
Glossary

This glossary provides simple explanations of the more important technical and arcane terms used in the Introductions to the chapters and in the Highlights and Conclusions of Chapters 2 to 8. These explanations do not pretend to be scientific definitions but are intended to help the general reader. Stratigraphical terms are omitted as they are given context within the tables and figures.

Absolute dating: method of determining the date of formation of a rock or mineral; includes radiometric dating, electron spin resonance, thermoluminescence and paleomagnetic techniques.

Adit: horizontal tunnel, for access or drainage, mined into a hillside.

Allogenic: derived from another source region; in karst, most commonly describing drainage flows derived from surface runoff that originates on adjacent non-karstic rocks.

Aquiclude: impermeable rock capable of absorbing water but generally acting as the boundary to an aquifer.

Aquifer: body of rock permeable enough to transmit significant flows of groundwater. **Anticline:** upfold of rock which rises in the middle, with older rock in its core.

Aragonite: natural mineral formed of calcium carbonate (CaCO_3); it has the same composition as the more common calcite, but differs in its atomic structure and crystal shape.

Artesian aquifer: an aquifer, confined by an overlying aquiclude within a syncline or comparable geological structure, so that its groundwater has enough hydrostatic pressure to rise to the surface through a fissure or a well.

Autogenic drainage: drainage water derived entirely from rainfall directly onto the rock outcrop.

Barrage tufa: natural dam of calcareous deposits which holds back stream water in a pool.

Bedding plane: planar feature in sedimentary rocks, created by an interruption or change within the original sediment deposition; commonly a site of cave inception and development.

Bedding plane cave: cave passage formed by dissolutional enlargement of a bedding plane in a limestone; in horizontal or gently dipping limestone it is therefore a very low and wide passage. The term may also refer to a cave initially formed on a bedding plane, but subsequently enlarged into a tube or entrenched into a canyon.

Bioclastic: consisting largely of broken shell debris.

Bourne: seasonal surface stream in a normally dry valley, resulting from winter rise in the water table, typically in the chalk karst.

Calcite: the common and stable mineral form of calcium carbonate (CaCO_3), which is the dominant component of limestone and secondary cave deposits due to its dissolution and reprecipitation by natural waters at normal temperatures.

Carbonic acid: weak natural acid formed by the absorption of atmospheric carbon dioxide into rainwater and soilwater, capable of the reversible reaction of dissolving or precipitating calcium carbonate.

Carboniferous: any rock formed within the eponymous period of geological time about 360–290 million years ago.

Cave: best defined as 'a natural cavity large enough to be entered by a person'. Most caves are formed by dissolution of limestone within karst landscapes, but others include glacier, sea, lava and tectonic caves.

Cave pearl: roughly spherical concretion of calcium carbonate, usually calcite, which grows by concentric accretion in cave pools saturated in lime and disturbed by dripping water.

Cavernous karst: limestone landscape that includes both surface karst features and also extensive cave systems.

Chalk: weak, friable and porous, poorly lithified, white limestone; Britain's chalk is a specific rock unit of late Cretaceous age.

Chalk karst: distinctive type of karst landscape formed on chalk; distinguished by systems of dry valleys, rounded hillsides with few rock scars and efficient underground drainage with few cave-sized conduits.

Chert: hard, microcrystalline silica mineral (SiO₂) that commonly occurs as nodules or bands within limestone.

Chinastone: very fine-grained calcite mudstone.

Choke: blockage in a cave passage formed either by inwashed sediment or breakdown debris from roof collapse; the latter commonly forms a boulder choke.

Clint: block of limestone within a limestone pavement, bounded by grykes.

Coccolith: calcareous skeleton of a type of microscopic marine alga, made of calcite plates, and forming a major component of chalk.

Collapse stoping: progressive breakdown and upward collapse of a cave ceiling, which causes the open cavity to migrate, or stope, to higher levels.

Combe: dry valley in chalk karst, excavated by meltwater river and modified by solifluction during past phases of periglacial conditions.

Combe rock: surface layer of periglacial head formed largely of chalk, mostly found on floors of valleys or combes in chalk karst.

Conduit: dissolutional void, generally greater than 100 mm in diameter, in limestone; larger than a fissure, and including cave passages.

Confined aquifer: aquifer containing water under pressure because it is confined by an overlying aquiclude.

Connate water: fossil water that has been trapped within the sediment since the time of deposition.

Cryoturbation: disturbance by the growth of ice crystals, including the expansion of frost wedges within soils in periglacial environments.

Dissolution: natural process of dissolving a solid; specifically in karst processes, the dissolving of carbonate rock to create a liquid solution of calcium and bicarbonate ions in water; also known as solution.

Doline: roughly circular, closed depression in the ground surface, with no drainage outlet except underground through a central sinkhole; may be regarded as the diagnostic landform of karst topography.

Dolomite: carbonate mineral very similar to calcite, except that it contains magnesium within its composition $\text{CaMg}(\text{CO}_3)_2$; also a sedimentary rock very similar to limestone, except that it contains more of the mineral dolomite than calcite.

Drumlin: low, rounded hill of glacial till, which was moulded into a streamlined shape by glacier ice passing over it.

Dry valley: fluvial valley, cut by a subaerial stream or river, then abandoned and left dry when underground drainage developed in a limestone karst region.

Electron spin resonance (ESR): a measure of the exposure of a calcite speleothem to environmental radiation, indicative of its age.

Epikarst: shallow zone immediately below the ground surface in a karst landscape, generally including the soil and the buried rock surface where much of the limestone dissolution occurs.

Estavelle: cave that acts as either a sinkhole or a spring in response to fluctuations in the level of the water table.

Evaporite: mineral or rock precipitated from water due to evaporation, most importantly gypsum and salt.

Exsurgence: natural spring fed entirely by percolation water, as opposed to a resurgence which is fed largely by sinking streams.

Fault: fracture within rock along which there has been significant displacement due to tectonic deformation.

Fissure: natural opening in rock, nominally 10–100 mm wide; therefore wider than a fracture, but smaller than a conduit or cave.

Flash: flooded depression formed by subsidence in salt karst.

Flint: mineral variety of chert which occurs as nodules and bands in chalk.

Flowstone: mineral deposited by flowing water on the walls or floor of a cave; mostly formed of calcite.

Fluviokarst: limestone landscape characterized by dendritic systems of dry valleys.

Fossil karst: karst landforms created by erosion in past eras of geological time, and now preserved within the rock sequence; better known as paleokarst.

Glaciokarst: karst landscape developed on limestone outcrops which have been scoured by glaciers; characterized by bare rock scars and limestone pavements.

Gour: barrier of calcite flowstone which dams a pool within a cave passage, and continues to grow by deposition from the overflowing water.

Greywacke: strong, old sandstone, with a significant clay content due to its turbidite origins, which has been metamorphosed to slate grade.

Gryke: fissure between clints within a limestone pavement, formed by dissolutional enlargement of a joint; Yorkshire name for kluftkarren.

Gypsum: white or colourless mineral of composition $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$; may form massive gypsum rock as an evaporite deposit; or forms crystals in caves by reaction between limestone and sulphuric acid derived from the oxidation of pyrite.

Head: surface layer of soil and rock debris, developed by frost shattering and moved downslope by solifluction largely under peri-glacial conditions.

Helictite: small stalactitic form of calcite, with twisted and contorted form, due to deposition from seepage water supplied by capillary action independent of gravity flow.

Hydraulic gradient: slope of the water table within an aquifer.

Influent cave: cave with surface stream flowing into it.

Inlier: outcrop of old rocks surrounded by younger rocks, commonly formed by erosion of deep valleys.

Interstadial: short phase of warm climatic conditions within a longer cold stage of glaciation.

Interstratal karst: caves and karst features formed by underground dissolution of a rock unit covered by insoluble rocks which occur at outcrop.

Interfluve: upland between adjacent valleys. **Joint:** fracture produced in rocks by tectonic deformation.

Kamenitza: dissolution basin, generally less than a metre across, formed on a limestone outcrop; self-deepening due to solution by regularly recharged rainwater.

Karren: small dissolution features formed on limestone outcrops and on limestone surfaces beneath a soil cover; dominated by channels or runnels, mostly 10–500 mm deep, which are entrenched to leave sharp or rounded intervening ridges; a German term now used throughout international literature.

Karst: distinctive terrain created by erosion of a soluble rock, where the topography and landforms are a consequence of efficient underground drainage; characterized by caves, dolines, sinkholes and dry valleys, and mainly developed on limestone.

Klippe: eroded remnant outlier of a unit of rock lying above a thrust plane.

Kluftkarren: deep open fissure formed by dissolutional enlargement of a joint or fault within limestone.

Limestone: sedimentary rock composed largely of calcium carbonate (CaCO_3) in the form of the mineral calcite, and therefore soluble in weak acids including rain and soil water; strong, well lithified limestones may stand in high vertical cliffs and can span large cave passages formed within them by dissolutional enlargement of fractures.

Knickpoint: break in slope of the long profile of a river, produced by rejuvenation or headward erosion and commonly marked by a waterfall or rapids.

Loess: fine-grained sediment of windblown silt and clay, largely derived from cold periglacial deserts.

Magnetic reversal: periodic reversal of the Earth's dipole magnetic field, which can be recognized by the orientation of ferric mineral particles in old sediments and rocks.

Maze cave: cave network of intersecting joint fissures or interconnecting and contemporaneous passage loops.

Mere: shallow lake, notably formed by flooding of a subsidence depression in the salt karst of Cheshire.

Metamorphism: process of change of the mineralogy and structure of rocks which are subjected to increases in pressure and temperature within the Earth's crust.

Meteoric water: water that originated from atmospheric rain or snow fall.

Micrite: fine-grained, chemically precipitated calcareous mud, which forms the matrix of many limestones.

Monocline: fold of rock which has one steeply dipping limb, with nearly horizontal rocks on both sides.

Moulin: hollow or pothole formed by scour in the bed of a stream.

Neptunian dyke: fissure or cavity infilled with younger sediment, commonly a feature of paleokarst.

Network cave: style of maze cave formed by the dissolutional enlargement of multiple intersecting joint systems.

Nunatak: mountain peak that projects above surrounding ice sheets and is subjected to intense frost action but is not scoured by glacial erosion.

Oolite: limestone made of rounded calcium carbonate grains (ooliths), produced by concretionary deposition in warm and shallow seas with high evaporation rates.

Outlier: outcrop of young rocks surrounded by older rocks, commonly left as an erosional remnant on a hill top.

Oxygen isotope stage: time subdivision of the Pleistocene based on the ratios of oxygen isotopes in marine sediments, which largely reflect changes in the ocean temperatures and world climates.

Paleokarst: karst landforms created by erosion in past eras of geological time, and now preserved within the rock sequence.

Paleomagnetism: remnant magnetism preserved in some ferric minerals as a feature of the Earth's magnetic polarity and field orientation at the time of the host rock or sediment formation, and changes in these provide a basis for stratigraphic dating.

Paleosol: fossil soil, buried and preserved by younger deposits.

Paragenesis: enlargement of a cave passage due to dissolution and progressive raising of the ceiling while erosion of the floor is inhibited by a protective layer of sediment.

Pavement: limestone bedding plane surface scraped clean by glaciers and subsequently carved by dissolution into clints and grykes.

Perched conduit: cave passage above the regional water table.

Pericline: fold of rock which is curved unequally in two directions, so that erosion of it creates an elliptical outcrop.

Periglacial: zone or environment peripheral to glaciers, so that it is very cold but is not covered by ice sheets; it is characterized by the frozen ground known as permafrost.

Permafrost: permanently frozen ground within a periglacial environment; may extend to more than 100 m deep, but the active layer of the top few metres thaws each summer and then refreezes in winter.

Phreatic zone: the saturated zone of the ground, below the water table, where all pore spaces, fissures and caves are filled with groundwater.

Phreatic cave: cave passage or cave system developed within the phreatic zone, therefore characterized by vertical loops, reverse gradients and rounded passage shapes due to dissolution of the floor, walls and ceiling.

Phreatic lift: section of a phreatic passage that carries, or carries, water upwards in a downstream direction.

Phreatic tube: tubular cave passage formed by almost equal dissolution of the walls, ceiling and floor, while full of water within the phreatic zone; abandoned tubes are common and may be filled with sediment.

Phreatic zone: synonym for phreatic zone.

Pipe: cylindrical or conical dissolutional cavity, which is infilled and buried by younger sediments.

Piping failure: process whereby a cave is developed headwards in unconsolidated sediment as the fine particles are first removed by seepage water, allowing the larger particles to be washed out next, and ultimately leading to collapse of the void roof.

Polje: large karstic depression with a flat floor and sharp breaks of slope to its rock walls.

Polygonal karst: mature karst terrain where dolines have replaced valleys as the main landform, and have partially coalesced to leave a polygonal network of interfluvies.

Pothole: single shaft, or entrance to a cave system, or an entire cave system that is dominantly vertical; also a moulin in a stream bed.

Proto-cave: natural void linking a potential water input point to an output within an aquifer, but which is still too small to be entered by a person.

Pseudokarst: landscape with caves, dolines and underground features, therefore resembling a true karst, but developed on rocks and soils by processes other than dissolution of rock.

Puddled: artificially lined with impermeable clay; sealing the floors of water channels.

Pyrite: widespread, naturally occurring iron sulphide mineral, FeS_2 , which may be oxidized to form corrosive sulphuric acid.

Pyroclastic: consisting of fragments of volcanic material produced by explosive eruptions.

Radiometric dating: method of absolute dating, or determining the date of formation of a rock, based on the known decay rates of radioactive elements, such as carbon-14 or uranium-234, which naturally occur in measurable quantities in certain rocks.

Rake: local name for a mineral vein large enough to be mined in the Derbyshire Peak District.

Rejuvenation: initiation of a new cycle of erosion, normally as a consequence of lowered base level, climatic change or tectonic uplift.

Resurgence: natural spring fed partly by sinking streams, as opposed to an exurgence which is fed only by percolation water.

Rift: tall, narrow and generally straight cave passage, formed by dissolutional widening of a joint or fault.

Rillenkarren: small dissolution runnels, generally 10–20 mm wide and deep, cut into sloping, exposed limestone surfaces by subaerial dissolution, leaving small intervening ridges with sharp crests.

Rinnenkarren: dissolution runnels about 200 mm wide, with rounded troughs and sharp rims, cut into sloping rock surfaces by rainwater runoff.

Rising: point where underground water rises to the ground surface; synonym for spring.

Rundkarren: dissolution runnels, generally 100–400 mm wide and deep, with rounded ridges between rounded troughs, formed largely by dissolution beneath a soil cover.

Runnels: small channels formed by dissolution in karren landforms.

Salt: white or colourless mineral of composition NaCl ; may form massive beds of rock salt as an evaporite deposit; also known as halite.

Salt karst: karst landscape developed over beds of buried rock salt, with subsidence features created by rapid dissolution of the salt.

Secondary minerals: minerals formed by chemical alteration, hydration or oxidation of older minerals.

Shakehole: local name in the northern Pennines for a subsidence doline formed in glacial till overlying limestone.

Sink: point where a stream sinks and disappears below ground; the water may filter through a sediment choke or flow into an open cave.

Sinkhole: synonym for either an active stream sink or a doline.

Solifluction: downslope movement of saturated sediment or soil debris, occurring most commonly in periglacial environments.

Solution: synonym for dissolution; also the product of the dissolution process where a solid component is dissolved within a liquid.

Sop: local name for a large doline in the Furness region, filled with sand, limestone rubble and hematite iron ore.

Sough: local name for a drainage adit cut by miners to lower the water table in the limestone of the Derbyshire Peak District.

Sparite: coarsely crystalline interstitial cement of limestones, generally comprised of calcite or aragonite, formed in the transformation of the sediment into a limestone.

Speleothem: general term for all cave mineral deposits, mostly formed of calcite by precipitation from lime-saturated groundwater.

Spitzkarren: residual limestone pinnacles or blades with sharp crests.

Spring: point where underground water emerges onto the ground surface from any aquifer; the largest springs are mostly the outlets from limestone caves.

Stadiab: cold phase within the Pleistocene period.

Stalactite: calcite speleothem hanging from a cave roof, where it grows by deposition from lime-saturated percolation water entering the cave.

Stalagmite: calcite speleothem growing upwards from a cave floor, where it forms by deposition from drips of water still saturated with lime when they fall from the cave roof.

Stratimorph: landform such as a plateau whose shape (or morphology) was determined by erosional stripping of rocks to expose a single strong surface on a bedding plane (or stratum).

Straw stalactite: fragile, thin-walled tube of calcite, produced by the continuous precipitation of calcite around the rim of water drops before they fell away; the diameter of the tube is therefore that of a drop of water, about 5 mm.

Subsidence doline: surface depression or doline formed entirely in the soil or sediment cover above a limestone, where the cover material has been washed down into underlying limestone fissures by percolating water.

Suffosion: process of washing soil particles down into an underlying fissure; a type of piping failure; also the mechanism behind the development of subsidence dolines, which are sometimes called suffosion dolines.

Sump: section of flooded or submerged cave passage; may be a short perched sump within a vadose cave, or an entire active phreatic cave below the regional water table.

Swallet: local name for a sinkhole in the karst of the Mendip Hills.

Swallow hole: synonym for sinkhole.

Syncline: downfold of rock which sinks in the middle, with younger rock in its core.

Tectonic: produced by large-scale Earth movements.

Tectonic cave: fissure or rift cave, or other opening, produced by ground movement, notably at the head of a landslide block.

Thalweg: line down the floor of a valley; therefore the position occupied by a river unless the valley is dry.

Thermoluminescence: measure of the exposure of a calcite speleothem to environmental radiation, and therefore indicative of its age.

Thixotropic: characteristic of some sediments which transform from a solid or plastic state to behave as a liquid when disturbed.

Thrust: gently dipping or horizontal fault.

Till: unsorted, non-stratified sediment deposited directly by glacial ice; commonly known as boulder clay or glacial till.

Toadstone: local name for heavily weathered or altered, basaltic lava or volcanic tuff, occurring within the limestone sequence of the Derbyshire Peak District.

Tor: mass of rock rising above the surrounding landscape, commonly shaped by frost shattering or exfoliation in past periglacial conditions.

Travertine: calcareous mineral deposited by flowing water, commonly where plants or algae promote carbonate precipitation by extracting carbon dioxide from the water; normally refers to deposits formed outside caves, thereby excluding speleothems.

Trittkarren: small stepped bevels cut into a gently sloping limestone surface by dissolution.

Troglobite: animal which permanently dwells underground beyond the daylight zone of a cave.

Tropical karst: extreme development of relief in a karst landscape, creating residual hills shaped as cones or towers.

Tufa: soft, porous variety of travertine.

Turlough: karst depression that may be dry or flooded in response to seasonal fluctuations of the water table.

Unconformity: boundary separating two sedimentary rock units whose bedding structures are not parallel to each other, due to a period of folding and erosion between their times of formation.

Underfit stream: stream that is clearly smaller than the ancestral stream or river which excavated the cave or valley now host to the underfit.

Uniclinal shift: sideways shift of a stream channel, notably one which cuts down obliquely and downdip to follow a weak bed from its strike outcrop, leaving a stronger underlying bed to form the updip valley side.

Uranium-series dating: the method of absolute dating used most widely on cave material.

Vadose canyon: cave passage with roughly parallel, vertical sides formed by continued floor entrenchment or incision by a free-flowing vadose stream.

Vadose cave: cave passage or cave system developed by freely flowing streams above the water table and with air above any water surface, therefore characterized by continuous downslope profiles and canyon passages formed by erosion only of the floor.

Vadose shaft: roughly cylindrical, vertical section of cave above the water table, which contains or contained a waterfall and was largely excavated by dissolution by spraywater.

Vadose zone: zone of rock above the water table with groundwater freely flowing downwards and with cavities only partially filled with water; also referred to as the unsaturated zone.

Vauclusian rising: karst rising where water flows up a flooded cave passage, within the phreatic zone and under pressure, to emerge at the surface.

Wadi: valley with intermittent stream flow in a semi-arid region.

Water table: the level within a rock mass below which all voids are filled with groundwater; above it the vadose zone is freely draining, and below it the phreatic zone is totally and permanently saturated.

Wayboard: thin bed of altered and weathered volcanic ash or tuff, within the limestone sequence of the Derbyshire Peak District.

[References](#)