

DATA & DEFINITIONS

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Location and Character name disclaimer

The characters and events portrayed in this paper are fictitious (but fun). Enjoy!

Locations on Earth, and the features they possess, are fictional unless otherwise stated (including those based on actual geography). Locations on other planets are real.

Units and conversions

Degrees Celsius (°C) to Degrees Kelvin (K): $T_{(°C)} = T_{(K)} - 273.15$

Physical constants

Constant	Symbol	Value
Speed of light	c	299,792,458 m/s effectively 3×10^8 m/s
Lightyear (distance)	ly	1 ly is approx. 9.46×10^{12} km
Parsec (distance)	pc	1 pc is approx. 3.26 lightyears
Universal gravitational constant	G	$6.67 \times 10^{-11} \text{ Nm}^2\text{kg}^{-2}$
Earth’s gravitational acceleration	g	9.8 ms^{-2}
Earth mass	M_{\oplus}	$5.98 \times 10^{24} \text{ kg}$
Earth radius	R_{\oplus}	$6.37 \times 10^6 \text{ m}$
$g_{\text{planet}} = G \times M_{\text{planet}} / R_{\text{planet}}^2$		

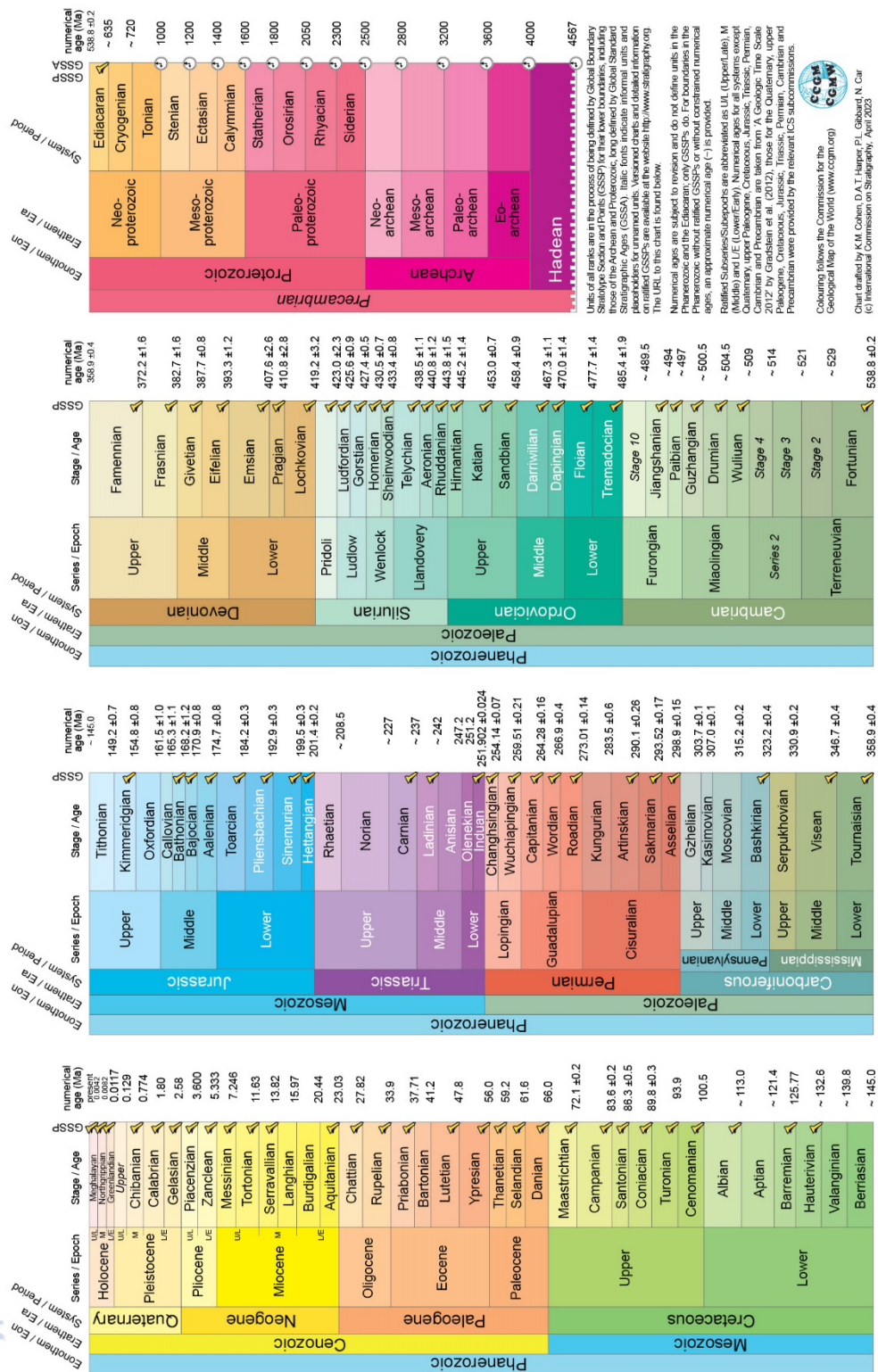
Periodic Table of the Elements

Periodic Table of the Elements

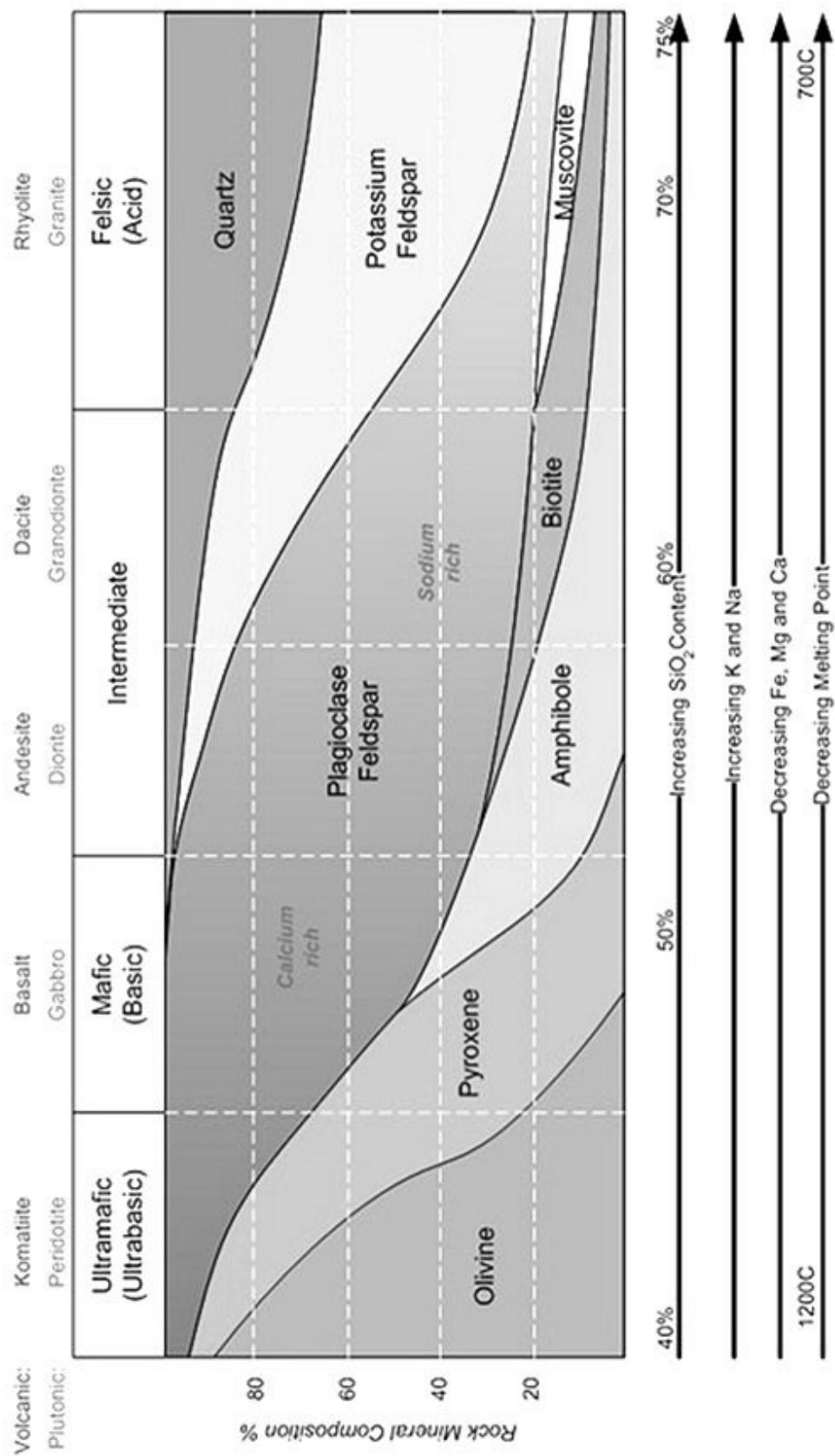
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	MERCURY	VENUS	EARTH	MARS	JUPITER	SATURN	URANUS	NEPTUNE	PLUTO
Mass (10^{24} kg)	0.330	4.87	5.97	0.642	1898	568	86.8	102	0.0130
Diameter (km)	4879	12,104	12,756	6792	142,984	120,536	51,118	49,528	2376
Density (kg/m^3)	5429	5243	5514	3934	1326	687	1270	1638	1850
Gravity (m/s^2)	3.7	8.9	9.8	3.7	23.1	9.0	8.7	11.0	0.7
Escape Velocity (km/s)	4.3	10.4	11.2	5.0	59.5	35.5	21.3	23.5	1.3
Rotation Period (hours)	1407.6	-5832.5	23.9	24.6	9.9	10.7	-17.2	16.1	-153.3
Length of Day (hours)	4222.6	2802.0	24.0	24.7	9.9	10.7	17.2	16.1	153.3
Distance from Sun (10^6 km)	57.9	108.2	149.6	228.0	778.5	1432.0	2867.0	4515.0	5906.4
Perihelion (10^6 km)	46.0	107.5	147.1	206.7	740.6	1357.6	2732.7	4471.1	4436.8
Aphelion (10^6 km)	69.8	108.9	152.1	249.3	816.4	1506.5	3001.4	4558.9	7375.9
Orbital Period (days)	88.0	224.7	365.2	687.0	4331	10,747	30,589	59,800	90,560
Orbital Velocity (km/s)	47.4	35.0	29.8	24.1	13.1	9.7	6.8	5.4	4.7
Orbital Inclination (degrees)	7.0	3.4	0.0 the ecliptic	1.8	1.3	2.5	0.8	1.8	17.2
Orbital Eccentricity	0.206	0.007	0.017	0.094	0.049	0.052	0.047	0.010	0.244
Obliquity to Orbit (degrees)	0.034	177.4	23.4	25.2	3.1	26.7	97.8	28.3	122.5
Mean Temperature (C)	167	464	15	-65	-110	-140	-195	-200	-225
Surface Pressure (bars)	0	92	1	0.01	?	?	?	?	0.00001
Number of Moons	0	0	1	2	92	83	27	14	5
Ring System?	No	No	No	No	Yes	Yes	Yes	Yes	No
Global Magnetic Field?	Yes	No	Yes	No	Yes	Yes	Yes	Yes	?

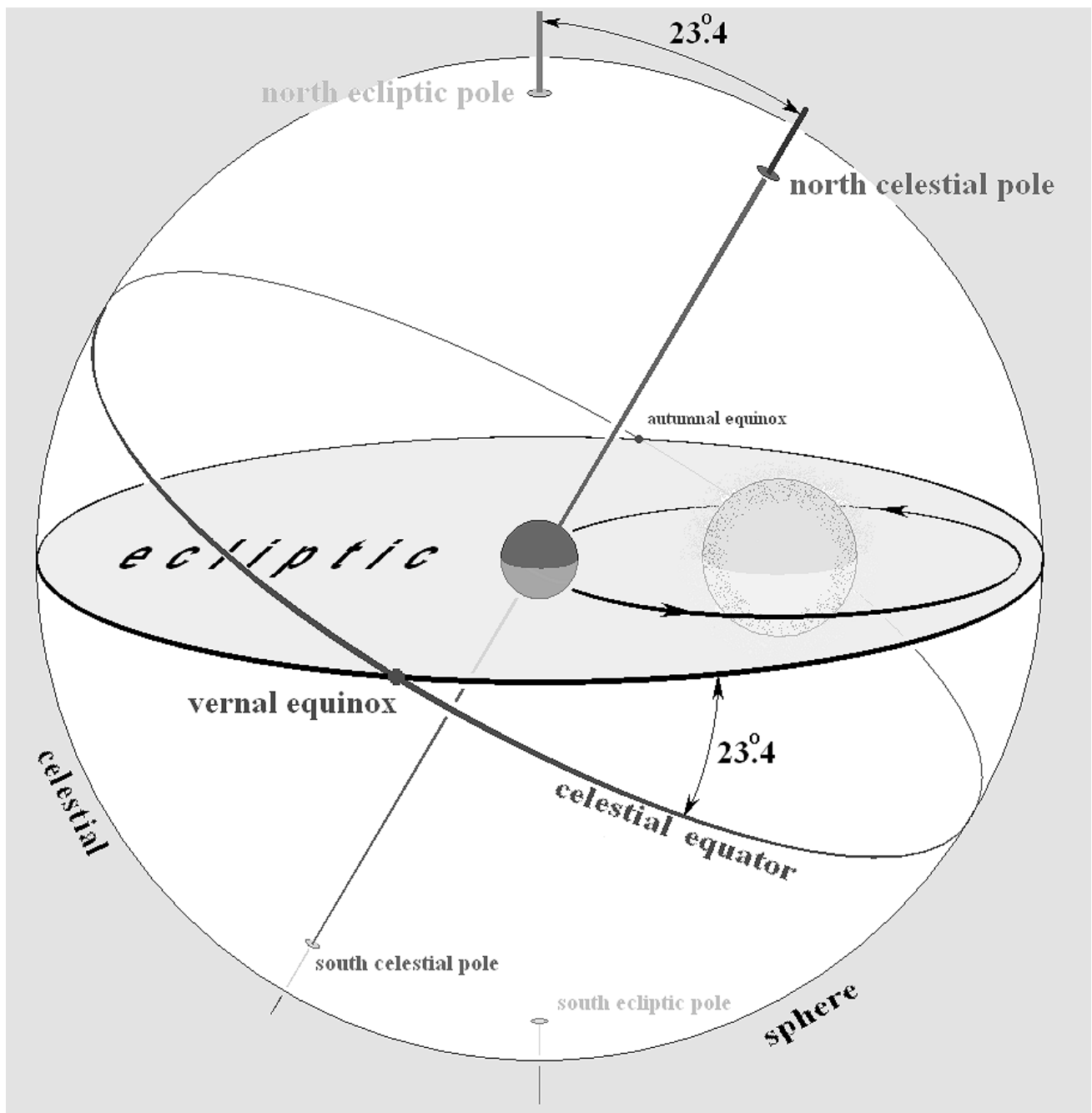
Useful planetary data



International Chronostratigraphic Chart 2023/04 courtesy of
<http://www.stratigraphy.org/index.php/ics-chart-timescale>
Note: Numerical age (Ma) means the age in millions of years

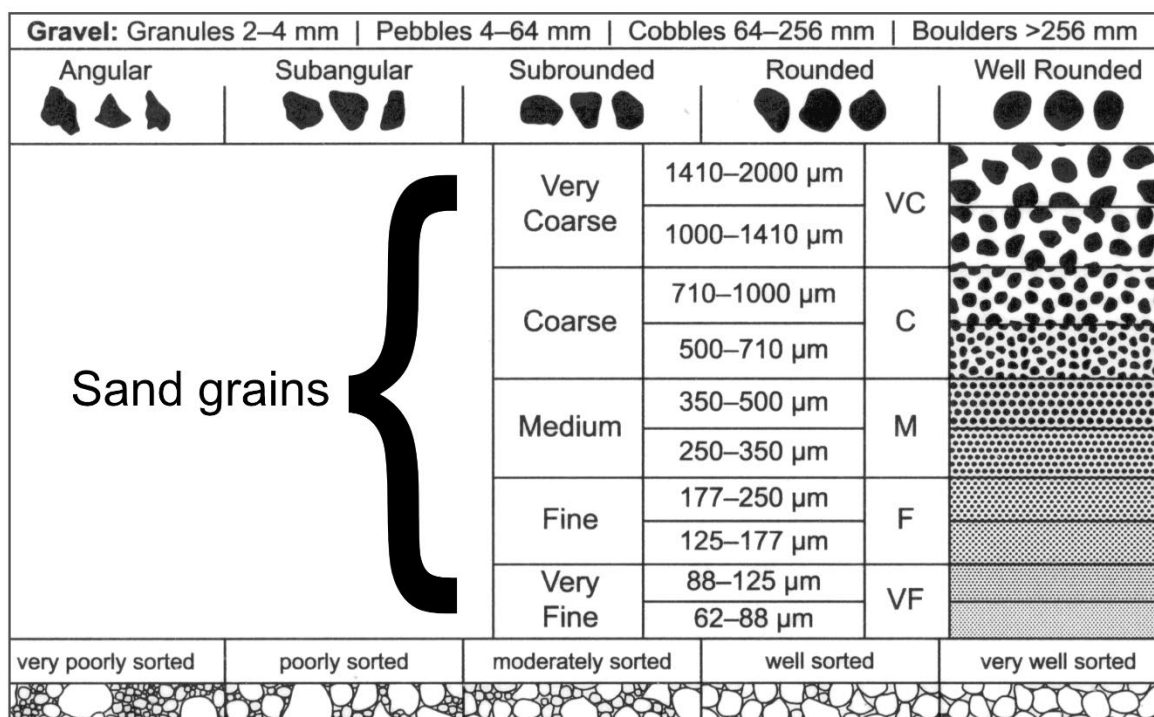


Igneous rock classification chart

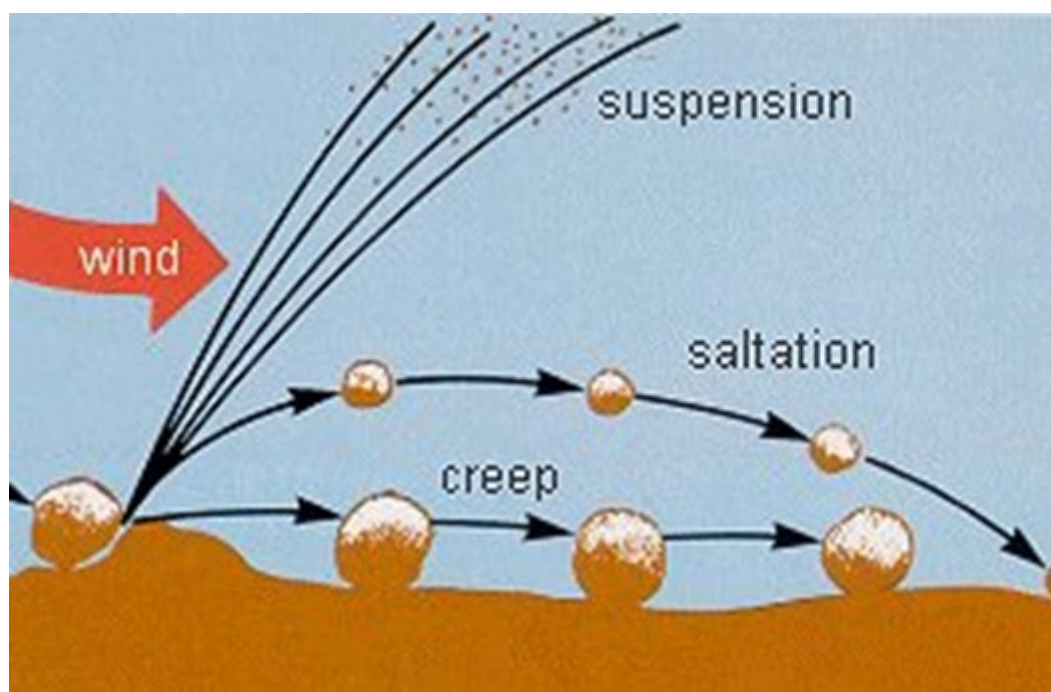


Schematic representation of Earth's ecliptic plane.

Image sourced from https://commons.wikimedia.org/wiki/File:Earths_orbit_and_ecliptic.PNG



Grainsize chart, courtesy of the Geological Survey of NSW

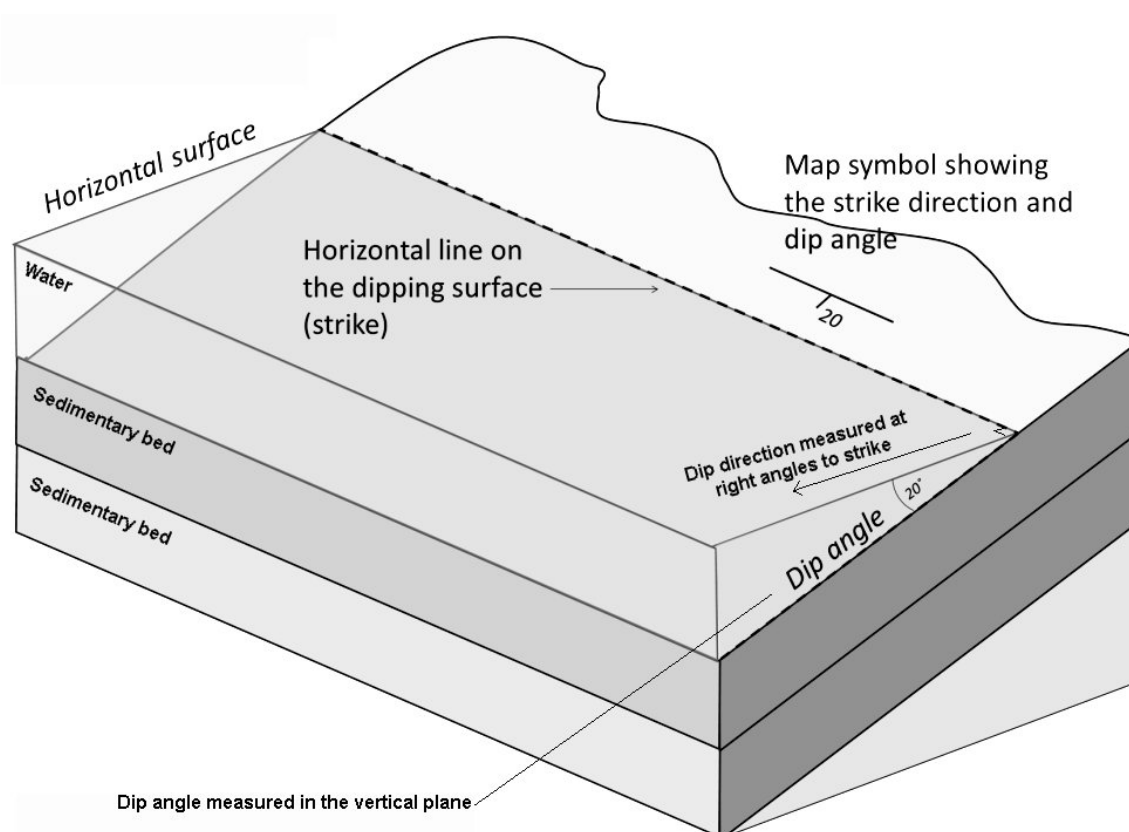


Movement of sand by fluids. Sediments move, driven by fluid motion, by being pushed along or by rolling along the ground (creep), bouncing from one spot on the ground to the next (saltation) or by suspension in the fluid without touching the ground. The transport mode for any given grainsize will vary as the fluid velocity changes. Image source: [https://en.wikipedia.org/wiki/Saltation_\(geology\)](https://en.wikipedia.org/wiki/Saltation_(geology))

Definition of Dip and Strike

Strike – the trend of a horizontal line contained in the surface of a planar structure such as a sedimentary bed, fault plane or planar intrusive body.

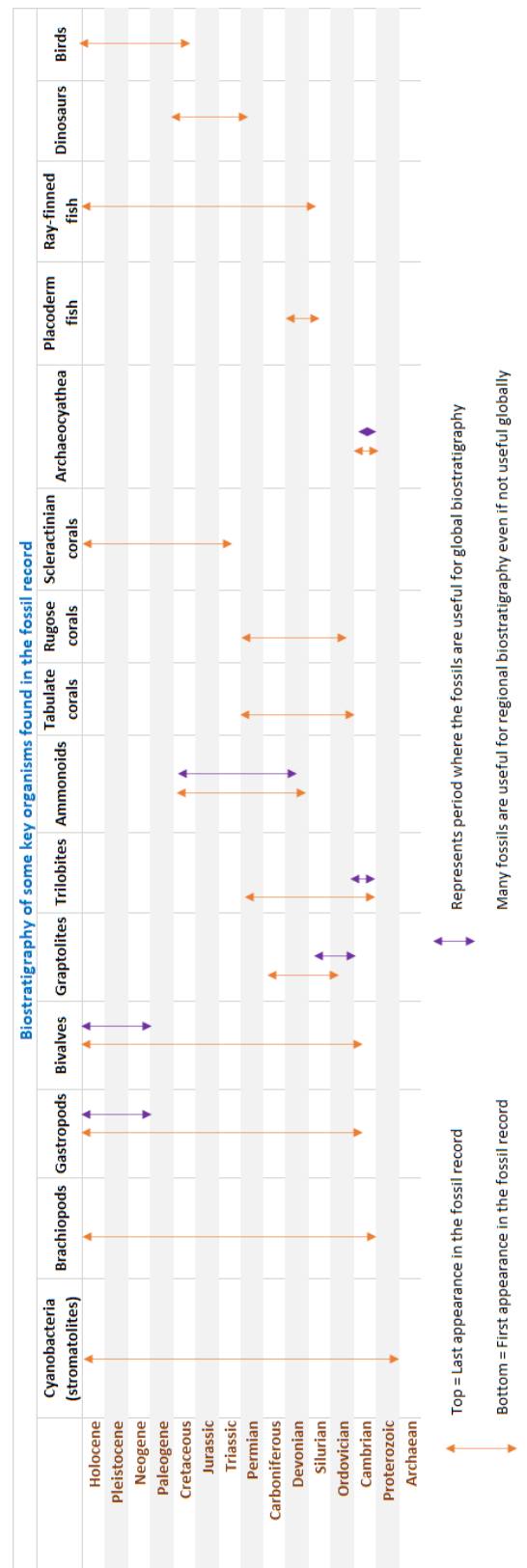
Dip – the angle between the horizontal and a planar structure such as a sedimentary bed, fault plane or planar intrusive body measured in the vertical plane perpendicular to strike.



A depiction of the strike and dip of some tilted sedimentary beds partially covered with water. The notation for expressing strike and dip on a map is shown. Modified from Figure 12.8, <https://opentextbc.ca/geology/chapter/12-4-measuring-geological-structures/>

Hardness	Example Minerals/materials
1	Talc
2	Gypsum
2.5	Fingernail, pure gold, silver, aluminium
3	Calcite, copper coin
4	Fluorite
4.5	Platinum, iron
5	Apatite, Pyroxene group (5 to 6)
6	Orthoclase feldspar, titanium, <u>spectrolite</u> , Pyroxene group (5 to 6)
6.5	Plagioclase feldspar, steel file, iron pyrite, glass, vitreous pure silica
7	Quartz, amethyst, <u>citrine</u> , agate, olivine, tridymite (high temp quartz)
7.5	Garnet, <u>coesite</u> (high pressure quartz)
8	Hardened steel, topaz, beryl, emerald, aquamarine
9	Corundum, ruby, sapphire
9.5	Carborundum
10	Diamond

Mohs Hardness Scale



Biostratigraphy of some key fossils