

# HS Earth Science Glossary

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Dana Desonie

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**AUTHOR**  
Dana Desonie

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# CHAPTER 1 HS Earth Science Glossary

## A

- axis** An imaginary line that runs from the North Pole to South Pole, and it includes the center of Earth.
- avalanche** Mass of snow that suddenly moves down a mountain under the influence of gravity.
- aurora** A spectacular light display that occurs in the ionosphere near the poles.
- atomic mass** The number of protons and neutrons in an atom.
- atom** The smallest unit of a chemical element.
- atmosphere** The layer of gases that surrounds a planet.
- astronomer** Scientists who study the universe beyond Earth.
- asteroid belt** Region between the orbits of Mars and Jupiter where many asteroids are found.
- asteroid** Rocky objects larger than a few hundred meters that orbit the Sun.
- asterism** A group or cluster of stars that appear close together in the sky.
- arch** An erosional landform that is produced when waves erode through a cliff.
- aquifer** A layer of rock, sand, or gravel that holds large amounts of ground water.
- aquaculture** Agriculture of the sea; farmed fish, seafood and aquatic plants.
- apparent polar wander** The path on the globe showing where the magnetic pole appeared to move over time.
- aphotic zone** The zone in the water column deeper than 200 m where sunlight does not penetrate.
- anticyclone** Wind system that rotates around a high pressure center.
- anticline** A fold that arches upward; older rocks are in the center and younger rocks are at the outside.
- amplitude** The height of a wave from the center to the top of the crest (or the bottom of the trough).
- amniote egg** An egg that contains all the nutrients needed for the developing embryo and is protected by a shell.
- amino acid** Organic molecules that are the building blocks of life.
- amber** Fossilized tree sap.
- altitude** Distance above sea level.
- alpine (valley) glacier** A glacier found in a valley in the mountains.
- alluvial fan** Curved, fan-shaped, coarse-sediment deposit that forms when a stream meets flat ground.
- alkaline** Also called basic. Substances that have a pH of greater than 7.0.
- albedo** The amount of light that reflects off a surface; snow and ice have high albedo.
- air pressure** The force of air pressing on a given area.
- air mass** A large mass of air with the same temperature and humidity characteristics.
- advection** Horizontal movement of a fluid or the transport of a substance in the flow.
- adaptive radiation** An explosion in the diversity of species as vacant niches are filled. This often occurs after a mass extinction.
- adaptation** A trait that an organism inherits that helps it survive in its natural environment.
- active volcano** A volcano that is currently erupting or is just about to erupt.
- acid rain** Rain that has a pH of less than 5.0.
- abyssal plains** Very flat areas that make up most of the ocean floor.
- absolute age** The actual age of a material in years.
- abrasion** A form of mechanical weathering that occurs whenever one rock hits another.
- abiotic** Non-living features of an ecosystem include space, nutrients, air, and water.

## B

- breakwater** Structure built in the water parallel to the shore to protect from strong incoming waves.
- brackish** Water that is a mixture of freshwater and saltwater.

- Bowen's Reaction Series** The order in which minerals undergo partial melting or fractional crystallization, which depends on temperature and the composition of the mineral.
- bottom trawling** Fishing by dragging nets along the ocean floor.
- body waves** Seismic waves that travel through the body of a planet; e.g. primary or secondary waves.
- body fossil** The remains of an ancient organism. Examples include shells, bones, teeth, and leaves.
- blizzard** A large snowstorm with high winds.
- black hole** The super dense core left after a supergiant explodes as a supernova.
- biozone** A rock unit that is defined by a characteristic index fossil or fossil assemblage.
- biotic** Living features of an ecosystem include viruses, plants, animals, and bacteria.
- biome** The living organisms that are found within a climate zone that make that zone distinct.
- biomass** The total mass of living organisms in a given region.
- biofuel** A fuel made from living materials, usually crop plants.
- biodiversity** The number of species of plants, animals and other organisms within a particular habitat.
- bioclastic** Sedimentary rock that forms from pieces of living organisms.
- biochemical sedimentary rocks** Rocks that form from materials created by living organisms removing ions from water and falling to the bottom to become sediments.
- bioaccumulation** The accumulation of toxic substances within organisms so that the concentrations increase up the food web.
- binary star** A system of two stars that orbit a common center of mass.
- Big Bang Theory** The hypothesis that all matter and energy were at one time compressed into a very small volume; then there was an explosion that sent everything moving outward, causing the universe to expand.
- bed load** Sediments moved by rolling or bumping along the stream bed.
- beach** The sediments on a shore.
- bathymetric map** A topographic map that shows depth below sea level to indicate geographic features. These maps are created from the measurement of ocean depths using echo sounders.
- batholith** An enormous body of granitic rock.
- basin** A circular anticline; oldest rocks are in the center and the youngest are on the outside.
- base level** Where a stream meets a large body of standing water, usually the ocean.
- barrier island** Long, narrow island composed of sand; nature's first line of defense against storms.
- barometer** An instrument for measuring atmospheric pressure.
- B horizon** The subsoil; the zone where iron oxides and clay minerals accumulate.

## C

- cyclone** Wind system that rotates around a low pressure center.
- cyanobacteria** Single celled prokaryotes that were extremely abundant in the Precambrian and that changed the atmosphere to one containing oxygen.
- crystallization** The formation of mineral grains from cooling magma.
- crystal** A solid in which all the atoms are arranged in a regular, repeating pattern.
- crust** The rocky outer layer of the Earth's surface. The two types of crust are continental and oceanic.
- crude oil** Unrefined oil as it is taken from the ground; a fossil fuel.
- cross-cutting relationships** One of Steno's principles that states that an intrusion or fault is younger than the rocks that it cuts through.
- crest** The highest point of a wave.
- crescent** Phase of the moon when it is less than half full but still slightly lit.
- creep** Exceptionally slow movement of soil downhill.
- craton** The ancient Precambrian felsic continental crust that forms the cores of continents.
- crater** Bowl-shaped depressions on the surface of the Moon caused by impact from meteorites.
- covalent bond** Electrons shared between atoms.
- cosmology** The study of the universe.
- corona** Outermost layer of the Sun; a plasma that extends millions of kilometers into space.

- Coriolis effect** The apparent deflection of a freely moving object like water or air because of Earth's rotation.
- core** The innermost, densest layer of a celestial body. Earth's metallic core has an inner solid layer and an outer layer of liquid metal. The sun's core is where nuclear fusion takes place.
- convergent plate boundary** A location where two lithospheric plates come together.
- convection zone** Layer of the Sun that surrounds the radiative zone where energy moves as flowing cells of gas.
- convection cell** A circular pattern of warm material rising and cool material sinking.
- convection** The movement of material due to differences in temperature.
- control** Factors that are kept the same in an experiment so that only the independent variable is tested.
- contour line** A line on a topographic map to show elevation.
- contour interval** The constant difference in elevation between two contour lines on a topographic map.
- continental rifting** A divergent plate boundary that breaks up a continent.
- continental margin** Submerged, outer edge of the continent. It is the transition zone from land to deep sea where continental crust gives way to oceanic crust.
- continental glacier** A sheet of ice covering a large area that is not confined to a valley.
- continental drift** The early 20th century hypothesis that the continents move about on Earth's surface.
- continental divide** A divide that separates water that goes to different oceans.
- continental crust** The crust that makes up the continents; thicker and less dense than oceanic crust.
- continental climate** A more variable climate dominated by a vast expanse of land.
- continental arc** A line of volcanoes on a continent resulting from subduction beneath the continent.
- continent** Land mass above sea level.
- contact metamorphism** Changes in a rock that result from temperature increases when a body of magma contacts a cooler existing rock.
- consumptive water use** Water use in which the water is lost to the ecosystem.
- consumer** An organism that uses other organisms for food energy.
- constructive forces** Forces that cause landforms to grow. Crustal deformation and volcanic eruptions are two examples.
- constellation** A group of stars that appear to form a pattern in the sky. Most often these stars are unrelated and are not near each other in space. Constellations are used to locate objects in space.
- conserve** To reduce the use of a natural resource so that it will last longer.
- confluence** Where two streams join together.
- confining stress** Stress from the weight of material above a buried object; reduces volume.
- conduction** The process in which energy moves from a location of higher temperature to a location of lower temperature as heat. The material does not move, just the heat.
- condensation** The change in a substance from a gas to a liquid, releases energy.
- conceptual model** An abstract, mental representation of an object or system.
- compression** Stresses that push toward each other, causing a decrease in the space a rock takes up.
- composite volcano** A large, steep-sided composed of alternating layers of ash and lava flows.
- competition** A rivalry between two species, or individuals of the same species, for the same resources.
- competence** A measure of the largest particle a stream can carry.
- compass rose** Figure on a map or nautical chart for displaying locations of north, south, east, and west.
- compass** Hand-held device with a magnetic needle used to find magnetic north.
- compaction** When sediments are squeezed together by the weight of sediments and rocks on top of them.
- community** All of the populations of organisms in an ecosystem.
- commensalism** A relationship in which one species benefits and the other species is not harmed.
- comet** A small, icy, dusty object with a bright tail in orbit around the Sun.
- column** A cave deposit formed by the merging of a stalactite and a stalagmite.
- cold front** A front in which a cold air mass pushes a warm air mass upward.
- coal** A solid fossil fuel from ancient dead organisms used for electricity.
- cloud** Tiny water or ice particles that are grouped together in the atmosphere.
- climate** The long-term average of weather.
- cleavage** The tendency of a mineral to break along certain planes to make smooth surfaces.

**clastic** Fragments or clasts of preexisting rock; a sedimentary rock made of clasts.

**cinder cone** A small volcano composed of small rock fragments piled on top of one another.

**chromosphere** Thin layer of the Sun's atmosphere that lies directly above the photosphere; glows red.

**Chinook winds (Foehn winds)** Winds that form when low pressure draws air over a mountain range.

**chemosynthesis** The breakdown of chemicals to produce food energy.

**chemical weathering** Weathering that changes the chemical composition of minerals that form at high temperatures and pressures to minerals that are stable at the Earth's surface.

**chemical sedimentary rocks** Rocks that form from the hardening of chemical precipitates.

**chemical energy** Energy that is stored in the chemical bonds in molecules.

**chemical compound** A substance in which the atoms of two or more elements bond together.

**chemical bond** The force that holds two atoms together.

**chaparral** Scrubby woody plants and widely scattered trees typical of the Mediterranean climate.

**cementation** When fluids deposit ions to create a cement that hardens loose sediments.

**catalytic converter** Found on modern motor vehicles, these devices use a catalyst to break apart pollutants.

**catalyst** A substance that increases (or decreases) the rate of a chemical reaction but is not used up in the reaction.

**catadioptric telescope** Telescopes that use a combination of mirrors and lenses to focus light.

**cast** A mold filled with sediment and hardened to create a replica of the original fossil.

**carrying capacity** The number of individuals of a given species a particular environment can support.

**carnivore** Animals that only eat other animals for food.

**carbon tax** A tax placed on energy sources that emit carbon to discourage their use and to raise funds to research alternative energy sources.

**carbon source** An area of an ecosystem that emits more carbon dioxide than it absorbs.

**carbon sink** A reservoir for carbon that absorbs more carbon dioxide than it produces.

**carbon sequestration** Removal of carbon dioxide from the atmosphere, so that it does not act as a greenhouse gas in the atmosphere.

**carbohydrate** Organic compound that supplies energy to the body; includes sugars, starches and cellulose.

**capillary action** Water moves from wet to dry regions in soil.

**cap-and-trade** A monetary system that encourages conservation and development of alternative energy sources. A cap is put on a nation's allowed carbon emissions and nations can trade for rights to emit carbon pollution.

**caldera** Circular-shaped hole into which a volcano collapses during an eruption.

**C horizon** The lowest layer of soil; partially altered bedrock.

## D

**dwarf planet** A planet-like object that has not cleared its orbit of other objects.

**dwarf galaxy** A small galaxy containing a few million to a few billion stars.

**drought** A long period of lower than normal rainfall for a particular region.

**drip irrigation** Pipes and tubes that deliver small amounts of water directly to the soil at the roots of plants.

**downwelling** Sinking water because of higher density.

**dormant volcano** A volcano that is not currently erupting, but that has erupted in the recent past.

**Doppler Effect** A change in the frequency of a wave relative to an observer moving in relationship to the source of the wave.

**dome** A circular anticline; oldest rocks are in the center and youngest are on the outside.

**divide** A ridge that separates one water basin from another.

**divergent plate boundary** A location where two lithospheric plates spread apart.

**dissolved load** The elements carried in solution by a stream.

**direction** The location of something relative to something else.

**dip-slip fault** A fault in which the dip of the fault plain is inclined relative to the horizontal.

**dip** The angle of a fault relative to horizontal.

**differentiation** The separation of planetary materials by density to create distinctly different layers.

**dew point** The temperature at which air is saturated with water vapor; when it has 100% humidity.

- destructive forces** Forces that modify or destroy landforms. Agents of erosion include water, wind, ice, and gravity.
- desert varnish** Dark mineral coating that forms on exposed rock surfaces as windborne clays are deposited.
- desert pavement** Rocky, pebbled surface created as finer silts and clays are removed by wind.
- desert** Areas receiving very little precipitation; plants are scarce but well adapted.
- dependent variable** The variable in an experiment that is being measured as the independent variable is changed.
- density** The amount of matter in a certain amount of space; mass divided by volume.
- delta** A triangular-shaped deposit of sediments that forms where a river meets standing water.
- deformation** Strain. The change of shape that a rock undergoes when it has been altered by stresses.
- deforestation** Cutting down and/or burning trees in a forested area.
- deflation** Wind removes finer grains of silt and clay, causing the ground surface to subside.
- decomposer** An organism that breaks down the tissues of a dead organism into its various components, including nutrients, that can be used by other organisms.
- day** The time it takes for a planet to rotate once on its axis.
- daughter product** The product of the radioactive decay of a parent isotope.
- dark matter** Matter in the universe that doesn't emit light.
- dark energy** An as yet undiscovered form of energy that we cannot see.

## E

- extrusive** Igneous rocks that form at Earth's surface from rapidly cooling lava.
- extinct volcano** A volcano that has not erupted in recorded history, and is unlikely to erupt again.
- extinct** A species dies out either by simply dying out or by evolving into another species.
- export** To send a resource or product to another country.
- explosive eruption** A potentially devastating eruption of rock, lava, ash, and gas exploding from a volcano.
- exosphere** The outermost layer of the atmosphere; the gas molecules are extremely far apart.
- evolution** Change through time. The change in the genetic makeup of a population of organisms over time such that a new species is often the result.
- evaporation** The change in a substance from a liquid to a gas by the addition of energy.
- eukaryote** A cell with a separate nucleus to hold its DNA and RNA.
- estuary** Where a stream meets a lake or, more usually, an ocean. The mixture of fresh and salt water attracts a large number of species and so estuaries have high biodiversity.
- eruption** The release of lava, tephra, and gases from a volcano.
- erosion** The transport of weathered materials and sediments by water, wind, ice, or gravity.
- epicenter** The point on the Earth's surface directly above the focus of the earthquake.
- energy efficiency** The amount of useful work that is done by a unit of energy.
- energy** The ability to do work or change matter.
- end moraine** Unsorted pile of glacial till that marks points where the glacier was stationary.
- elliptical galaxy** An oval or egg shaped galaxy with older stars and little gas and dust.
- ellipse** A shape that looks like a slightly squashed circle.
- elevation** Height of a feature measured relative to sea level.
- element** A pure chemical substance with one type of atom.
- electron** Tiny negatively charged particles that orbit the nucleus.
- electromagnetic waves** Waves with both electrical and magnetic properties; travel by radiation.
- electromagnetic spectrum** The full range of electromagnetic radiation.
- electromagnetic (EM) radiation** Energy transmitted through space as a wave.
- elastic rebound theory** How earthquakes are generated. Stresses cause strain to build up in rocks until they can no longer bend elastically and they break, causing an earthquake.
- elastic deformation** Strain that alters the shape of a rock but that is not permanent.
- El Nio** A natural climate variation in which the trade winds weaken or reverse directions, and warm water accumulates on the ocean surface off of South America.

**effusive eruption** A relatively gentle, non-explosive volcanic eruption.

**ecosystem** All of the living things in a region and the physical and chemical factors that they need.

**echo sounder** A device that uses sound waves to measure the depth of the seafloor.

**earthquake** Ground shaking caused by the release of energy stored in rocks.

## F

**fuel cell** An energy cell in which chemical energy is converted into electrical energy.

**fuel** Material that releases energy as it changes chemically.

**front** The meeting place of two air masses with different characteristics.

**fresh water** Water with a low concentration of salts; found in streams, lakes, ground, ice, atmosphere.

**frequency** The number of wavelengths that pass a given point every second. (structural geology) A break in rock caused by stresses, with or without movement of material.

**fracture** (minerology) The way a mineral breaks when it is not broken along a cleavage plane.

**fractional crystallization** The crystallization of a fraction of the minerals in magma depending on temperature.

**fossilization** The process of becoming a fossil.

**fossil fuel** A hydrocarbon created from the remains of formerly living organisms that can be used for energy.

**fossil** Any remains or trace of an ancient organism.

**food web** Interwoven food chains that show each organism eating from different trophic levels.

**food chain** An energy pathway that includes all organisms that are linked as they pass along food energy, beginning with a producer and moving on to consumers.

**foliation** Flat layers in rocks due to squeezing by pressure.

**fold** A bend in a set of rocks caused by compression.

**fog** Air condensed below its dew point that is near the ground like a cloud.

**focus** The point where rocks rupture during an earthquake.

**flood** An overflow of water in a location.

**fissure** A crack in the ground that may be the site of a volcanic eruption.

**felsic** A type of igneous rock that is made mostly of light minerals such as quartz and feldspar.

**fault** A fracture along which one side has moved relative to the other.

**facies** Characteristic sedimentary rock layers that indicate the processes and environments in which they were formed.

## G

**gyre** Five loops created by surface ocean currents.

**groundwater** Fresh water that moves through pore spaces and fractures in soil and rock beneath the land surface.

**ground moraine** Thick layer of sediment deposited under a glacier.

**groin** Long, narrow piles of stone or timbers built perpendicular to the shore to trap sand.

**greenstone** A metamorphosed volcanic rock that forms at a subduction zone.

**greenhouse gas** Gases such as carbon dioxide and methane that absorb and hold heat from the sun's infrared radiation in the atmosphere.

**greenhouse effect** The trapping of heat by greenhouse gases in the atmosphere; moderates temperatures.

**Green Revolution** Changes in the way food is produced since World War II that have resulted in enormous increases in production.

**Great Red Spot** An enormous, oval-shaped, long-lived storm on Jupiter.

**gradient** The slope of a stream.

**globular cluster** Groups of tens to hundreds of thousands of stars held together by gravity.

**global warming** Warming of Earth's atmosphere because of the addition of greenhouse gases. The increase in average global temperature is caused by human activities.

**Global Positioning System (GPS)** A set of satellites that allows a receiver to know its exact location.



**glaciers** Large sheets of flowing ice.

**glacial till** Any unsorted sediment deposited by glacial ice.

**glacial striations** Long, parallel scratches carved into underlying bedrock by moving glaciers.

**glacial erratic** Large boulder with a different rock type or origin from the surrounding bedrock.

**gibbous** Phase of the moon when it is more than half lit but not completely full.

**geyser** A fountain of hot water and steam that erupts onto the surface.

**geostationary orbit** A satellite at just the right distance above Earth so that it orbits at the same rate that Earth spins and stays above a single location.

**geologic time scale** A division of Earth's history into blocks of time distinguished by geologic and evolutionary events.

**geologic map** A map showing the geologic features, such as rock units and structures, of a region.

**Geographic Information System (GIS)** An information system that links data to a particular location.

**geocentric model** Model used by the ancient Greeks that puts the Earth at the center of the universe.

**gemstone** Any material that is cut and polished to use in jewelry.

**gasification** A technology that cleans coal before it is burned, which increases efficiency and reduces emissions.

**gas giants** The four large outer planets composed of the gases hydrogen and helium.

**gamma ray** A penetrating form of electromagnetic radiation.

**Galilean moons** The four largest moons of Jupiter discovered by Galileo.

**galaxy** A very large group of stars held together by gravity; few million to a few billion stars.

## H

**hypothesis** A good working explanation for a problem that can be tested.

**hydrothermal vent** A stream of heated water that enters into the ocean at a mid-ocean ridge.

**hydrolysis** Hydrogen or hydroxide ions replace the cations in a mineral to change the mineral.

**hydrologic (water) cycle** The movements of water in and between reservoirs (e.g. oceans, clouds, streams, ice, and ground water).

**hydrogen bond** A weak intermolecular connection between two polar molecules.

**hydrocarbon** A chemical compound containing hydrogen and carbon that is used for energy.

**hybrid vehicle** A very efficient vehicle that is powered by an internal combustion engine, an electric motor and a rechargeable battery.

**hurricane** Cyclone that forms in the tropics and spins around a low-pressure center.

**humus** The partially decayed remains of plants and animals; forms the organic portion of soil.

**humidity** The amount of water vapor held in the air.

**hotspot** A plume of hot material that rises through the mantle and can cause volcanoes.

**hot spring** A stream of hot water that flows out of the ground continuously.

**high tide** The highest water levels during a day caused by the gravitational pull of the Moon.

**high pressure zone** A region where relatively cool, dense air is sinking.

**herbivore** An animal that only eats producers.

**hemisphere** One half of a sphere.

**heliocentric model** Model proposed by Copernicus that put the Sun at the center of the universe.

**heat wave** A period of prolonged excessively hot weather for a particular region.

**heat** Energy associated with the movement of atoms or molecules that can be transferred.

**headwaters** The location where a stream forms, often high in the mountains.

**hardness** The ability of a mineral to resist scratching.

**hanging valley** A cliff where a large glacier cut off the U-shaped valley of a tributary glacier.

**half-life** The amount of time required for half of the atoms of a radioactive substance to decay to the daughter product.

**haboob** Desert sandstorms that form in the downdrafts of a thunderstorm.

**habitat** Where an organism lives, with distinctive features such as climate or resource availability.

## I

- isotope** A chemical element that has a different number of neutrons.
- isotherms** Lines connecting locations that have equal temperatures.
- isotachs** Lines connecting locations that have equal wind speed.
- isobars** Lines connecting locations that have equal air pressure.
- island arc** A line of ocean island volcanoes resulting from subduction beneath oceanic lithosphere.
- irregular galaxy** A galaxy that is neither spiral nor elliptical.
- ionosphere** An ionized layer within the thermosphere.
- ionic bond** A chemical bond in which atoms give or accept atoms.
- ion** An atom with one or more electrons added or subtracted; it has an electrical charge.
- invertebrate** Animal with no backbone.
- inversion** A situation in which warm air lies above cold air.
- invasive species** A species of organism that spreads in an area where it is not native. People often introduce invasive species either purposefully or by accident.
- intrusive** Igneous rocks that form inside the Earth from slowly cooling magma.
- intraplate activity** Geologic activity that takes place away from plate boundaries.
- Intertropical Convergence Zone (ITCZ)** A low pressure zone where the Hadley Cells at the equator meet.
- intertidal zone** The part of the ocean closest to the shore, between low and high tide.
- intermediate** A type of igneous rock that is in between felsic and mafic.
- insulation** A material that inhibits conduction of heat or electricity.
- insolation** The amount of solar radiation striking a given area over a given period of time.
- inorganic** Not organic; not involving life or living organisms. For example, the rock and mineral portion of the soil.
- inner planets** The four planets inside the asteroid belt: Mercury, Venus, Earth, and Mars.
- infrared light** Electromagnetic waves with frequencies between radio waves and red light.
- Industrial Revolution** A time when mass production and fossil fuel use started to grow explosively.
- index fossil** A fossil indicates the relative age of the rock in which it is found. Index fossils come from species that were widespread but existed for a relatively brief period of time.
- independent variable** The variable in an experiment that is controlled and changed by the researcher.
- import** To receive a resource or product from another country.
- impermeable** Something that water cannot penetrate.
- igneous rock** A rock formed from cooled magma.
- ice wedging** Water enters a crack, expands as it freezes, and wedges the rock apart.
- ice core** Cylinder of ice extracted from a glacier or ice sheet.
- ice cap** Permanent ice that is found mostly around Greenland and Antarctica.

## J

- joint** A break in rock along which there is no movement.
- jet stream** A fast-flowing river of air high in the atmosphere, where air masses with two very different sets of temperature and humidity characteristics move past each other.

## K

- Kuiper belt** A region beyond the orbit of Neptune that contains millions of frozen objects.
- kinetic energy** The energy that an object in motion has because of its motion.
- key bed** A distinctive, widespread rock layer that formed at a single time.
- katabatic winds** Winds that move down a slope.

**L**

**luster** The way light reflects off of the surface of the mineral.

**lunar eclipse** An eclipse that occurs when the Moon moves through the shadow of the Earth and is blocked from view.

**lunar** Related to the Moon.

**LUCA (Last Universal Common Ancestor)** The last life form that was the ancestor to all life that came afterward

**low tide** The lowest water levels during a day when high tide is one-quarter of the way around Earth's sphere.

**low pressure zone** A region where relatively warm, lower density air is rising.

**low Earth orbit** Satellites that orbit relatively close to Earth.

**longshore current** Local surface currents that move along a shoreline in the direction of prevailing winds.

**longitude** The location of a place relative to the Prime Meridian, which runs north-south through Greenwich, England.

**loess** Extremely fine-grained, wind-borne deposit of silts and clays; forms nearly vertical cliffs.

**location** Where an object is on Earth, best described in three dimensions.

**loam** Soil texture that forms from a roughly equal combination of sand, silt and clay.

**lithosphere** The layer of solid, brittle rock that makes up the Earth's surface; the crust and the uppermost mantle.

**lithification** The creation of rock from sediments.

**liquefaction** Clay, silt, and sand saturated with water become like quicksand, lose their strength, and behave more like a liquid than a solid.

**limnology** The study of freshwater bodies and the organisms that live in them.

**limiting factor** The one factor that limits the population of a region. The limiting factor can be a nutrient, water, space, or any other biotic or abiotic factor that the species need.

**lightning** A huge discharge of electricity typical of thunderstorms.

**light-year** The distance light can travel in one year; 9.5 trillion kilometers.

**levee** A raised structure designed to hold back the waters of a stream or river in the case of a flood.

**leaf litter** Dead leaves, branches, bark, and other plant parts that accumulate on the floor of a forest.

**leaching** The process of removing dissolved minerals as they are carried to lower layers in soil.

**law of conservation of energy** Law stating that energy cannot be created or destroyed.

**lava plateau** A flat area formed by the eruption of large amounts of fluid lava.

**lava dome** A dome-shaped plug of viscous lava that cools near the vent of a volcano.

**lava** Molten rock that has reached the Earth's surface.

**latitude** The location of a place between the north and south pole relative to the equator.

**laterite** Nutrient poor, red, tropical soil that forms in rainforest areas.

**lateral moraine** Glacial till formed from debris that falls at the edges of a glacier.

**lateral continuity** A sedimentary rock layer that extends sideways as wide as the basin in which it forms.

**latent heat** Energy absorbed or released as material changes from solid to liquid or liquid to gas.

**landslide** Rapid movement downslope of rock and debris under the influence of gravity.

**landform** A physical feature that is part of the landscape, such as a hill or peninsula.

**land breeze** A wind that blows from land to sea in winter when the ocean is warmer than the land.

**lake-effect snow** Extreme snowfall caused by the evaporation of relatively warm, moist air into a cold front that then drops its snow on the leeward side of the lake.

**lake** A large body of freshwater drained by a stream; naturally occurring or human-made.

**lahar** A volcanic mudflow containing ash, rock, and water from melting snow or rainfall that races down river valleys during an eruption.

**La Nia** A natural climate variation in which the trade winds are stronger than normal and surface water off of South America is cold.

**M**

**mutualism** A symbiotic relationship between two species in which both species benefit.

**mutation** A change in the genetic makeup of a population of organisms that can be beneficial, harmful, or neutral.

**mudflow** Saturated soil that flows down river channels.

**mouth** Where a stream enters a larger body of water such as a lake or an ocean.

**mountain breeze** A wind that blows from a mountain to a valley at night when mountain air is cooler.

**moraine** Linear deposit of unsorted, rocky material on, under, or left behind by glacial ice.

**moon** A celestial object that orbits a planet.

**monsoon** Hot land draws cool air off a nearby sea creating large winds and often rain.

**monocline** A bend in a set of rocks that causes them to be inclined relative to the horizontal.

**molecule** The smallest unit of a compound; it is made of atoms.

**molecular mass** The mass of all the atoms in a molecule.

**mold** An impression made in sediments by the hard parts of an organism.

**model** A representation of an object or system that is easier to study and manipulate.

**mineralogist** A scientist who studies minerals.

**mineral** A naturally occurring inorganic, crystalline solid with a characteristic chemical composition.

**Milky Way Galaxy** The spiral galaxy in which Earth and our solar system reside.

**Milankovitch cycles** Cycles adding up to variations of around 100,000 years regarding Earth's position relative to the Sun that affect global climate.

**mid-ocean ridge** A large, continuous mountain range found within an ocean basin. It is the location on the seafloor where magma upwells and forms new seafloor.

**mid-latitude cyclone** A cyclone that forms in the middle latitudes at the polar front.

**microwave** The shortest wavelength radio waves.

**microfossil** A fossil that must be studied with the aid of a microscope.

**microcontinent** A fragment of crust that is smaller than a continent.

**microclimate** A local climate that is different from the regional climate.

**microbe** A microorganism.

**meteoroid** A small rock in interplanetary space that has not yet entered Earth's atmosphere.

**meteorite** Fragments of planetary bodies such as moons, planets, asteroids, and comets that strike Earth.

**meteor shower** An area of frequent meteors appearing to originate in a particular part of the sky.

**meteor** Material from outer space that burns up as it enters Earth's atmosphere.

**metamorphism** A solid state change in an existing rock due to high temperature and/or pressure that creates a metamorphic rock.

**metamorphic rock** A rock that forms from a previous rock that is exposed to heat and/or pressure.

**metabolism** The chemical work of cells; the chemical reactions a living organism needs to live, grow and reproduce.

**mesosphere** Layer between the stratosphere and thermosphere; temperature decreases with altitude.

**medial moraine** Lateral moraines that join together within a main glacier as tributary glaciers merge.

**mechanical weathering** Weathering that breaks rocks into smaller pieces without altering their chemical composition.

**meander** A bend or curve in a stream channel.

**mathematical model** A set of mathematical equations that simulates a natural system.

**marsh** A shallow wetland with grasses and reeds, but there no trees. Water may be fresh, saline, or brackish.

**maritime climate** A moderate climate dominated by a nearby ocean.

**marine transgression** The rising of sea level over the continents.

**marine regression** The falling of sea level so that seas no longer cover the continents.

**maria** The dark parts of the Moon's surface, made up of ancient basaltic eruptions.

**map** A 2-dimensional representation of Earth's surface.

**mantle** The middle layer of the Earth; made of hot rock that circulates by convection.

**manganese nodule** Rocks on the seafloor that contain valuable minerals, especially manganese.

**main sequence star** A star that is fusing hydrogen atoms to helium; a star in the main portion of its life.

**magnetosphere** Charged particles beyond the atmosphere that are held in place by Earth's magnetic field.

**magnetometer** An instrument that measures the magnetic field intensity.

**magnetite** A magnetic mineral that takes on Earth's magnetic polarity as it crystallizes.

**magnetic polarity** The direction of the Earth's magnetic field. A compass today will point north, which is normal polarity; south is reversed.

**magnetic field** A field produced by a magnetic object that exerts a force on other magnetic materials or moving electrical charges. Earth's magnetic field behaves as if a magnet were contained within the planet.

**magma chamber** A region below a volcano where magma and gases collect.

**magma** Molten rock deep inside the Earth.

**mafic** A type of igneous rock that is made mostly of dense, dark minerals, such as olivine and pyroxene.

## N

**nutrients** Ions that organisms need to live and grow.

**nucleus** The center of an atom, made of protons and neutrons.

**nucleic acid** Biological molecules necessary for life; includes DNA and RNA

**nuclear fusion reaction** When nuclei of two atoms fuse together, giving off tremendous amounts of energy.

**nuclear fusion** The merging together of the nuclei of atoms to form new, heavier chemical elements; huge amounts of nuclear energy are released in the process.

**nuclear energy** Energy that is released from the nucleus of an atom when it is changed into another atom.

**normal fault** A dip-slip fault in which the hanging wall drops down relative to the footwall.

**noreaster** Mid-latitude cyclones that strike the northeastern United States.

**non-renewable resources** Resources that are being used faster than they can be replaced or their availability is limited to what is currently on Earth; e.g. fossil fuels.

**non-consumptive water use** Water use that does not use up the water supply.

**niche** An organism's job within its community.

**neutron star** The remnant of a massive star after it explodes as a supernova.

**neutron** A neutral particle in the nucleus of an atom.

**net-energy ratio** The ratio between the useful energy present in a type of fuel, and the energy used to extract and process the fuel.

**net energy** The amount of usable energy available from an energy resource.

**neritic zone** The part of the ocean where the continental shelf gradually slopes seaward. Sunlight can penetrate to the bottom in much of the neritic zone.

**nebular hypothesis** The hypothesis that our solar system formed from a spinning cloud of gas and dust, or a nebula.

**nebula** An interstellar cloud of gas and dust.

**neap tide** The smallest tidal range in a lunar month occurring at the first- and third-quarter moons when the Sun and Moon are at 90°s relative to each other, relative to Earth.

**natural selection** The mechanism for evolution. Natural processes favor some traits over others in a population causing those traits to be more common in subsequent generations. This results in change to a new species or subspecies.

**natural levee** Coarse-grained deposits of sediments that build up along a stream's banks as it floods.

**natural gas** A fossil fuel composed of the hydrocarbon methane.

## O

**ozone layer** A layer of the stratosphere where ozone gas is more highly concentrated.

**ozone hole** A region around Antarctica in which ozone levels are reduced in springtime because of the action of ozone-destroying chemicals.

**ozone** Three oxygen atoms bonded together in an O<sub>3</sub> molecule. Ozone in the lower atmosphere is a pollutant but in the upper atmosphere protects life from ultraviolet radiation.

**oxidation** Oxygen reacts with another element to create a metal oxide.

**overpopulation** When the population of an area exceeds its carrying capacity or when long-term harm is done to resource availability or the environment.

**over-consumption** Resource use that is unsustainable in the long term; obtaining many more products than people need.

**outgassing** The transfer of gases from Earth's mantle to the atmosphere by volcanic eruptions.

**outer planets** The four large planets beyond the asteroid belt in our solar system.

**outcrop** Exposed rock formations that are attached to the ground.

**orogeny** A mountain building event, usually taking place over tens or hundreds of millions of years.

**original horizontality** Sedimentary layers that were deposited horizontally.

**organic** Something from living organisms.

**ore deposit** A mineral deposit that contains enough minerals to be mined for profit.

**ore** A type of rock that contains useful minerals.

**orbiter** The main part of the space shuttle that has wings like an airplane.

**orbit** To travel in a circular or elliptical path around another object.

**open cluster** Groups of up to a few thousand stars loosely held together by gravity.

**omnivore** An organism that consumes both producers and other consumers for food.

**oil** A liquid fossil fuel from ancient dead organisms used for transportation and other products.

**oceanic zone** The open ocean, where sunlight does not reach the seabed.

**oceanic crust** The crust that underlies the oceans; thinner and denser than continental crust.

**ocean trench** The deepest parts of the ocean basins.

**ocean basin** Areas covered by ocean water. The three major ocean basins are the Pacific, Atlantic, and Indian.

**occluded front** A front in which a cold front overtakes a warm front.

## P

**pyroclastic flow** Hot ash, gas, and rock that race down a volcano's slopes during an eruption.

**proton** A positively charged particle in a nucleus.

**prokaryote** An organism that lacks a cell nucleus or membrane-bound organelles.

**projection** A way to represent a 3-dimensional surface in two dimensions.

**producer** An organism that converts energy into chemical energy that it can use for food. Most producers use photosynthesis but a very small number use chemosynthesis.

**primary productivity** The creation of food energy.

**prey** An animal that could be killed and eaten by a predator.

**predator** An animal that kills and eats other animals.

**precipitation** Water that falls from the sky as rain, snow, sleet, or hail.

**precipitate** Solid substance that separates out of a liquid to form a solid, usually when the liquid evaporates.

**potential energy** Energy stored within a physical system that has the potential to do work.

**porphyritic** Igneous rock texture in which visible crystals are found in a matrix of tiny crystals.

**porosity** The small holes that exist between grains in a rock or sediment.

**population** All the individuals of a species that occur together in a given place and time.

**pool** A deep, slow-moving part of a stream, usually wider than elsewhere on the stream.

**pond** A small body of freshwater, with no stream draining it; fed by an underground spring.

**polar stratospheric clouds (PSC)** Clouds that form in the stratosphere when it is especially cold; PSCs are necessary for the breakup of chlorofluorocarbons (CFCs).

**polar orbit satellite** Orbit that moves over Earth's North and South poles as Earth rotates underneath so that the entire planet can be viewed in less than one day.

**polar orbit** A satellite orbit that goes over the North and South Poles, perpendicular to Earth's spin.

**polar molecule** A molecule with an unevenly distributed electrical charge.

**polar front** The meeting zone between cold continental air and warmer subtropical air at around 50°N and 50°S.

**pluton** An igneous intrusive rock body that has cooled in the crust.

**plucking** Removal of blocks of underlying bedrock as meltwater seeps into cracks and freezes.

- platform** A craton and its overlying younger sedimentary rocks.
- plate tectonics** The theory that the Earth's surface is divided into lithospheric plates that move on the planet's surface. Plate tectonics is driven by convection currents within Earth's mantle.
- plate boundary** A location where two plates come together.
- plate** A slab of Earth's lithosphere that can move around on the planet's surface.
- plastic deformation** Strain in which the rock deforms but does not return to its original shape when the strain is removed.
- plasma** A high energy, high temperature form of matter. Electrons are removed from atoms, leaving each atom with a positive electrical charge.
- plankton** A diverse group of tiny animals and plants that freely drift in the water.
- planetary rings** Rings of dust and rock encircling a planet in a thin plane.
- planet** A round celestial object orbiting a star that has cleared its neighboring region of planetesimals.
- placer** Valuable metal found in modern or ancient stream gravels.
- phytoplankton** Tiny plants that photosynthesize and create food energy and oxygen.
- physical model** A physical representation of an object or system.
- photosynthesis** The process in which plants produce simple sugars (food energy) from carbon dioxide, water, and energy from sunlight. Photosynthesis uses carbon dioxide and releases oxygen.
- photosphere** The visible surface of the Sun.
- photon** A particle of light.
- photochemical smog** This type of air pollution results from a chemical reaction between pollutants in the presence of sunshine.
- photic zone** The upper 200 m of the ocean, where sunlight penetrates.
- pH scale** A scale that measures the acidity of a solution. A pH of 7 is neutral. Smaller numbers are more acidic and larger numbers are more alkaline.
- pesticide** A chemical that kills a certain pest that would otherwise eat or harm plants that humans want to grow.
- permineralization** Fossilization in which minerals in water deposit into empty spaces in an organism.
- permeable** A material with interconnecting holes so that water can move through it easily.
- permeability** The interconnectedness of the pores within a rock or sediment.
- permafrost** Permanently frozen ground that is found in the polar regions.
- penumbra** Outer part of shadow that remains partially lit during an eclipse.
- pedocal** Less fertile soil that forms in drier, grassland regions.
- pedalfer** Fertile, dark soil that forms in mid latitude, forested regions.
- pathogen** Disease causing organisms.
- partial melting** The melting of some, but not all, of the minerals in a rock, depending on temperature.
- parent isotope** An unstable isotope that will undergo radioactive decay.
- parasitism** A symbiotic relationship between two species in which one species benefits and one species is harmed.
- parallax** A method used by astronomers to calculate the distance to nearby stars, using the apparent shift relative to distant stars.
- paleontologist** A scientist who studies Earth's past life forms.
- paleogeography** The arrangement of the continents; ancient geography.
- P-waves** Primary waves; arrive first at a seismograph.

## R

- rotation** The motion of the Earth spinning on its axis.
- rocket** A device propelled by particles flying out one end at high speed.
- rock cycle** The never-ending cycle in which one rock type changes into another rock type.
- rock** Mixture of minerals.
- RNA world hypothesis** RNA was the first nucleic acid and the only one at the beginning of life.
- rip current** A strong surface current that returns to the ocean from the shore.
- revolution** The Earth's movement around the Sun in an orbital path.

- reverse fault** A dip-slip fault in which the hanging wall pushes up relative to the footwall.
- respiration** The process in which organisms convert sugar into useful food energy. Respiration burns oxygen and produces carbon dioxide.
- residual soil** Soil that forms from the bedrock upon which it lies.
- residence time** The amount of time, on average, a substance remains in a reservoir.
- reservoir** A storage location for a substance, such as water. The atmosphere is a reservoir for carbon dioxide.
- renewable resources** Resources that are limitless or that are replaced more quickly than we can use them.
- relief** Difference in height of landforms in a region.
- relative humidity** The amount of water vapor in the air relative to the maximum amount of water vapor that the air could contain at that temperature.
- relative age** The age of an object in comparison with the age of other objects.
- regional metamorphism** Changes in rock that occur because of high pressure over a large area.
- refraction** A change in the direction of a wave caused by a change in speed. Waves refract when they travel from one type of medium to another.
- refracting telescope** Telescopes that use convex lenses to collect and focus light.
- reflection** Bouncing back. A wave bounces off a reflective surface, just as a light wave bounces off a mirror.
- reflecting telescope** Telescopes that use mirrors to collect and focus light.
- reef** A large underwater structure created from the calcium carbonate skeletons of coral.
- redshift** Shift of wavelengths of light towards the red end of the spectrum; happens as a light source moves away from us.
- red giant** Stage in a star's development when the inner helium core contracts while the outer layers of hydrogen expand.
- reclamation** Restoring a mined property to its pre-mining state.
- rainshadow effect** A location of little rain on the leeward side of a mountain range due to descending air.
- rainforest** The tropical wet biome where temperatures are warm and rain falls nearly every day.
- radiosonde** A group of instruments that measure the characteristics of the atmosphere temperature, pressure, humidity, etc. as they move through the air.
- radiometric dating** Process of using the concentrations of radioactive substances and daughter products to estimate the age of a material.
- radioactivity** Emission of high-energy particles by unstable isotopes.
- radioactive isotope** Substance that is unstable and likely to decay into another isotope.
- radio wave** The longest wavelengths of the electromagnetic spectrum; 1 mm to more than thousands of kilometers.
- radio telescope** A radio antenna that collects radio waves or microwaves.
- radiative zone** Layer of the Sun immediately surrounding the core where energy moves atom to atom as electromagnetic waves.
- radiation** The movement of energy through empty space between objects by electromagnetic waves.
- radar** Radio detection and ranging device that emits radio waves and receives them after they bounce on the nearest surface. This creates an image of storms and other nearby objects.

## S

- syncline** A fold in the rocks that bends downward, in which the youngest rocks are at the center.
- symbiotic** A relationship between organisms in which each benefits and none is harmed.
- symbiosis** Relationships between two species in which at least one species benefits.
- swamp** A low-lying wetland where water moves very slowly and oxygen levels are low.
- sustainable development** Economic development that helps people out of poverty, use resources at a rate at which they can be replaced, and protects the environment.
- suspended load** Solid particles that are carried in the main stream flow.
- surface waves** Seismic waves that travel along the ground surface; they do the most damage.
- surface current** A horizontal movement of ocean water, caused by surface winds.
- supervolcano** A massive volcano that can produce unbelievably enormous, but rare, eruptions.



- superposition** In a sequence of sedimentary rock layers, the oldest is at the bottom and the youngest is at the top.
- supernova** A tremendous explosion that occurs when the core of a star is mostly iron.
- Superfund site** A site where hazardous waste has been spilled. Under the Superfund Act, the company that created the hazardous waste is responsible for cleaning up the waste.
- Superfund Act** A law passed by the U.S. Congress in 1980 that held companies responsible for any hazardous chemicals that they might create.
- supercontinent cycle** The cycle in which the continents join into one supercontinent and then move apart to join together at the other side of the planet as another supercontinent.
- supercontinent** A collection of continents that have come together because of the plate tectonics processes.
- sunspot** Cool, dark area on the Sun's surface that have lower temperatures than surrounding areas; sunspots usually occur in pairs and come and go on an 11-year cycle.
- subsoil** The B horizon of a soil profile; beneath the topsoil.
- subsidence** Sinking of the land surface because of the extraction of ground water.
- sublimation** The change of a substance from a solid to a gas without going through the liquid phase.
- subduction zone** The area where two lithospheric plates come together and one sinks beneath the other.
- subduction** The sinking of one lithospheric plate beneath another.
- stromatolites** Reef like cyanobacteria that still exist today.
- strike-slip fault** A fault in which the dip of the fault plane is vertical.
- stress** Force per unit area in a rock.
- stream** A body of moving water, contained within a bank (sides) and bed (bottom).
- streak** The color of the powder of a mineral.
- stratosphere** Above the troposphere; temperature increases with altitude because of the presence of ozone.
- strain** Deformation in a rock because of a stress that exceeds the rock's internal strength.
- storm surge** Water that is pushed in a pile near shore by storm winds causing sea level to rise locally.
- steppe** The biome of semi-arid deserts, with bunch grasses, scattered low bushes and sagebrush.
- stationary front** A stalled front in which the air does not move.
- star system** Small groups of stars that are close together.
- star cluster** A group of hundreds of thousands of stars.
- star** A glowing sphere of gases that produces light through nuclear fusion reactions.
- stalagmite** Deposit of calcium carbonate that grows upward in caves as water drips onto the floor.
- stalactite** Icicle-like formation of calcium carbonate from water dripping from the ceiling of a cave.
- squall line** A line of thunderstorms that forms at the edge of a cold front.
- spring tide** A large tidal range that occurs when the Moon, Sun, and Earth are aligned; this happens at full and new moon phases.
- spring** A point on the Earth's surface where ground water bubbles up.
- spit** Long, narrow bar of sand that forms as waves transport sand along shore.
- spiral galaxy** A rotating type of galaxy with a central bulge and spiral arms with stars, gas and dust.
- spiral arm** Regions of gas and dust plus young stars that wind outward from the central area bulge.
- spectrometer** A tool that uses a prism to break light into its component colors.
- specific heat** The amount of energy needed to raise the temperature of 1 gram of material by 1°C.
- species** A classification of organisms that can or do interbreed and produce fertile offspring.
- space telescope** Telescopes in orbit above Earth's atmosphere.
- space station** A large spacecraft in space on which humans can live for an extended period of time.
- space shuttle** A reusable spacecraft capable of carrying large pieces of equipment or a space station.
- space probe** An unmanned spacecraft that collects data by flying near or landing on an object in space.
- solar wind** High-speed protons and electrons that fly through the solar system from the Sun. The solar wind extends millions of kilometers out into space and can reach out into the solar system.
- solar system** The Sun and all the objects that revolve around the Sun as a result of gravity.
- solar prominence** Plasma loop flowing between sunspots.
- solar flare** A violent explosion on the Sun's surface.
- solar eclipse** Occurs when moon passes directly between the Earth and Sun; the Moon's shadow blocks the Sun

from view.

**soil profile** The entire set of soil layers or horizons for a particular soil.

**soil horizon** An individual layer of a complete soil profile; examples include A, B C horizons.

**soil** The top layer of Earth's surface containing weathered rocks and minerals and organic material.

**slump** Downslope slipping of a mass of soil or rock, generally along a curved surface.

**slip face** Steeper, downwind side of a dune where sand grains fall down from the crest.

**slip** The distance rocks move along a fault.

**slash-and-burn agriculture** Plants are slashed down and then burned to clear the land for agriculture.

**slash-and-burn** A method of clearing land for farming that involves cutting trees and then burning the leftover debris. This is common in rainforests.

**sinkhole** Circular hole in the ground that forms as the roof of a cave collapses.

**silicates** Minerals of silicon atoms bonded to oxygen atoms.

**shield volcano** A shield-shaped volcano composed of fluid lavas.

**shield** The part of a craton that crops out at the surface.

**shear** Parallel stresses that move past each other in opposite directions.

**shadow** Darkness that occurs where a light source is blocked.

**sewage treatment** Any process that removes contaminants from sewage or wastewater.

**seismometer** A seismometer is a machine that measures seismic waves and other ground motions.

**seismology** The study of seismic waves including earthquakes and the Earth's interior.

**seismograph** An older type of seismometer in which a suspended, weighted pen wrote on a drum that moved with the ground.

**seismogram** A seismogram is the printed record of seismic activity produced by a seismometer.

**seismic waves** Also called earthquake waves. Seismic waves transport the energy released during an earthquake.

Seismic waves give scientists information on Earth's interior.

**sedimentation** Sediments are laid down in a deposit.

**sedimentary rock** A rock that forms from the compaction of sediments or the precipitation of material from a liquid.

**sediment** Small particle of soil or rock deposited by wind or water.

**seawall** Structure built parallel to the shore on the beach to protect against strong waves.

**seafloor spreading** The mechanism for moving continents. The formation of new seafloor at spreading ridges pushes lithospheric plates on the Earth's surface.

**sea stack** Isolated tower of rock that forms when a sea arch collapses.

**sea level** The average height of the ocean; the midpoint between high and low tide.

**sea breeze** A wind that blows from sea to land in summer when the land is warmer than the ocean.

**scientific method** A means of investigating a testable question using empirical information gathered from experiments, experience, or observations.

**scavenger** Animals that eat animals that are already dead.

**savanna** The tropical wet and dry biome, typified by grasses and widely scattered deciduous trees.

**satellite** An object, either natural or human made, that orbits a larger object.

**Santa Ana winds** Hot winds that blow east to west into Southern California in fall and winter.

**sand dune** Sand deposit formed in regions of abundant sand and constant winds.

**saltation** The intermittent movement of bed load particles.

**salinity** A measure of the amount of dissolved salt in water; average ocean salinity is 3.5%.

**S-waves** Secondary waves; arrive second at a seismograph.

## T

**tundra** The treeless area of the arctic with very cold, harsh winters.

**tsunami** An enormous wave generated by vertical movement of the ocean floor during an underwater earthquake; tsunamis can also be caused by volcanic eruptions, landslides, or meteorite impacts. A deadly set of waves can rise high on a beach and travel far inland.

**trough** The lowest point of a wave.

**troposphere** The lowermost layer of the atmosphere; temperature decreases with altitude.

**tropical rainforest** A warm, wet biome with abundant broadleaf evergreen trees and large biodiversity.

**tropical depression** A low pressure cell that rises in the tropics; thunderstorms arise here.

**tropical** A climate that is warm and humid.

**trophic level** Energy levels within a food chain or food web.

**tributary** The smaller of two streams that join together to make a larger stream.

**trench** A deep gash in the seafloor; the deepest places on Earth.

**tree ring** Rings of wood equaling one year of tree growth in a tree trunk.

**travertine** Beautiful deposit of calcium carbonate that forms around hot springs.

**transported soil** Soil that forms from weathered components transported to a different area.

**transpiration** The release of water vapor into the air through the leaves of plants.

**transform plate boundary** The type of plate boundary where two plates slide past one another.

**transform fault** An earthquake fault; one plate slides past another.

**trace fossil** Evidence of the activity of an ancient organism; e.g. tracks, tubes, and bite marks.

**tornado** Violently rotating funnel cloud that grows downward from a cumulonimbus cloud.

**topsoil** The A horizon; the most fertile layer with humus, plant roots and living organisms.

**topography** Height of a feature relative to sea level.

**topographic map** A map that shows elevations above sea level to indicate geographic feature.

**timber** Trees that are cut for wood to be used for building or some other purpose.

**tide** The regular rising and falling of Earth's surface waters twice a tidal day as a result of the Moon's and Sun's gravitational attraction.

**tidal range** The difference between the high and low tide in a day.

**thunderstorm** Storms caused by upwelling air; cumulonimbus clouds, thunder, and lightning.

**thunder** The loud clap produced by lightning.

**thrust fault** A reverse fault in which the dip of the fault plane is nearly horizontal.

**thrust** The forward force produced by gases escaping from a rocket engine.

**thermosphere** The outer atmosphere where gases are extremely thinly distributed.

**thermometer** A device that measures temperature.

**thermohaline circulation** Temperature and salinity (density) driven currents that drive deep ocean circulation.

**thermal pollution** Water pollution created by adding heat to water.

**theory** A hypothesis that has been repeatedly tested that has no significant evidence against it.

**terrestrial planets** The solid, dense, rocky planets that are the same as the inner planets.

**terrae** The light parts of the Moon's surface, composed of high crater rims.

**terminal moraine** Glacial till dumped at the furthest point reached by a glacier.

**tephra** Fragments of material produced in a volcanic eruption.

**tension** Stresses that pull material in opposite directions.

**temperature gradient** The change in temperature with distance.

**temperature** A physical property of matter that expresses how hot or cold it is.

**talus slope** A pile of angular rock fragments formed at the base of a cliff or mountain.

**taiga** Vast, boreal forests of small, widely spaced trees typical of the subpolar climate.

## U

**upwelling** Cold, nutrient-rich water that rises from oceanic depths.

**uplift** The upward rise of rock material.

**universe** Everything that exists; all matter and energy; also includes all of space and time.

**uniformitarianism** Natural processes operated the same way throughout Earth's history as they do today.

**unconformity** A gap between rocks of very different ages. Unconformities are often marked by an erosional surface.

**umbra** Inner cone shaped part of a shadow when all light is blocked during an eclipse.

**ultraviolet (UV) radiation** High energy radiation from the Sun that can be dangerous to Earth's life.

**ultraviolet (UV)** Electromagnetic radiation having wavelengths shorter than the violet.

**ultramafic** A type of igneous rock that contains more than 90% mafic minerals.

## V

**volcanic rock** Rock that originates in a volcano or volcanic feature.

**visible light** The portion of light in the electromagnetic spectrum that is visible to humans.

**viscosity** The thickness of a liquid; its resistance to flow.

**vesicular** Igneous rock texture with holes that indicate the presence of gas bubbles in the magma.

**vertebrate** Animals with a backbone.

**ventifacts** Polished, faceted stones formed by abrasion by sand particles.

**vein** Minerals that cooled from a fluid and filled cracks in a rock.

**varve** Paired deposit of light-colored, coarser sediments and darker, fine-grained sediments deposited in a glacial lake that represent an annual cycle.

**variation** Having many differences.

**valley breeze** An uphill airflow.

## W

**white dwarf** A small to mid-sized star that has collapsed.

**wetland** Lands that are wet a large amount of the time.

**well** A circular hole that goes into an aquifer to allow people to access groundwater.

**weathering** The chemical or physical breakdown of rocks, soils or minerals at Earth's surface.

**weather map** A map showing weather conditions over a wide area at a given time.

**weather** The temporary state of the atmosphere in a region.

**wavelength** Horizontal distance from wave crest to wave crest, or wave trough to wave trough.

**wave-cut platform** Level area formed by wave erosion as waves undercut cliffs.

**wave-cut cliff** A sea cliff cut by strong wave energy.

**wave** A change in the shape of water caused by energy from wind.

**water vapor** Water in the form of a gas. Water vapor is invisible to humans; when we see clouds, we actually are seeing liquid water in the clouds.

**water table** The upper surface of ground water.

**water purification** Any process used to produce safe drinking water by removing contaminants.

**water column** A vertical column of ocean water, divided into different zones according to their depth.

**warm front** A front in which a warm air mass replaces a cold air mass.

## X

**X-ray** A band of electromagnetic radiation between gamma and ultraviolet.

## Y

**year** The time it takes for a planet to orbit the Sun.

## Z

**zooplankton** Tiny animals that float at the surface their whole lives or only part of their lives.