

Glossary of Earth Science Terms

- abrasion:** Form of physical weathering caused by friction between rock particles
- absolute age:** Age of a rock unit, a fossil, or an event expressed in units of time, such as years
- absolute humidity:** Moisture content of the air more commonly expressed as a vapor pressure in millibars
- absolute time scale:** Geologic time that uses numerical time units (years)
- absolute zero:** Coldest possible temperature, -273°C , at which molecules have no energy of vibration (heat)
- absorption (energy):** Taking in of energy
- adiabatic temperature change:** Change in the temperature of a gas caused by expansion (cooling) or compression (warming)
- aerobic organism:** Organism that must live in an environment that contains oxygen
- aerosol:** Tiny particles or droplets suspended in a gas
- agent of erosion:** Medium, such as water, wind, or glacial ice, that transports weathered sediments
- air mass:** Large body of air that has relatively uniform conditions of temperature and pressure
- air pressure:** Effect of the weight of the atmosphere pressing on a given surface area
- alpine glacier:** Glacier that forms in high mountains where snow accumulates to sufficient depth that it is compressed and recrystallized into ice
- altitude:** Height, measured in degrees, of an object above an observer's the horizon
- anaerobic organism:** Organism that can live without oxygen (See aerobic organism.)
- anemometer:** A device that measures wind speed
- angle of insolation:** Angle of the sun above the horizon
- angular diameter:** Angle formed between opposite sides of an object and an observer's eye
- annular drainage pattern:** Stream pattern of concentric circles formed on a mountain whose rocks have differing ability to resist weathering
- anticyclone:** High-pressure system that often brings cool, clear weather as its winds rotate clockwise and away from the center; a zone of divergence
- aphelion:** Farthest approach of a satellite to its primary; where a satellite moves the slowest in its orbit
- apparent diameter:** How large an object looks, which depends on its size and distance from an observer
- apparent motion:** The way celestial objects appear to move across the sky
- apparent solar day:** Time required for the sun to go from its highest point in the sky on one day to its highest point the next day
- apparent solar time:** Time based upon the position of the sun in the sky, it is usually a few minutes ahead of, or behind, clock time (mean solar time)
- arc:** Uniformly curved line that is a part of a circle; the path of the sun or a star through the sky
- arctic air mass:** Extremely cold air mass that originated in the far north
- arid:** Dry; a climate in which there is little precipitation
- asteroid:** One of the tens of thousands of rocky objects located, for the most part, in a belt between the orbits of Mars and Jupiter
- asthenosphere:** Part of Earth's interior below the lithosphere that becomes plastic in response to stress
- astronomy:** Study of the motions and properties of objects in space
- atmosphere:** Shell of gases that surrounds a planet, for example, Earth
- atmospheric pressure:** A measure of the force exerted by the atmosphere

- atmospheric variables:** Observable or measurable characteristics of the air, such as temperature, pressure, humidity, wind speed, and wind direction
- axis:** Imaginary line around which an object rotates
- banding:** Type of layering (foliation) found in some metamorphic rocks that is caused by the movement or growth of minerals into homogeneous layers
- barometer:** Instrument used to measure air pressure
- basaltic:** Igneous rock composed mostly of dark-colored, dense minerals containing compounds of iron and magnesium
- base level:** The lowest level to which a stream can erode
- basic unit:** Unit of measure, such as mass, length, or time, that cannot be expressed in terms of a combination of other units
- bedrock:** Solid layer of rock that extends into Earth, bedrock can always be found beneath the soil
- bench mark:** Metal disk, or other marker, placed in rock or concrete that shows the location of a surveyed position and its elevation above sea level
- big bang:** Theory that the universe began as the rapid expansion of an infinitesimal object of incredible mass and density
- big crunch:** Theory that gravity will reverse the expansion of the universe so that it contracts
- bioclastic:** Sedimentary rock, such as coal and some types of limestone, formed by the accumulation of plant and animal remains
- boiling temperature:** Temperature at which a substance changes from a liquid to a gaseous phase at normal atmospheric pressure
- bonding:** Attachments; the way that atoms are connected to adjacent atoms
- calorie:** Amount of heat energy needed to raise the temperature of 1 gram of pure water 1 Celsius degree; a common measuring unit of heat energy
- calorimeter:** Closed energy system used to determine the specific heat of a substance
- capillarity:** Ability of a soil to draw water upward into tiny pores
- capillary water:** Water held within the aerated zone of the soil above the water table
- carbon-14:** Radioactive form of the element carbon that has been used to determine the absolute age of recent fossils and geologic events
- celestial object:** Object in the sky outside Earth's atmosphere; the sun, moon, stars, and planets.
- celestial sphere:** Imaginary sphere encircling Earth on which all objects in the night sky appear
- cement (natural):** Mineral or another fine matrix that fills the pores between the grains of sediments in sedimentary rock
- chemical weathering:** Change in the chemical composition of a rock caused by adjustment to conditions at Earth's surface
- circumference:** Perimeter of a circle, or the straight-line distance around a sphere
- classification:** Organization by similarities of objects, ideas, or information into groups
- cleavage:** The way that a mineral splits between layers of atoms that are joined by weak bonds
- cleavage planes:** Flat surfaces along which some minerals break naturally
- climate:** Average weather conditions over many years
- cloud:** Large mass of water droplets or ice crystals suspended in the air
- cold front:** Boundary between a mass of cold air and the warmer air it is replacing
- color:** Typically used in Earth science to describe the characteristic color of a mineral
- comet:** Icy object that most likely originated in a region beyond the planets; some comets travel in highly elliptical orbits
- competent rock:** Hard rock that resists weathering and erosion
- compression waves:** (See P-waves.)
- condensation:** Process by which a gas changes into a liquid; a way in which clouds form
- condensation nuclei:** Surface on which water vapor may change into a liquid
- conduction:** The way heat energy is transferred through matter by the direct contact of molecules
- conglomerate:** Sedimentary rock composed of cemented gravel, pebbles, or cobbles
- constellation:** Observed pattern people use to mark the position of stars in the sky; one of the 88 regions of the night sky each associated with a particular constellation

- contact metamorphism:** Chemical and physical changes to a rock caused mostly by the heat of a nearby intrusion or extrusion of molten liquid rock
- continental air mass:** Body of dry air that is low in humidity because it formed over a land area
- continental climate:** Climate in which there are large seasonal changes in temperature due to the absence of nearby bodies of water that could moderate the climate
- continental crust:** Rocks within the continents, usually a thin layer of sedimentary rocks over granitic rocks, that are less dense than oceanic crust
- continental drift:** Idea that the continents move over Earth's surface like rafts on water
- continental glacier:** A glacier that spreads over a wide geographic area
- contour interval:** Difference in height between two adjacent contour lines
- contour line:** Line on a map that connects places with the same elevation and shows the shape of the land
- contour map:** Map that shows the shape of the land using contour lines; a map showing an elevation field
- convection:** Circulation of a heated fluid (a liquid or a gas) caused by density currents; a form of heat flow in which the heated material moves
- convection cell:** Circular path of convection flow
- convergence:** Coming together of winds as they blow into a cyclone (low-pressure system); the coming together of tectonic plates
- convergent boundary:** Boundary at which crustal plates collide
- coordinate system:** Grid on which each location has a unique designation defined by the intersecting of two lines; for example, latitude and longitude
- core:** Innermost layer of Earth, thought to be composed mostly of iron and nickel
- Coriolis effect (force):** Apparent curvature of the winds, ocean currents, or objects moving long distances along Earth's surface; caused by Earth's rotation on its axis
- correlation:** Matching rock layers in different locations by age or by rock types
- crust:** Thin, outermost layer of the solid Earth
- crystal:** Solid form of a mineral with a regular shape caused by the internal arrangement of atoms
- crystalline:** Made of crystals
- crystallize:** To form intergrown crystals as a liquid cools to form a solid
- cyclic change:** A change that repeats itself, like the annual cycle of the seasons or the apparent daily motion of the sun through the sky
- cyclone:** Low-pressure system in which the winds rotate counterclockwise in the Northern Hemisphere and converge to the center
- decay product:** Element produced by the decay of a radioactive isotope
- decay product ratio:** Ratio between the mass of a radioactive element and its decay product
- day:** Average interval of time during which the sun passes from its highest point on one day to its highest point on the next; approximately 24 hours
- dendritic:** Drainage pattern resembling a tree and its branches
- density:** Mass per unit volume of a substance
- deposition:** Settling or release of sediments by an agent of erosion
- derived units:** Units of measure that consist of combinations of basic units
- dew point:** Temperature at which the air would be saturated with moisture
- direct rays:** Sunlight that strikes Earth from straight overhead; vertical rays
- discharge:** Quantity of water flowing past a certain point in a stream per unit of time
- distorted structures:** Bedding, fossils, or other features of a rock that have been warped or otherwise changed by metamorphism
- divergence:** Outward movement of winds from a high-pressure zone (anticyclone)
- divergent boundary:** Plate boundary at which the plates move apart; an upwelling of material that forms new crust that moves away from the boundary
- Doppler shift:** (See redshift.)
- double refraction:** Property of transparent crystals to form a double image of objects viewed through the crystals
- drainage pattern:** Arrangement of adjoining streams as seen from above
- drumlin:** Oval-shaped mound of unsorted glacial till
- duration of insolation:** Length of time from sunrise to sunset that the sun is in the sky

dynamic equilibrium: State of balanced change

earthquake: Natural vibrations, sometimes destructive, that radiate from a sudden movement along a fault zone within Earth or from sudden movements of magma (molten rock) under a volcano

Earth science: Study of Earth's systems and setting in the universe

eccentricity: Degree of elongation of an ellipse

eclipse: Occurs when one celestial object casts its shadow on another celestial object; a lunar eclipse occurs when the Earth lies between the moon and the sun; a solar eclipse occurs when the moon passes between the Earth and the sun

electromagnetic energy: Energy, such as heat waves, visible light, and X rays, that can radiate through empty space

electromagnetic spectrum: Range of electromagnetic energy from long-wave radio waves to short-wave gamma rays

ellipse: Closed curve around two fixed points known as the foci

energy: Ability to do work

energy source: (See source.)

engineering: Application of science to solving problems

epicenter: Location along the Earth's surface that is directly above the focus of an earthquake

equator: Imaginary line that circles Earth halfway between the North and South Poles

equilibrium: State of balance between opposing forces in a system

equinox: Time at which the sun is directly above the equator, and all places on the Earth have 12 hours of daylight and 12 hours of darkness (Equinoxes occur near the end of March and September; they mark the beginning of spring and autumn.)

era: Large division of geologic time

erosion: Transportation of weathered material (sediments) by water, wind, or ice away from their place of origin and the deposition of them elsewhere

erosional-depositional system: River system within which energy transformations from potential energy to kinetic energy are constantly occurring

escarpment: Steep slope or cliff where resistant layers of rock overlie weaker layers

esker: Winding ridge of sand and gravel deposited by a stream confined to a tunnel under a glacier

evaporation: Change in phase from a liquid to a gas (vapor); also known as vaporization

evaporite: Sedimentary rock deposited when minerals in a saturated solution settle out of an evaporating body of water

event: Change or series of changes in Earth's environment

evolution (organic): Principle that through Earth's history, living things have changed in form from a few simple organisms to a great diversity of organisms

exponential notation: (See scientific notation.)

extrusion: Molten, liquid rock (lava) flowing out onto Earth's surface; a fine-grained igneous rock formed by the rapid crystallization of lava at or near Earth's surface

extrusive: Rocks formed from lava that solidifies quickly at Earth's surface

fault: Break in the rock of the Earth's crust along which there has been displacement (movement)

felsic: Light-colored rocks composed mostly of feldspar and silica

field: Region of space in which a similar quantity can be measured at every point or location

Finger Lakes: Lakes created in western New York State as the advancing ice deeply scoured former north-south river valleys

flotation: Transportation of sediments along the surface of a stream

fluid: Substance that can flow; liquids and gases

focus: One of two fixed points that determine the shape and position of an ellipse; an earthquake's point of origin within Earth

folds: Layers of rock that have been bent by forces within Earth

foliation: Alignment or segregation of minerals in a metamorphic rock, producing a layered appearance

fossil: Any preserved remains or traces of life

fossil fuels: Fuels, such as coal, oil, and natural gas, that were formed millions of years ago from the remains of ancient organisms

Foucault pendulum: Weight that is free to rotate as it swings back and forth; its slow change in direction of a swing is proof of Earth's rotation

- fracture:** Uneven splitting of a mineral sample
- fragmental (clastic):** Most common group of sedimentary rocks, made up of different sized particles
- freezing temperature:** Temperature at which a liquid will start to change to a solid
- front:** Boundary, or interface, between different air masses
- frost action:** Form of physical weathering in climates with seasonal temperature changes alternately above and below 0°C
- galaxy:** Huge body of stars and other matter in space
- gas:** Phase of matter in which molecules or atoms flow freely and are not bound closely
- geocentric model:** Early model of the solar system and universe in which Earth is stationary, located at the center of the universe, and around which all celestial objects revolve
- geologic time scale:** Divisions of Earth's history originally based on observations of fossil evidence; now, through the use of radioactive isotope measurements, it has changed from a relative scale to an absolute scale
- geology:** study of what Earth is made of and how it changes
- glacial erratic:** Large rock that has been transported by a glacier
- glacial polish:** Bedrock surface smoothed by the passage of a glacier
- glacier:** Large mass of moving ice.
- graded bedding:** Layers of sediment that change from coarse particles at the bottom of each layer to progressively finer particles toward the top
- gradient:** Rate of change in field values between two points in a field; the average slope
- grains:** Particles from which rocks are made
- granitic:** Rocks composed mostly of light-colored, low-density minerals, such as quartz and feldspar
- gravity (gravitational force):** Attractive force between objects that is directly proportional to the product of their masses and inversely proportional to the square of the distance between their centers of mass
- greenhouse effect:** Process by which infrared heat waves are trapped in the Earth's atmosphere by gases such as carbon dioxide and methane
- greenhouse gas:** gas, such as carbon dioxide and methane, that affects Earth's climate
- Greenwich Mean Time:** Time based on observations of the sun along the prime meridian
- groundwater:** Water that infiltrates the ground
- half-life:** Time needed for half the atoms in a radioactive sample to change to the decay product
- hardness:** In geology, the ability of a mineral to resist scratches
- heat energy:** Total potential and kinetic energy that an object can release as heat
- heat of fusion:** Latent potential energy absorbed when a solid melts and released when a liquid freezes
- heat of vaporization:** Latent potential energy absorbed when a liquid vaporizes and released when a gas condenses
- heliocentric model:** Modern model of the solar system and universe in which the planets revolve around the sun and Earth undergoes daily rotation
- high-pressure system:** Anticyclone; a dense mass of air in which the atmospheric pressure is the highest at the center; a zone of divergence
- horizontal sorting:** Gradual change in the size, density, and shape of particles deposited when a stream slows on reaching calm water (The largest, most dense, and roundest particles settle first while the smaller, least dense, and flatter particles are carried farther out into the calm water.)
- hot spot:** Location at which a stationary hot plume of magma breaks through the crust
- hour:** 1/24 of a day
- humid:** Moist; climate in which there is abundant precipitation
- humidity:** Measure of the moisture, or water vapor content, of the air
- humus:** Organic remains that are part of the soil
- hydrosphere:** Earth's liquid water, including oceans, lakes, streams, and groundwater
- ice age:** Long period of Earth's history when ice sheets covered large areas of the continents
- igneous:** Rock formed by the cooling and crystallization of molten rock (magma or lava)
- index fossil:** Fossil found over a large geographic area but which existed for a brief period of geologic time

- inertia:*** tendency of an object to remain at rest, or, if it is moving, to move at constant speed in an unchanging direction
- inference:*** Conclusion based on observations and experiences; something that is thought out, but not directly observed; an interpretation
- infiltrate:*** Water that seeps into the ground
- infrared waves:*** Long-wave heat radiation
- inner core:*** Central portion of Earth's core thought to be composed mostly of solid iron and nickel
- inorganic:*** Substance not formed by or from living things
- insolation:*** Electromagnetic energy that Earth receives from the sun; contraction of the words, "incoming solar radiation"
- insolation-temperature lag:*** Time delay between maximum or minimum insolation and maximum or minimum air temperature
- instrument:*** Device that makes observations or measurements easier to perform or more precise
- intensity:*** Strength
- interface:*** Boundary between different materials or systems
- intrusion:*** Molten, liquid rock (magma) pushed into cracks within Earth's crust; a body of coarse-grained igneous rock formed by slow cooling within Earth
- intrusive (plutonic):*** Rocks that crystallize slowly inside Earth's crust
- island arc:*** Islands formed by rising magma plumes at a convergent boundary
- isobar:*** Line on a weather map connecting places with the same atmospheric pressure
- isoline:*** Line connecting points having the same value within a field
- isosurface:*** Surface in which all points have the same measured value
- isotherm:*** Line within a temperature field or on a weather map that connects places that have the same temperature
- isotope:*** Form of an element with more or fewer neutrons than other forms of the same element
- jet stream:*** Currents, or very fast winds, that flow in the upper atmosphere
- joint:*** Crack in a rock produced by shrinkage or uneven pressure (Unlike a fault, no displacement occurs along a joint surface.)
- kame:*** Delta deposited by a stream at the end of a glacier
- kettle lake:*** Lake formed when a block of glacial ice melts
- kinetic energy:*** Energy of motion
- land breeze:*** Breeze that blows at night from the land to the sea
- landform:*** Unit of rock of uniform age or composition
- landscape:*** General shape of a region on Earth's surface
- latent heat:*** Energy absorbed or released in a change in state. (Latent heat is so named because it does not show up as a temperature change.)
- latitude:*** Angular distance in degrees north or south of the equator. (It varies from 0° at the equator to 90° at the poles.)
- lava:*** Molten rock at Earth's surface
- law of superposition:*** (See superposition, law of.)
- leaching:*** Process by which groundwater carries dissolved minerals deeper into the soil as the water infiltrates the ground
- leeward:*** Downwind side of a mountain range (Usually the side with less precipitation.)
- length:*** Distance between two points measured in meters or other units of length
- light-year:*** Distance light travels in one year
- liquid:*** Phase of matter in which the molecules or atoms are close but free to move about
- lithosphere:*** Solid portion of Earth below the atmosphere and hydrosphere; a solid layer that includes the crust and the upper portion of Earth's mantle
- longitude:*** Angular distance in degrees east or west of the prime meridian. (Longitude varies from 0° at the prime meridian to 180° near the middle of the Pacific Ocean.)
- low-pressure system:*** Weather system in which the atmospheric pressure is lower than in surrounding areas; cyclone
- luster:*** Way the surface of a mineral reflects light
- mafic:*** Composed of dark minerals rich in iron and magnesium
- magma:*** Molten rock within Earth
- magnitude:*** Total energy released by an earthquake, measured by the Richter scale

- major axis:** Line through the widest part of an ellipse
- mantle:** Portion of Earth below the crust and above the core
- marine (maritime) air mass:** Body of air that is relatively moist because it formed over an ocean
- marine climate:** Climate in which seasonal temperature changes are moderated by a large body of water
- mass:** Quantity of matter in an object, measured in grams or other units of mass
- mass extinction:** Extinction of a large number of species
- mass movement:** Downhill movement of rock or sediment without being carried by water, wind, or ice
- mass wasting:** (See mass movement.)
- maturity:** Relative measure of the development of a landscape as either young, mature, or old
- meander:** Natural looping bend, or S-shaped curve, in a stream
- mean solar day:** Average length of the day as measured from noon to noon (24 hours).
- measurement:** Observation of a quantity made using an instrument
- melting temperature:** Temperature at which a substance starts to change from a solid to a liquid phase
- meridian:** Imaginary semicircle, drawn around Earth from the North Pole to the South Pole, that represents a constant longitude
- metamorphic:** Sedimentary or igneous rock that has been changed without melting in texture or composition by heat or pressure, or both
- meteor:** Small solid particle from space caught by Earth's gravity that as they fall are heated by friction with Earth's atmosphere and burn, producing streaks of light visible at night; "shooting stars" (Most meteors vaporize during their fall through the atmosphere, although some of them reach the ground.)
- meteorite:** Natural object that has fallen to Earth from space
- meteoroid:** Potential meteors in space
- meteorologist:** Scientist who studies the weather
- meteorology:** Study of the changing conditions of the atmosphere, or weather
- mid-ocean ridge:** System of submerged mountain ranges that encircles Earth and often connects with mountain ranges on the continents, new crust forms here
- millibar:** Metric unit of atmospheric pressure
- mineral:** Natural, crystalline inorganic substances of which rock is made
- model:** Representation of an object or natural event
- Moho:** Interface between Earth's crust and mantle
- Mohs scale:** Series of ten minerals used as a scale of hardness
- moisture:** Presence of water or water vapor, particularly in the atmosphere
- monomineralic:** Rock composed of a single mineral
- moraine:** Irregular, hilly, unsorted deposit formed at the end of an advancing glacier when the melting ice front stays at the same position for a period of time; ridge deposited along the side of a glacier
- mountain:** Landscape region characterized by nonhorizontal rock structure and great topographic relief; landscape feature usually characterized by high elevation and steep slopes
- natural resource:** substance that comes from Earth
- navigation:** Science of locating position on Earth
- nonrenewable resource:** Resource that cannot be replenished for millions of years, if at all
- nonsedimentary rocks:** Igneous or metamorphic rocks that were not formed directly by sedimentary processes
- North Star:** Polaris; the star located almost directly above the North Pole
- nuclear fusion:** Under conditions of extreme heat and pressure in the sun, the nuclei of two hydrogen atoms join to form one helium nucleus
- oblate spheroid:** Nearly spherical shape of Earth, slightly flattened at the poles and slightly bulging at the equator
- observation:** Information obtained directly from the senses
- occluded front:** Type of weather front produced when a cold air mass overtakes a warm air mass, isolating the warm air above the ground
- oceanic crust:** Relatively thin, dense layer of basaltic rock that lies under the ocean sediments and on top of the mantle layer

- oceanography:** Study of the characteristics and dynamics of the blanket of water that covers most of our planet
- orbit:** Path (usually an ellipse) of any satellite around its primary
- orbital speed:** Measure of a satellite's orbital motion
- organic evolution:** (See evolution.)
- organic rock:** Sedimentary rock formed by the accumulation of plant or animal remains
- origin:** Method by which rock was formed
- origin time:** Time an earthquake occurs at its epicenter
- orogeny:** Process of mountain building
- outcrop:** Bedrock exposed at the surface because it is not covered by soil
- outer core:** Outside portion of Earth's core thought to consist mostly of liquid iron and nickel because S-waves can not pass through it
- outwash plain:** Layered deposits left by water from a glacier
- ozone:** Form of oxygen (O₃) that in the upper atmosphere protects Earth from harmful radiation from space, and at ground level is a pollutant
- ozone layer:** Protective layer, in the upper atmosphere, that has a high ozone content
- Pangaea:** Ancient supercontinent that broke apart millions of years ago to form the present continents
- parallel:** Imaginary line drawn around Earth parallel to the equator that represents a constant latitude
- percent error:** Mathematical method of comparing a measurement with the commonly accepted value for that measurement; percent deviation from accepted value
- perihelion:** Closest approach of a satellite to its primary; where a satellite moves the fastest in its orbit
- period:** Time required for a complete cycle; in geologic time, a subdivision of an era
- permeability:** Ability of a soil to transmit water
- phase:** Physical state of matter; solid, liquid, or gas; apparent change in shape of the lighted portion of a celestial object (phases of the moon)
- physical weathering:** Mechanical breakdown of rocks without any change in chemical composition
- plains:** Landscape region characterized by horizontal rock structure and low topographic relief
- planetary wind belt:** Latitude zone of prevailing wind conditions caused by uneven heating of Earth and Earth's rotation
- plate boundary:** Line along which crustal plates meet and interact
- plate tectonics:** Unified theory of crustal motion that incorporates continental drift and seafloor spreading; theory that Earth's surface is composed of about a dozen large, rigid plates that diverge and converge, carrying the continents
- plateau:** Landscape region characterized by horizontal rock structure and high topographic relief (A plateau is usually a relatively flat or rolling uplands area deeply cut by stream valleys.)
- plutonic:** (See intrusive.)
- polar air mass:** Mass of cool air
- Polaris:** (See North Star.)
- pollution:** Substance or form of energy in sufficient concentration to harm living things or the natural environment
- polymineralic:** Rock composed of more than one mineral
- porosity:** Portion or percent of empty space within a soil; the number of pores in a material compared with its volume
- potential energy:** Energy in storage, energy of position, or energy involved in a change of state
- precipitate:** Salt crystals that form and settle out of solution
- precipitation:** Water, in the form of rain, snow, or sleet, falling from the sky; sedimentary process that involves substances settling out of a saturated solution
- prediction:** Inference made about future events
- pressure gradient:** Rate of change in air pressure between two points on a map
- prevailing wind:** Wind that blows more often from one direction than from any other
- primary:** Object (lying along the major axis of an ellipse) around which a satellite moves. (The sun is the primary of the orbiting Earth, and the Earth is the primary of the moon.)
- primary waves:** (See P-waves.)
- Prime Meridian:** Imaginary line (semicircle) that runs through Greenwich, England, from the North Pole to the South Pole

- probability:** Likelihood that an event will take place
- profile:** Side view of the elevations along a baseline crossing contour lines on a topographic map
- P-wave:** Compression (longitudinal) wave that is the fastest of the seismic waves that radiate from an earthquake (P-waves can travel through solids and liquids; also known as primary waves.)
- radial drainage:** Stream pattern in which streams run like spokes down the sides of a central mountain such as a volcano
- radiation:** Emission and transfer of energy by means of electromagnetic waves, and the only way that energy can travel through empty space; rays or particles given off by an unstable radioactive substance
- radiative balance:** Equilibrium between absorbed radiant energy and radiant energy given off
- radioactivity:** Emission of energy rays or nuclear particles due to the breakdown of an unstable isotope
- red-shift:** Displacement of spectral lines of distant stars toward the red end of the spectrum; Doppler shift
- reflected:** Process in which energy waves bounce off a surface or interface
- refraction:** Process in which energy waves change direction as they move from one medium to another
- regional metamorphism:** Process by which large masses of rock are changed by deep burial within Earth
- relative age:** Comparative age; age expressed as before or after other events without specifying the age in units
- relative humidity:** Ratio between the actual amount of water vapor in the air and the maximum amount of water vapor the air can hold at a given temperature
- relative time scale:** Time scale that indicates whether the object in question is older or younger than something else
- relief (topographic):** Change in elevation from one place to another
- renewable resources:** Resources that can be replaced by nature after they have been used
- residual soil:** Soil that remains on top of the bedrock from which it formed
- retrograde motion:** Apparent backward motion of planets, such as Mars, through the stars (Retrograde motion occurs in a direction opposite to the more common direction of motion.)
- reversed magnetic polarity:** Magnetic polarity of an igneous rock that was formed at a time in the geologic past when Earth's north and south magnetic poles had the opposite polarity that they have at the present
- revolution:** Orbital motion of a satellite around its primary
- rift zone:** Linear feature of Earth where new crust is being created
- Ring of Fire:** Zone of volcanoes, earthquakes, and mountain building that surrounds the Pacific Ocean
- rock:** Natural piece of the solid Earth, usually composed of one or more minerals
- rock cycle:** Model explaining the natural changes in rocks and sediment
- rotation:** Spinning of a body around an internal axis (The Earth's rotation causes day and night.)
- runoff:** Precipitation that is unable to infiltrate the soil, so it moves overland into streams
- satellite:** Object that moves elliptically around another object (Earth is a satellite of the sun. The moon is a satellite of Earth.)
- saturated:** Weather condition in which the air holds as much water vapor as it can at a given temperature; a saturated solution is one that can hold no more of a particular substance dissolved in it
- saturation vapor pressure:** Portion of air pressure that could be caused by the weight of water vapor alone, if the air were saturated with water vapor
- scalar:** Measured quantity that has magnitude (size), but no direction
- scale:** Ratio of the dimensions of the real object to its model
- scattering:** Random reflections from an irregular surface
- scientific notation:** Mathematical shorthand in which numbers are written in the form $M \times 10^n$, where M is a number 1 or greater, but less than 10, and 10^n is a power of 10
- sea breeze:** Cool breeze that blows off the water during the day

- sea-floor spreading:** Theory that the oceanic crust has been constructed by material from deep within Earth that rises and spreads apart at the mid-ocean ridges
- seamount:** Isolated volcanic island located on the bottom of the ocean
- seasons:** Annual cycle of weather conditions as Earth orbits the sun
- secondary waves:** (See S-waves.)
- sediment:** Accumulation of particles of weathered rock, organic remains, or both; rock fragments
- sedimentary:** Rock formed by the compression and cementation of particles of sediment
- seismic waves:** Vibrational energy that radiates through Earth from an earthquake
- seismograph:** Instrument designed to measure and record the magnitude of an earthquake
- seismologist:** Scientist who studies earthquakes
- seismometer:** Instrument that detects vibrations of the ground
- sense:** Any of the five means by which we directly observe our environment (sight, hearing, smell, taste, and touch)
- shear waves:** (See S-waves.)
- silicates:** Large family of minerals that has the silicon-oxygen tetrahedron as its basic structure
- slope:** (See gradient.)
- soil:** Weathered rock mixed with organic remains at the top of the lithosphere
- soil horizon:** Layer within the soil showing a particular stage of soil development
- solar noon:** Time at which the sun is at its highest point in the sky
- solar system:** Planets and other objects that revolve around the sun
- solid:** State of matter in which the molecules or atoms are held rigidly in a three-dimensional network known as a crystal lattice
- solstice:** Most hours of daylight in the Northern hemisphere when the sun is directly above the Tropic of Cancer or least hours of daylight when the sun is directly over the Tropic of Capricorn (The solstices occur about June 21 and about December 21, and they mark the beginning of summer and winter in the Northern Hemisphere.)
- sorted:** Separated by particle size or other characteristics
- source region:** Place an air mass originates
- species:** Group of living organisms with similar characteristics, a common name, and the capability to interbreed
- specific gravity:** Ratio of the density of a substance to the density of water
- specific heat:** Amount of heat energy required to raise the temperature of 1 gram of a substance by 1 Celsius degree (Water, with a specific heat of 1, is the common standard.)
- spectrum:** (See electromagnetic spectrum.)
- sphere:** Round object on whose surface all points are equidistant from its center
- star:** Large, self-luminous body in space that creates its own radiant energy
- state of matter:** (See phase.)
- static equilibrium:** State of balance in a system in which no movement or change occurs in any of the system's components
- stationary front:** Interface, or boundary, between two air masses that are not moving
- strata:** Layers, or beds, of rock, usually sedimentary
- streak:** Color of the powder of a mineral revealed by rubbing the mineral along a white, unglazed porcelain plate
- streambed:** Bottom of a stream
- stream discharge:** (See discharge.)
- stream velocity:** Speed at which a stream flows
- striations (glacial):** Parallel scratches on the surface of a rock caused by the movement of a glacier
- subduction zone:** Region in which Earth's crust is destroyed as it is pulled down into the mantle
- subsidence:** Gradual sinking of a portion of Earth's crust
- sun spot:** temporary storm on the visible surface of the sun
- superposition (law of):** Principle that the lowest layer in a sequence of rock strata must have been deposited before the layers above, unless the rock strata have been turned upside down
- suspension:** Fluid containing large particles that can be filtered but are too small to settle on their own
- S-waves:** Transverse earthquake waves that arrive after the P-waves and that cannot travel through a liquid such as Earth's outer core; secondary or shear waves
- synoptic weather map:** Map showing a variety of field quantities, such as temperature, pres-

sure, and sky conditions, at a particular time and over a large geographic area

talus: Rock fragments that accumulate at the base of a cliff

tectonics: Study of large-scale deformations of Earth's crust

tectonic structures: Rock structures formed by faulting and folding

temperature: Measure of the average vibrational kinetic energy in a substance

terrestrial: Objects that are a part of Earth, such as rocks, oceans, and clouds

texture: Shape or feel of a surface; particularly the shape, arrangement, and size of mineral crystals on a rock surface

thermal energy: (See heat energy.)

tides: Rise and fall of the oceans that usually occurs twice a day

till: Unsorted sediments deposited directly by glacial ice

tilted strata: Beds of rock (usually sedimentary) thought to have been deposited horizontally that have been pushed into a different inclination (angle), usually by motions of Earth's crust

time: Measurable period in which an event or process occurs

topographic map: (See contour map)

topography: Shape of the land surface

traction: Transportation of large particles along a streambed by rolling and bouncing

transform boundary: Plate boundary at which crustal plates slide past each other

transition zone: Rock next to an igneous intrusion that has been altered by the heat of the intrusion; a region of contact metamorphism that gradually intensifies toward the zone of contact

transparency: Quality of a mineral that determines how it transmits light

transpiration: Process by which living plants release water vapor to the atmosphere

transported soil: Soil eroded and deposited away from its parent bedrock

transverse wave: Energy wave that vibrates perpendicular to the direction of travel, such as S-waves and electromagnetic energy

trellis drainage: Drainage pattern in which most of the streams occupy parallel valleys; pattern

usually develops on folded strata of rocks with differing competence

trench (ocean): Ocean floor depression that marks the zone where crust is subducted

Tropic of Cancer: Farthest north the vertical ray of sunlight reaches (at the June solstice); 23 1/2° north of the equator

Tropic of Capricorn: Farthest south the vertical ray of sunlight reaches (at the December solstice); 23 1/2° south of the equator

tropical air mass: Warm air mass

troposphere: Lowest layer of air; reaches from Earth's surface up to about 12 km and contains most of the mass of the atmosphere

tsunami: Ocean wave or a series of waves usually associated with an undersea earthquake or landslide

turbidity current: Down-slope, underwater flow of a dense mixture of sediment and sea water that can deposit a layer of graded bedding

unconformity: Gap in the geologic record caused by the erosion of sediments or rock followed by new deposition

uniformitarianism: Principal that most geologic events of the past are similar to processes that occur in the present

unsorted deposit: Sediment left by melting glacial ice usually containing a mixture of clay, sand, cobbles, and boulders

uplift: Rising of Earth's crust due to forces within Earth, generally related to motion of the tectonic plates

vaporization: (See evaporation.)

vapor pressure: Portion of the total air pressure caused by the weight of water vapor

vector: Quantity that has both magnitude (size) and direction

vein: Small inclusion of crystalline rock within a preexisting rock; formed by intrusion, partial melting, or deposition in cracks by mineral-laden groundwater

vertical ray: Sunlight that strikes Earth from directly overhead (the zenith)

vertical sorting: Sorting of particles from bottom to top in a layer (The roundest, largest, and densest particles are on the bottom and the flattest, smallest, and least dense particles at the top of the layer.)

vesicular: Rock containing many holes created by expanding gas as magma rose to Earth's surface (Scoria and pumice are vesicular.)

visibility: Measure of the transparency of the atmosphere

volcanic ash: Cinders blown into the air by a volcano, which are useful in correlating rock outcrops in different locations

volume: Amount of space that matter occupies

walking the outcrop: Following rock layers to correlate layers within the same outcropping

warm front: Boundary between a mass of warm air and the colder air it is replacing

water budget: Accounting procedure that models the annual movement of water through the soil for any given location

water cycle: Model of the circulation of water between the oceans, atmosphere, and land

watershed: Drainage basin; the geographic area in which water drains into a particular stream or other body of water

water table: Boundary at the top of the saturated zone within the soil

water vapor: Water in the form of a gas

wavelength: Distance between corresponding points on two successive crests or two successive troughs of a wave (For visible light, the wavelength determines the color. Heat radiation [infrared] and red light have longer wavelengths than violet, ultraviolet, or X rays.)

weather: Short-term condition of the atmosphere, including the changes that occur within hours or days

weathering: Breakdown of rock due to physical or chemical change

weight: Measure of the pull of gravity on an object

wind: Natural movement of air along, or parallel to, Earth's surface; convection within the atmosphere

windward: Side of a mountain range where warm, moist air is forced to rise, leading to cloud formation and precipitation

year: Time required for a planet (Earth) to complete one orbit around its primary (the sun); $365\frac{1}{4}$ days on Earth

zenith: Point on a celestial sphere directly overhead with respect to an observer (90°)

zone of aeration: Soil above the water table in which most of the interconnected pores are filled with air

zone of crustal activity: Area around an ocean ridge or continental mountain range where volcanoes and earthquake epicenters are concentrated

zone of saturation: Soil below the water table in which the pores are filled with groundwater