

Geological words and phrases

There are many words and terms used by earth scientists to describe rocks and geological processes within the various geological sciences. This glossary only contains a limited selection of geological and geophysical definitions in alphabetical order.

The glossary is derived from various simplified glossaries compiled by the **US Geological Survey** and the **UK Geological Society** for the general public and students. Other definitions can be obtained via internet search engines such as Wikipedia and Google. There are also numerous geological dictionaries published and available at good book shops. This glossary has been used in the publication – ***A Geological Guide to the Canberra Region and Namadgi National Park*** – published by the Geological Society of Australia (ACT Division).

Try the web sites below or the Google search engine if you require further clarification of geological words used on the Old Courthouse Museum, Batemans Bay, web site.

<http://geomaps.wr.usgs.gov/parks/misc/glossarys.html>

<http://www.geolsoc.org.uk/ks3/gsl/education/resources/rockcycle.html>

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Basalt thin section



Doug Finlayson
Canberra, 2016

- alluvial fan:** A mass of sediment deposited by a river where there is a significant decrease in gradient (e.g. from a mountain to a plain).
- anticline:** A fold or fold system in the form of an arch.
- aquifer:** Part of a rock formation that can yield significant quantities of water to bores, wells and springs.
- basalt:** A fine-grained, sometimes glassy, black volcanic rock generally found in the form of lava flows. A dark-coloured volcanic rock consisting mainly of olivine, augite and plagioclase.
- batholith:** A large mass (more than 100 square kilometres of surface exposure) of coarse-grained intrusive igneous rock, most often granite.
- bedding:** A 'bed' is a single uniform layer of sedimentary rock, separated from layers above and below by more or less distinct surfaces or partings called 'bedding planes'. 'Bedding' is a collective term to describe the arrangement of successive beds.
- biotite:** A widely distributed mica mineral useful in the potassium-argon method of the age determination.
- breccia:** A rock consisting mostly of broken angular fragments; often produced by explosive volcanic activity.
- calcite:** The mineral calcium carbonate (CaCO_3), which is the principal constituent of limestone and of which the shells of many marine animals, living and fossil, are made.
- caldera:** A large basin-shaped depression, more or less circular, around a volcanic vent or vents; may be a product of erosion (erosion caldera) or of collapse following withdrawal or ejection of supporting lava below (collapse caldera).
- carbonaceous:** Describes a sedimentary rock containing organic matter.
- cherty:** Containing chert, a hard, very compact sedimentary rock consisting mainly of silica (SiO_2).
- clast:** A grain or a fragment produced by the disintegration of a larger rock mass.
- cleavage:** Closely spaced parallel planes along which a rock tends to split, generally at a high angle to the bedding planes. Cleavage is developed in rocks that have been subjected to considerable pressure, and it is accompanied by at least some reorientation and recrystallisation of the minerals in the rock.
- colluvium:** - A general term used to describe loose and incoherent deposits/rubble usually at the foot of a slope or cliff.

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Essexite outcrop, Bawley Point.



Doug Finlayson
Canberra, 2016

conglomerate: A sedimentary rock composed of rounded (to sub-angular) fragments larger than 2 mm in diameter (commonly granules and pebbles), set in a matrix of sand, silt, or clay.

continental: A sedimentary deposit laid down on land or in bodies of water not directly connected with the ocean.

crater: A generally bowl-shaped depression which is the vent of an active volcano.

crust: The outermost layer or shell of the Earth (to a depth of about 20 to 50km).

crystal: A single grain of a mineral; often restricted to grains with planar faces that reflect the internal structure of a mineral.

dacite: A lava whose principal minerals are feldspar (with plagioclase predominant over alkali-feldspar) quartz, and hornblende or pyroxene, with a little mica.

delta: The sediments deposited at or near the mouth of a river.

dip: The angle at which a bedding or cleavage plane is inclined from the horizontal.

dolerite: An igneous rock similar to a basalt, but with a slightly coarser grain size as a result of its slower cooling.

dome: An anticlinal structure, either circular or elliptical in outline, in which the strata dip away (down) in all directions.

dyke: A tabular body of igneous rock, often vertical or steeply dipping, that cuts across the structure of adjacent rocks.

essexite: A coarse-grained plutonic intrusive rock with composition similar to monzodiorite and monzogabbro.

fault: A fracture along which the rock on one side has been displaced relative to the other.

feldspar: A group of rock-forming minerals that is the most widespread of any mineral group, constituting 60% of the Earth's crust. There are two basic sub-groups important for the purpose of defining igneous rocks: alkali feldspars and plagioclase. Feldspars are aluminium silicates of, generally, potassium and or sodium (alkali feldspar) or sodium and or calcium (plagioclase), and occur in all kinds of rocks. They decompose to clay minerals.

felsic: Containing an abundance of feldspar minerals, usually giving a rock a light colour (contrast with mafic).

fluvial: Produced by the action of a stream or river.

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Braidwood Granodiorite at Bells Creek.



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Canberra, 2016

gabbro: A medium to coarsely grained igneous rock consisting of basic plagioclase (a suite of basic aluminium silicate minerals) and clinopyroxene (a suite of basic chain silicates).

garnet: A group of minerals, most commonly found as well-shaped crystals in metamorphic rocks, but also occurring as an accessory mineral in igneous rocks. Good crystals have a practically circular cross-section. Their colour depends on composition, but dark red is most common.

graben: An elongated downthrown crustal block bounded by faults on its long sides (e.g. a rift valley).

granite: - A general term commonly used to describe a coarse-grained alkali-rich plutonic igneous rock formed in the middle and lower crust and commonly containing quartz, feldspar and biotite crystals. Many compositional variations are encountered.

granodiorite: A coarse-grained intrusive igneous rock (as compared with lava, which is extrusive), whose principal minerals are feldspar (with plagioclase predominant over alkali-feldspar), quartz, biotite, and hornblende.

groundmass: The fine-grained material between the phenocrysts of an igneous rock, usually representing the portion of a magma that was liquid at the time of eruption or intrusion.

gypsum: A widely distributed, very soft, white to colourless mineral consisting of hydrous calcium sulphate ($\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$), commonly found in evaporite deposits (formed from the evaporation of saline water) or in limestones, shales and clays.

hornblende: A member of the rock-forming amphibole group of minerals, of very complex chemical formula. It is a primary constituent of many igneous rocks and is common in metamorphic rocks. Seen in a broken rock surface it is black, with a rough surface. Good crystals are roughly rectangular.

hornfels: A fine-grained rock resulting from contact metamorphism. The term is a general one for rocks that have been baked very hard, and therefore significantly re-crystallized by the heat of a nearby igneous intrusion, usually with the introduction of extra silica and changes in the mineral composition of the rock..

hydrothermal alteration: The alteration of rocks through reaction with hot volcanic water or steam.

igneous rocks: Those rocks that have solidified from a molten state (magma).

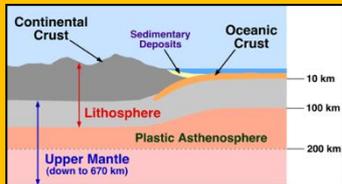
impermeable: The condition of a rock where it is incapable of transmitting fluids under pressure.

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Earth's crust and lithosphere.



Doug Finlayson
Canberra, 2016

The Old Courthouse Museum
Batemans Bay NSW

intrusive rocks: Igneous rocks that have solidified after being injected into pre-existing solid rocks.

ironstone: A sedimentary rock containing a substantial proportion of an iron oxide, carbonate, or silicate.

joint: A fracture or parting in a rock without displacement. Joints may arise through external compression/tension or through shrinkage during cooling or desiccation. They usually occur parallel in series to form joint sets.

lahar: A chaotic deposit of boulders and mud resulting from a flow of rainwater, volcanic mud and debris.

lava: Fluid or viscous magma extruded onto the surface of the earth from a volcano or volcanic fissure.

lava flow: A stream of fluid or viscous magma erupted from a volcanic cone or fissure; the solidified mass of rock formed when a stream of lava cools and solidifies.

limestone: A sedimentary rock consisting essentially of carbonates, the two most important being calcite (CaCO_3) and dolomite (Ca/MgCO_3); a general term for all rocks containing at least 80 per cent calcium carbonate.

lithification: The process in which a loose and unconsolidated accumulation of sediment or pyroclastic material becomes a hard compact rock.

lithosphere: - That part of the Earth's outer shell that includes the crust and upper mantle and that behaves like a rigid zone above a more ductile asthenosphere. In the plate tectonic description of geodynamic processes, the various lithospheric plates across the globe move with respect to each other.

mafic: Containing an abundance of dark-coloured silicate minerals rich in the heavier elements iron and magnesium (contrast with felsic).

magma: Naturally occurring liquid rock material, generated within the earth and capable of being intruded or extruded to solidify as an igneous rock. It may be wholly liquid or contain a proportion of suspended crystals which will form phenocrysts if the magma is quickly chilled.

mantle: The portion of the earth's interior below the Earth's crust and above the core, that is from a depth of about 35 km to 3480 km.

mélange: A rock unit that is multiply deformed and includes metamorphic rock commonly associated with a subduction zone at a convergent plate margin.

metamorphic: - A class of rocks that has been formed as a result of partial or complete recrystallisation in the solid state of pre-existing rocks under high temperatures and pressures. There are various grades of metamorphism.

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Monzodiorite thin section



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Canberra, 2016

mica: Prominent rock-forming constituents of igneous and metamorphic rocks. They form as tabular hexagonal prisms that characteristically split into thin tough flakes. Two common varieties are biotite and muscovite, which are dark as thick crystals, and brown and colourless, respectively, as thin flakes.

mineral: A naturally occurring substance with a specific composition or range in composition and a fixed internal structure.

moho: - An abbreviation for Mohorovicic discontinuity; boundary between the Earth's crust and the underlying upper mantle defined where there is a significant increase in the velocity of seismic waves; named after its discoverer Andriji Mohorovicic, a Croatian seismologist (1857-1936).

mudstone: A general term for sedimentary rocks of very fine grain size, often used when it is not possible to define the rock more closely as a claystone, siltstone, or shale.

olivine: Olive to grey-green coloured mineral, $(Mg, Fe)_2SiO_4$. A green magnesium-iron silicate mineral characteristic of dark-coloured basic igneous rocks such as basalt.

orogen: From the Greek for "mountain generating". A geological province or region that has been subjected to mountain building and crustal shortening processes as a result of plate tectonic activity at some stage. The province may be deeply eroded and now have benign terrain.

peat: An accumulation of rotting organic material in a swamp.

permeable: Describes a rock that is capable of transmitting fluids under pressure.

phenocryst: – a relatively large crystal set in the finer matrix of an igneous rock.

porous: Describes a rock which can contain fluids in the cavities between the grains making up the rock.

plagioclase: A member of the feldspar mineral group containing calcium and sodium but little potassium.

plutonic rocks: Coarse-grained igneous rocks which have crystallised well below the earth's surface.

porphyritic: A texture in igneous rocks in which large crystals (phenocrysts) are enclosed in a finer-grained groundmass.

porphyry: An igneous rock rich in phenocrysts. The term is commonly used in conjunction with other mineral names, e.g quartz porphyry.

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Quartz dyke, Malua Beach



Doug Finlayson
Canberra, 2016

pyroclastic rocks: Rocks formed by the accumulation of material derived from the explosive fragmentation of very viscous magma or other pre-existing rocks.

pyroxene: A silicate mineral group of complex composition containing varying amounts of iron, magnesium, calcium and sodium.

plate tectonics: A description of geodynamic processes across the globe that envisages the outer part of the Earth (crust and upper mantle) as a jigsaw of interacting semi-rigid plates "floating" above a deeper, more fluid deep mantle.

plunge: The direction and amount of inclination of the crest or trough of a fold.

pluton: - A major intrusive body of igneous rock formed beneath the Earth's surface by the consolidation of magma or partial melt fraction.

pyroclastic rock: An igneous rock made up of fragmental material ejected more or less explosively from a volcano (distinguished from a lava, which emerged as a viscous fluid).

quartz: Crystalline silica, SiO₂. Quartz is a very stable mineral, which does not alter chemically during weathering or metamorphism. Therefore, besides being an essential constituent of 'acid' igneous rocks, it is very common in sedimentary rocks such as sandstone and siltstone. It is hard, usually, colourless or white, and seldom forms good crystals. Quartz can also precipitate from aqueous solutions, and may, therefore be found in such places as fault zones, veins, and holes (vugs, vesicles) in rocks.

rhyodacite: A porphyritic lava whose principal minerals are feldspar (with plagioclase and alkali-feldspar in roughly equal quantities), quartz, and biotite.

rhyolite: The lava equivalent of granite; typically porphyritic, but may be wholly glassy. A volcanic rock consisting mainly of quartz and alkali feldspar.

sandstone: A cemented or compacted rock consisting of detrital grains which range in size from 1/16mm to 2 mm. Because of its stability, quartz often makes up a large proportion of the grains. Adjectives are added to the name to indicate the nature of the cement or the presence of relatively large proportions of a distinctive grain type, e.g. feldspathic sandstone. tuffaceous sandstone. argillaceous (clayey) sandstone, ferruginous sandstone, calcareous sandstone, etc.

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Sedimentary rocks, Wasp Head.



Doug Finlayson
Canberra, 2016

scoria: Fragments of frothy or very vesicular lava, usually having a basaltic composition.

scre: Loose boulder rock material accumulated at the base of a cliff or on a steep mountain slope.

sedimentary: Pertaining to or containing fragmental material that originates from the weathering and erosion of rocks and is transported and deposited by air, water, or ice.

sedimentary rocks: Rocks formed by the accumulation of sediments transported in water or air by the action of rivers, lakes, oceans or wind.

seismic survey: The gathering of seismic data which uses the generation, reflection, refraction, detection and analysis of elastic waves in the Earth to map subsurface geological structures.

sequence: A succession of rocks arranged in chronological order to show their relative position and age with respect to geological history as a whole.

shale: A very fine-grained sedimentary rock showing fine laminations and originally deposited as mud.

shield volcano: A volcano having a broad, low shape similar to an inverted saucer with a diameter many times its height.

silicate minerals: A large and common group of minerals consisting of a network of silicon and oxygen atoms, usually modified by the presence of atoms of one or more metals.

sill: A sheet of intrusive igneous rock, often near horizontal, intruded parallel to the structure of adjacent rocks.

siltstone: A sedimentary rock whose grains are from 1/256mm to 1/16mm across – finer than sandstone, but coarser than shale or claystone. In a siltstone the grains can still be seen (if not identified) with a lens, which is not the case with a claystone.

stratigraphy: The study of stratified rocks (sedimentary and volcanic), especially their sequence in time, the character of the rocks, and their correlation with different localities.

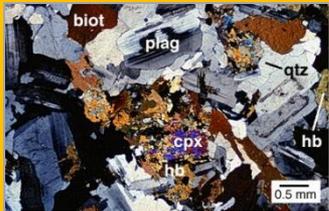
strike: The direction of a horizontal line on the plane of an inclined bedding, cleavage, or joint plane. On flat ground, the exposed edges of dipping beds lie along the direction of strike. When describing the attitude of beds by dip and strike, it is important to give the general direction of the dip (i.e. if the strike is 90 deg. and dip 35 deg., it must be stated whether the dip is to north or south).

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Tonalite thin section



Doug Finlayson
Canberra, 2016

strike-slip: - The component of movement parallel with the strike of a fault.

tectonics: The study of the major structural features of the earth's crust, or the broad structure of a region.

tonalite: A plutonic igneous rock with essential quartz (>20%) and plagioclase feldspar (oligoclase or andesine), mafic minerals and minor alkali feldspar (<10% vol).

truncated: Describes bedding or a sedimentary sequence that has been cut off by erosion.

tuff: A compact deposit of volcanic ash and dust that may contain up to 50% of sand and/or clay. A pyroclastic rock composed of compacted ash and lapilli-sized fragmentary material.

turbidite: - Sedimentary rock formed in the deep water off the margins of continents by turbidity currents transporting and sorting huge suspended sediment loads.

unconformity: A break in sediment deposition indicating a significant lapse of time. If the beds on either side of the break are more or less parallel, it is an *erosional unconformity*, or *disconformity*, but if the beds have different attitudes it is an *angular unconformity*. Most geologists, when they talk of an unconformity, have the latter in mind.

uplift: A structurally high area in the crust, produced by positive movements that raised or thrust the rocks up.

volcano: A vent in the earth's crust from which molten lava and pyroclastic material is erupted, also the mountain built up by the accumulation of these rocks.

volcanic arc: A chain of volcanic islands adjacent to a continent, generally with a deep oceanic trench on the ocean facing side and a marginal basin on the landward side (e.g. Japan, Aleutian Islands). Plate tectonic processes indicate that this feature is the result of an oceanic plate (large rigid part of Earth's crust) sliding underneath the continental plate.

weathering: The process by which rocks are broken down and decomposed by wind, rain, temperature changes, plants, and bacteria.