



## Glossary

**Abrasion:** the process of wearing away rock surfaces by the scouring action of sedimentary particles in air water or ice.

**Aeolian:** of wind/air. Aeolian sediments are those which have been transported in air by wind and then deposited. Common to deserts but can also be found in foreshore and neighbouring environments.

**Angle of Repose:** the maximum angle at which a pile of sedimentary material will naturally rest. The angle of repose in a *fluvial* environment is lower than in an *aeolian* environment.

**Attrition:** the process by which sedimentary particles are slowly worn away and rounded as they collide with each other.

**Bedding:** the (usually) parallel layers found in sedimentary rocks that mark the orientation of land-surface which they are being laid down on.

**Bed Form:** the shape of the surface onto which sedimentary material is being laid down. This may be flat, rippled, striated etc.

**Boulder:** a type of sedimentary *clast* which is greater than 256mm in diameter.

**Calcite:** a mineral composed of Calcium Carbonate ( $\text{CaCO}_3$ ) a major component of *limestones* and a common *cement* for *clastic* sedimentary rocks. A key component of shells, corals and other skeletons. Its crystals have trigonal symmetry commonly forming elongate pyramid shaped crystals giving its common name of dog-tooth spar. It has a hardness 3 on the Mohs Scale.

**Caledonian Orogeny:** the mountain building event brought about by the collision of the ancient continents of Laurentia, Baltica and Avalonia which created the *metamorphic* terrane which underpins the Highlands of Scotland. The orogeny comprised a series of events as the continents met between the *Ordovician Period* and the early *Devonian Period*.

**Carboniferous Period:** geological time period between 358.9 and 298.9 million years ago. It follows the *Devonian Period* and is succeeded by the *Permian Period*.

**Cement:** mineral material precipitated between the grains of clastic sedimentary rocks after the clastic material was laid down, which hold the rock together in much the same way that cement (in common parlance) holds bricks together. Calcite, iron oxides and quartz are common cements in sandstones.

**Clast:** a piece of mineral or rock which has been deposited as a discrete sedimentary particle which can be of any size from micron to many metres. Also referred to as a grain.

**Clastic:** a rock made up of clasts (or grains), for example sandstones, shales and conglomerates. Most sedimentary rocks are clastic excluding *evaporites* and some *limestones*.

**Clay (minerals):** a suite of mica-like minerals found in clays. In the presence of water they are the breakdown products of a range of silicate minerals (such as feldspars, pyroxenes and amphiboles) found in metamorphic and igneous rocks. They invariably occur in extremely fine grains. The minerals include Kaolin, Montmorillonite, Illite and Chlorite.

**Cleavage:** planes of weakness found in minerals and some rocks, along which they break more easily. In minerals such as feldspar and calcite which have strong cleavage planes, they easily fracture along the cleavage planes producing flat shiny surfaces.

**Cobble:** a type of sedimentary *clast* which is between 64 and 256mm in diameter.

**Concretion:** rounded nodules found in (principally) sedimentary rocks from a few millimetres to many metres in diameter. They are formed by the preferential precipitation of minerals from groundwater after sedimentary material is deposited. They are formed of the same minerals as *cement* – calcite, iron oxide and quartz, and can be thought of as a sort of differential cementation.

**Cross-lamination:** lamination found between sedimentary *bedding* planes which are at an angle to the *bedding* planes. Also known as Cross-stratification.

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**Devonian Period:** geological time period between 419.2 and 358.9 million years ago. It follows the *Silurian Period* and is succeeded by the *Carboniferous Period*.

**Diagenesis** (from the Greek, across generations): The process that happens after sediments are laid down where water circulating through the sediment precipitates minerals onto the grains. Diagenesis is responsible for forming cement as well as concretions and banding.

**Diamond:** the hardest crystalline form of Carbon, with a hardness 10 on the Mohs Scale.

**Distal:** a generalised description for a rock in which the material included in it has have travelled a long distance from its source. Opposite of *proximal*.

**Erosion:** the process by which rocks are broken down and removed as sedimentary material.

**Feldspar:** a framework silicate mineral made of varying proportions of silica, aluminium, sodium, potassium, and calcium. There are two major groups of feldspars – alkali feldspars and plagioclase feldspars. Feldspars have a hardness of between 6 and 6.5 on the Mohs scale.

**Fluvial:** of rivers. Fluvial sediments are those which have been transported by rivers and then deposited. Other water-based sedimentation occurs marine and lacustrine environments.

**Fracture (mineralogical):** the way that a mineral breaks (other than along *cleavage* planes). Descriptors may include earthy, jagged, uneven, conchoidal (shell-like for example in flint).

**Garnet:** a group of silicates which commonly but not exclusively form in metamorphic rocks. Several varieties of garnet are used as gemstones. Garnets have a hardness of between 6.5 and 7.5.

**Grain:** a piece of mineral or rock which has been deposited as a discrete sedimentary particle which can be of any size from micron to many metres. Also known as a *clast*.

**Grit:** a very coarse grain of sand. Doesn't form part of the Wentworth classification of grain size so not precisely defined.

**Gravel:** a type of sedimentary *clast* which is between 2 and 64mm in diameter.

**Hardness:** a measure of how resistant a mineral or rock is to abrasion. Mohs scale of hardness uses scratching as a qualitative test of this resistance.

**Igneous:** relating to volcanic or subsurface plutonic activity. Igneous rocks are one of the three types of rock, *igneous*, *metamorphic* and *sedimentary* and are formed when molten rock (magma) cools.

**Immature:** used to describe sedimentary material which has spent a short time in the sedimentary lifecycle so that there has been little time for physical and chemical breakdown and *sorting*. *Immature* sediments will have a *proximal* source.

**Joints:** natural breaks (fractures) in rock confined and running perpendicular to beds. They are caused by contraction of the rock (particularly *igneous* rock) or by flexing of the rock through *tectonic* activity. Not to be confused with faults which fracture multiple beds and move them relative to each other so that *bedding* planes no longer line up.

**Lamination:** a sequence of fine layering found between bedding surfaces in *sedimentary* rocks. See also *cross-lamination*.

**Laminar:** a description of flow in steady parallel streamlines as if in layers.

**Limestone:** a sedimentary rock composed mostly of carbonate, usually calcium carbonate (lime).

**Lithic fragments:** clasts found in sedimentary (and sometimes in volcanic igneous rocks) which are fragments of pre-existing rock with more than one mineral grain.

**Lustre:** the way that light interacts with the surface of a mineral. Lustre types include vitreous, resinous, pearly, greasy, silky, and adamantine.

**Mature:** used to describe sedimentary material which has spent a long time in the sedimentary lifecycle so that there has been plenty of time for physical and chemical breakdown and *sorting*. *Mature* sediments will have a *distal* source.

**Metamorphic** (from Greek to change form): rocks that have been transformed in consequence of heat and/or pressure through burial or proximity igneous material.

**Mica:** a family of sheet silicate minerals which have a strong basal cleavage which means they appear in sedimentary rocks as fine shiny flakes. Most common micas are muscovite (silvery gold colour) and biotite (dark brown or black). Micas have a hardness of between 2 and 3 on the Mohs scale.

**Mineral:** naturally occurring inorganic, solid element or compound forming a crystalline structure.

**Mud flakes:** partially consolidated mud ripped up in *fluvial* environments and redeposited within another sedimentary layer.

**Munsell Chart:** a reference book of colours to quantify the colour of objects, including rocks. Created by Albert Henry Munsell an artist working at the turn of the 20<sup>th</sup> century.

**Native Metal:** metals which are made of a single element e.g. pure gold or pure copper. This is distinct from most ores where the metal is combined to form a mineral oxide (e.g. hematite) carbonate (e.g. malachite) or sulphide (e.g. iron pyrites).

**Ordovician Period:** geological time period between 485.4 and 443.8 million years ago. It follows the Cambrian Period and is succeeded by the Silurian Period.

**Period:** one of a series of geological units of time. Period denotes 10 to 100 million years of time. The series used in geochronology from largest (0.5 billion years plus) to smallest (millions of years) are Eon, Era, Period, Epoch and Age.

**Permian Period:** geological time period between 298.9 and 251.9 million years ago. It follows the *Carboniferous Period* and is succeeded by the *Triassic Period*.

**Polarising Microscope:** microscope used by geologists to examine thin sections and identify minerals in them. The polarising microscope has two polarising filters which can either be oriented in the same direction (plane polarised light) or at 90° (cross polarised light). In cross-polarised light anisotropic minerals (all without cubic symmetry) will produce coloured patterns which enable their identification.

**Pores:** those parts of a sedimentary rock which are neither grain or cement but either air or fluid filled.

**Provenance (geology):** The source of sedimentary material including the journey it has made between its source and the location in which it is deposited.

**Proximal:** a generalised description for a rock where the material included in it has travelled a short distance from its source. Opposite of *distal*.

**Quartz:** a mineral made silicon dioxide (SiO<sub>2</sub>) which occurs in granites and almost all *clastic sedimentary* rocks. It is also a common vein mineral as it is readily dissolved in hydrothermal fluids. Quartz has a hardness of 7 on the Mohs scale.

**Rhombic:** a crystal shape where the visible 2-dimensional shape of the crystal is a rhombus (parallel sided, with opposite angles equal and adjacent angles different).

**Sandstone:** a *clastic* rock composed of grains (of sand) between 62.5 micrometres and 2 mm in diameter.

**Silt:** a *clastic* rock composed of grains between 3.9 and 62.5 micrometres in diameter.

**Sorting:** a description of how diverse the range of sizes and shapes are in a *clastic* sedimentary rock. A small variation is classed as well sorted and a wide variation as poorly sorted.

**Stratigraphy:** the study of the relationship between layers of rock and what this can tell us about the relative ages of the layers.

**Tephra:** rock particles ejected in a volcanic eruption.

**Thin Section:** a cut slice of rock to be examined under a *polarising microscope* which is adhered to a glass slide with epoxy and then ground and polished to a precise thickness of 30µm.

**Till:** material deposited directly by glaciers, which is poorly *sorted*. Often referred to as boulder clay.

**Transport:** the mechanism by which sedimentary material is moved from its source to its depositional destination. Transport will be by one of water, air or ice.

**Triassic Period:** geological time period between 251.9 and 201.3 million years ago. It follows the *Permian Period* and is succeeded by the *Jurassic Period*.

**Tuff:** or volcanic tuff, is the rock formed from the accumulation and consolidation of *tephra* ejected from a volcano.

**Turbulent:** a description of flow in convoluted spiralling streams in contrast to *laminar* flow.

**Twinning:** where crystals of a single mineral grow back to back but in different orientations. This is common in feldspars. In Plagioclase feldspars twinning commonly happens multiple times creating a distinctive stripy look just visible with a magnifying glass.

**Uniformitarian:** the idea that the physical and biological processes which operate today have operated in a progressive and similar way through out geological history.

**Weathering:** processes acting on a rock at or near to the surface where the rock is in situ.

**Zircon:** a mineral composed of zirconium silicate ( $ZrSiO_4$ ). It forms as a secondary mineral in some igneous and metamorphic rocks. Its physical and chemical durability means it is also found in *clastic* sedimentary rocks. It is also used as a gemstone. Zircon has a hardness of 7.5 on the Mohs scale.