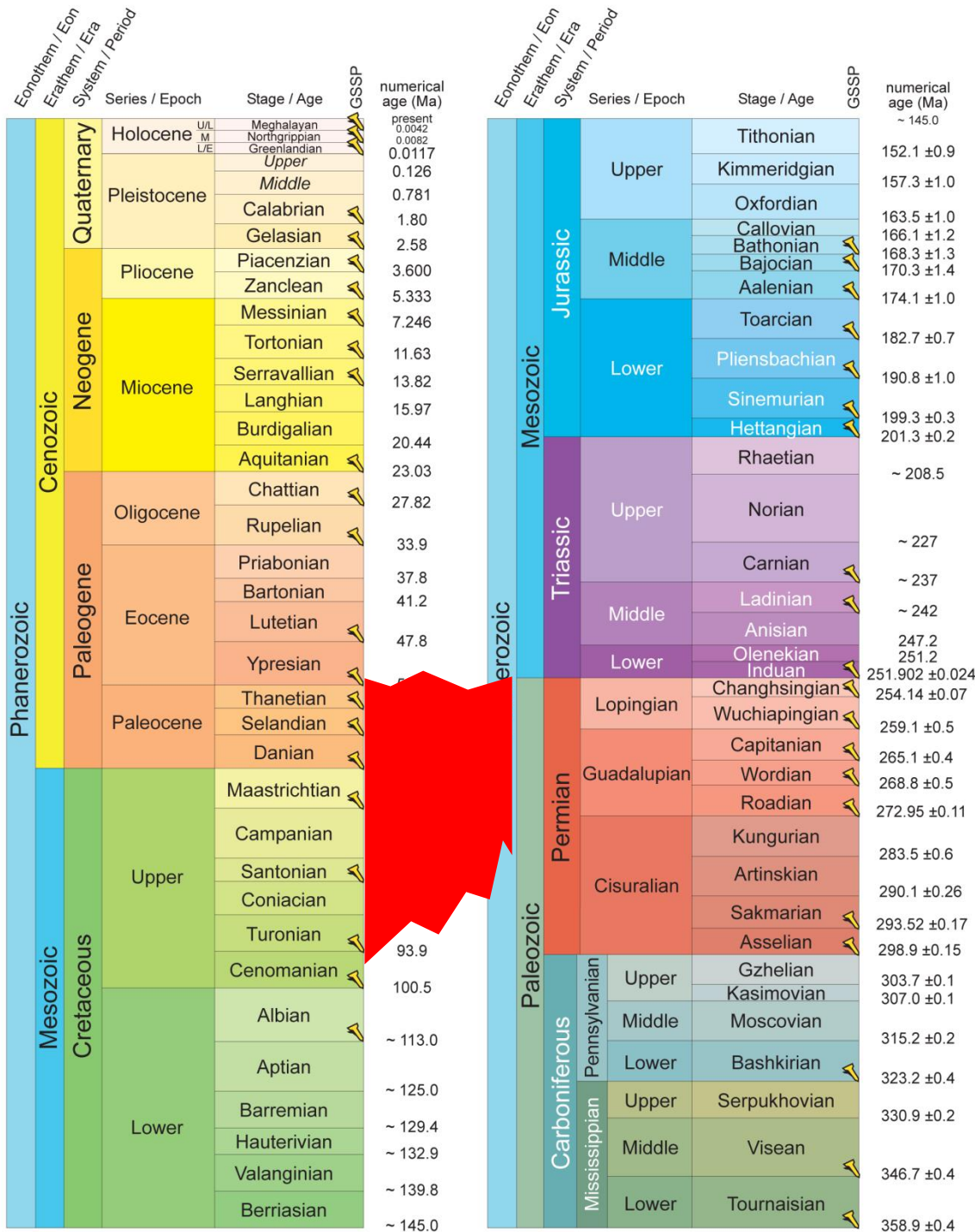


Dubravčani



Čardak (BH)

Dragičević & Velić, 2002



VII – L. Cretaceous / Pc, E₁

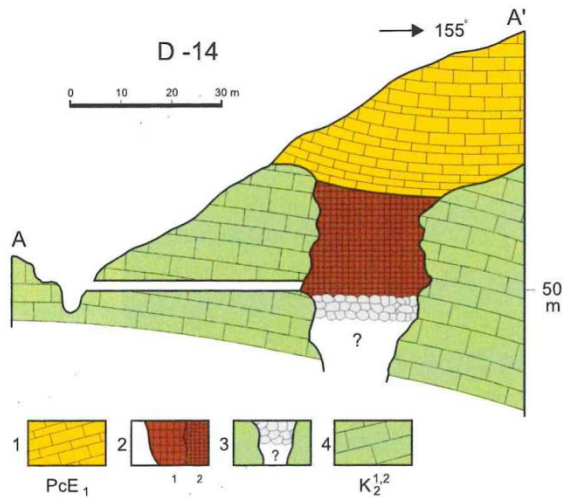
Cenomanian–Turonian–
'Senonian' /
Palaeocene(?)–E. Eocene

VII – L. Cretaceous / Pc, E₁

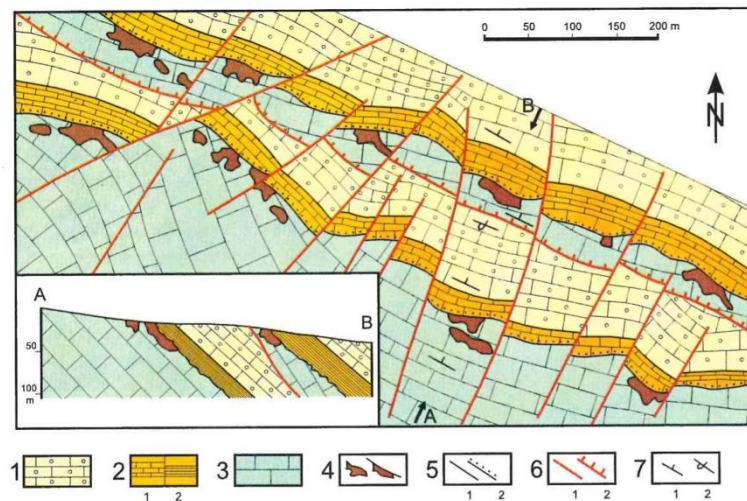
Istra
Bukovica
Promina
Sinj
Imotski
Cres
Lošinj
Krk
Rab
Pag
...



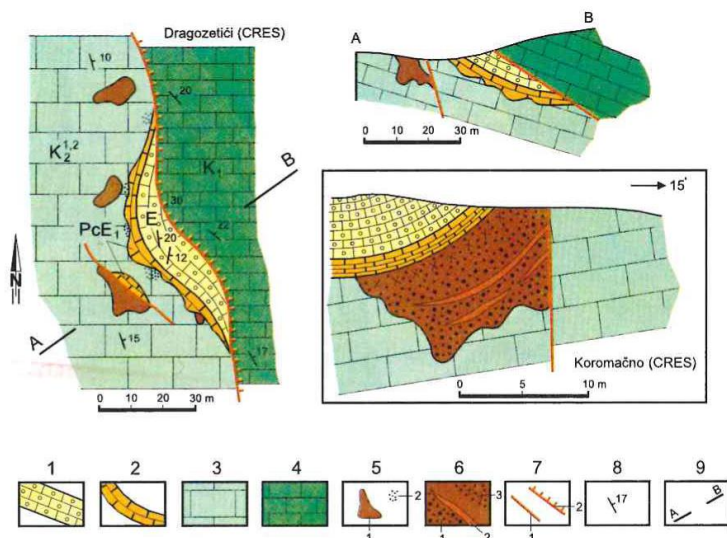
Mirna Valley (Istria)



Ričice (Imotski)

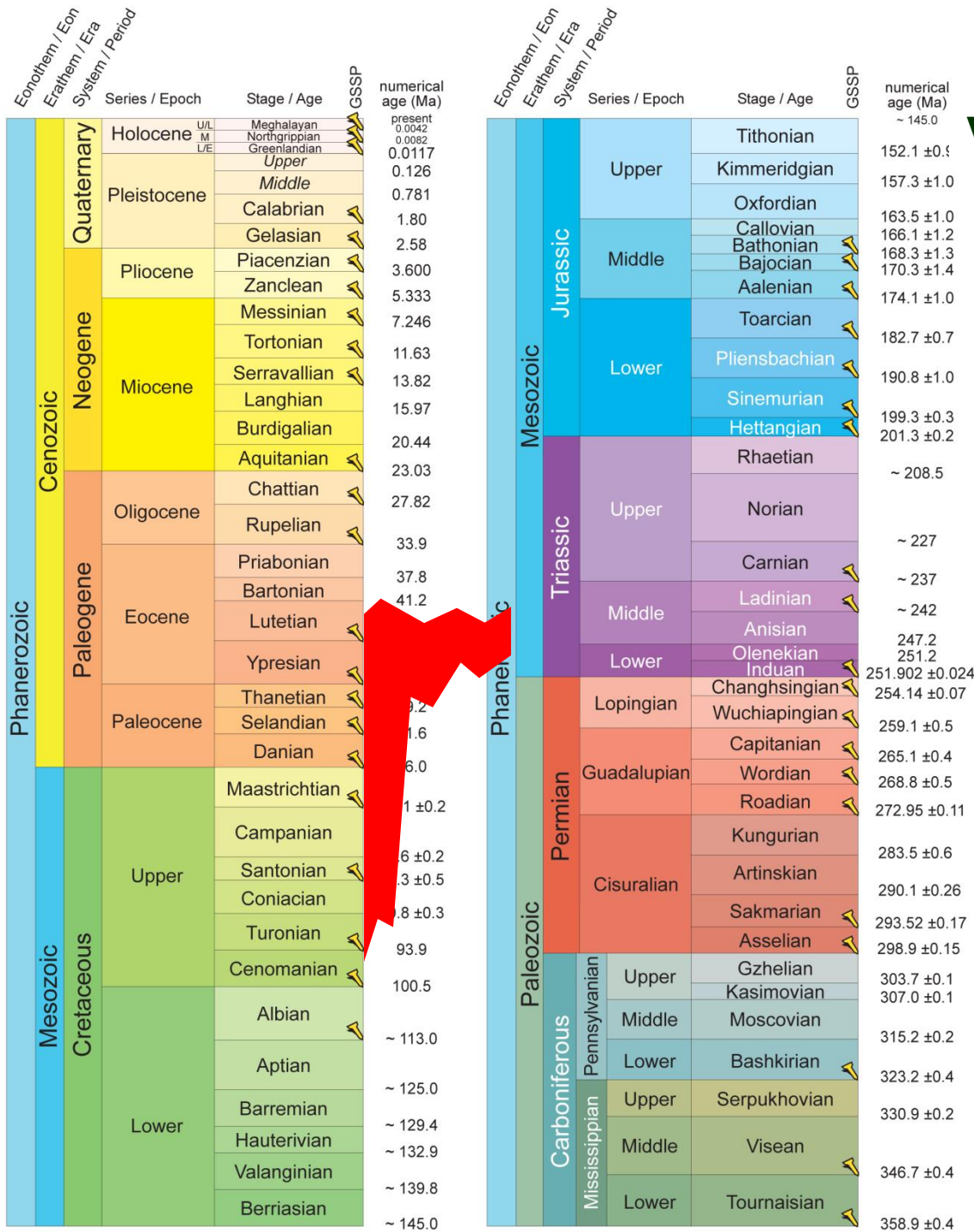


Cres Island



Marković, 2002





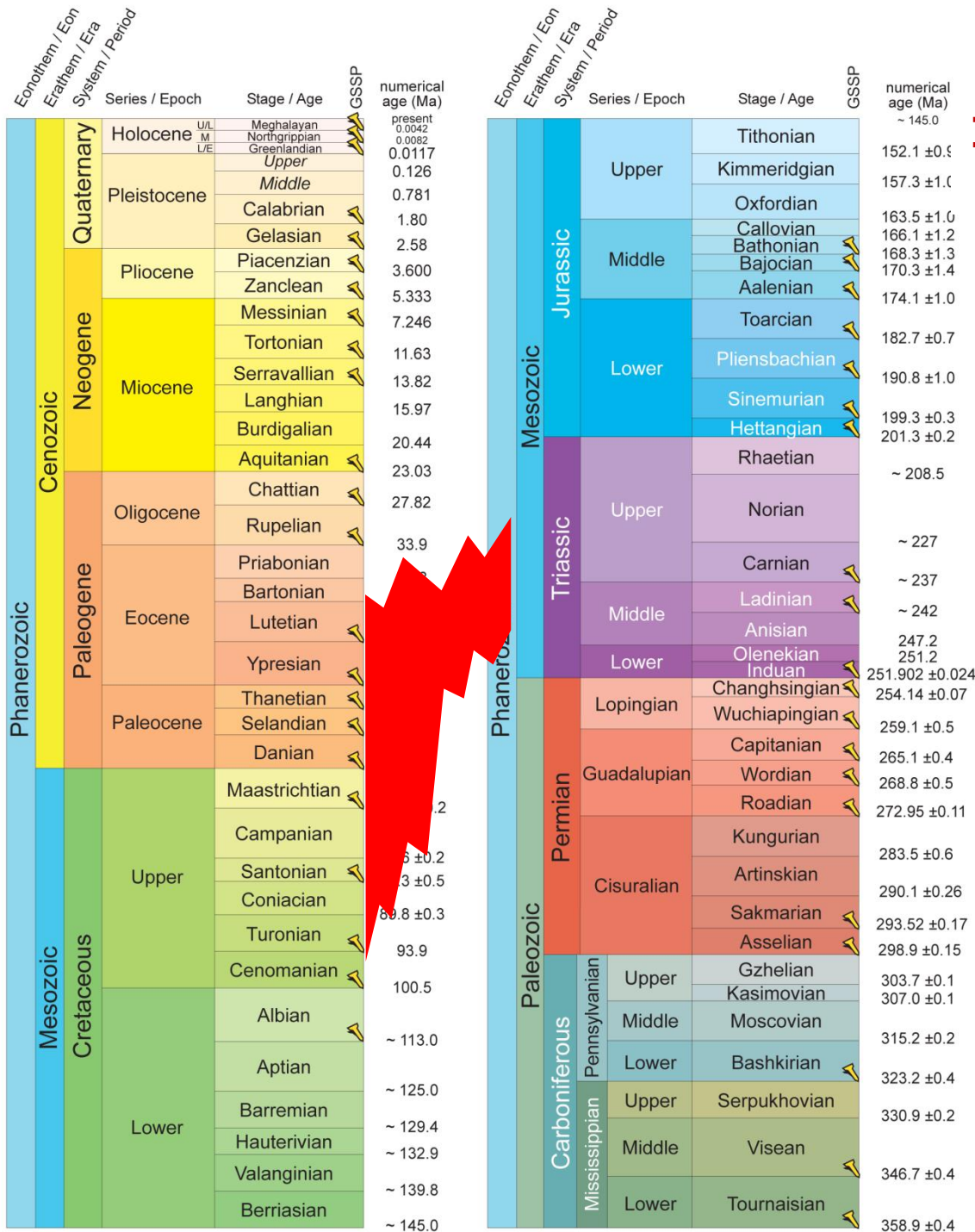
VIII – L. Cretaceous–E_{1,2} / E₂

Cenomanian–Turonian–
E. to M. Eocene /
M. Eocene

VIII – L. Cretaceous–E_{1,2} / E₂

*Ervenik
Promina*





IX – L. Cretaceous–Pc–E_{1,2} / E_{2,3}–O₁

Cenomanian–Turonian–
‘Senonian’–E. to M. Eocene /
M. to L. Eocene–E. Oligocene

IX – L. Cretaceous–Pc–E_{1,2} / E_{2,3}–O₁

Obrovac

Drniš

Promina

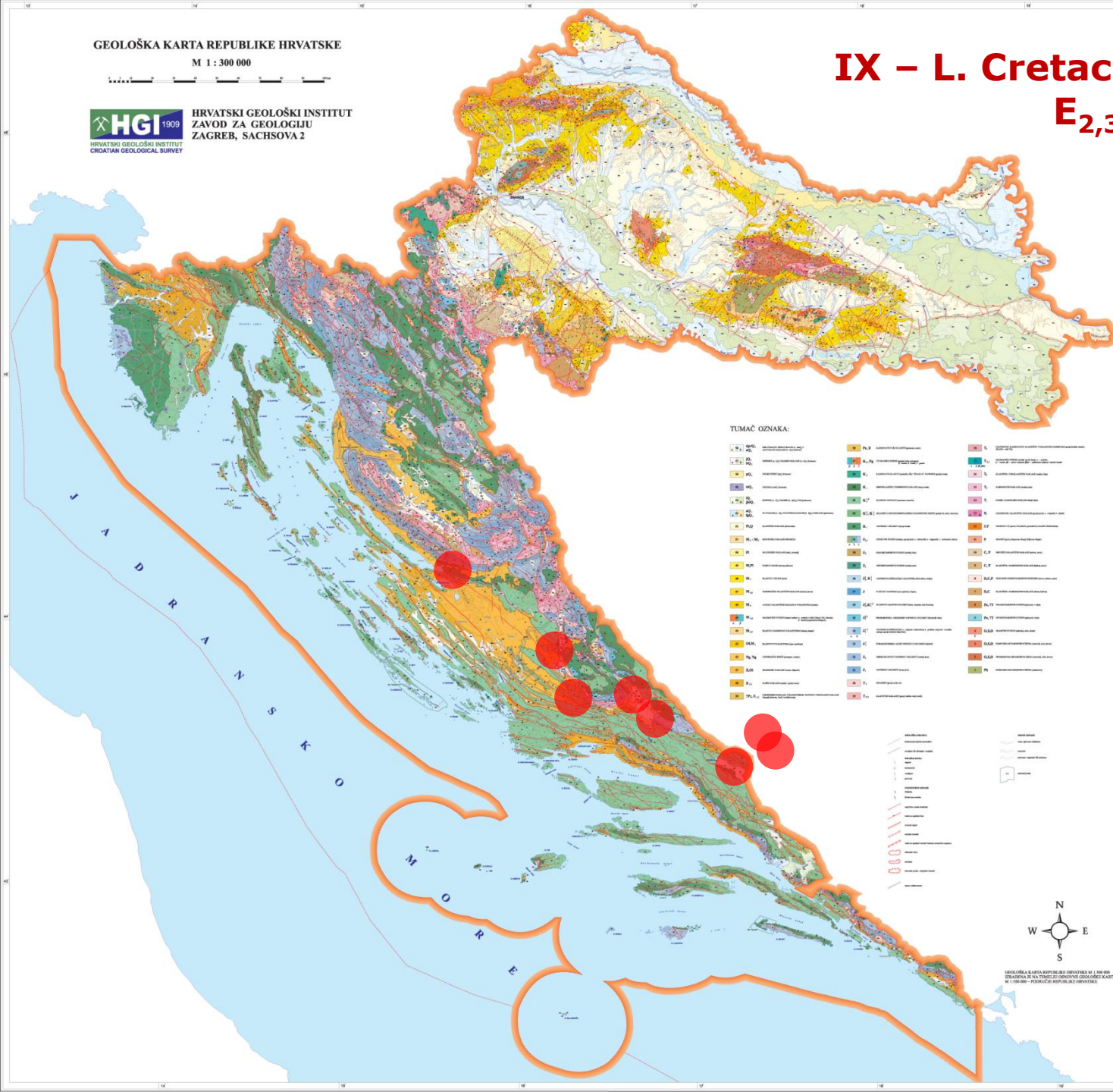
Moseć

Sinj

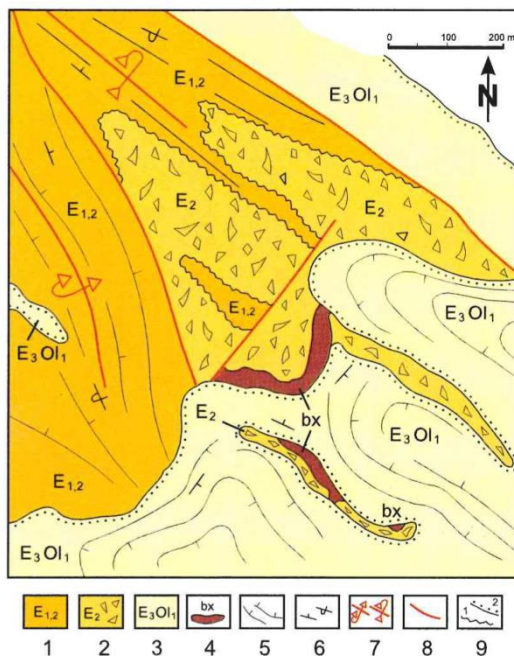
Trilj

Imotski

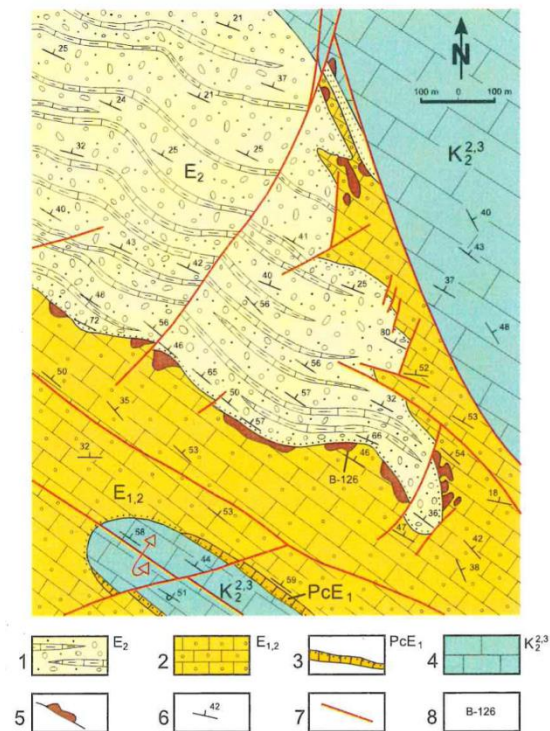
Posušje (BH)



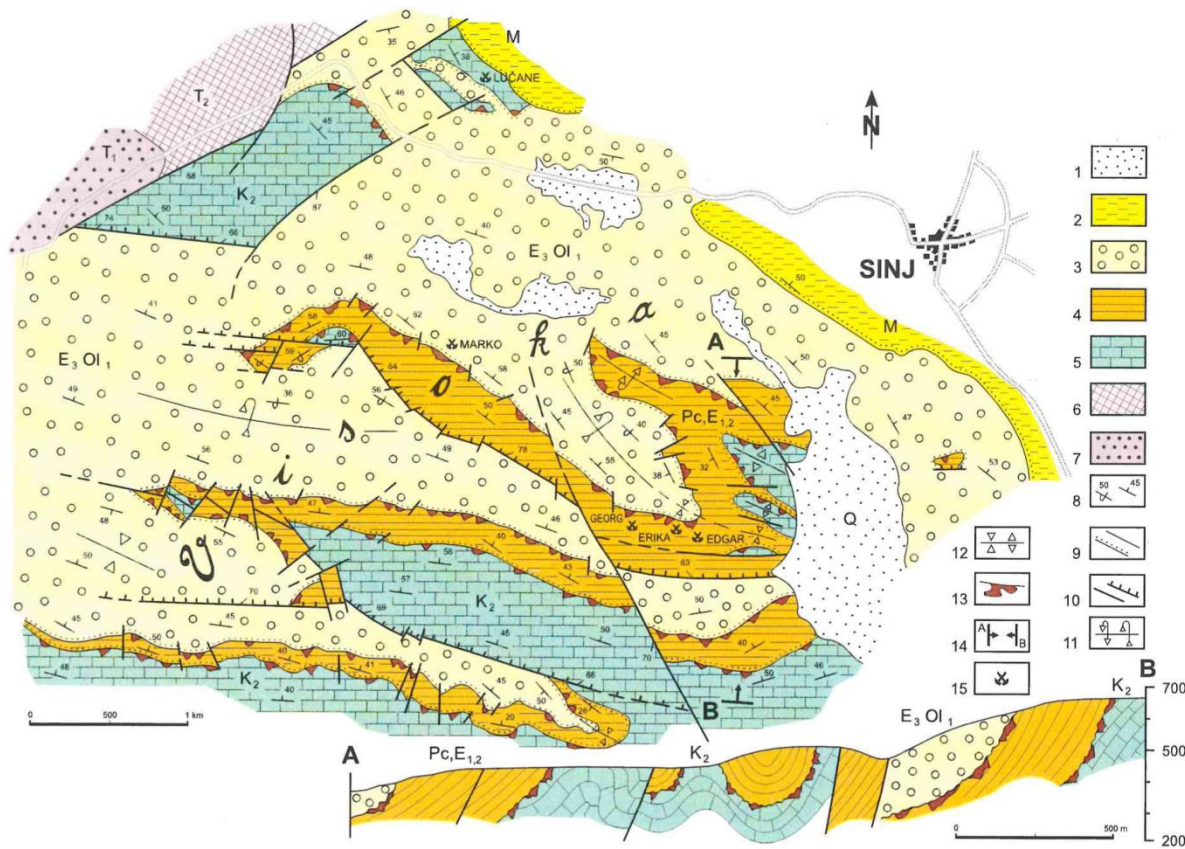
Suknovac Deposit (Drniš)



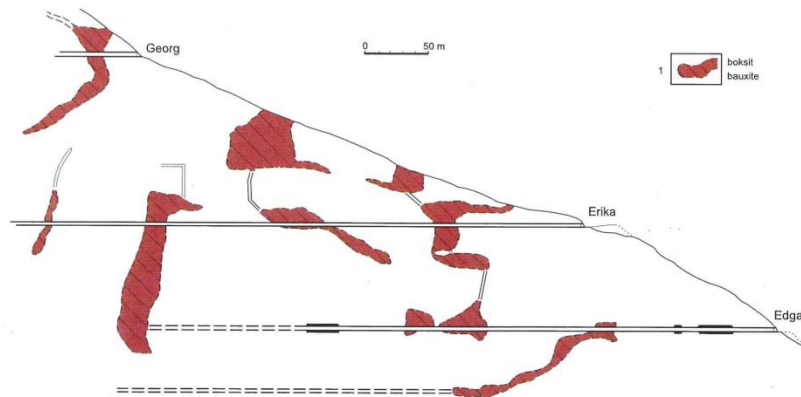
Kljaka Deposit (Moseć)



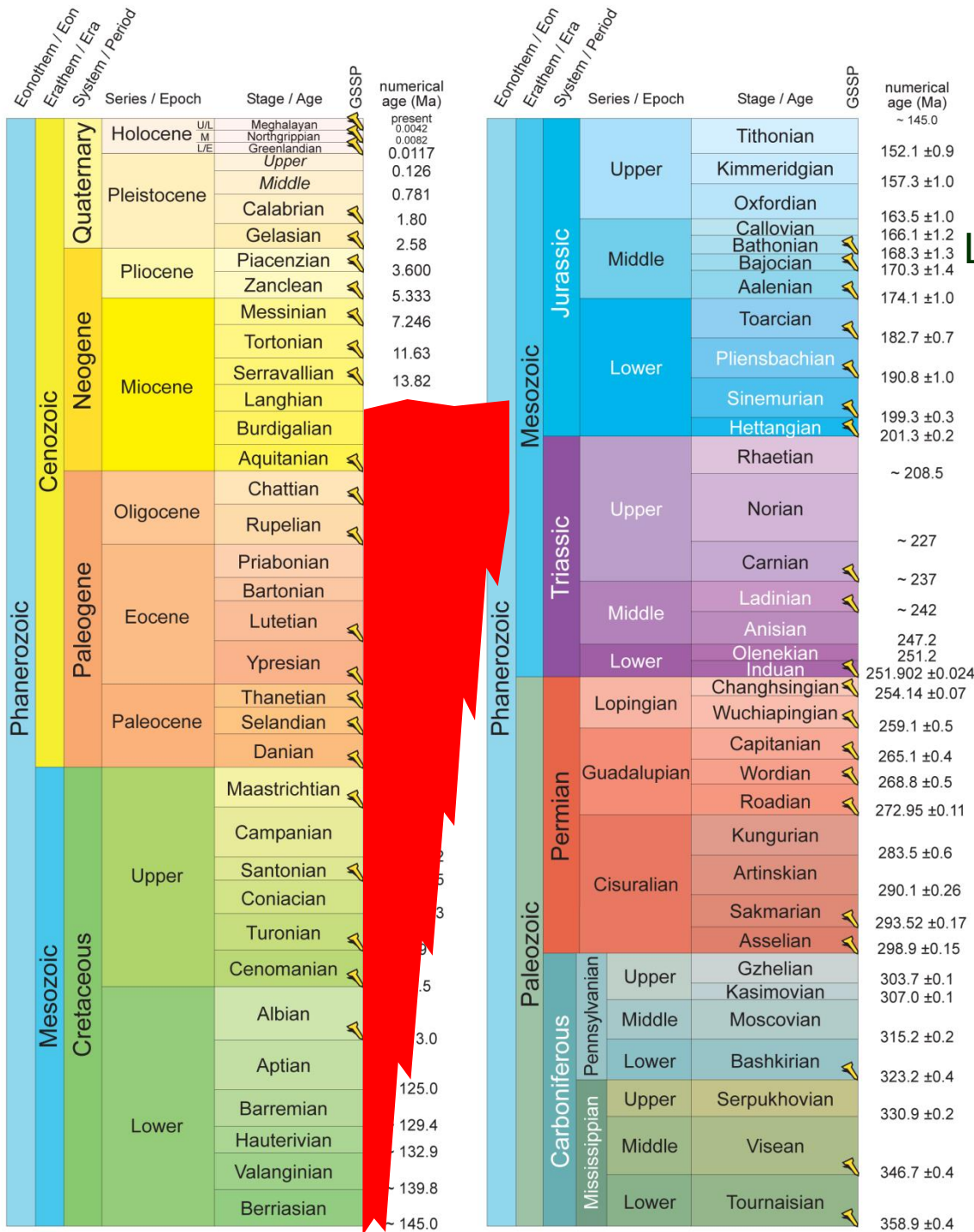
Marković, 2002



Visoka Deposit
(Sinj)



Marković, 2002



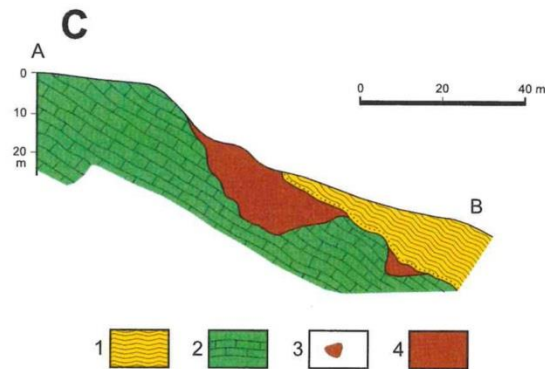
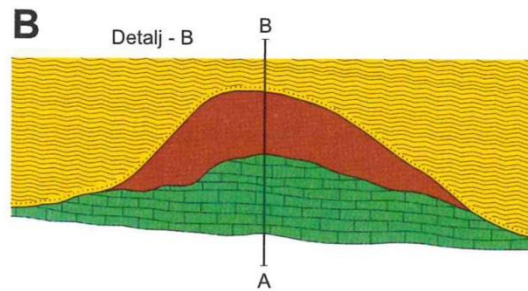
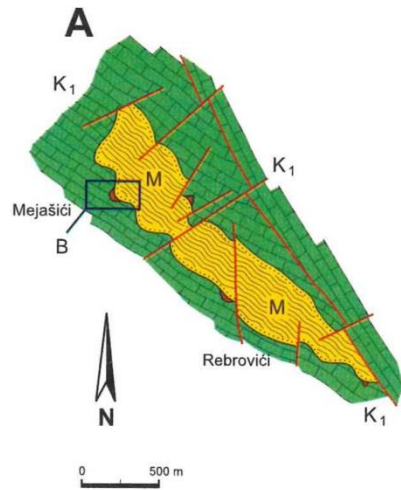
X – L. Jurassic–E, OI / M₂

L. Jurassic–Aptian–Cenomanian–
 Turonian–‘Senonian’–Eocene–
 Oligocene / M. Miocene

X – L. Jurassic–E, O1 / M₂

Tounj
Peruča
Trilj





Mejašići Deposit
(Tounj)

Marković, 2002

Instead of conclusion

In the Croatian part of the External Dinarides bauxite occurrences and deposits may be generally divided into ten horizons, and four of them had economical value.

Several small bauxite occurrences have also been found in the Northern Croatia.

The first bauxite mine in Europe was opened in the Mirna river valley in Istria almost 400 years ago, with the first written record from 1780 and the first scientific discussion published in 1808. Those K/Pg pyritic bauxites were excavated for production of sulphuric acid and later for production of alum used for tanning in the leather industry.

German mineralogist August Breithaupt described in 1847 *cliachite* as previously unknown mineral from the Kljaka bauxite deposit near Drniš – this term is still used as a synonym for bauxite (which was described from Le Baux in 1821).

Bauxite was often unofficially cited as the '**Croatian national mineral**'.



Thank you!