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Glossary

Absolute age The age of a rock or an event in years, or millions of years

Acid mine drainage When mines are working, the water table is often lowered, allowing minerals to oxidise; when the mine is abandoned, the water rises and dissolves the minerals, producing acid, which drains from old mine passages into surrounding streams

Acid rain Rain polluted by human-produced chemicals in the atmosphere, such as nitrogen and sulfur compounds, in addition to the normal carbon dioxide content of the rain

Acid test One drop of dilute hydrochloric acid (wear eye protection) is added to the specimen; if it reacts (fizzes), carbonate is present, usually calcium carbonate; used to identify calcite, aragonite, limestone and marble

Aggregate Crushed rock (e.g. limestone, sandstone, granite, basalt) or sand and gravel; used to add to concrete, for foundations and for railways

Andesite A fine-grained chemically intermediate igneous rock found in lavas and small intrusions; usually grey in colour

Angular unconformity Unconformity, where the rocks beneath the unconformity surface dip at a different (usually steeper) angle than the rocks above

Anomaly A feature (e.g. high copper concentration; high magnetic field strength) that differs from the background

Anticline Upfolded rocks (strictly, folded rocks with the oldest rock in the centre of the fold - since, if the sequence was tectonically inverted, anticlines would be downfolds)

Aquifer A permeable rock layer containing water

Aragonite A mineral (CaCO_3); an allotrope of calcite (same chemical make-up, different atomic structure)

Archaea Simple organisms that have cells with no nuclei

Asteroids Small bodies in outer space that sometimes collide with planets

- Asthenosphere** The zone in the mantle beneath the lithosphere, between around 100 and 250 km beneath the Earth's surface; is partially molten (1 - 5% liquid) and flows, carrying the tectonic plates
- Attrition** The rounding of rock fragments during transportation
- Aureole (metamorphic)** The zone of baked rock around an intrusion; the thermal metamorphic zone
- Axial plane surface** A plane formed by joining the axes of folded layers together
- Baked margin** The thin zone of metamorphosed rock along the margin of a narrow igneous intrusion, such as a dyke or sill; a thermal metamorphic zone
- Basalt** A fine-grained mafic (magnesium and iron-rich) rock, dark in colour; commonly forms lavas and small intrusions
- Bed (sedimentary)** A layer in a sedimentary rock, originally laid down as a layer of sediment
- Benioff zone** Zone of earthquakes sloping diagonally downwards where a plate is subducting (sometimes at 90°)
- Biofuel** Crop grown to produce power for human use
- Biological weathering** The physical and chemical effects of plants on rocks and soils, including the extensive effects of microscopic bacteria
- Borehole core** A cylinder of rock drilled from a rock formation using a hollow drill bit
- Breccia** A coarse-grained rock with angular grains (sedimentary or formed along a fault as a fault breccia)
- Brittle behaviour** When a material behaves in a brittle manner, it breaks (fractures) under pressure
- Bund** An embankment; bunds are often built around quarries to reduce their environmental impact
- Calcite** A mineral (CaCO_3), usually white or colourless, can form good 'dog tooth'-shaped crystals, good cleavage, fairly low hardness, reacts with dilute acid, is the main mineral in limestone and marble, is found as a gangue mineral in veins and as cement in some sedimentary rocks
- Cap rock** An impermeable rock that can trap fluids (oil, natural gas, water) underground; includes impermeable mudstone, shale, clay, salt or clay layers along some faults

- Carbon capture** The reduction of carbon emissions by collecting the carbon dioxide released by coal-, oil- and gas-burning power stations and storing it in abandoned oil or gas fields - still experimental; also called carbon sequestration
- Carbon footprint** Relates to the amount of carbon dioxide released to the atmosphere by the activities of an individual or organisation; usually related directly to the energy used
- Carbon sequestration** The reduction of carbon emissions by collecting the carbon dioxide released by coal-, oil- and gas-burning power stations and storing it in abandoned oil or gas fields - still experimental; also called carbon capture
- Carbon trading** A commercial system designed to offset carbon production by one activity (such producing power from fossil fuel) with another that reduces carbon production (such as planting trees); 'units' of carbon may be 'traded' by different organisations
- Cement** Formed of minerals that crystallise in the pore spaces of sediments, hardening them into sedimentary rocks; usually quartz or calcite
- Cephalopod** Cephalopods alive today include octopus and squid, but the geologically important ones lived in coiled shells and are nearly all extinct; the most well known shelled cephalopods are the extinct ammonites and the living *Nautilus*
- Chemical weathering** The chemical breakdown of rock surfaces; rainwater and soil-water play critical roles
- Chilled margin** The edge of an igneous intrusion, that has cooled more quickly than the inside, and so is formed of finer-grained rock
- Clay minerals** Fine-grained sedimentary minerals; formed from the chemical breakdown of silicate minerals like feldspar and mica
- Clean coal technology** The use of new technology to burn coal and produce power, whilst keeping the release of polluting and greenhouse gases to a minimum
- Cleavage (mineral)** The way in which a mineral breaks, parallel to the weaknesses in its atomic structure; minerals can have no cleavage, or one, two, three, or four directions of cleavage
- Cleavage (slaty or metamorphic)** The slaty foliation of low-grade regional metamorphic rocks; forms slates
- Coarse-grained igneous rock** Rock formed by slow cooling of a magma, deep underground; crystals easily visible
- Columnar basalt** Basalts that have contracted as they cooled to form polygonal columns; the columns are usually vertical

- “Concentrate and contain” landfill method** The landfill method of disposing of waste in impermeable sites that are capped, with no leakage to the surrounding environment, as used in recent years
- “Cone of depression”** The inverted cone-shape of the water table around a pumping water well
- Confined aquifer** A water-bearing rock (aquifer) beneath an impermeable layer; the water is usually under pressure and can flow naturally through boreholes to the surface
- Conglomerate** A sedimentary rock formed of rounded pebbles (at least 2mm in diameter), usually with a fine-grained matrix
- Conservative margin** The sliding margin of a tectonic plate, where material is neither constructed or destroyed, but is conserved; also called a transform fault
- Constructive margin** The margin of a tectonic plate where new plate material is formed as plates are moved apart; also called a divergent plate margin
- Continental Drift (Theory of)** Alfred Wegener’s theory of the early 1900s, that the continents had moved across the Earth’s surface; the theory was later modified and included in the Theory of Plate Tectonics
- Convection current** Flow caused when heated material rises, because of its lower density, then cools and sinks, producing a continuous current
- Convergent margin** The margin of a tectonic plate where plate material is ‘destroyed’ as plates converge, either by partially melting and rising as magma, or by being absorbed in the mantle; also called a destructive margin
- Core (borehole)** A cylinder of rock drilled from a rock formation using a hollow drill bit
- Correlation** The use of fossils to identify rocks of the same age
- Cross bed** A bed laid down at an angle to the horizontal, usually in underwater dunes or wind-formed sand dunes
- Cross-cutting relationships (law of)** The stratigraphic law that anything (faults, joints, dykes, plutons, unconformity surfaces, etc.) which cut across anything else is younger
- Crust** The outer part of the Earth above the mantle, differing chemically from the mantle; it comprises oceanic crust under oceans (5 - 10 km thick) (30 - 50 km thick) and continental crust beneath continents and averages 15 km in thickness
- Crustal extension** The results of tensional stress; the rocks take up more space on the surface than they did before deformation

- Crustal shortening** This results of folding and/or faulting under compressional forces; as a result, the surface rocks occupy less space
- Cuesta** An asymmetrical ridge in the landscape that typically forms where a tough rock with a shallow dip (of usually less than 10°) overlies a weaker rock; also called an escarpment
- Current ripple marks** Non-symmetrical ripple marks formed by flowing water or wind; the steeper slope is in the down-current direction
- Cuttings** Wide, deep trenches excavated through hills or ridges for transportation routes
- Debris flow** The downhill flow of debris from a landslide; debris flows contain coarser material than mudflows
- Deep focus earthquake** An earthquake that originates between 300 and 700 km below the surface; these occur only at destructive convergent plate margins, where plates are subducted
- Deep mine (mine)** An underground excavation, usually for metal ores, other minerals or coal; mine excavations usually have vertical shafts and horizontal adits
- Deep time** Geological time
- Desiccation cracks** Polygonal cracks left by drying mud - can be preserved in mudstones; also called mudcracks
- Destructive margin** The margin of a tectonic plate where plate material is ‘destroyed’ as plates converge, either by partially melting and rising as magma or by being absorbed in the mantle; also called a convergent margin
- Diagenesis** The change of sediments to sedimentary rocks, through compression of the overlying sediments and cementation (cement being deposited in pore spaces); also called lithification
- Diamond** A mineral formed of carbon (C), usually colourless, forms good crystals, extremely hard, rare
- “Dilute and disperse” landfill method** The old landfill disposal method of allowing rainwater to disperse toxic elements of landfill in the rocks beneath
- Dinosaur** A type of reptile, now extinct
- Dip** The amount of downward slope of rock layers or structures, measured from the horizontal
- Discordant (drainage)** A river system cutting across underlying geology and not affected by it; often caused by a system that developed on overlying rocks, which have since been cut through and eroded away

- Divergent margin** The margin of a tectonic plate where new plate material is formed as plates are moved apart; also called a constructive plate margin
- Dolerite** A medium-grained mafic rock, dark in colour; commonly forms dykes and sills
- Downhole logging** Measurements made remotely by lowering sensors down a previously-drilled borehole
- Ductile behaviour** When a material behaves in a ductile way, it bends and flows under pressure, and stays in the same shape when the pressure is removed
- Dune** A mound of sand formed under water or by the action of wind; contains cross bedding
- Dyke** An igneous intrusion that cuts across the bedding planes of sedimentary rock or across igneous or metamorphic rock
- Earth System Science** The study of the Earth as a series of systems that interact with one another
- Earthquake (deep focus)** An earthquake that originates between 300 and 700 km below the surface; these occur only at destructive convergent plate margins, where plates are subducted
- Earthquake (intermediate depth)** An earthquake that originates between 70 and 300 km below the surface; these occur only at destructive convergent plate margins, where plates are subducted
- Earthquake (shallow focus)** An earthquake that originates between 0 and 70 km below the surface; these occur at all plate margins but shallow focus earthquakes alone occur at constructive (divergent) and conservative (transform) plate margins
- Earthquake focus** The place under the surface where the fracture of a fault produces earthquake shock waves
- Ecological niche** The local environment in which an organism lives and interacts with other organisms
- Elastic behaviour** When a material behaves elastically, it deforms under pressure, but then bounces back to its original shape when the pressure is removed
- Epicentre** The point where the shock waves from an earthquake first reach the Earth's surface - the surface waves then radiate out from this point like ripples on a pond; most earthquake damage usually occurs at the epicentre
- Erosion** The removal of solid material, which has often been loosened by weathering - by gravity, flowing water, wind or ice; erosion is usually the beginning of transportation
- Eukaryotes** Organisms that have cells with nuclei

- Evaporite deposits (or evaporites)** Salts (e.g. halite) that crystallise out when a lake or arm of the sea evaporates
- Exceptional preservation (lagerstätten)** Unusual examples in the fossil record where groups of fossils are very well preserved, usually with many of their soft parts attached
- Exfoliation** The formation of curved sheets of rock by weathering of the rock's surface; common on granites affected by heating and cooling weathering
- Exploration well** A borehole drilled to prospect for oil or gas (or water)
- Extinction** The dying out of a group of organisms
- Extrusive (lava, pyroclastics or igneous rock)** Extrusion is caused by magma reaching the surface and erupting volcanically as lava, ash, or larger pyroclastic materials
- Facing stones** Thin slabs of ornamental rock attached to the walls of buildings
- Fault** The brittle failure of rock under pressure, with movement of one side relative to the other; earthquakes are caused by faulting
- Fault breccia** Fractured angular rock fragments in a fault plane, caused by rock breakage during fault movement
- Fault displacement** The amount of movement of layers by faulting, measured along the fault plane
- Fault plane** The fracture surface of a fault, along which relative movement occurred
- Fault scarp** A steep slope in the landscape caused when rocks either side of a major fault have differed in their resistance to erosion
- Faunal succession (law of)** The law that all animals follow one another in geological time in a predictable sequence; plants have a similar predictable sequence - we now know that this is due to evolution
- Feedback** Change in a system resulting in further change, either reinforcing the change (positive feedback) or resisting the change (negative feedback)
- Feldspar** A mineral silicate, usually white, sometimes pink, can form good almost rectangular crystals, good cleavage, hard, common in igneous and some metamorphic rocks
- Fine-grained igneous rock** Rock formed by quick cooling of a magma, e.g. in a surface lava; crystals usually too small to see, even with a hand lens
- Focus (earthquake)** The place under the surface where the fracture of a fault produces earthquake shock waves

- Fold** The ductile bending and flow of rock under pressure resulting in bent layers; folds can be gentle and open, or tight
- Fold axis** The place where a rock is most bent by folding
- Fold limb** The sloping layers either side of a fold axis
- Foliation** The 'layered' texture of regionally metamorphosed rocks, caused by the metamorphic minerals being aligned with one another; includes metamorphic cleavage in slates, foliation in schists, and banding in gneisses
- Foreshock** A minor earthquake that takes place before a more major earthquake
- Fossil** Traces of an organism preserved in rock (usually regarded as more than 10,000 years old)
- Freeze-thaw weathering** Weathering caused by many cycles of freezing and thawing
- Gabbro** A coarse-grained mafic (magnesium/iron-rich) rock, with predominantly dark minerals
- Gabions (gabion baskets)** Galvanised wire mesh cubic or rectangular containers around a metre or so across filled with pebbles or larger rock; used to stabilise slopes such as cuttings, river banks and coastal cliffs
- Gaia Hypothesis** The idea that life on Earth causes negative feedback which regulates many of the Earth's systems; proposed by James Lovelock
- Galena** A lead-containing mineral (PbS), silvery grey, metallic lustre, cube-shaped crystals, good cleavage, feels very dense, grey streak, low hardness (soft), found mainly in mineral veins
- Gangue mineral** Uneconomic mineral, like quartz and calcite, that may be thrown away when metal ores are mined
- Garnet** A silicate mineral, usually red or pink, often forms ball-shaped crystals, no cleavage, hard, found mainly in medium and high grade metamorphic rocks
- Geochemical survey** Using chemical methods to explore and understand the Earth; the chemical testing is usually done in laboratories nowadays, using high tech methods
- Geohazard** A geological process that causes risk to humans and human constructions
- Geological time** The time from the origin of the Earth (around 4,560 million years ago) to the present day
- Geopark** An area of international importance for its geological interest, designated by UNESCO (the United National Educational, Scientific and Cultural Organisation)

- Geophysical survey** Using the methods of physics to probe the Earth including: seismology, gravity, electrical methods, magnetic methods and radioactivity
- Geotechnical engineering** The study of building foundations and the soil/bedrock in which constructions, such as dams, bridges, roads, railways and waterways are sited, together with landfill and coastal protection sites
- Geotextiles (geofabrics)** Tough textiles used to cover steep slopes to reduce erosion
- Glacial period (glaciation)** A time when there were extensive ice sheets on Earth
- Glacial till** Sedimentary deposit formed largely of mixed mud and boulders, deposited by melting ice
- Gneiss** A metamorphic rock formed by high-grade regional metamorphism; contains metamorphic banding, which sometimes has complex folding
- Gold (native gold)** A mineral made of one element (Au) that can be found in mineral veins or eroded from veins and deposited in sediments
- Gondwana** A 'supercontinent' of all the current southern hemisphere continents (and India) formed around 550 million years ago
- Graded bed** A layer of sediment that is coarser at the bottom and becomes finer upwards; frequently deposited by turbidity currents
- Granite** A coarse-grained, pale-coloured, silica-rich igneous rock
- Graptolite** Extinct animals that formed small colonies strung together in saw-blade-like shapes; lived in the open ocean
- Greenhouse effect** The sun's radiation absorbed by the Earth's surface is re-radiated as infra-red radiation (heat) that is absorbed by 'greenhouse gases' such as carbon dioxide and methane, causing the surface of the planet to be warmer than it otherwise would be; the gases behave rather like the panes of glass in a greenhouse 'trapping' the heat
- Greenhouse gas** A gas in the atmosphere that absorbs infra-red radiation (heat); includes carbon dioxide, methane and water vapour
- Halite** A mineral, NaCl, white or pink, cube-shaped crystals, good cleavage, low hardness (very soft), soluble in water, forms rock salt deposits
- Hard parts** The solid parts of organisms, such as shells, bones, teeth or cartilage, which are most likely to become fossilised
- Hardness (mineral)** Usually measured by the scratch test, harder minerals will scratch softer ones; Mohs' scale of hardness ranges from 1 (very soft talc) to ten (very hard diamond)

- Heat engine** A pump and heat exchangers used to extract heat from the ground or the air to heat buildings; can be reversed to add heat to the surroundings in order to cool buildings
- Heating of hydrocarbon source rocks** Rocks have to be heated to release hydrocarbons; most gas and oil are released between 100 and 200°C; above 200°C they are destroyed
- Heavy mineral survey** Stream or soil survey for minerals of higher density than average, such as diamond, gold or ilmenite (titanium ore)
- Hematite** An iron-containing mineral (Fe_2O_3), earthy red, metallic lustre, feels dense, red streak, usually hard, often found in irregular masses
- Hominid** The family (group) of primate species, of which *Homo sapiens* is the only one living; all the other hominid species have become extinct
- Hydrocarbon** The fossil fuels, coal, crude oil, and natural gas
- Hydrocarbon reservoir rock** Rock with enough pore space and permeability to hold hydrocarbons and to allow them to flow out
- Hydrocarbon source rock** Rock from which crude oil or natural gas originally came; the decay of plankton in mudstones/shales produced oil and some gas whilst most gas comes from coal
- Hydrocarbon trap** The shape of a formation that can trap hydrocarbons underground; includes anticlinal, fault and unconformity traps and traps associated with salt domes
- Hydrogeology** Study of subsurface water, called groundwater
- Hydrology** Study of the whole of the water cycle, both above and below ground
- Hydrothermal fluid** Hot watery liquid produced by some magmas and by the heating of rocks deep underground; rises and cools to crystallise minerals
- Igneous rock** Rock formed by the cooling of liquid magma or lava
- Impermeable** A material that fluids cannot flow through
- Included fragments (law of)** The stratigraphic law that anything (e.g. pebbles in conglomerates, fragments of the surrounding rock in plutons) included in anything else must be older
- Infiltration (of water)** Water percolating down into the ground surface, usually from surface precipitation (rain, snow, etc.)

- “Integrated waste management”** The modern landfill method involving the “reduce, reuse, recycle” approach; remaining waste is disposed of using “concentrate and contain” methods
- Intermediate** An igneous melt or rock rich in neither magnesium/iron nor silicon; these elements have roughly equal ratios
- Intermediate depth earthquake** An earthquake that originates between 70 and 300 km below the surface; these occur only at destructive convergent plate margins, where plates are subducted
- Intrusion** Magma that has penetrated rocks underground and has solidified there
- Intrusive (magma or igneous rock)** Intrusion is the penetration of magma into rocks underground, which subsequently solidifies
- Joint** A fracture which is usually straight, where the rock on either side has not moved relative to the other (and so is not a fault); often found as groups of parallel joints together, in joint sets
- Keeling Curve** The graph showing the increase of carbon dioxide in the atmosphere since 1958, first measured by Charles Keeling
- Lagerstätten (exceptional preservation)** Unusual examples in the fossil record where groups of fossils are very well preserved, usually with many of their soft parts attached; from German meaning ‘place of storage’
- Lahar** A ‘mudflow’ of volcanic material, predominantly ash with blocks; lahars flow like liquid concrete at tens of kilometres per hour (even though they are flows of pyroclastic materials, the term ‘pyroclastic flow’ has a different meaning)
- Lamination** Thin layer of mud; can be formed into laminated mudstone or shale
- Landfill** Material such as domestic refuse (trash or garbage) or other waste buried in disused quarries, pits or other depressions in the landscape
- Landfill membrane** The impermeable plastic liner used to line permeable landfill sites
- Landslide (or landslip)** The downslope movement of geological materials; landslides can be slow or catastrophically quick, and include rock fall, slips, slides and flows of material
- Landslip (or landslide)** The downslope movement of geological materials; landslips can be slow or catastrophically quick, and include rock fall, slips, slides and flows of material
- Lateral continuity (principle of)** The stratigraphic principle that strata were originally deposited in laterally continuous sheets over large areas

Lava Liquid rock at the surface

Leachate The poisonous liquid produced by decaying waste

Limb (fold) The sloping layers either side of a fold axis

Limestone A sedimentary rock made largely of calcium carbonate (CaCO_3); formed mainly in tropical and sub-tropical seas from fossil debris or the evaporation of sea water

Liquefaction (of loose material) When loose surface material is shaken by an earthquake, it can lose its internal strength and 'liquefy', causing buildings to sink and collapse

Lithosphere Outer rigid shell of the Earth, around 100 km thick, comprising the crust and part of the upper mantle; broken into the tectonic plates

Lustre (mineral) The surface appearance of a mineral, for example dull, glassy or adamantine (diamond-like)

Ma Millions of years (mega annum)

Mafic An igneous melt or rock rich in magnesium (ma) and iron (fic)

Magma Liquid rock underground

Magnetic field (of the Earth) The Earth's magnetic field that, at different times in the past has 'flipped' so that the current north magnetic pole has become the south pole, and *vice versa*

Magnetic stripes The linear ocean floor magnetic anomalies detected by magnetometer surveys that show 'normal' and 'reversed' mirror-image patterns on either side of oceanic ridges

Mantle The zone of the Earth beneath the crust (around 15 km mean depth) to the core (around 2900 km depth); solid apart from the narrow zone of the asthenosphere, which is 1 - 5% liquid

Marble Metamorphic rock formed of calcite (CaCO_3), formed by the metamorphism of limestone

Mass extinction A point in geological time when significant numbers of groups of organisms died out, all at a similar time

Massive Description of a rock in a rock face which has no obvious layering

Metal ore Metal-containing minerals that are rich enough to mine

Metamorphic rock Rock formed when another rock has been recrystallised by increased heat and/or pressure (without fully melting)

- Metamorphism** The recrystallisation of a rock under increased heat and/or pressure (without fully melting)
- Metaquartzite (quartzite)** Metamorphic rock formed largely of quartz, formed by the metamorphism of pure quartz sandstones (also called quartzite)
- Mica** A mineral silicate, usually colourless or black, forms platy crystals, good cleavage in one direction, low hardness (soft), common in many igneous and some metamorphic rocks
- Mine (deep mine)** An underground excavation, usually for metal ores, other minerals or coal; mine excavations usually have vertical shafts and horizontal adits (an opencast coal pit is called an opencast mine)
- Mineral** A naturally occurring inorganic compound or element (or, more precisely, a naturally occurring inorganic compound with a definite chemical composition, a definite atomic structure, and physical properties which vary between known limits)
- Mountain-building episode** Rock deformation and metamorphism caused by a plate collision that formed mountain ranges
- Mudcracks** Polygonal cracks left by drying mud - can be preserved in mudstones; also called desiccation cracks
- Mudflow** The downhill flow of mud, usually from a landslide; usually finer-grained than debris flows
- Mudstone** A sedimentary rock formed of mud-grade sediment
- Natural selection** Darwin's idea that the best adapted organisms survive in an environment and that the others die and so are unable to reproduce
- Negative feedback** Change in a system, where the effects reduce the change
- Normal fault** Tensional fault where the rocks on one side have slid down relative to the rocks on the other, usually along a steep fault plane of 60° or more
- “Normal” magnetism** When the remnant magnetisation of rock, such as found in the magnetic stripes on the ocean floors, is in the same direction as the Earth's magnetic field today
- Nuée ardente (pyroclastic flow)** A density flow of red hot ash that flows downhill from a volcanic blast at speeds of up to hundreds of kilometres per hour (does not include lahars); from the French 'glowing cloud'
- Oceanic ridge** The ridges of mountains in oceans where new plate material forms, with a rift valley down the centre; when in the centres of oceans, they are called mid-oceanic ridges

Oolites Tiny balls of limestone (aragonite, CaCO_3) formed by waves and currents in strongly evaporating seas

Oolitic limestone A sedimentary rock made of oolites, tiny balls of calcium carbonate that first formed as aragonite and usually later changed to calcite (CaCO_3)

Ore An economic concentration of metal minerals

Ore mineral A metal-containing mineral that is rich enough to mine

Original horizontality (principle of) The stratigraphic principle that strata were originally deposited as near-horizontal layers

Pangaea A ‘supercontinent’ of all the continents on Earth (including Gondwana) that existed between about 300 and 250 million years ago

Partial melting When a substance is heated so that only the low melting point components melt, it is described as a ‘partial melt’; in rocks, silicon-rich minerals melt before iron- and magnesium-rich minerals

“Peer review” The checking of scientific publications by other scientists of equal standing - their peers’

Percolation (of water) Water flowing through pore spaces in the ground/soil/rock

Peridotite A coarse-grained ultramafic rock (very rich in magnesium/iron) found in the Earth’s mantle

Permeability How quickly a fluid can flow through a rock; given as a flow rate per surface area of rock

Physical weathering The break up of rock surfaces by physical weathering processes, such as freeze-thaw and heating and cooling

Piles Vertical columns of steel-reinforced concrete hammered into weak ground to support foundations

Pillow basalt Basalt that has erupted under water to form pillow-like shapes

Plate (tectonic) The slabs of rigid, solid rock made of lithosphere (comprising the crust and part of the upper mantle) that are moved across the surface of the Earth by plate tectonic movement

Plate Tectonics (Theory of) J. (John) Tuzo Wilson’s theory of the late 1960s linking together earlier ideas into a global theory of tectonic plate movement

Plateau A horizontal flat upland area, typical of regions where tough rocks are horizontal

Pluton A large igneous intrusion, often inverted drop-shaped; may be several kilometres across

- Pore spaces (or pores)** Gaps between the grains; fluids such as oil, natural gas or water can flow through pores, or they may become filled with cement as a porous rock hardens
- Pore water pressure** The pressure of water in the pore spaces of rocks; high pore water pressure contributes to landslides
- Porosity** The amount of pore space in a rock; given as a percentage
- Positive feedback** Change in a system, where the effects increase the change
- Primate** An order (group) of mammals that includes lemurs, monkeys, apes and humans
- Production well** A borehole drilled to extract the oil and gas (or sometimes, water) found by previous exploration wells
- Pumping tests** Tests carried out by drilling a line of boreholes, pumping water from the central one and monitoring the height of the water table in the others, to establish whether or not a water well is viable
- Pyroclastic** Material ejected by explosive eruptions, including fine-grained ash and volcanic blocks; from the Greek, (*pyro* = fire-formed; *clastic* = broken material)
- Pyroclastic flow (nuée ardente)** A density flow of red hot ash that flows downhill from a volcanic blast at speeds of up to hundreds of kilometres per hour (does not include lahars)
- Quarry** A pit or hillside excavated for its raw materials (large pits dug for coal are usually called opencast mines; pits dug for sand or clay may be called sand- or clay-pits)
- Quartz** A mineral, silicon dioxide (SiO_2), usually grey, white or colourless, hard with no cleavage and a glassy lustre - found in a variety of rocks as well as in mineral veins
- Quartzite (metaquartzite)** Metamorphic rock formed largely of quartz, formed by the metamorphism of pure quartz sandstones (also called metaquartzite)
- Radiometric dating** Method of calculating the age (in years/millions of years) of a rock (subject to a measurable margin of error) from the decay of the radioactive elements it contains
- Raised beach** A narrow flat coastal area, often backed by a cliff, that was formed when sea level was higher, relative to the land; linked to changes in sea level during and after ice ages
- Regional metamorphism** Rock recrystallisation caused by heat and increased pressure during the mountain-building episodes caused by plate tectonics; affects large areas
- Regionally Important Geological and Geomorphological Sites (RIGS)** Sites in the UK listed for their geological importance

- Relative age** Sequenced events, from the oldest to the youngest
- Remediation (site)** The cleaning up of formerly polluted sites
- Reserves** The amount of a natural resource available for extraction
- Reservoir rock (hydrocarbon)** Rock with enough pore space and permeability to hold hydrocarbons and to allow them to flow out
- Resistivity (electrical)** A geophysical method measuring the conductivity of rock; rocks with high conductivity (low resistivity) may contain metal ores or water
- Reverse fault** Compressional fault that usually dips at around 45°(between 30 and 60°)
- “Reversed” magnetism** When the remnant magnetisation of rock, such as found in the magnetic stripes on the ocean floors, is in the opposite direction to that of the Earth today
- Ridge** Caused by tough rocks that normally dip at more than 10°, with steep slopes on either side
- Rift valley** The valley formed when the Earth’s crust is in tension, as at constructive plate margins; as the rock is pulled apart, the central block slides down along normal faults, creating a long valley
- Ripple marks (asymmetrical)** Non-symmetrical ripple marks formed by flowing water or wind; the steeper slope is in the down-current direction
- Ripple marks (symmetrical)** Ripple marks with equal slopes, formed by oscillating waves in shallow water
- Rock** A naturally-occurring material composed of a mixture of minerals, fragments of rock, and/or fossils
- Rock bolt** Large bolts used to tie potentially hazardous loose rock sheets and fragments to a rock face
- Rock cycle** Cycle of weathering and erosion, transportation, deposition, sedimentary rock formation, metamorphism and igneous processes through which all rocks are formed
- Rock texture** The ways in which the grains of the rock fit together; linked to the shapes, sizes and orientations of the grains
- Rodinia** An early ‘supercontinent’ of all the early landmasses about 1000 million years ago
- Rounding** The removal of sharp corners of angular grains and the smoothing of the surface during sediment transportation; caused by attrition

Saltation Sediment movement by fluid (water or wind) where the grains bounce along the bed

Sandstone A sedimentary rock of sand-grade sediment

Saturated zone The zone beneath the ground surface where all the pore spaces are full of water; the top surface of the saturated zone is the water table

Scarp and vale topography A series of cuestas formed in areas of alternating tough and weak rocks of shallow dip (of usually less than 10°)

Schist A metamorphic rock formed by medium-grade regional metamorphism; contains a coarse mineral foliation with garnet crystals sometimes visible

Scree A slope of angular rock fragments accumulated beneath a rock face

Sea Floor Spreading (Theory of) Harry Hess' theory of the 1960s that the oceans were young and that new ocean material was formed at oceanic ridges as the ocean floor was moved apart

Sedimentary rock Rock made of sediments which are fragments of other rocks (mineral or rock fragments) or fossils; sometimes also laid down by the evaporation of water

Seismic gap The 'locked' part of a fault where no slippage has occurred recently; this is the most likely site of a future earthquake

Seismic survey Method using shock waves to show the positions and shapes of the rock layers beneath the surface

Shale A weak laminated sedimentary rock of mud-grade sediment, that tends to fall apart in your hand

Shallow focus earthquake An earthquake that originates between 0 and 70 km below the surface; these occur at all plate margins but shallow focus earthquakes alone occur at constructive (divergent) and conservative (transform) plate margins

Shotcrete A blanket of concrete used to cover and stabilize an unstable rock face

Silicic An igneous melt or rock rich in silica (silicon dioxide, SiO₂)

Sill An igneous intrusion that follows the bedding planes of rock, and so is parallel to them; can be horizontal, tilted or even vertical, paralleling the bedding

Site of Special Scientific Interest (SSSI) A site in the UK protected by law for its biological or geological importance

Slate A metamorphic rock formed by low-grade regional metamorphism; contains slaty foliation or cleavage

“Slushball Earth” The theory that the Earth was once nearly covered by ice, but there was probably some areas of non-frozen ocean near the Equator

Smelting The process of separating metal from the impurities in metal ore by heating

“Snowball Earth” The theory that the Earth was once completely covered by ice

Soft bodies Organisms with no hard parts such as shells or bones, which therefore are unlikely to become fossilised

Solution (transport by) Dissolved material carried by water currents

Sorting The sorting out of sediment grains into different sizes during transportation; well-sorted sediments have grains of just one size, e.g. well-sorted sand

Source rock (hydrocarbon) The rock from which oil or natural gas originally came; the decay of plankton in mudstones/shales produced oil and some gas whilst most gas comes from coal

Spring Natural flow of groundwater out of the ground

Stipe A single arm of a saw-blade-like graptolite colony

Strata Sedimentary or volcanic layers, deposited at the Earth’s surface

Stratigraphic principles The principles used to understand how layers (strata) were deposited in the past and the sequence of events involved in their deposition and later history

Streak (mineral) Colour left as a scratch on a white tile (or by filing onto white paper)

Strike The two directions at right angles to the dip direction of sloping rock layers; for example, rocks that dip east have a north-south strike

Strike-slip fault The results of shear stresses; when seen from above, one side has moved relative to the other along a fault plane that is usually vertical

Stromatolites Mats of simple organisms (cells with no nuclei) that can form pillars of mats

Structure (sedimentary) The sedimentary features of a sediment or sedimentary rock that are larger than grain size, including features like bedding and cross bedding

Subduction The sinking of an oceanic plate into the mantle at a destructive/convergent plate margin

Supercontinent A large continent formed when plate tectonics brought several continental masses together in the past

Superposition of strata (principle of) The stratigraphic principle that strata deposited on top of other strata are younger

- Suspension** Sediment movement by fluid (water or wind) where the grains remain buoyed up in the current as they are carried along
- Suture line (cephalopod)** The junction between the wall of the chamber and the outer wall of the shell; early cephalopods had simple straight suture lines, later ones were much more complex
- Syncline** Downfolded rocks (strictly, folded rocks with the youngest rock in the centre of the fold - since, if the sequence was tectonically inverted, synclines would be upfolds)
- Tectonic** Deformation of the Earth's outer layers
- Texture (rock)** The ways in which the grains of the rock fit together; linked to the shapes, sizes and orientations of the grains
- Theca (plural thecae)** The living chamber of a single graptolite animal
- Thermal metamorphism** Rock recrystallisation caused by the baking of surrounding rocks by cooling igneous intrusions; caused primarily by high temperatures
- Thrust fault** Compressional fault with a sliding surface that has low angle of slope of less than 45°(often around 10°or less); sometimes bodies of rock can be moved tens of kilometres along thrust faults
- Till (glacial)** Sedimentary deposit largely of mixed mud and boulders deposited by melting ice
- Tor** Exposed rounded mass of jointed rock in an upland area, typical of granite and coarse sandstone bedrock
- Traction** Sediment movement by fluid (water or wind) where the grains slide or roll along the bed
- Transform fault** A major fault offsetting oceanic ridges; the conservative plate margins of plate tectonics
- Trap (hydrocarbon)** The shape of a formation that can trap hydrocarbons underground; includes anticlinal, fault and unconformity traps and traps associated with salt domes
- Trench (oceanic)** The deep clefts on the margins of many oceans, where plates are subducted into the mantle beneath
- Tsunami** Water waves produced by earthquakes or landslips - large tsunamis can be very damaging; the older term of 'tidal wave' is falling out of use
- Turbidite** A flat sheet of sediment deposited by a turbidity current, often as a graded bed

Turbidity current A billowing cloud of muddy sediment that flows downslope underwater

Ultramafic An igneous melt or rock very rich in magnesium (ma) and iron (fic)

Unconformity A surface between two rock sequences; the first was deposited, formed into rock, probably folded/tilted, and then uplifted and eroded, then the second rock sequence was deposited on the eroded unconformity surface

Uniformitarianism (principle of) Ancient rocks were formed by processes still active on Earth today; 'the present is the key to the past'

Vesicles Gas bubbles preserved as holes (usually spherical), when a lava flow became solid

Volcanic ash Fine-grained solid volcanic material ejected during an eruption, often high into the atmosphere

Volcanic block Coarse-grained solid volcanic material such as boulders ejected during an eruption

Water table The top of the saturated zone under the ground surface; can be seen by looking down a well

Wave ripple marks Ripple marks with equal slopes, formed by oscillating waves in shallow water

Weathering The natural break up and break down of rock and other materials at the Earth's surface, without the removal of solid material

Well A borehole drilled for oil/gas or water; wider wells are excavated for water

Wind turbine Windmill used to produce power

Wind farm A cluster of wind turbines