

# INTERNATIONAL STRATIGRAPHIC CHART

EONOTHEM EON	ERATHEM ERA	SYSTEM PERIOD	SERIES EPOCH	STAGE AGE	AGES G.S. ODIN		STAGE NOTATION	SERIES NOTATION	SYSTEM NOTATION		
					Ma +/-	Ma +/-					
<b>PHANEROZOIC PH</b>	<b>CENOZOIC CZ</b>	QUATERNARY	HOLOCENE					<b>Q<sub>2</sub></b>	<b>Q</b>		
			PLEISTOCENE					<b>Q<sub>1</sub></b>			
		NEOGENE	PLIOCENE	Gelasian	1.75	0.05	1.81	GSSP	<b>n<sub>9</sub></b>	<b>N<sub>2</sub></b>	
				Piacenzian			2.58	GSSP	<b>n<sub>8</sub></b>		
				Zanclean	3.4	3.60		GSSP	<b>n<sub>7</sub></b>		
		MIOCENE		Messinian	5.30	0.15	5.33	GSSP	<b>n<sub>6</sub></b>	<b>N<sub>1</sub></b>	
				Tortonian	7.30	0.15	7.1	GSSP	<b>n<sub>5</sub></b>		
				Serravallian	11.0	0.3	11		<b>n<sub>4</sub></b>		
				Langhian	14.3	0.5	13.6		<b>n<sub>3</sub></b>		
				Burdigalian	15.8	0.2	16.4		<b>n<sub>2</sub></b>		
				Aquitanian	20.3	0.4	19.1		<b>n<sub>1</sub></b>		
			OLIGOCENE		Chattian	23.5	1.0	23.8	GSSP		<b>e<sub>9</sub></b>
				Rupelian	28	1			<b>e<sub>8</sub></b>		
				Priabonian	33.7	0.5		GSSP	<b>e<sub>7</sub></b>		
	EOCENE			Bartonian	37.0	1/0.5			<b>e<sub>6</sub></b>		<b>E<sub>2</sub></b>
			Lutetian	40	1			<b>e<sub>5</sub></b>			
			Ypresian	46.0	1/0.5			<b>e<sub>4</sub></b>			
	PALEOCENE		Thanetian	53	1			<b>e<sub>3</sub></b>	<b>E<sub>1</sub></b>		
			Selandian					<b>e<sub>2</sub></b>			
			Danian	65.0	0.5	65.0	0.1	GSSP		<b>e<sub>1</sub></b>	
	<b>MESOZOIC MZ</b>	<b>CRETACEOUS</b>	UPPER/LATE	Maastrichtian	72.0	0.5	71.3	0.5		<b>k<sub>6</sub></b>	<b>K</b>
				Campanian	83	1	83.5	0.5		<b>k<sub>5</sub></b>	
				Santonian	87	1	85.8	0.5		<b>k<sub>4</sub></b>	
				Coniacian	88	1	89.0	0.5		<b>k<sub>3</sub></b>	
				Turonian	92	2	93.5	0.2		<b>k<sub>2</sub></b>	
			LOWER/EARLY	Cenomanian	96	2	98.9	0.6		<b>k<sub>1</sub></b>	
				Albian	108	3/1	112.2	1.1		<b>b<sub>6</sub></b>	
				Aprian	113	3	121.0	1.4		<b>b<sub>5</sub></b>	
				Barremian	117	5/2	127.0	1.6		<b>b<sub>4</sub></b>	
				Hauterivian	123	6/2	132.0	1.9		<b>b<sub>3</sub></b>	
		JURASSIC	UPPER/LATE	Valanginian	131	4	136.5	2.2		<b>b<sub>2</sub></b>	
				Berriasian	135	5/5	144.2	2.6		<b>b<sub>1</sub></b>	
				Tithonian	141	7/5				<b>j<sub>7</sub></b>	
				Kimmeridgian	146					<b>j<sub>6</sub></b>	
			MIDDLE	Oxfordian	154	5				<b>j<sub>5</sub></b>	
				Callovian	160	2				<b>j<sub>4</sub></b>	
				Bathonian	164	2				<b>j<sub>3</sub></b>	
				Bajocian	170	4/3				<b>j<sub>2</sub></b>	
	LOWER/EARLY	Aalenian	175	3				<b>j<sub>1</sub></b>			
		Toarcian	184	3				<b>l<sub>4</sub></b>			
		Pliensbachian	191					<b>l<sub>3</sub></b>			
		Sinemurian	200	4/7				<b>l<sub>2</sub></b>			
	TRIASSIC	UPPER/LATE	Hettangian	203	3			<b>l<sub>1</sub></b>	<b>J</b>		
			Rhetian					<b>t<sub>7</sub></b>			
			Norian	220				<b>t<sub>6</sub></b>			
		MIDDLE	Carnian	230	6			<b>t<sub>5</sub></b>			
			Ladinian	233	5			<b>t<sub>4</sub></b>			
			Anisian	240	5			<b>t<sub>3</sub></b>			
LOWER/EARLY	Olenekian					<b>t<sub>2</sub></b>					
	Induan	250	3	251.1	3.6		<b>t<sub>1</sub></b>				

EONOTHEM EON	ERATHEM ERA	SYSTEM PERIOD	SUBSYSTEM SUBPERIOD	SERIES EPOCH	STAGE AGE	AGES G.S. ODIN		STAGE NOTATION	SERIES NOTATION	SYSTEM NOTATION	
						Ma +/-	Ma +/-				
<b>PHANEROZOIC PH</b>	<b>PALEOZOIC PZ</b>	PERMIAN	LOPINGIAN	Changhsingian	250	3	251.1	3.6	<b>p<sub>9</sub></b>	<b>P<sub>3</sub></b>	
				Wuchiapigian					<b>p<sub>8</sub></b>		
			GUADALUPIAN	Capitanian					<b>p<sub>7</sub></b>	<b>P<sub>2</sub></b>	
				Wordian					<b>p<sub>6</sub></b>		
			CISURALIAN	Roadian				272.2	3.2	<b>p<sub>5</sub></b>	<b>P</b>
				Kungurian					<b>p<sub>4</sub></b>		
		Artinskian						<b>p<sub>3</sub></b>			
		Sakmarian					280.3	2.6	<b>p<sub>2</sub></b>		
		Asselian						<b>p<sub>1</sub></b>			
		CARBONIFEROUS		PENNSYLVANIAN	Gzhel'ian	295	5	298		GSSP	
			Kazimovian						<b>c<sub>6</sub></b>		
			Moscovian						<b>c<sub>5</sub></b>		
	MISSISSIPPIAN		Bashkirian				320		GSSP	<b>c<sub>4</sub></b>	
			Serpukhovian					<b>c<sub>3</sub></b>			
			Visean	325	5	327		<b>c<sub>2</sub></b>			
	DEVONIAN	UPPER/LATE	Tournaisian	345	342	3.6		<b>c<sub>1</sub></b>	<b>D</b>		
			Famennian	355	5	354	4	GSSP		<b>d<sub>7</sub></b>	
		MIDDLE	Frasnian	370	5			<b>d<sub>6</sub></b>			
			Givetian	375	5			<b>d<sub>5</sub></b>			
		LOWER/EARLY	Emsian	380				<b>d<sub>4</sub></b>			
			Pragian	390	5			<b>d<sub>3</sub></b>			
	SILURIAN	PRIDOLI	Lochkovian	400	5			<b>d<sub>2</sub></b>	<b>S</b>		
				410	8/5			<b>d<sub>1</sub></b>			
		LUDLOW	S <sub>8</sub>	415				<b>s<sub>8</sub></b>			
			S <sub>7</sub>					<b>s<sub>7</sub></b>			
		WENLOCK	S <sub>6</sub>	425	5			<b>s<sub>6</sub></b>			
			S <sub>5</sub>					<b>s<sub>5</sub></b>			
	LLANDOVERY	S <sub>4</sub>	430	6			<b>s<sub>4</sub></b>				
		S <sub>3</sub>					<b>s<sub>3</sub></b>				
	ORDOVICIAN	UPPER/LATE	S <sub>2</sub>	435	6/4	440		<b>s<sub>2</sub></b>	<b>O</b>		
			S <sub>1</sub>	435	6/4	440		<b>s<sub>1</sub></b>			
		MIDDLE	Darriwilian	440			467.5	3		<b>o<sub>3</sub></b>	
	CAMBRIAN	UPPER/LATE	O <sub>2</sub>	455	5			<b>o<sub>2</sub></b>			
			O <sub>1</sub>					<b>o<sub>1</sub></b>			
		LOWER/EARLY	Tremadocian	465	5			<b>o<sub>0</sub></b>			
	TRIASSIC	UPPER/LATE	E <sub>3</sub>	495				<b>e<sub>3</sub></b>	<b>E</b>		
			E <sub>2</sub>					<b>e<sub>2</sub></b>			
		LOWER/EARLY	E <sub>1</sub>	500				<b>e<sub>1</sub></b>			

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						AGES (Ma) S/C
<b>PRECAMBRIAN PE</b>	<b>PROTEROZOIC PR</b>	NEOPROTEROZOIC	540		<b>NP<sub>3</sub></b>	<b>NP</b>
			650	GSSA	<b>NP<sub>2</sub></b>	
			850	GSSA	<b>NP<sub>1</sub></b>	
		MESOPROTEROZOIC	1000	GSSA	<b>MP<sub>3</sub></b>	<b>MP</b>
			1200	GSSA	<b>MP<sub>2</sub></b>	
			1400	GSSA	<b>MP<sub>1</sub></b>	
	PALEOPROTEROZOIC	1600	GSSA	<b>PP<sub>4</sub></b>	<b>PP</b>	
		1800	GSSA	<b>PP<sub>3</sub></b>		
		2050	GSSA	<b>PP<sub>2</sub></b>		
	ARCHEAN AR	NEOARCHEAN	2300	GSSA	<b>PP<sub>1</sub></b>	<b>NA</b>
			2500	GSSA		
			2800			
	MESOARCHEAN	No subdivision into periods	3200			<b>MA</b>
			3600			<b>PA</b>
						<b>EA</b>

This new edition of the Global Stratigraphic Chart gives a clear picture of the present state of the art in the chronostratigraphic division of geological time, mentioning only units recommended for international use. The 1986 Guidelines of ICS (Cowie et al. 1986) and their revision (Remane et al. 1996) regulate the procedure to be followed in defining international chronostratigraphic/geochronologic units. The Revised Guidelines were ratified in a formal vote by the Full Commission of ICS. They stipulate that global chronostratigraphic units are NOT defined by unit-stratotypes, but by their lower boundary only, following the principle introduced with the definition of the base of the Devonian in 1972 (Martinsson, 1977). This is indeed the only way to arrive at a global chronostratigraphic scale made up of strictly contiguous units.

Phanerozoic global chronostratigraphic boundaries are thus formally defined by a Global Stratotype Section and Point (GSSP - Cowie et al. 1986), whereas Precambrian chronostratigraphic boundaries are formally defined in terms of absolute age by a Global Standard Stratigraphic Age (GSSA - Remane et al. 1996). In order to become formal, boundary definitions have to be accepted by a 60% majority in successive votes, first by the working group responsible for the choice of the GSSP, then by the concerned Subcommission of ICS, and finally by ICS. With its ratification through IUGS, a GSSP or GSSA becomes formal. International agreements of this kind should be reported in scientific publications.

In the present chart, a typographical distinction is made among formal, semiformal, and informal units. FORMAL UNITS (in bold characters): all those that have their lower boundary defined by a GSSP or a GSSA voted

on by ICS and ratified by IUGS. SEMIFORMAL UNITS (normal characters): several Subcommissions of ICS (Neogene, Paleogene, Jurassic, Triassic, Permian) have conducted a formal vote by postal ballot on the stage names which should be used and codified by a GSSP. As long as no GSSP has been adopted, these units, recommendable as they are, have no formal status. INFORMAL UNITS (in italics): Cretaceous stages have never been voted upon, but they follow a long-standing tradition and tacit international agreement.

The divisions used in the present Global Chart are based on the proposals made by the concerned Subcommissions. Simplified subdivisions have, however, been adopted for the Carboniferous and the Ordovician, in order to maintain the necessary homogeneity of presentation. More detailed versions are included in the attached extended explanatory note. Also, some traditional names which are becoming obsolete have been omitted: Lias, Dogger, Malm in the Jurassic and Tertiary in the Cenozoic (the latter already abandoned in the first edition of this chart). 'Tertiary' can be used as an informal name like *Permian*.

Numerical ages of the Phanerozoic chronostratigraphic boundaries were provided by G. Odin (Chairman of the Subcommission on Geochronology of ICS). Differing ages indicated by some of the Subcommissions of ICS are mentioned in a parallel column.

The letter/number symbols and the colours used for divisions down to stage/age rank are the same as those employed in the Geological Atlas of the World. They were established in concert with the Commission on the Geological Map of the World (CGMW/CCGM).