

# GENERAL DICTIONARY OF GEOLOGY

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2009 First Edition

# General Dictionary of Geology

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*This dictionary dedicated to Jasmine Anita Putri as  
one of this dictionary's contributor which dead in  
Sydney at December 2008*



## **Foreword**

In the name of God most gracious most merciful, because of His salvation this dictionary can be completed. We felt so happy because we can finish this dictionary without any big trouble although we lost one of our beloved editors. Thank you very much for Mr. Tokuhide Akabana, Mr. Richard A Matzner, and Mrs. Nadine Barlow which gave us motivation to finish this dictionary.

The subjects of this dictionary are most of geological terms but there are many terms that also related with geophysics, biology, astrophysics, and geography. Geology is an interesting subject in knowing history of Earth creation, creature evolution, ancient Earth life and Earth condition in the past; even find mine, coal, also oil deposit below Earth surface. Petrogeologist study geology to find mine, coal, or oil deposit. Geophysics scientist study geology for recognize the physical characteristics of Earth component such as magnetism, seismicity, elasticity, Earth thermodynamic, by physical experiments in a specific geological structure which consist of specific rocks and minerals. Biology scientist study geology for tracing the historical evolution of creature in its first appearance until this time. Geographers also study geology for recognize a spatial phenomenon of Earth surface that were formed or influenced with a sequences of geological event.

We hope this dictionary can help much in giving a general knowledge about many terms which being used in geology. There is no human creation that perfect in the world like this dictionary. We apologize for any mistakes that we didn't notice as long as we write this dictionary and we hope that each mistake which our made didn't disturb the function of this dictionary as a guide to know geological terms. Thank you very much for using this dictionary.

**Editor**

**Yogyakarta, Indonesia**

## Contents

List of editors	<a href="#">3</a>
Dedication page	<a href="#">4</a>
Foreword	<a href="#">5</a>
Contents	<a href="#">6</a>
A	<a href="#">8</a>
B	<a href="#">10</a>
C	<a href="#">13</a>
D	<a href="#">15</a>
E	<a href="#">18</a>
F	<a href="#">20</a>
G	<a href="#">22</a>
H	<a href="#">24</a>
I	<a href="#">26</a>
J	<a href="#">28</a>
K	<a href="#">29</a>
L	<a href="#">30</a>
M	<a href="#">32</a>
N	<a href="#">35</a>
O	<a href="#">37</a>
P	<a href="#">39</a>
Q	<a href="#">42</a>
R	<a href="#">43</a>
S	<a href="#">46</a>
T	<a href="#">50</a>
U	<a href="#">53</a>
V	<a href="#">54</a>
W	<a href="#">56</a>
X	<a href="#">57</a>

Y	.....	<a href="#">58</a>
Z	.....	<a href="#">59</a>
References	.....	<a href="#">60</a>



### **Aa:**

A term of Hawaiian origin. Used in reference to a basaltic lava that occurs in flows with a fissured, rough and jagged surface.

---

### **Acidic Rock:**

An igneous rock that has a relatively high silica content. Examples are granite and rhyolite. Also see entries for basic, intermediate and ultrabasic rocks.

---

### **Acre-Foot:**

The volume of water needed to flood one acre of land to a depth of one foot. Equivalent to 43,560 cubic feet, 1,233 cubic meters or 325,851 gallons. One of the most common units of measure used for reservoir capacity. Also used in mineral resource calculations (an acre-foot of coal is a block of coal one acre in area and one foot thick - it weighs approximately 1,800 tons).

---

### **Alkali:**

Used in reference to materials that are rich in sodium and/or potassium.

---

### **Alluvial Fan:**

A fan-shaped wedge of sediment that typically accumulates on land where a stream emerges from a steep canyon onto a flat area. In map view it has the shape of an open fan. Typically forms in arid or semiarid climates.

---

### **Alluvium:**

An unconsolidated accumulation of stream-deposited sediments, including sands, silts, clays or gravels.

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### **Angle of Repose:**

The maximum angle that a soil, sediment or other loose material can be placed or accumulate and be stable. The angle of repose varies for different types of materials and different moisture conditions.

---

### **Angular Unconformity:**

An erosional surface that separates rock units of differing dips. The rocks below the surface were deposited, deformed and eroded. The younger rocks above then accumulated upon the erosional surface.

---

### **Anthracite:**

The highest rank of coal. By definition, a coal with a fixed carbon content of over 91% on a dry ash-free basis. Anthracite coals have a bright luster, break with a conchoidal fracture, a semi-metallic luster and are difficult to ignite. Frequently referred to by the layman as "hard coal".

---

### **Aquiclude:**

A subsurface rock, soil or sediment unit that does not yield useful quantities of water.

---

### **Aquifer:**

A subsurface rock or sediment unit that is porous and permeable. To be an aquifer it must have these traits to a high enough degree that it stores and transmits useful quantities of water.

---

### **Aquifer (artesian):**

An aquifer that is bounded above and below by impermeable rock or sediment layers. The water in the aquifer is also under enough pressure that, when the aquifer is tapped by a well, the water rises up the well bore to a level that is above the top of the aquifer. The water may or may not flow onto the land surface.

---



### **Aquifer (confined):**

An aquifer that is bounded above and below by impermeable rock or sediment layers. There may or may not be enough pressure in the aquifer to make it an "artesian aquifer".

---

### **Aquifer (unconfined):**

An aquifer that is not overlain by an impermeable rock unit. The water in this aquifer is under atmospheric pressure and is recharged by precipitation that falls on the land surface directly above the aquifer.

---

### **Arkose:**

A sandstone that contains at least 25% feldspar. Easily recognized because the feldspar grains are typically pink and angular in shape.

---

### **Arroyo:**

A flat-bottom gully with steep sides that is a channel for an intermittent stream.

---

### **Asthenosphere:**

A portion of the upper mantle that is directly below the lithosphere. A zone of low strength in the upper mantle defines the top of the asthenosphere. This weak zone allows the plates of the lithosphere to slide across the top of the asthenosphere.

---

### **Astrobleme:**

An ancient circular scar on Earth's surface produced by the impact of a meteorite or comet. Use our Google maps page to get close up images of these meteor impact structures.

---

### **Atoll:**

A ring-shaped group of coral islands that are surrounded by deep ocean water and that enclose a shallow lagoon.

# B

## **Backwash:**

The seaward rush of water down a beach that occurs with a receding wave.

---

## **Banded Iron Ore:**

A rock that consists of alternating layers of chert and iron oxide mineral (usually hematite) with the iron oxide in high enough concentration to be of economic value.

---

## **Bankfull Stage:**

A height of water in a stream that completely fills the natural channel. If the water rises any higher a flood will occur.

---

## **Bank Storage:**

Water that seeps into the ground along the banks of a stream during a time of high flow. This loss of water into the ground slightly reduces the height that the stream will attain and then slowly seeps into the stream as the high water level subsides - hence the term "bank storage".

---

## **Bar:**

An underwater ridge, usually of sand and/or gravel, that forms from the deposition and reworking of sediments by currents and/or waves. Bars occur in rivers, river mouths and in offshore waters.

---

## **Barchan:**

A sand dune that is crescent-shaped in map view. Barchan dunes form in areas of limited sand supply. They move across the desert floor with their gently sloping convex

sides facing upwind and their steeply sloping concave sides facing downwind.

---

## **Barrier Island:**

A long, narrow island that parallels a shoreline.

---

## **Basalt:**

A dark-colored fine-grained extrusive igneous rock composed largely of plagioclase feldspar and pyroxene. Similar in composition to gabbro. Basalt is thought to be one of the main components of oceanic crust.

---

## **Base Flow:**

Water that seeps into a stream through a permeable rock or sediment unit that outcrops in the bottom or banks of the stream.

---

## **Base Level:**

The lower limit of erosion by a stream. Sea level is the ultimate base level. However, lakes can serve as a temporary base level in upstream areas.

---

## **Basement:**

The igneous and metamorphic rocks that exist below the oldest sedimentary cover. In some areas such as shields the basement rocks may be exposed at the surface.

---

## **Basic Rock:**

An igneous rock that has a relatively low silica content. Examples are gabbro and basalt. Also see entries for acidic, intermediate and ultrabasic rocks.

---

## **Basin:**

In tectonics, a circular, syncline-like depression of strata. In sedimentology, the site of accumulation of a large thickness of sediments.

---

### **Batholith:**

A very large intrusive igneous rock mass that has been exposed by erosion and with an exposed surface area of over 100 square kilometers. A batholith has no known floor.

---

### **Bathymetry:**

The measurement of ocean depths and the preparation of topographic maps of the ocean floor.

---

### **Bauxite:**

The principal ore of aluminum. A mixture of aluminum oxides and hydroxides that forms from intense chemical weathering of a soil in tropical environments.

---

### **Bedding:**

The characteristic structure of sedimentary rocks in which layers of different composition, grain size or arrangement are stacked one on top of another in a sequence with oldest at the bottom and youngest at the top.

---

### **Bedding Plane:**

A distinct surface of contact between two sedimentary rock layers.

---

### **Bed Load:**

The larger, heavier particles that are being transported by a stream. Instead of being dissolved or suspended, these are being rolled or bounced along, spending at least part of their time in contact with the stream bottom. See also: load, suspended load, dissolved load.

---

### **Bedrock:**

Solid rock present beneath any soil, sediment or other surface cover. In some locations it may be exposed at Earth's surface.

---

### **Beta-Particle:**

An electron emitted with high energy and velocity from the nucleus of an atom during radioactive decay.

---

### **B-horizon:**

A layer in the soil, below the A-horizon, where materials leached from above accumulate. Typically enriched in clay and oxides.

---

### **Biochemical Rocks:**

A sedimentary rock that forms from the chemical activities of organisms. Organic (reef and fossiliferous) limestones and bacterial iron ores are examples.

---

### **Bioturbated:**

An adjective used in reference to a sediment or sedimentary rock. Bioturbated sediments have been disturbed by animals (such as burrowing worms or shell fish) or plant roots. These have penetrated the sediment and disturbed any or all original sedimentary laminations and structures. Bioturbated rocks were disturbed in this way while still in the soft sediment phase of their formation.

---

### **Bituminous Coal:**

A rank of coal that falls between anthracite and semi-bituminous. The most abundant rank of coal. Frequently referred to by the layman as "soft coal".

---

### **Block Fault Mountain:**

A linear mountain that is bounded on both sides by normal faults.

---

### **Blowout:**

A shallow, round or trough-shaped depression in sand or dry soil that is formed by wind erosion. The material removed by the wind may also be referred to as "blowout".

---

**Butte:**

A conspicuous hill with steep sides and a flat top. The top is usually a cap-rock of resistant material. This structure is frequently an erosional remnant in an area of flat-lying sedimentary rocks.

# C

## **Caldera:**

A large, bowl-shaped crater associated with a volcanic vent. A caldera can form from a volcanic blast or the collapse of a volcanic cone into an emptied magma chamber.

---

## **Carbonate Rock:**

A rock made up primarily of carbonate minerals (minerals containing the  $\text{CO}_3$  anionic structure). Limestone (made up primarily of calcite -  $\text{CaCO}_3$ ) and dolostone (made up primarily of dolomite -  $\text{CaMg}(\text{CO}_3)_2$ ) are the most common examples.

---

## **Carbonic Acid:**

A weak acid ( $\text{H}_2\text{CO}_3$ ) that forms from the reaction of water and carbon dioxide. Most rain water is a very weak carbonic acid solution formed by the reaction of rain with small amounts of carbon dioxide in the atmosphere.

---

## **Cataclastic Rock:**

A breccia of powdered rock formed by crushing and shearing during tectonic movements.

---

## **Cement:**

A solid precipitate of calcium carbonate, silica, iron oxide, clay minerals or other materials that forms within the pore spaces of a sediment and binds it into a sedimentary rock.

---

## **Cementation:**

The processes through which chemical precipitates form within the pore spaces of a sediment and help bind it into a sedimentary rock.

---

## **Chemical Sedimentary Rock:**

A rock that forms from the precipitation of mineral material from solution. Examples are chert and rock salt.

---

## **Chemical Weathering:**

The breaking down of surface rock material by solution or chemical alteration. Common alteration processes are oxidation and hydrolysis.

---

## **Chert:**

A microcrystalline or cryptocrystalline sedimentary rock material composed of  $\text{SiO}_2$ . Occurs as nodules and concretionary masses and less frequently as a layered deposit.

---

## **C-horizon:**

The lowest horizon of a soil profile. It is below the B-horizon and is made up of weathered bedrock.

---

## **Cinder Cone:**

A cone-shaped hill that consists of pyroclastic materials ejected from a volcanic vent.

---

## **Cirque:**

A bowl-shaped depression with very steep sides that forms at the head of a mountain glacier. Forms from cold-climate weathering processes including frost wedging and plucking.

---

## **Clastic:**

A sedimentary rock (such as shale, siltstone, sandstone or conglomerate) or sediment (such as mud, silt, sand, or pebbles). An accumulation of transported weathering debris.

---

### **Clay:**

A clastic mineral particle of any composition that has a grain size smaller than 1/256 mm. The term is also used in reference to a broad category of hydrous silicate minerals in which the silica tetrahedrons are arranged into sheets.

---

### **Coal:**

A brown or black sedimentary rock that forms from accumulated plant debris. A combustible rock that contains at least 50% (by weight) carbon compounds.

---

### **Coastal Plain:**

An area of low relief along a continental margin that is underlain by thick, gently dipping sediments.

---

### **Compaction:**

A compression process that reorients and reshapes the grains of a sediment in response to the weight of overlying deposits.

---

### **Composite Cone:**

A cone-shaped volcanic mountain composed of alternating layers of cinders and lava flows. Also known as a stratovolcano.

---

### **Cone of Depression:**

A cone-shaped lowering of the water table around a producing well.

---

### **Contact Metamorphism:**

Alteration of a rock, mainly by heat, which occurs adjacent to a dike, sill, magma chamber or other magma body.

---

### **Contour Line:**

A line on a map that traces locations where the value of a variable is constant. For example, contour lines of elevation trace points of equal elevation across the map. All points on the "ten foot" contour line are ten feet above sea level.

---

### **Contour Map:**

A map that shows the change in value of a variable over a geographic area through the use of contour lines. For example, a contour map of elevation has lines that trace points of equal elevation across the map. See also: contour line and topographic map.

---

### **Cubic Feet Per Second:**

A unit of measure frequently used to quantify the rate of flow of a stream. It is equal to a volume of water one foot high and one foot wide moving a linear distance of one foot in one second.

---

# D

## **Datum:**

A reference location or elevation which is used as a starting point for subsequent measurements. Sea level is a datum for elevation measurements. Datums can also be arbitrary such as the starting point for stream stage measurements or based upon a physical feature such as the base of a rock unit.

---

## **Daughter Element:**

The element produced through the radioactive decay of a parent element.

---

## **Debris Avalanche:**

The sudden downslope movement of rock and soil on a steep slope.

---

## **Decolment:**

A horizontal to subhorizontal fault or shear zone with a very large displacement. The rocks above the fault might have been moved thousands of meters or more relative to the rocks below the fault. This often produces a situation where the rocks above the fault have entirely different structures than the rocks below the fault.

---

## **Deflation:**

The removal of clay- and silt-size particles from a soil by wind erosion. The term can also be used in reference to the removal by wind of any unconsolidated material.

---

## **Delta:**

A deposit of sediment that forms where a stream enters a standing body of water such as a lake or ocean. The name

is derived from the Greek letter "delta" because these deposits typically have a triangular shape in map view.

---

## **Dendritic Drainage:**

A stream drainage pattern that resembles the veins of a leaf in map view. Occurs mainly where the rocks below have a uniform resistance to erosion.

---

## **Density Current:**

A gravity-driven flow of dense water down an underwater slope. The increased density of the water is a result of a temperature difference, increased salinity or suspended sediment load.

---

## **Deposition:**

The settling from suspension of transported sediments. Also, the precipitation of chemical sediments from mineral rich waters.

---

## **Desert Pavement:**

A ground cover of granule-size and larger particles that is typically found in arid areas. This ground cover of coarse particles is a residual deposit - formed when the wind selectively removes the sand-, silt- and clay-sized materials.

---

## **Detrital:**

A word used in reference to sediments or sedimentary rocks that are composed of particles that were transported and deposited by wind, water or ice.

---

## **Diagenesis:**

All of the changes which happen to a sediment after deposition, excluding weathering and metamorphism. Diagenesis includes compaction, cementation, leaching and replacement.

---

## **Diatom:**

A one celled plant that lives in the shallow waters of lakes, streams or oceans. Many of these secrete a shell or internal parts composed of silica. Diatoms can occur in very large numbers and can make significant contributions to sea-floor or lake sediment.

---

### **Diatomite:**

A light colored, fine-grained siliceous sedimentary rock that forms from a sediment rich in diatom remains.

---

### **Diatom Ooze:**

A seafloor sediment that consists of at least 30% diatom remains.

---

### **Differentiated Planet:**

A planet that has layers composed of elements and minerals of different densities. As an example, Earth is a differentiated planet because it has a metal-rich core, surrounded by a rocky mantle, and covered by a crust of low-density minerals.

---

### **Dip:**

The angle that a rock unit, fault or other rock structure makes with a horizontal plane. Expressed as the angular difference between the horizontal plane and the structure. The angle is measured in a plane perpendicular to the strike of the rock structure.

---

### **Discharge:**

The volume of water in a flowing stream that passes a given location in a unit of time. Frequently expressed in cubic feet per second or cubic meters per second. Calculated by the formula  $Q = A \times V$  where Q is the discharge, A is the cross sectional area of the channel and V is the average velocity of the stream.

---

### **Discontinuity:**

A surface separating rock layers of differing properties or compositions. (See seismic discontinuity.)

---

### **Dissolved Load:**

The dissolved material being carried by a stream. See also: load, suspended load, bed load.

---

### **Divide:**

A ridge that separates two adjacent drainage basins.

---

### **Dome:**

An uplift that is round or elliptical in map view with beds dipping away in all directions from a central point.

---

### **Drainage Basin:**

The geographic area that contributes runoff to a stream. It can be outlined on a topographic map by tracing the points of highest elevation (usually ridge crests) between two adjacent stream valleys. Also referred to as a "watershed".

---

### **Drainage Divide:**

The boundary between two adjacent drainage basins. Drainage divides are ridge crests (or less obvious locations where slope of the landscape changes direction). Runoff produced on one side of the ridge flows into stream "A" and runoff on the other side of the ridge flows into stream "B".

---

### **Drawdown:**

A lowering of the water table around a producing well. The drawdown at any given location will be the vertical change between the original water table and the level of the water table reduced by pumping.

---

### **Drift:**

A general term for all sedimentary materials deposited directly from the ice or melt water of a glacier.

---

### **Drumlin:**



A low, smoothly rounded, elongate hill. Drumlins are deposits of compacted till that are sculpted beneath the ice of a flowing glacier. The long axis of a drumlin parallels the flow direction of the ice.

---

**Dune:**

A mound or ridge of wind-blown sand. Typically found in deserts and inland from a beach. Many dunes are moved by the wind.



### **Earthflow:**

A detached mass of soil that moves downslope over a curved failure surface under the influence of gravity. An earthflow is more complex than a slump; it has a higher moisture content and the moving mass of soil has some internal movement or "flow". Rates of movement are typically a few inches per year but faster rates can occur.

---

### **Earthquake:**

A trembling of the earth caused by a sudden release of energy stored in subsurface rock units.

---

### **Ebb Tide:**

A tidal current that generally moves seaward and occurs during the part of the tide cycle when sea level is falling. (see also: flood tide)

---

### **Effluent Stream:**

A stream that gains water from ground water flow. These streams are typical of humid climates where water tables are high. The discharge of an effluent stream can be sustained by ground water flow for long periods of time between runoff-producing rainfall or snowmelt. Effluent streams generally increase in discharge downstream and contain water throughout the year. The opposite is an influent stream.

---

### **Elastic Limit:**

The maximum stress that can be applied to a body without resulting in permanent deformation - the rock reverts to its original shape after the stress is removed. In the case of a fault or a fold the elastic limit is exceeded and the deformation becomes a permanent structure of the rock.

---

### **Elastic Rebound Theory:**

A theory that explains the earthquake process. In this theory, slowly accumulating elastic strain builds within a rock mass over an extended length of time. This strain is suddenly released through fault movement, producing an earthquake.

---

### **Electron:**

A subatomic particle with a negative charge and of negligible mass that orbits the nucleus of an atom.

---

### **Elevation:**

The vertical distance between mean sea level and a point or object on, above or below Earth's surface.

---

### **Eolian:**

A term used in reference to the wind. Eolian materials or structures are deposited by or created by the wind.

---

### **Eon:**

The major divisions of the geologic time scale. Eons are divided into intervals known as "eras". Two eons of the geologic time scale are the Phanerozoic (570 million years ago to present) and the Cryptozoic (4,600 million years ago until 570 million years ago).

---

### **Epicenter:**

The point on the Earth's surface directly above the focus of an earthquake.

---

### **Epoch:**

A subdivision of geologic time that is longer than an age but shorter than a period. The Tertiary Period is divided into five epochs. From most recent to oldest they are: Pliocene, Miocene, Oligocene, Eocene and Paleocene.

---

### **Era:**

A subdivision of geologic time that is longer than a period but shorter than an eon. Precambrian, Paleozoic, Mesozoic, and Cenozoic are the eras of the time scale from oldest to youngest.

---

### **Erosion:**

A general term applied to the wearing away and movement of earth materials by gravity, wind, water and ice.

---

### **Esker:**

A long winding ridge of sorted sands and gravel. Thought to be formed from sediment deposited by a stream flowing within or beneath a glacier.

---

### **Eustatic Sea Level Change:**

A rise or fall in sea level that affects the entire earth. Thought to be caused by an increase/decrease in the amount of available water or a change in the capacity of ocean basins.

---

### **Evaporation:**

The process of liquid water becoming water vapor. Includes vaporization from water surfaces, land surfaces and snow/ice surfaces.

---

### **Evaporite:**

A chemical sediment or sedimentary rock that has formed by precipitation from evaporating waters. Gypsum, salt, nitrates and borates are examples of evaporite minerals.

---

### **Evapotranspiration:**

All methods of water moving from a liquid to water vapor in nature. Includes both evaporation and transpiration.

---

### **Exfoliation:**

A physical weathering process in which concentric layers of rock are removed from an outcrop.

---

### **Expansive Clay (Expansive Soil):**

A clay soil that expands when water is added and contracts when it dries out. This volume change when in contact with buildings, roadways, or underground utilities can cause severe damage.

---

### **Extrusive:**

Igneous rocks that crystallize at Earth's surface.

---

# F

## **Facies:**

The characteristics of a rock mass that reflect its depositional environment. These characteristics enable the rock mass to be distinguished from rocks deposited in adjacent environments.

---

## **Fault:**

A fracture or fracture zone in rock along which movement has occurred.

---

## **Fault-Block Mountain:**

A linear mountain that is bounded on both sides by normal faults.

---

## **Faunal Succession:**

A principle of relative dating that is based upon the observed sequence of organisms in the rock record. The relative age of two rock units can frequently be determined by matching the fossils found in those rocks to their positions in the rock record.

---

## **Felsic:**

A term used to describe an igneous rock that has a large percentage of light-colored minerals such as quartz, feldspar, and muscovite. Also used in reference to the magmas from which these rocks crystallize. Felsic rocks are generally rich in silicon and aluminum and contain only small amounts of magnesium and iron. Granite and rhyolite are examples of felsic rocks. (See mafic to contrast.)

---

## **Fjord:**

A deep, narrow, steep-walled, U-shaped valley that was carved by a glacier and is now occupied by the sea.

---

## **Flood:**

An overflow of water onto lands that are normally above local water levels. Can be caused by stream discharge exceeding the capacity of the stream channel, storm winds and reduced pressure drawing water from a lake or ocean onto the coastline, dam failure, lake level increase, local drainage problems or other reasons.

---

## **Flood Basalt:**

A sequence of parallel to subparallel basalt flows that were formed during a geologically brief interval of time and which covered an extensive geographic area. Thought to have formed from simultaneous or successive fissure eruptions.

---

## **Flood Plain:**

An area of alluvium-covered, relatively level land along the banks of a stream that is covered with water when the stream leaves its channel during a time of high flow.

---

## **Flood Stage:**

A water height that is reached when the discharge of a stream exceeds the capacity of the channel.

---

## **Flood Tide:**

A tidal current that generally moves landward and occurs during the part of the tide cycle when sea level is rising. (See neap tide for contrast.)

---

## **Flowing Well:**

A well that taps an aquifer that is under enough pressure to force water to the surface. Caused when the aquifer has a recharge area at a higher elevation.

---

## **Fluid Inclusion:**

A small amount of fluid (liquid and/or gas) trapped within a rock and which is thought to represent the fluid from which the rock crystallized.

---

### **Focus:**

A point beneath Earth's surface where the vibrations of an earthquake are thought to have originated. Also known as a hypocenter.

---

### **Fold:**

A bend or flexure in a rock unit or series of rock units that has been caused by crustal movements.

---

### **Foliation:**

The planar or layered characteristics of metamorphic rocks that are evidence of the pressures and/or temperatures to which the rock was exposed. These can be structural such as cleavage, textural such as mineral grain flattening or elongation, or compositional such as mineral segregation banding.

---

### **Foraminifer:**

A group of single-celled organisms, mostly marine, that produce a calcium carbonate shell. Their shells can make up a significant portion of the carbonate sediment in some areas.

---

### **Foraminiferal Ooze:**

A calcareous sea-floor sediment composed of foraminifer shells.

---

### **Forset Beds:**

The distinctly dipping sediment layers deposited on the front of a prograding delta or on the lee side of a sand dune.

---

### **Formation:**

A laterally continuous rock unit with a distinctive set of characteristics that make it possible to recognize and map from one outcrop or well to another. The basic rock unit of stratigraphy.

---

### **Fossil:**

Remains, imprints or traces of an ancient organism that have been preserved in the rock record. Bones, shells, casts, tracks and excrement can all become fossils.

---

### **Fossil fuel:**

A carbon-rich rock material or fluid, of organic origin that can be produced and burned as a fuel. Coal, oil and natural gas are examples of fossil fuels.

---

### **Fumarole:**

A vent that emits hot gases, usually associated with past or current magmatic activity below.

# G

## **Gabbro:**

A black, coarse-grained intrusive igneous rock that is the compositional equivalent of basalt. Composed of calcium-rich feldspars, pyroxene and possibly olivine, but containing little if any quartz.

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## **Gage Height:**

A measured height of water above a reference datum. Frequently used to describe the height of water in a stream, lake, well, canal or other water body.

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## **Gaging Station:**

A facility on a stream, lake, canal, reservoir or other water body where instruments are installed to automatically monitor the water. Measurements such as stage, discharge, water temperature and pH are automatically taken and transmitted to hydrologists via satellite, radio or telephone. Measurements from these stations are useful for a wide variety of flood prediction, water management, recreation and navigation purposes.

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## **Geochronology:**

A study of the time relationships of rock units. Includes methods of both relative and absolute dating.

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## **Geomorphology:**

The science of Earth's landforms, their description, classification, distribution, origin and significance.

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## **Geosyncline:**

A major trough or downwarp of the Earth's crust, in which great thicknesses of sedimentary and/or volcanic rocks have accumulated.

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## **Geothermal Gradient:**

The progressive increase of temperature with depth into the Earth.

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## **Geyser:**

A hot spring that intermittently erupts a spray of steam and hot water. Caused by the heating of ground water within a confined opening in hot rock.

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## **Glacial Rebound:**

A very gradual uplift of Earth's crust that occurs after the weight of a thick continental ice sheet (which produced subsidence) has melted away.

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## **Glacial Striations:**

Grooves and scratches on a bedrock surface that were produced by the movement of a glacier. The orientation of the striations gives evidence to the direction of glacial movement.

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## **Glacial Valley:**

A valley with a U-shaped cross section that was cut by an alpine glacier.

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## **Glacier:**

A thick mass of ice that forms on land from an accumulation and recrystallization of snow significant enough to persist through the summer and grow year by year. There are two basic types of glaciers: 1) valley (or alpine) glaciers that creep downslope under the influence of gravity, and 2) continental glaciers that flow outward from a thick central area under their own weight.

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## **Glass:**

An amorphous (without crystal structure) igneous rock that forms from very rapid cooling of magma. The rapid cooling does not provide enough time for crystal growth.

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### **Gneiss:**

A coarse-grained, foliated rock produced by regional metamorphism. The mineral grains within gneiss are elongated due to pressure and the rock has a compositional banding due to chemical activity.

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### **Graben:**

An elongated, downthrown block bounded by two steeply dipping normal faults. Produced in an area of crustal extension.

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### **Graded Bedding:**

A rock layer that has a progressive change in particle size from top to bottom. Most common is a sequence with coarse grains at the bottom and fining upwards, which is typically caused by a declining current velocity within the depositional environment.

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### **Granite:**

A coarse-grained, intrusive igneous rock composed primarily of light colored minerals such as quartz, orthoclase, sodium plagioclase and muscovite mica. Granite is thought to be one of the main components of continental crust.

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### **Gravel:**

Clastic sedimentary particles of any composition that are over 2 mm in diameter.

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### **Gravity Anomaly:**

A geographic area where the gravitational attraction is significantly higher or significantly lower than normal.

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### **Greenhouse Effect:**

A warming of the atmosphere caused by carbon dioxide and water vapor in the lower portions of the atmosphere capturing heat that is radiated from and reflected by Earth's surface.

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### **Greenstone:**

A low-grade metamorphic rock that frequently contains green minerals such as chlorite, epidote and talc.

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### **Ground Moraine:**

A blanket of till that is deposited during the retreat of a glacier.

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### **Ground Water:**

Water that exists below the water table in the zone of saturation. Ground water moves slowly in the same direction that the water table slopes.

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### **Ground Water Recharge Area:**

A location where surface water or precipitation can infiltrate into the ground and replenish the water supply of an aquifer.

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### **Guyot:**

A seamount with a flat top.

# H

## **Half-Life:**

The time required for one half of a radioactive substance to decay into its daughter material.

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## **Hanging Valley:**

A tributary to a U-shaped glacial valley which, instead of entering the valley at the same level as the main stream, enters at a higher elevation, frequently as a waterfall. These different stream levels are a result of the rapid downcutting of the glacier being much faster than the slower downcutting of the tributary stream.

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## **Hard Water:**

Water that has a significant amount of dissolved calcium and magnesium ions. This water performs poorly with most soaps and detergents and leaves a scaly deposit in containers where it is heated or evaporates. It can frequently be improved through the use of home-based water treatment systems.

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## **Headwater(s):**

The upper portions of a drainage basin where the tributaries of a stream first begin flow.

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## **Heat Flow:**

The movement of heat energy from the core of the Earth towards the surface.

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## **Hogback:**

A narrow ridge with steeply inclined sides of nearly equal slopes. Formed by differential erosion of steeply dipping rock units.

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## **Hornfels:**

A nonfoliated metamorphic rock that is typically formed by contact metamorphism around igneous intrusions.

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## **Horst:**

An elongated block of high topographic relief that is bounded on two sides by steep normal faults. Produced in an area of crustal extension.

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## **Hot Spot:**

A volcanic center located within a lithospheric plate that is thought to be caused by a plume of hot mantle material rising from depth.

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## **Hot Spring:**

A natural spring that delivers water to the surface that is of higher temperature than the human body.

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## **Humus:**

The dark portion of a soil that consists of organic material that is well enough decayed that the original source material can not be identified.

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## **Hydraulic Conductivity:**

The ability of a porous material to transmit a fluid. Permeability.

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## **Hydrocarbon:**

Any organic chemical compound (gaseous, liquid or solid) that is composed of carbon and hydrogen. The term is frequently used in reference to fossil fuels, specifically crude oil and natural gas.

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## **Hydrograph:**



A graph that shows the change of a water-related variable over time. Example: A stream discharge hydrograph shows the change in discharge of a stream over time.

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### **Hydrologic Cycle:**

The natural cycling of Earth's water between the atmosphere, surface and subsurface through the processes of evaporation, transpiration, percolation, infiltration, runoff and precipitation.

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### **Hydrology:**

The science of Earth's water, its movement, abundance, chemistry and distribution on, above and below Earth's surface.

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### **Hydrolysis:**

A chemical reaction involving water that results in the breakdown of mineral material.

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### **Hydrothermal:**

Pertaining to hot water, the actions of hot water or the products produced by the actions of hot water.

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### **Hydrothermal Deposits:**

Mineral deposits that are formed by the actions of hot water or gases associated with a magmatic source.

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### **Hydrothermal Metamorphism:**

Alteration of rock by hot waters or gases associated with a magmatic source.

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### **Hydrothermal Vein:**

A deposit of minerals precipitated in a fracture by the actions of hot water or gases associated with a magmatic source.

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### **Hypocenter:**

A point beneath earth's surface where the vibrations of an earthquake are thought to have originated. Also known as the focus

# I

## **Igneous Rock:**

A rock formed by the crystallization of magma or lava.

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## **Ignimbrite:**

An igneous rock formed by the lithification of ash flow or pyroclastic flow deposits.

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## **Impermeable Layer:**

A layer of rock, sediment or soil that does not allow water to pass through. This could be caused by a lack of pore space or pore spaces that are so small that water molecules have difficulty passing through.

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## **Infiltration:**

The movement of surface water into porous soil.

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## **Injection Well:**

A well that is used to force a fluid into the ground. The injection could be done for disposal or to place the fluid (such as natural gas) into a subsurface reservoir.

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## **Interior Drainage:**

A system of streams that flow into a landlocked basin and evaporate.

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## **Intermediate Rock:**

An igneous rock that has an intermediate silica content. Examples are syenite and diorite. Also see entries for acidic, basic and ultrabasic rocks.

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## **Intrusion:**

A igneous rock body that formed from magma that forced its way into, through or between subsurface rock units.

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## **Intrusive:**

Igneous rocks that crystallize below Earth's surface.

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## **Ion:**

An atom or group of atoms that have gained or lost one or more electron and as a result has an electrical charge.

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## **Ionic Bond:**

A chemical bond formed by the electrostatic attraction between oppositely charged ions.

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## **Iron Formation:**

A layered deposit of chemical sedimentary rocks containing at least 15 percent (by weight) iron in the form of sulfide, oxide, hydroxide, or carbonate minerals.

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## **Isograd:**

A line on a map that represents a specific degree of metamorphism. Rocks on one side of the line have been subjected to a greater level of metamorphism and on the other side of the line a lower level of metamorphism.

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## **Isostasy:**

A condition of gravitational balance (similar to floating) in which a mass of lighter crustal rocks are buoyantly supported from below by denser mantle rocks. The crustal rocks above subside into the mantle until they have displaced an adequate amount of mantle material to support them.

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**Isotope:**

One of several forms of an element. These different forms have the same number of protons but varying numbers of neutrons.

# J

## **Jade:**

A translucent gemstone consisting of either jadeite or nephrite that is typically green in color. Jade is a very durable stone and is used for a variety of jewelry and ornamental objects. Typically cut in the cabochon shape or carved.

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## **Jadeite:**

A high pressure clinopyroxene that is frequently carved and polished as a gemstone.

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## **Jasper:**

A variety of colored chert, typically red or green and often found in association with iron ores. Jasper is frequently used as a gemstone or in the production of ornaments.

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## **Jet:**

A variety of coal that is frequently cut and polished for jewelry or ornaments.

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## **Jetty:**

A human made structure built at right angles to a coastline and extending into the water. Jetties are built to protect an area of shoreline from the effects of currents, erosion or deposition.

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## **Joint:**

A fracture in rock along which there has been no displacement.

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## **Joint Set:**

A group of joints that are parallel or nearly parallel. They are frequently formed at the same time interval from a common process.

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## **Jolly Balance:**

A spring balance used in the determination of specific gravity.

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## **Juvenile Water:**

Water that is new to the hydrologic cycle. Brought to Earth's surface through volcanic eruptions.

# K

## **Karst:**

A landscape that is characterized by the features of solution weathering and erosion in the subsurface. These features include caves, sinkholes, disappearing streams and subsurface drainage.

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## **Kerogen:**

Solid organic substances frequently found in shales. The organic component of an oil shale.

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## **Kettle:**

A depression formed in glacial deposits when a buried block of ice, left behind by a retreating glacier, melts.

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## **Kettle Lake:**

A lake that forms in a kettle.

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## **K-feldspar:**

A potassium feldspar such as orthoclase, microcline, sanidine or adularia. Also referred to as potash feldspar.

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## **Kilobar:**

A unit of pressure equal to 1000 bars (the mean atmospheric pressure at 100 meters above sea level is one bar).

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## **Kimberlite:**

A variety of peridotite that is found in volcanic pipes which are thought to be intrusions from the upper mantle. Many diamond deposits are found in kimberlite pipes.

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## **Knickpoint:**

An abrupt change in slope. A point on a stream profile where a change in gradient occurs. This could be caused by a change in underlying bedrock or bedrock structure.

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## **Knob:**

A small hilltop that is round in shape.

# L

## **Laccolith:**

An igneous intrusion that has been forced between two layered rock units. The top of the intrusion is arched upwards and the bottom of the intrusion is nearly flat.

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## **Lahar:**

A mudflow composed of water and volcanic ash. Lahars can be triggered by the flash melting of the snow cap of a volcanic mountain or from heavy rain. Lahars are very dangerous because they can occur suddenly and travel at great speeds.

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## **Laminar Flow:**

A state of uniform flow within a fluid in which the moving particles travel along parallel paths (compare with Turbulent Flow).

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## **Landslide:**

A downslope movement of rock and soil over a failure surface and under the influence of gravity. Slumps, earthflows, debris flows and debris slides are examples.

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## **Lapilli:**

Volcanic rock materials which are formed when magma is ejected by a volcano. Typically used for material that ranges between 2 and 64 millimeters in diameter.

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## **Lateral Moraine:**

An accumulation of till along the sides of a valley glacier that is produced by ice action.

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## **Lava:**

Molten rock material on Earth's surface.

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## **Lava Tube:**

A tunnel below the surface of a solidified lava flow, formed when the exterior portions of the flow solidify and the molten internal material is drained away.

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## **Leaching:**

The removal of soluble constituents from a rock or soil by moving ground water or hydrothermal fluids.

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## **Left-Lateral Fault:**

A fault with horizontal movement. If you are standing on one side of the fault and look across it the block on the opposite side of the fault has moved to the left. (Also see Right-Lateral Fault.)

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## **Levee:**

A long continuous ridge built by people along the banks of a stream to contain the water during times of high flow. Natural levees can also be built along the banks of a stream. When the flood water decelerates upon leaving the channel, sediments quickly drop out of suspension and build a ridge over time.

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## **Limb:**

One side of a fold. The dipping rock units between the crest of an anticline and the trough of a syncline.

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## **Limestone:**

A sedimentary rock consisting of at least 50% calcium carbonate (CaCO<sub>2</sub>) by weight.

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## **Lineament:**

A straight topographic feature of regional extent which is thought to represent crustal structure. A fault, line of sinkholes, straight stream stretch or a line of volcanoes can be considered linear features.

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### **Lithification:**

The processes through which sediments are converted into sedimentary rock, including compaction and cementation.

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### **Lithology:**

The study and description of rocks, including their mineral composition and texture. Also used in reference to the compositional and textural characteristics of a rock.

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### **Lithosphere:**

The rigid outer shell of the earth which includes the crust and a portion of the upper mantle.

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### **Lithospheric Plate:**

A large slab of the lithosphere that can be moved by convection current motion within the mantle.

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### **Load:**

The total amount of sediment being carried by a stream or a glacier. Includes suspended materials, dissolved materials and materials moved along Earth's surface. (Also see: bed load, dissolved load, suspended load.)

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### **Lode:**

A rich accumulation of minerals in solid rock. Frequently in the form of a vein, layer or an area with a large concentration of disseminated particles. (See placer deposit for contrast.)

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### **Longitudinal Dune:**

A long, narrow sand dune that has its long dimension oriented parallel to the direction of the wind.

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### **Longitudinal Profile:**

A cross section of a stream or valley beginning at the source and continuing to the mouth. These profiles are drawn to illustrate the gradient of the stream.

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### **Longshore Current:**

A flow of water parallel to a coastline that is caused by waves striking the coast at an oblique angle.

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### **Longshore Drift:**

The movement of sediment along a coastline caused by waves striking the coast at an oblique angle. The waves wash sediment particles up the beach at an oblique angle and the swash back to the sea carries the particles down the gradient of the beach. This produces a zig-zag path of particle movement along the beach.

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### **Lowland:**

A relatively flat area in the lower levels of regional elevation.

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### **Low-Velocity Zone:**

A zone within the upper mantle where seismic wave velocities are relatively low. This zone is located about 35 to 155 miles below the surface.

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### **Luster:**

The manner in which light reflects from a mineral surface. Metallic, submetallic and non-metallic are the basic types of luster.

# M

## **Mafic:**

A term used to describe an igneous rock that has a large percentage of dark-colored minerals such as amphibole, pyroxene and olivine. Also used in reference to the magmas from which these rocks crystallize. Mafic rocks are generally rich in iron and magnesium. Basalt and gabbro are examples of mafic rocks. (See felsic to contrast.)

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## **Magma:**

Molten rock material that occurs below Earth's surface.

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## **Magma Chamber:**

A full or emptied magma reservoir in the shallow portion of the lithosphere.

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## **Magmatic Water:**

Water that is dissolved in a magma or water that is released from a magma. Some magmas can contain up to several percent dissolved water by weight.

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## **Magnetic Anomaly:**

An increase or decrease in the local magnetic field compared to the normally expected value.

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## **Magnetic Declination:**

The horizontal angular difference between True North and Magnetic North.

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## **Magnetic Inclination:**

The vertical angular difference between a horizontal plane and the orientation of Earth's magnetic field.

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## **Magnetic North:**

The direction that a compass points. The location where Earth's magnetic field dips vertically into the Earth.

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## **Magnetic Reversal:**

A change in the polarity of Earth's magnetic field in which the north magnetic pole becomes the south magnetic pole and vice versa. Also known as geomagnetic reversal or polarity reversal. Earth's magnetic field has reversed many times in the past and the time intervals between these changes are known as polarity epochs.

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## **Magnetic Stratigraphy:**

The correlation of rock units and study of Earth's history using magnetic events and magnetic epochs as a time reference.

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## **Magnetometer:**

An instrument designed to measure the strength and character of Earth's magnetic field.

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## **Magnitude:**

A measure of earthquake strength based upon the amount of ground motion experienced and corrected for the distance between the observation point and the epicenter. There are several magnitude scales in use.

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## **Manganese nodule:**

A rounded concretion, rich in manganese minerals with minor concentrations of cobalt, copper and nickel. These occur in abundance on some parts of the deep ocean floor and have been considered as a potential source of manganese.

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## **Mantle:**



A major subdivision of Earth's internal structure. Located between the base of the crust and overlying the core.

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### **Mantle Plume:**

A rising mass of hot mantle material that can create an area of volcanic activity in the center of a lithospheric plate.

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### **Massive:**

A term used in reference to a rock unit that is homogeneous in texture, fabric and appearance.

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### **Mass Wasting (also Mass Movement):**

A general term used for any downslope movement of rock, soil, snow or ice under the influence of gravity. Includes: landslides, creep, rock falls and avalanches.

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### **Meandering Stream:**

A stream that has many bends (meanders). This type of drainage pattern usually develops on a nearly level landscape and where the banks of the stream are easily eroded.

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### **Mechanical Weathering:**

A general term applied to a variety of weathering processes that result in the particle size reduction of rock materials with no change in composition. Frost action, salt crystal growth and pressure relief fracturing are examples. Also known as physical weathering.

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### **Medial Moraine:**

A streak of till in the center of a glacier. These are found downslope from the junction of two glaciers and are a merging of their lateral moraine deposits.

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### **Medical Geology:**

The study of human health related to geology. Examples would include the correlation of disease or vitality with residences over specific types of bedrock or health problems associated with exposure to specific mineral materials.

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### **Metamorphism:**

Alteration of the minerals, textures and composition of a rock caused by exposure to heat, pressure and chemical actions.

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### **Meteoric Water:**

Water from the atmosphere, such as rain, snow, hail, or sleet.

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### **Meteor:**

A meteoroid that penetrates Earth's atmosphere, producing a streak of bright light caused by incineration.

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### **Meteorite:**

A particle of iron or rock that has fallen to Earth's surface from inter-planetary space.

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### **Meteoroid:**

A particle of iron or rock found in inter-planetary space. Distinguished from planets or asteroids by its much smaller size.

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### **Microseism:**

A vibration of the Earth that is unrelated to earthquake activity - instead it is caused by wind, moving trees, ocean waves or human activity.

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### **Mineral:**

A naturally occurring, inorganic solid with a definite chemical composition and an ordered internal structure.

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## **Mineralogy:**

The study of minerals - their composition, structure, formation, uses, properties, occurrence and geographic distribution.

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## **Mohorovicic Discontinuity:**

The boundary between the crust and the mantle. Frequently referred to as the Moho.

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## **Mohs Hardness Scale:**

A collection of minerals ranging from very soft to very hard. Use as a comparison scale during mineral identification. From softest to hardest, the ten minerals are: talc 1, gypsum 2, calcite 3, fluorite 4, apatite 5, orthoclase 6, quartz 7, topaz 8, corundum 9, and diamond 10. Developed by Friedrich Mohs, a German mineralogist in the early 1800's.

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## **Monocline:**

An area of increased dip in otherwise gently dipping strata.

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## **Moraine:**

A mound, ridge or ground covering of unstratified and unsorted till, deposited by ice action or by melting away of a glacier.

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## **Mountain:**

A general term used in reference to an area that is at a conspicuously higher elevation than surrounding lands. Mountains are larger than hills and are significant enough in relief that they are given names by local residents.

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## **Mudflow:**

A type of mass movement composed mainly of clay-size materials with a high enough water content that it flows readily.

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## **Mudstone:**

A sedimentary rock composed of clay-size particles but lacking the stratified structure that is characteristic of a shale.

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## **M.Y.:**

Million years - abbreviation.

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## **M.Y.A.:**

Million years ago - abbreviation.

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## **Mylonite:**

A brecciated metamorphic rock frequently found in a fault zone. The fractured texture is thought to form by the crushing actions of fault movement.

# N

## **Nannofossils:**

A generic term used in reference to very small fossils that are at the limit of resolution by a light microscope. They are therefore studied with electron microscopes and are frequently fossil discoasters and coccoliths.

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## **Nappe:**

A large slab of earth's surface that has been moved in a horizontal or near horizontal direction over a plane of separation. This motion can be produced by faulting or sliding. The term is generally used for very large slabs which are many square kilometers or miles in surface area.

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## **Native Metal:**

A natural deposit of a metallic element such as gold, silver, copper or iron in a pure form.

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## **Natural Bridge:**

An arch-shaped rock formation produced by weathering and/or erosion.

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## **Natural Gas:**

Naturally occurring hydrocarbons that exist in subsurface rock units in the gaseous state. Methane is the most abundant but ethane, propane and others also occur.

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## **Natural Levee:**

A mound of sediment that parallels a stream channel forming a levee-like deposit. When flood waters leave the normal stream channel and enter the flood plain there is a reduction of velocity that causes suspended sediments to fall to the bottom, producing this deposit.

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## **Neap tide:**

A daily tidal range of minimal amplitude that occurs when the moon and sun are positioned at 90 degrees to one another. In this moon-earth-sun configuration, the gravitational attraction of the moon and sun compete for Earth's water. Occurs at the first and third quarters of the moon. See spring tide for contrast.

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## **Nebula:**

A cloud of interstellar dust that is faintly visible from Earth.

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## **Neutron:**

A subatomic particle, contained in the nucleus of an atom. It has no electrical charge and a mass similar to that of a proton.

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## **Nodule:**

A mineral mass that has a different composition or is more weathering resistant than its surrounding rock. These are normally rounded in shape. Examples include: chert masses in a limestone rock unit, pyrite masses in a coal seam, or carbonate masses in a shale. In most cases these "nodules" have formed within the rock unit or its former sediment mass. The term is also applied to rounded masses of manganese minerals that occur on some parts of the ocean floor.

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## **Non-Point Source Pollution:**

Pollution that does not originate at a single location. In an urban area runoff water can be polluted as it flows to a stream by gasoline, antifreeze, road salt or other contaminants. In rural areas runoff can be contaminated by insecticides, manure, or fertilizer. This contamination can be significant but can not be traced back to a specific source.

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## **Normal Fault:**

A fault with vertical movement and an inclined fault plane.  
The block above the fault has moved down relative to the block below the fault.



### **Oblique-Slip Fault:**

A fault that has both horizontal and vertical elements of displacement.

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### **Obsidian:**

A glassy igneous rock with a composition similar to granite. The glassy texture is a result of cooling so fast that mineral lattices were not developed.

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### **Oil Field:**

The geographic area above an underground accumulation of oil and natural gas.

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### **Oil Shale:**

A dark-colored shale containing an unusual amount of solid organic material. This shale can be crushed and heated to liberate gaseous and liquid hydrocarbons. At present the expenditure required to process oil shale into a fuel makes this effort marginally profitable or unprofitable.

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### **Old Age:**

A stage in the development of a landscape when streams have a low gradient and meander back and forth across broad floodplains. The landscape is marked by meander scars and oxbow lakes.

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### **Oolite:**

A small sphere of calcium carbonate no more than a few millimeters in diameter and with a concentric internal structure. These spheres are thought to have formed by inorganic precipitation of calcium carbonate in very thin

layers around a grain of sand or a particle of shell or coral. A rock composed primarily of oolites.

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### **Oolitic:**

A limestone texture that is characterized by spherical grains of calcium carbonate with a concentric internal structure. These grains are thought to form by inorganic precipitation of calcium carbonate around a sand grain or shell particle nucleus.

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### **Opaque:**

An adjective used in reference to a substance that does not allow light of visible wavelength to enter or pass through. Minerals with a metallic or submetallic luster are normally opaque.

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### **Ophiolite Suite:**

The typical sequence of rocks in the oceanic crust: from bottom to top: ultrabasic rocks, gabbro, sheeted dikes, pillow basalts, and sea-floor sediments. Igneous rocks and deep-sea sediments associated with divergence zones and the sea-floor environment.

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### **Orbit:**

An elliptical or hyperbolic path traveled by a satellite object around a more massive body. For example, the Earth orbits the Sun.

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### **Ore Deposit:**

A natural accumulation of a metal, gemstone or other valuable mineral substance, which is rich enough in concentration that it can be mined and processed at a profit.

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### **Ore Mineral:**

A mineral that contains a high enough concentration of a useful element or compound that the element or compound can be extracted at a profit.

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### **Original Horizontality:**

One of the principles of relative dating. Based upon the good assumption that sedimentary rocks are deposited in horizontal or nearly horizontal layers; then if sedimentary layers are found in an inclined orientation the force that moved them to that orientation must have been applied at some time after their deposition.

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### **Orogenic Belt:**

A linear or arcuate region of folded and uplifted rocks.

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### **Orogeny:**

A compressive tectonic process that results in intense folding, reverse faulting, crustal thickening, uplift and deep plutonic activity. A mountain-building episode.

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### **Oscillation Ripple Marks:**

Symmetrical ridges in sand or other sediment that are caused by a back-and-forth wave action.

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### **Outcrop:**

An exposure of bedrock. Outcrops can be formed naturally or by human action. Stream erosion and highway construction can produce outcrops.

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### **Outfall:**

A location where water is discharged. Normally used in reference to where a water treatment facility releases treated water into the environment.

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### **Outgassing:**

The release of juvenile gases and water to the surface from a magma source.

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### **Outwash:**

Sorted and stratified sediment deposited in front of a glacier by meltwater streams.

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### **Overtured Fold:**

A fold that has both limbs dipping in the same direction, resulting from one of those limbs being rotated through an angle of at least 90 degrees. Overtured folds are found in areas of intense deformation. The name overtured is given because the strata on one limb of the fold are "overtured" or upside down.

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### **Oxbow Lake:**

A crescent-shaped lake that forms when a meandering stream changes course. Such changes in course frequently occur during flood events when overbank waters erode a new channel.

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### **Oxidation:**

A chemical reaction in which substances combine with oxygen. For example, the combination of iron with oxygen to form an iron oxide.

# P

## **Pahoehoe:**

A Hawaiian term for a lava flow that has a surface flow structure appearance that looks like coiled rope or cord. See aa for contrast.

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## **Paleoclimate:**

The climate of a given area at a specific time in the past. Paleoclimates can be read from the rocks much as areas with different types of climates produce sediments with specific characteristics today.

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## **Paleocurrent Map:**

A map that shows the directions of currents at the time of sediment deposition. These directions can be determined through the study of cross bedding, ripple marks, tool marks and other sedimentary structures.

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## **Paleogeographic Map:**

A map that shows the distribution of sedimentary environments at a specific time in the past. These maps are made by studying the rock record to correlate rock units that were deposited at the same time, then relating rock characteristics to specific sedimentary environments.

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## **Paleomagnetism:**

The study of Earth's magnetic field over time. When rocks that contain magnetic minerals are deposited, the character (vertical and horizontal orientation) of Earth's magnetic field is locked within the rocks. This information can be used to study changes in Earth's magnetic field as well as the movement of plates over time.

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## **Paleontology:**

The study of ancient life through fossils.

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## **Pangaea:**

A large continental landmass that existed from about 300 million years ago through about 200 million years ago. It included most of the continental lithosphere present at that time. It has since broken up and the fragments have drifted to become the configuration of Earth's present day continents.

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## **Panthalassa:**

The ancient ocean that surrounded the Pangaea landmass.

---

## **Parent Element:**

A radioactive element that spontaneously decays into a new substance. The product of this decay is known as a "daughter" element.

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## **Peak Flow:**

The maximum instantaneous discharge of a stream at a specific location. Corresponds to the highest stage of a flood.

---

## **Peat:**

An accumulation of unconsolidated plant debris that if buried and preserved could become coal. Special conditions are required to accumulate and preserve plant materials. These conditions are most often found in a marsh or swamp where water cover prevents oxidation and attack by most organisms.

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## **Pediment:**

A broad, gently sloping erosional surface of low local relief adjacent to an eroding cliff or mountain range. The area is likely covered with sediments.

---

## **Pegmatite:**

A very coarse grained igneous rock, normally of granitic composition. Typically forms during the final states of magma chamber crystallization when the high water content solutions allow rapid crystal growth.

---

### **Pelagic Sediment:**

A ocean sediment that accumulates far enough from land that detrital materials are a minor component. These sediments are largely composed of the tiny shell debris of radiolarians and foraminifera.

---

### **Perched Water Table:**

A water table that is isolated from and higher than the regional water table. This can occur when a hilltop is underlain by an impermeable rock unit. Infiltrating waters stack up on the impermeable unit, creating an isolated water table that is higher than the water table of the surrounding land.

---

### **Peridotite:**

A dark-colored, coarse-grained igneous rock that is made up mainly of olivine and pyroxene, with very little quartz or feldspar.

---

### **Permeability:**

A measure of how well a material can transmit water. Materials such as gravel, that transmit water quickly, have high values of permeability. Materials such as shale, that transmit water poorly, have low values. Permeability is primarily determined by the size of the pore spaces and their degree of interconnection. Permeability measures are expressed in units of velocity, such as centimeters per second, and assume a gradient of one vertical foot of drop per linear foot.

---

### **pH:**

A relative measure of the acidity or alkalinity of a water based upon a scale that ranges between 0 and 14 with 7 being neutral. Values of pH below 7 indicate acid solutions and values of pH above 7 indicate basic solutions.

---

### **Physical Weathering:**

A general term applied to a variety of weathering processes that result in the particle size reduction of rock materials with no change in composition. Frost action, salt crystal growth and pressure relief fracturing are examples. Also known as mechanical weathering.

---

### **Placer Deposit:**

A mass of stream sediment that contains an economically significant concentration of mineral particles. This accumulation of mineral particles is a result of their being of high specific gravity or resistant to abrasion. Gold, magnetite, and diamonds can be found in placer deposits.

---

### **Plateau Basalt:**

A sequence of parallel to subparallel basalt flows that were formed during a geologically brief interval of time and which covered an extensive geographic area. Thought to have formed from simultaneous or successive fissure eruptions.

---

### **Point-Source Pollution:**

Water contamination that can be traced to a single point. A toxic material spill and a sewage discharge pipe are examples of point sources.

---

### **Polarity Epoch:**

An interval of time between reversals of Earth's magnetic field.

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### **Polarity Event:**

A specific event in the history of Earth's magnetic field. Usually used in reference to a specific polarity reversal.

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### **Polarity Reversal:**

A change in the polarity of Earth's magnetic field in which the north magnetic pole becomes the south magnetic pole and vice versa. Also known as geomagnetic reversal or



magnetic reversal. Earth's magnetic field has reversed many times in the past and the time intervals between these changes are known as polarity epochs.

---

### **Porosity:**

The volume of pore space in a rock, sediment or soil. Usually expressed as a percentage. This pore space can include openings between grains, fracture openings and caverns.

---

### **Potable Water:**

Water that is of adequate quality for drinking.

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### **Pothole:**

A cylindrical or hemispherical hold in the bedrock of a stream that is formed from the continual swirling motion of sand and gravel by swirling currents.

---

### **PPM:**

An abbreviation for parts per million.

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### **Precipitation:**

Movement of water from the atmosphere to the land or to a surface water body. Rain, hail, snow, dew, and sleet are all examples of precipitation.

---

### **Primary Seismic Waves:**

The fastest set of earthquake vibrations - also known as P-waves. They move through the Earth in compression and expansion motions (much like sound waves move through air). Called primary because they are the first recorded at a seismograph. Primary waves are able to travel through both solids and liquids.

---

### **Proto-Sun:**

An intermediate stage in the development of a star in which a large cloud of dust and gases gradually condenses through gravitational actions.

---

### **Proven Reserves:**

Mineral deposits that have been explored thoroughly enough to be quantified but which are still in the ground.

---

### **Pumice:**

A vesicular volcanic glass of granitic composition. It has so many vesicles that it has a very low specific gravity - sometimes low enough to float on water.

---

### **P-wave:**

Primary seismic waves. The fastest set of earthquake vibrations. They move through the Earth in compression and expansion motions (much like sound waves move through air). Called primary because they are the first recorded at a seismograph. Primary waves are able to travel through both solids and liquids.

---

### **Pyroclastic Rock:**

A rock formed when small particles of magma are blown from the vent of a volcano by escaping gas.

---

### **Pyroxene Granulite:**

A coarse-grained contact metamorphic rock that is formed at high temperatures and low pressures and which is rich in pyroxene minerals

A nickname for the element mercury.



### **Quarry:**

A surface mine usually for the extraction of construction stone.

---

### **Quartz:**

One of the most abundant minerals in the earth's crust. Has a chemical composition of SiO<sub>2</sub> and a hardness of seven. One of the index minerals in Moh's Hardness Scale. Occurs in sedimentary, metamorphic and igneous rocks.

---

### **Quartz Arenite:**

A sandstone consisting of at least 95% quartz.

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### **Quartzite:**

A metamorphic rock formed by the alteration of sandstone by heat, pressure and chemical activity.

---

### **Quartzose:**

An adjective used in reference to a rock that is composed primarily of quartz.

---

### **Quicksand:**

A bed of sand that has a high water content. The water within the sand is often flowing through the spaces between the sand grains. This creates a soft, fluid-like material that yields easily to pressure and in which heavy objects will sink.

---

### **Quicksilver:**



### **Radial Drainage:**

A drainage pattern in which stream channels run away from a central high point such as a volcano or dome.

---

### **Radiolarian:**

A group of one-celled marine animals with a siliceous skeleton that occupies shallow portions of the water column. Radiolarians have a range from Cambrian to present.

---

### **Radiolarian Ooze:**

A deep-sea pelagic sediment that contains at least 30% siliceous radiolarian remains.

---

### **Rating Curve:**

A plot that shows the relationship between the stage and discharge (streamflow) of a specific stream at a specific location. It is customary to plot stream stage on the y-axis of the plot and discharge on the x-axis. The resulting relationship is normally a curve. Rating curves can be used to estimate discharge (which is time consuming and expensive to measure) using a single stage measurement (which can be collected with automatic equipment). The principle of a rating curve enables hydrologists to monitor the discharge of many streams simultaneously once gages have been placed to collect and report the stage of the stream.

---

### **Reaction Series:**

A series of interactions between a melt and mineral crystals in contact with the melt. In a reaction series the first formed crystals (highest temperature minerals) react with the melt to produce a new mineral.

---

### **Recharge:**

Water added to an aquifer or other water body. An aquifer is recharged by precipitation in an area where the aquifer has a porous connection to the surface.

---

### **Recharge Area:**

The geographic area where water infiltrates into the ground and enters an aquifer.

---

### **Recrystallization:**

A solid state reaction in which the atoms of existing crystals within a rock are reorganized in response to heat and/or pressure. The recrystallized mineral grains are typically larger in size than the original crystals.

---

### **Rectangular Drainage:**

A drainage pattern in which stream channels develop within a large-scale network of intersecting joints. This drainage pattern is characterized by right-angle bends in the channels of streams and streams that intersect at right angles.

---

### **Recumbent Fold:**

An overturned fold that has two limbs which are nearly horizontal.

---

### **Refraction:**

The bending of a seismic wave as it enters a material of different density, or, the bending of a beam of light as it enters a material of different refractive index.

---

### **Regional Metamorphism:**

Metamorphism across a broad area caused by the elevated temperatures and pressures of plate collision or deep burial.

---

### **Regolith:**

A general term used in reference to unconsolidated rock, alluvium or soil material on top of the bedrock. Regolith may be formed in place or transported in from adjacent lands.

---

### **Regression:**

A retreat of the sea from land areas. Possible causes include a drop in sea level or uplift.

---

### **Relief:**

Variations in the height and slope of Earth's surface. Also used in reference to the vertical difference between the highest and lowest elevations of an area.

---

### **Remote Sensing:**

The collection of information about an object or area from a distance. Methods employed include photography, radar, spectroscopy and magnetism.

---

### **Replacement:**

The dissolving or disintegration of one material followed by precipitation of a new material in its place.

---

### **Retrograde Metamorphism:**

Mineral changes within a rock that are caused by adjustments to conditions of reduced temperature and pressure.

---

### **Reverse Fault:**

A fault with vertical movement and an inclined fault plane. The block above the fault has moved upwards relative to the block below the fault.

---

### **Rhyolite:**

The fine-grained volcanic or extrusive rocks that are equivalent in composition to granite. Normally white, pink or gray in color.

---

### **Richter Magnitude Scale:**

A scale that is used to compare the strength of earthquakes based upon the amount of energy released. The scale is logarithmic and an arbitrary earthquake was used as a starting point for creating the scale. As a result it is a continuous scale with no upper limit and negative numbers possible for very small earthquakes. An upper limit of approximately 9.0 is suspected as Earth materials will most likely fail before storing enough energy for a larger magnitude earthquake.

---

### **Ridge (Mid-Ocean):**

An elevated area of the sea floor in the center of an ocean basin with rugged topography, a central rift-valley and recurring seismic activity. Ridges generally stand about 1000 meters to 3000 meters above the adjacent ocean floor and are about 1500 kilometers in width.

---

### **Right-Lateral Fault:**

A fault with horizontal movement. If you are standing on one side of the fault and look across it, the block on the opposite side of the fault has moved to the right. (Also see Left-Lateral Fault.)

---

### **Rip Current:**

A strong, narrow current of high velocity and short duration that flows seaward through the breaker zone. Caused when a build up of water pushed onto the beach by winds and waves returns seaward.

---

### **Ripple Marks:**

A series of parallel or sub-parallel ridges in sand or sediment that is caused by the rhythmic or directional movement of wind or water.

---

### **Rock Cycle:**

All rock at or near Earth's surface is being modified by the processes of metamorphism, melting, crystallization, lithification and weathering. These processes move rock

material through the states of metamorphic rock, igneous rock, sedimentary rock, melts and sediment. The natural and continuous cycling of rock materials through these states is known as the rock cycle.

---

### **Rock Flour:**

Finely pulverized rock material of silt or smaller size produced by abrasion at the base of a glacier.

---

### **Rock Glacier:**

A mass of rock material, cemented together by ice, that flows down a slope under the force of gravity much like the motion of a glacier.

---

### **Rockslide:**

A type of mass wasting in which a large volume of rock debris slides down a slope under the influence of gravity.

---

### **Runoff:**

Liquid water moving over the land surface as a sheet or channelized flow. The portion of precipitation that moves over the ground instead of evaporating or infiltrating.

---

### **Rupture Strength:**

The maximum amount of stress that a material can sustain without failure

# S

## **Saltation:**

The transport of sediment in short jumps and bounces above the stream bed or ground by a current that is not strong enough to hold the sediment in continuous suspension. (See suspension and traction for comparison.)

---

## **Sandstone:**

A sedimentary rock composed of sand-sized particles (1/16 to 2 millimeters in diameter).

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## **Schist:**

A metamorphic rock containing abundant particles of mica, characterized by strong foliation, and originating from a metamorphism in which directed pressure plays a significant role.

---

## **Schistosity:**

The parallel arrangement of platy or prismatic minerals in a rock that is caused by metamorphism in which directed pressure plays a significant role.

---

## **Scoria:**

An igneous rock of basaltic composition and containing numerous vesicles caused by trapped gases.

---

## **Sea-Floor Spreading:**

The process that occurs at mid-ocean ridges in which convection currents below pull the plates apart and create new sea floor.

---

## **Seamount:**

A mountain on the sea floor that has at least 1000 meters of local relief. Most seamounts are shield volcanoes. (See also Guyot.)

---

## **Sediment:**

A loose, unconsolidated deposit of weathering debris, chemical precipitates or biological debris that accumulates on Earth's surface.

---

## **Sedimentary Rock:**

A rock formed from the accumulation and consolidation of sediment, usually in layered deposits.

---

## **Sedimentary Structure:**

A structure in a sedimentary rock that forms at or near the time of deposition and reveals information about the depositional environment. Examples include: ripple marks, cross-bedding, mud cracks, and graded bedding.

---

## **Sedimentation:**

The process of sediment deposition from out of a suspension or solution.

---

## **Seepage:**

The slow movement of water through the pore spaces of a solid material. This term is also applied to a loss of water by infiltration through the bottom of a stream, canal, irrigation ditch, reservoir or other body of water.

---

## **Seif Dune:**

A large sand dune that forms parallel to the direction of a strong wind that blows in a consistent direction throughout the year. Also called a longitudinal dune.

---

## **Seismic Discontinuity:**

A surface separating rocks that transmit seismic waves at different velocities.

---

### **Seismicity:**

The study of the worldwide distribution of earthquakes over time and the probability of an earthquake occurring in a specific location.

---

### **Settling Pond:**

An open pond where waste or process water is allowed to stand while suspended materials settle out.

---

### **Sinkhole:**

A depression in the land surface that results from the collapse or slow settlement of underground voids produced by solution weathering. The rock being dissolved is normally limestone but can also be salt, gypsum or dolostone.

---

### **Solution:**

A chemical weathering process in which a material is dissolved. Also, the transport of dissolved ions by the water of a stream.

---

### **Storm Sewer:**

A sewer system that collects surface runoff instead of waste water. These two types of water are kept separate because they require different processing before release to the environment.

---

### **Storm Surge:**

The piling up of water along a shoreline cause by the sustained winds of a strong storm - usually a hurricane..

---

### **Strain:**

A change in the volume or shape of a rock mass in response to stress.

---

### **Stratification:**

A layered structure of sedimentary rocks in which the individual layers can be traced a considerable distance. The layers can be caused by many differences which include materials of different composition, color, grain size or orientation.

---

### **Stratigraphic Sequence:**

The sequence of sedimentary rock layers found in a specific geographic area, arranged in the order of their deposition.

---

### **Stratigraphy:**

The study of sedimentary rock units, including their geographic extent, age, classification, characteristics and formation.

---

### **Stratovolcano:**

A volcanic cone made up of alternating layers of lava flows and pyroclastics. Also known as a composite cone.

---

### **Streak:**

The color of a mineral in powdered form. Streak is normally determined by scraping a specimen across a surface of unglazed porcelain known as a "streak plate".

---

### **Streak Plate:**

A piece of unglazed porcelain that is used for determining the streak of a mineral specimen.

---

### **Stream Order:**

A classification system that represents the relative position of streams in a drainage basin. The highest tributaries in the basin are first order streams. These converge to form second order streams, which have only first order streams as their tributaries. Third order streams form by the

confluence of two second order streams. The numbering system continues downstream resulting in higher stream orders.

---

### **Stress:**

A force acting upon or within a mass or rock, expressed in terms of unit weight per surface area such as tons per square inch.

---

### **Striations:**

Scratches or grooves on a rock or sediment surface caused by abrasive action of objects being transported above it by ice, water or wind.

---

### **Strike:**

The geographic direction of a line created by the intersection of a plane and the horizontal. Often used to describe the geographic "trend" of a fold or fault.

---

### **Strike-Slip Fault:**

A fault with horizontal displacement, typically caused by shear stress.

---

### **Stromatolite:**

A mound-shaped fossil that forms from the repetitious layering of algal mat covered by trapped sediment particles.

---

### **Subduction Zone:**

An area at a convergent plate boundary where an oceanic plate is being forced down into the mantle beneath another plate. These can be identified by a zone of progressively deeper earthquakes.

---

### **Sublimation:**

The process through which ice goes directly into a vapor without passing through the liquid state.

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### **Submarine Canyon:**

An underwater canyon, carved into the continental shelf. These can be carved by turbidity currents or carved subaerially during a time when sea level was lower.

---

### **Subsidence:**

A lowering of the land surface in response to subsurface weathering, collapse or slow settlement of underground mines, or the production of subsurface fluids such as ground water or oil.

---

### **Supercontinent:**

A large landmass that forms from the convergence of multiple continents.

---

### **Superposed Stream:**

A stream that cuts across resistant bedrock units. This can occur when the stream's course was determined at a previous time and on a previous landscape.

---

### **Superposition:**

The concept that the oldest rock layers are at the bottom of a sequence with younger rock layers deposited on top of them. This can be considered a rule that applies in all situations, except where the rocks are extremely deformed.

---

### **Supersaturated Solution:**

A solution that contains more solute than its solubility allows. Such a solution is unstable and precipitation can be triggered by a variety of events.

---

### **Surf:**

The breaking of waves as they enter shallow water.

---



### **Surf Zone:**

An area of breaking waves bounded by the point of first breakers, then landward to the maximum uprush of waves on the beach.

---

### **Surface Wave:**

A type of seismic wave that travels along Earth's surface.

---

### **Suspended Load:**

Small particles being carried by a stream and held in suspension by the movement of the water. (Also see: load, dissolved load, bed load.)

---

### **Suspension:**

Transport of sediment by wind or water currents that are strong enough to keep the sediment particles continuously above the stream bottom or ground. (See traction and saltation for comparison.)

---

### **Swash:**

The rush of a breaking wave up the slope of a beach.

---

### **S-wave:**

Secondary seismic waves. A seismic wave with a direction of vibration that is perpendicular to the direction of travel. S-waves are slower than P-waves and travel only through solids.

---

### **Symbiosis:**

A relationship between two species who live in close association but do not compete with each other or prey on one another. At least one of the species derives benefit from this association.

---

### **Syncline:**

A trough-shaped fold with youngest strata in the center.

---

### **System:**

A stratigraphic unit of major significance which was deposited during a specific time period, and which can be correlated worldwide on the basis of its fossil content.

# T

## **Tableland:**

An area of elevated land with a nearly level surface.

---

## **Tar Sand:**

A sandstone that contains asphalt within its pore spaces.

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## **Talus:**

An accumulation of angular rock debris at the base of a cliff or steep slope that was produced by physical weathering.

---

## **Tectonics:**

The study of processes that move and deform Earth's crust.

---

## **Terminal Moraine:**

A mound of unsorted glacial till that marks the furthest advance of a glacier.

---

## **Terrestrial Planet:**

One of the four rocky planets closest to the sun, which include Mars, Venus, Earth and Mercury.

---

## **Terrigenous Sediment:**

Sediment that is derived from the weathering of rocks which are exposed above sea level.

---

## **Texture:**

The visible characteristics of a rock which include its grain size, grain orientation, rounding, angularity or presence of vesicles.

---

## **Thermal Pollution:**

Water quality is not defined by chemistry alone. If natural waters are withdrawn for use they should be returned to the environment at approximately the same temperature. An increase or decrease in temperature can have an adverse effect upon plants, animals and chemical balances. Returning water to a stream at a different temperature than it was withdrawn is known as thermal pollution. For example, coal-fired power plants use water in the production of steam that turns turbines. That water is then cooled in the large cooling towers before it is returned to the environment.

---

## **Thrust Fault:**

A reverse fault that has a dip of less than 45 degrees.

---

## **Tidal Current:**

Currents of water that are produced in response to a rising or falling tide. These currents can flow into or out of a bay, delivering the rising water or removing the falling water.

---

## **Tidal Flat:**

A broad flat area, very close to sea level that is flooded and drained with each rise and fall of the tide.

---

## **Tidal Wave:**

A term that is incorrectly used in reference to a tsunami. Tsunamis have nothing to do with the tides.

---

## **Till:**

An unsorted sediment deposited directly by a glacier and not reworked by meltwater.

---

## **Topographic Map:**

A map that shows the change in elevation over a geographic area through the use of contour lines. The contour lines trace points of equal elevation across the map. See also: contour line and contour map.

---

## **Topography:**

The shape of Earth's surface or the geometry of landforms in a geographic area.

---

## **Trace Element:**

An element that is present in very small quantities.

---

## **Traction:**

Transport of sediment by wind or water in which the sediment remains in contact with the ground or bed of the stream, moving by rolling or sliding. (See suspension and saltation for comparison.)

---

## **Transform Fault:**

A strike-slip fault that connects offsets in a mid-ocean ridge.

---

## **Transgression:**

An advance of the sea over land areas. Possible causes include a rise in sea level or subsidence.

---

## **Transpiration:**

A process of plants removing water from the soil and releasing it into the atmosphere through their leaves.

---

## **Transverse Dunes:**

Sand dunes that are oriented at right angles to the direction of the prevailing wind. These form where vegetation is sparse and the sand supply is abundant.

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## **Trap:**

A sedimentary or tectonic structure where oil and/or natural gas has accumulated. These are structural highs where a porous rock unit is capped by an impermeable rock unit. Oil and gas trapped within the porous rock unit migrate to a high point in the structure because of their low density.

---

## **Travertine:**

Calcium carbonate deposits which form in caves and around hot springs where carbonate-bearing waters are exposed to the air. The water evaporates, leaving a small deposit of calcium carbonate.

---

## **Trellis Drainage:**

A drainage pattern in which streams intersect at right angles. This forms in areas of long parallel valleys such as in folded mountain belts. Rivers occupy the valleys and tributary streams join them at right angles.

---

## **Trench:**

A long, narrow, deep depression in the ocean floor that parallels a convergent boundary involving at least one oceanic plate.

---

## **Triple Junction:**

A point where three lithospheric plates meet. Triple junctions can be areas of unusual tectonic activity due to the differential motions of the three intersecting plates.

---

## **Tsunami:**

A large sea wave normally produced by sudden movement of the ocean floor caused by an earthquake or volcanic eruption. These waves can travel at high speeds across an ocean basin and cause great destruction when they reach land.

---

### **Tuff:**

A rock composed of pyroclastic materials that have been ejected from a volcano. In many instances these fragments are still hot when they land, producing a "welded" rock mass.

---

### **Turbidite:**

A vertical sequence of sediments deposited by a turbidity current. Because the largest particles of the current settle first a turbidite will be graded deposits with coarsest grain sizes at the bottom and finer grain sizes going upwards.

---

### **Turbidity Current:**

A mixture of sediment particles and water that flows down the continental slope. These high density currents can reach great speeds and generally erode loose sediments from the seafloor beneath them. See also: Density Current.

---

### **Turbulent Flow:**

An irregular state of fluid flow in which the particle paths cross one another and may even travel in opposing directions. (Compare with Laminar Flow.)

# U

## **Ultrabasic Rock:**

An igneous rock with a very low silica content and rich in minerals such as hypersthene, augite and olivine. These rocks are also known as ultramafic rocks.

---

## **Ultramafic Rock:**

See Ultrabasic Rock.

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## **Unconformity:**

A contact between two rock units of significantly different ages. An unconformity is a gap in the time record for that location.

---

## **Unconsolidated:**

A term used when referring to sediment that has not been lithified into a rock. Uncemented.

---

## **Uniformitarianism:**

A basic geologic principle. Processes that act upon the Earth today are the same processes that have acted upon it in the past. The present is the key to the past.

---

## **Unit Cell:**

The smallest sample of a substance that has a complete representation of its atomic structure. A crystal structure is formed by repetition of the unit cell in three dimensions.

---

## **Uplift:**

A structurally high area in Earth's crust. Formed by movements that bend the crust into a structure such as a dome or an arch.

---

## **Upwelling:**

Movement of cold water from the floor of a lake or ocean up into a shallow area.

---

## **U-shaped Valley:**

A deep valley with a flat floor and very steep walls. Shaped in cross-section like the letter "U". Valleys with this geometry are frequently cut by a glacier.



### **Vadose Water:**

Water that exists in the pore spaces of a rock or soil, between the ground surface and the water table.

---

### **Valence Electrons:**

Electrons in the outermost shell of an atom. The electrons that are typically involved in making chemical bonds.

---

### **Valley Glacier:**

A glacier that occurs in a mountainous region and occupies a valley. Also known as an Alpine Glacier.

---

### **Van der Waals Bond:**

A weak chemical bond in which atoms are held together by weak electrostatic attraction.

---

### **Varve:**

A thin layer of fine-grained sediment deposited in the still waters of a lake. Varves are frequently associated with glaciation and represent a yearly sedimentation cycle - a silty, light-colored layer deposited in summer and a darker, organic-rich clay layer deposited during winter.

---

### **Vein:**

A fracture that has been filled with mineral material.

---

### **Ventifact:**

A rock that has been shaped or polished by the sandblasting effect of wind-blown sand.

---

### **Vertical Exaggeration:**

In making sketches of landscapes and cross-sections, the vertical dimension is frequently exaggerated to show detail. Vertical exaggeration is a number that represents the magnitude of this exaggeration. It is a proportion between the vertical scale and the horizontal scale. For example, a cross section with a vertical exaggeration of 4 has a vertical scale that is four times the horizontal scale (in this example the vertical scale could be 1:25 while the horizontal scale is 1:100).

---

### **Vesicle:**

Spherical or elongated cavities in an igneous rock that are created when a melt crystallizes with bubbles of gas trapped inside.

---

### **Viscosity:**

The resistance of a fluid to flow. Fluids with a high viscosity resist flow. Fluids with a low viscosity flow freely.

---

### **Volcanic Ash:**

Sand-sized particles of igneous rock that form when a spray of liquid magma is blown from a volcanic vent by escaping gas.

---

### **Volcanic Ash Fall:**

An accumulation of volcanic ash produced by an eruption. These can be very thick near the vent and decrease to a light dusting in a downwind direction.

---

### **Volcanic Bomb:**

A projectile of hot magma or rock that is blown from the vent during a volcanic eruption. These solidify in flight and frequently form an elongated rock of streamlined shape.

---

### **Volcanic Breccia:**

A rock made up of pyroclastic fragments that are at least 64 millimeters in diameter.

---

### **Volcanic Cone:**

A cone-shaped hill or mountain composed of pyroclastic debris and/or lava which builds up around a volcanic vent during eruptions.

---

### **Volcanic Dome:**

A steep-sided extrusion of very viscous lava that is squeezed from a volcanic vent without major eruption. These are frequently rhyolitic in composition and produce a rounded mound above the vent.

---

### **Volcanic Neck:**

A vertical intrusion with the geometry of a volcanic pipe. An erosional remnant of a volcanic pipe.

---

### **Volcanic Pipe:**

A vertical or nearly vertical tunnel which connects a magma reservoir to the surface. Magma and gas travel up this tube to produce the eruption. After the eruption the tube can be filled with a cooling magma which preserves its shape as an intrusive body.

---

### **Volcano:**

A vent in Earth's surface through which molten rock and gases escape. The term also refers to deposits of ash and lava which accumulate around this vent.

---

### **V-shaped valley:**

A valley with a narrow bottom and a cross section shaped like the letter "V". Valleys of this shape are almost always cut by stream erosion.



### **Wadi:**

A stream valley in an arid region that is dry except during the rainy season.

---

### **Warping:**

A slight bend, uplift or subsidence of Earth's crust on a regional scale.

---

### **Water Cycle:**

The movement of water between the atmosphere, ground and surface water bodies through the processes of evaporation, precipitation, infiltration, percolation, transpiration and runoff. Also known as the "hydrologic cycle".

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### **Water Quality:**

An assessment of the physical, chemical and biological characteristics of water, especially how they relate to the suitability of that water for a particular use.

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### **Watershed:**

The geographic area that contributes runoff to a stream. It can be outlined on a topographic map by tracing the points of highest elevation (usually ridge crests) between two adjacent stream valleys. The watershed of a large river usually contains the watersheds of many smaller streams. Also referred to as a "drainage basin".

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### **Water Table:**

A level beneath the Earth's surface, below which all pore spaces are filled with water and above which the pore

spaces are filled with air. The top of the zone of saturation in a subsurface rock, soil or sediment unit.

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### **Wave-Cut Terrace:**

A long, level surface formed by wave erosion during a time when sea level was higher.

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### **Wavelength:**

An interval of repetition in a wave-like disturbance. The distance between two successive crests or two successive troughs.

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### **Withdrawal:**

A removal of water from a surface or ground water source for use.



# X

## **Xenoblast:**

A crystal that has grown in a rock during the process of metamorphism and which has not developed its characteristic crystal faces because of space limitations.

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## **Xenolith:**

A preexisting rock that has been incorporated into magma without melting. When the magma crystallizes the preexisting rock fragment is known as a xenolith.

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## **Xerophyte:**

A plant that can survive in a very dry location or climate.

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## **X-ray Diffraction:**

A technique used to identify minerals by bombarding them with X-rays. Planes of repetition within the atomic structure of the mineral diffract the X-rays. The pattern of diffraction is unique for each mineral structure and can be used for identification.



### **Yazoo Stream:**

A tributary that parallels the main channel for a considerable distance. Joining of these streams is normally blocked by a natural levee along the larger stream.

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### **Yellow Ground:**

Oxidized kimberlite. A yellow soil that is characteristic of the area above a kimberlite diamond pipe.

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### **Yield:**

The quantity of water, coal, gold or other resource that can be produced from a deposit.

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### **Youth:**

The earliest stage in the development of a landscape. During this stage streams are actively downcutting and flowing straight for long distances with frequent waterfalls and rapids. The valleys are typically steep sided and v-shaped

# Z

## **Zeolite:**

A group of hydrous aluminosilicates that are similar to the feldspars. They easily lose and regain their water of hydration and they fuse and swell when heated. Zeolites are frequently used in water softening, ion exchange and absorbent applications

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## **Zinc Blende:**

A term used in reference to the mineral sphalerite.

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## **Zirconium:**

A mineral, zirconium silicate. A hard mineral with a high index of refraction that is used as a gemstone and as an ore of zirconium.

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## **Zoned Crystal:**

A crystal that grew while temperatures were changing or while the composition of the parent solution was changing. Crystals of these minerals can have a range of compositions, with a certain chemistry in the center reflecting the early growth conditions and the outer chemistry reflecting the later growth conditions. Minerals such as olivine or plagioclase which have a solid solution series frequently form such crystals.

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## **Zone of Aeration:**

A zone between the land surface and the water table where pore spaces are filled mainly with air. Water that exists in the pore space in this zone is referred to as "soil moisture".

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## **Zone of Saturation:**

The zone beneath the water table where all pore spaces are completely filled with water. Water that exists within this zone is known as "ground water".

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## **Zone of Weathering:**

A subsurface area, above the water table, where mineral and organic materials are subject to weathering.

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