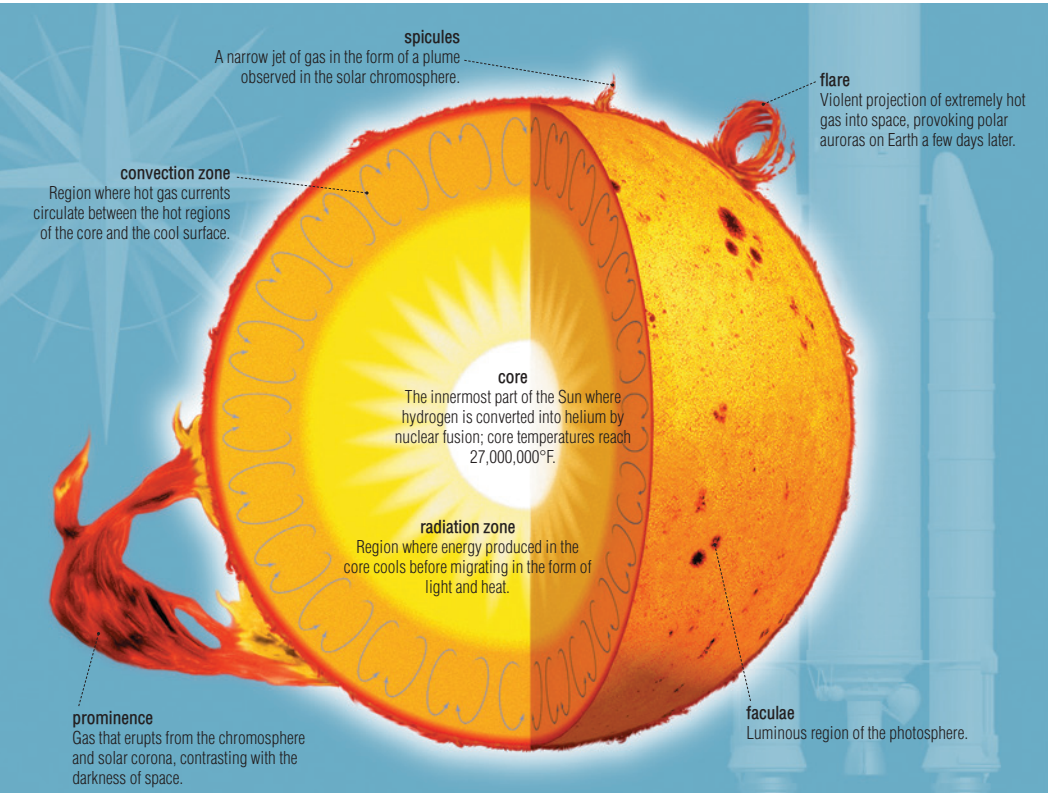
THE VISUAL DICTIONARY OF

# UNIVERSE & EARTH



# UNIVERSE & EARTH

Jean-Claude **Corbeil**
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QA INTERNATIONAL

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# INTRODUCTION

## EDITORIAL POLICY

*The Visual Dictionary* takes an inventory of the physical environment of a person who is part of today's technological age and who knows and uses a large number of specialized terms in a wide variety of fields.

Designed for the general public, it responds to the needs of anyone seeking the precise, correct terms for a wide range of personal or professional reasons: finding an unknown term, checking the meaning of a word, translation, advertising, teaching material, etc.

The target user has guided the choice of contents for *The Visual Dictionary*, which aims to bring together in 12 thematic books the technical terms required to express the contemporary world, in the specialized fields that shape our daily experience.

## STRUCTURE

Each tome has three sections: the preliminary pages, including the table of contents; the body of the text (i.e. the detailed treatment of the theme); the index.

Information is presented moving from the most abstract to the most concrete: sub-theme, title, subtitle, illustration, terminology.

## TERMINOLOGY

Each word in *The Visual Dictionary* has been carefully selected following examination of high-quality documentation, at the required level of specialization.

There may be cases where different terms are used to name the same item. In such instances, the word most frequently used by the most highly regarded authors has been chosen.

Words are usually referred to in the singular, even if the illustration shows a number of individual examples. The word designates the concept, not the actual illustration.

## DEFINITIONS

Within the hierarchical format of *The Visual Dictionary*'s presentation, the definitions fit together like a Russian doll. For example, the information within the definition for the term *insect* at the top of the page does not have to be repeated for each of the insects illustrated. Instead, the text concentrates on defining the distinguishing characteristics of each insect (the *louse* is a parasite, the female *yellow jacket* stings, and so forth).

Since the definition leaves out what is obvious from the illustration, the illustrations and definitions complement one another.

The vast majority of the terms in the *Visual Dictionary* are defined. Terms are not defined when the illustration makes the meaning absolutely clear, or when the illustration suggests the usual meaning of the word (for example, the numerous *handle*s).

## METHODS OF CONSULTATION

Users may gain access to the contents of *The Visual Dictionary* in a variety of ways:

- From the TABLE OF CONTENTS at the end of the preliminary pages, the user can locate by title the section that is of interest.
- With the INDEX, the user can consult *The Visual Dictionary* from a word, so as to see what it corresponds to, or to verify accuracy by examining the illustration that depicts it.
- The most original aspect of *The Visual Dictionary* is the fact that the illustrations enable the user to find a word even if he or she only has a vague idea of what it is. The dictionary is unique in this feature, as consultation of any other dictionary requires the user first to know the word.

**TITLE**

Its definition is found below. If the title refers to information that continues over several pages, after the first page it is shown in a shaded tone with no definition.

**NARROW LINES**

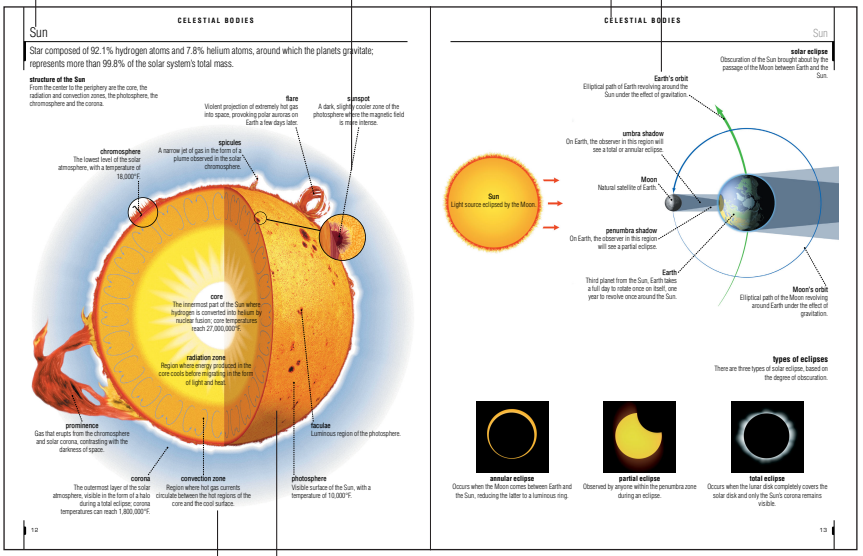
These link the word to the item indicated. Where too many lines would make reading difficult, they have been replaced by color codes with captions or, in rare cases, by numbers.

**SUB-THEME**

These are shown at the end of the preliminary pages along with their definitions. They are then repeated on each page of a section, but without the definition.

**TERM**

Each term appears in the index with a reference to the pages on which it appears.




**DEFINITION**

It explains the inherent qualities, function, or characteristics of the element depicted in the illustration.

**ILLUSTRATION**

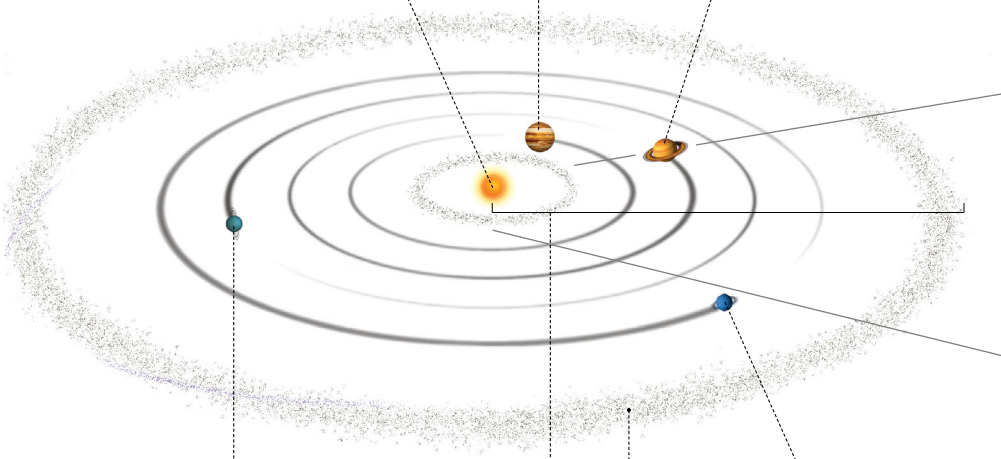
It is an integral part of the visual definition for each of the terms that refer to it.

# CONTENTS

# solar system

Region of our galaxy under the influence of the Sun; includes eight planets and their natural satellites as well as one dwarf planet, two plutoids, asteroids and comets.

**outer planets**
Planets located beyond the asteroid belt; these are known as the gas giants.



**Sun**
Star around which the planets gravitate; represents over 99.8% of the total mass of the solar system.

**Jupiter**
Fifth planet from the Sun, also the largest; Jupiter is 1,330 times the size of Earth.

**Saturn**
Sixth planet from the Sun, also the second largest planet; Saturn is encircled by rings forming a band about 120,000 mi in diameter.

**Uranus**
Seventh planet from the Sun, also the third largest planet; Uranus is composed mainly of rock, ice and hydrogen and features 11 rings.

**Neptune**
Eighth planet from the Sun; its atmosphere, composed of hydrogen, helium and methane, gives Neptune its bluish color. Features four rings.

**50 astronomical units**
Corresponds to about 50 times the Earth-Sun distance.

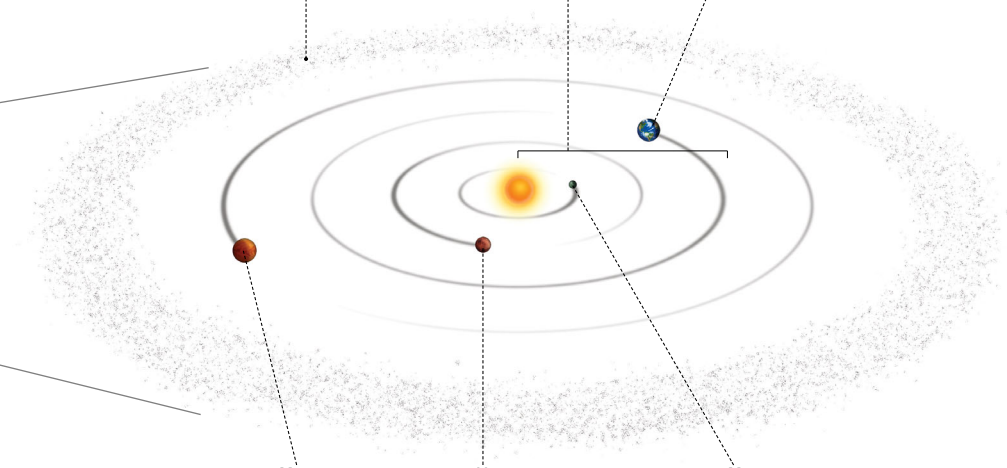
**Kuiper belt**
Circular region of the solar system about 50 astronomical units from the Sun; thought to be a repository of small icy bodies, the source of comets.

**inner planets**
Rocky planets closest to the Sun; located inside the asteroid belt.

**asteroid belt**
Circular region between Mars and Jupiter containing the greatest number of asteroids; marks the boundary between the inner and outer planets.

**1 astronomical unit**
Unit of distance equal to the mean distance between Earth and the Sun, equivalent to about 93 million mi.

**Earth**
Third planet from the Sun, inhabited by humankind; up to now, the only planet with evidence of life.



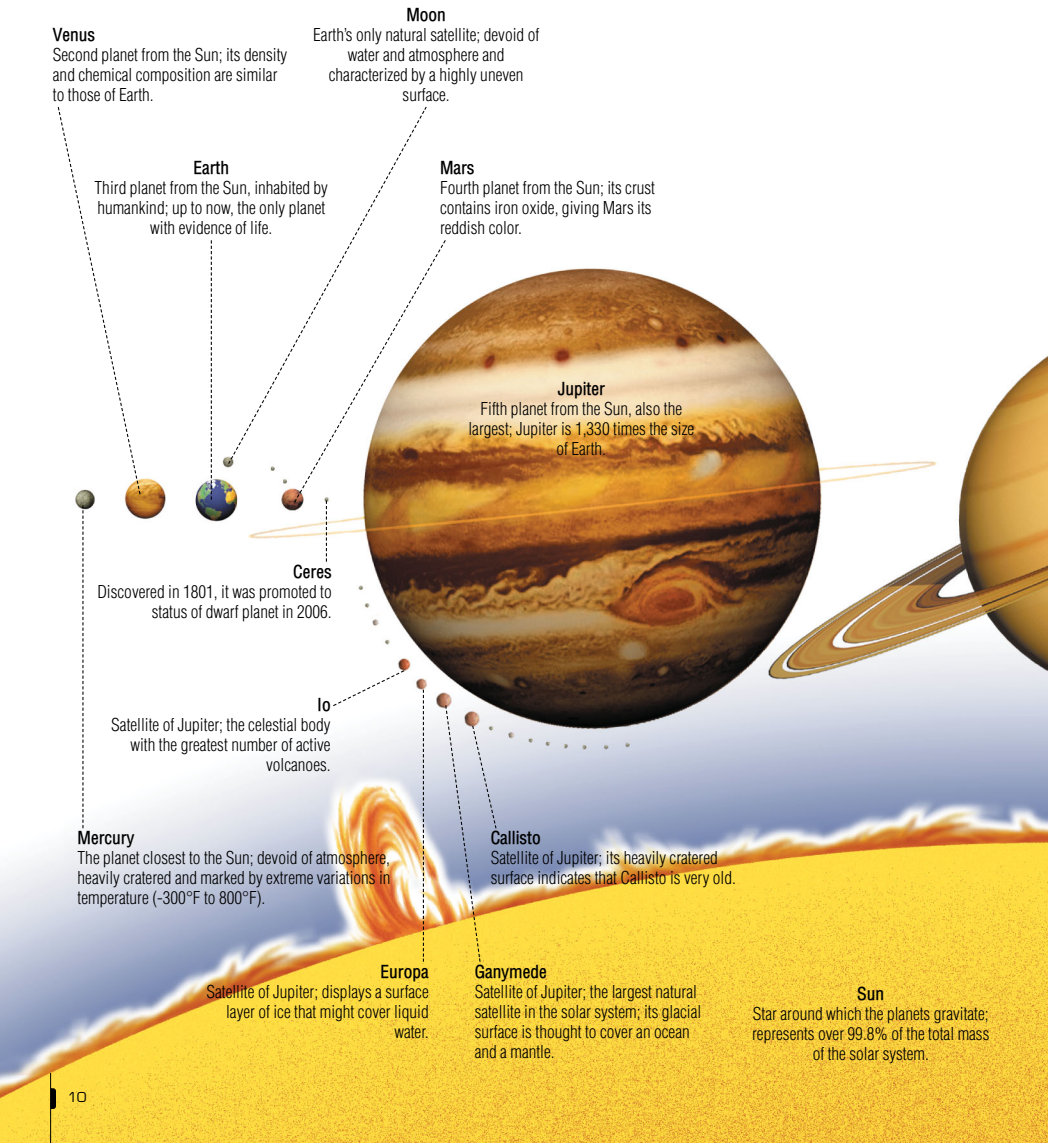
**Mars**
Fourth planet from the Sun; its crust contains iron oxide, giving Mars its reddish color.

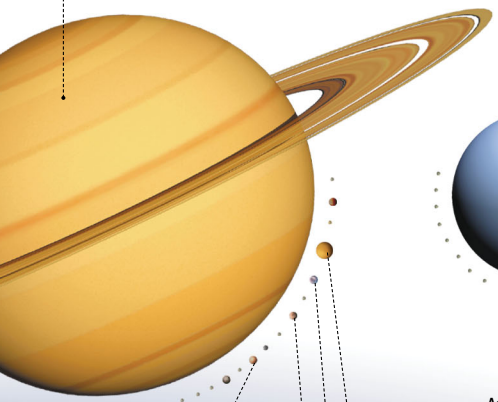
**Venus**
Second planet from the Sun; its density and chemical composition are similar to those of Earth.

**Mercury**
The planet closest to the Sun; devoid of atmosphere, heavily cratered and marked by extreme variations in temperature (-300°F to 800°F).

# planets and satellites

Planets, dwarf planets and plutoids orbit the Sun, satellites orbit the planets. They are represented from left to right from the Sun, based on their relative sizes.





**Eris**
Plutoid discovered in 2005, with a diameter bigger than Pluto's. It has a satellite, Dysnomia.

**Saturn**
Sixth planet from the Sun, also the second largest planet; Saturn is encircled by rings forming a band about 120,000 mi in diameter.

**Charon**
Pluto's only satellite; almost equal in size and mass to the planet itself.

**Uranus**
Seventh planet from the Sun, also the third largest planet; Uranus is composed mainly of rock, ice and hydrogen and features 11 rings.

**Neptune**
Eighth planet from the Sun; its atmosphere, composed of hydrogen, helium and methane, gives Neptune its bluish color. Features four rings.

**Ariel**
Satellite of Uranus; its cratered surface is composed of numerous long valleys and extremely high escarpments.

**Triton**
Neptune's largest satellite; together with Pluto, Triton is the coldest object in the solar system.

**Tethys**
Satellite of Saturn thought to be composed of ice; visible on its surface is an immense impact crater named Odysseus.

**Titan**
Saturn's largest satellite, 1.5 times the diameter of the Moon.

**Pluto**
Discovered in 1930, it was long considered the ninth planet of the solar system. Since 2008, it has been classified as a plutoid.

**Dione**
Satellite of Saturn; its cratered surface features ice deposits.

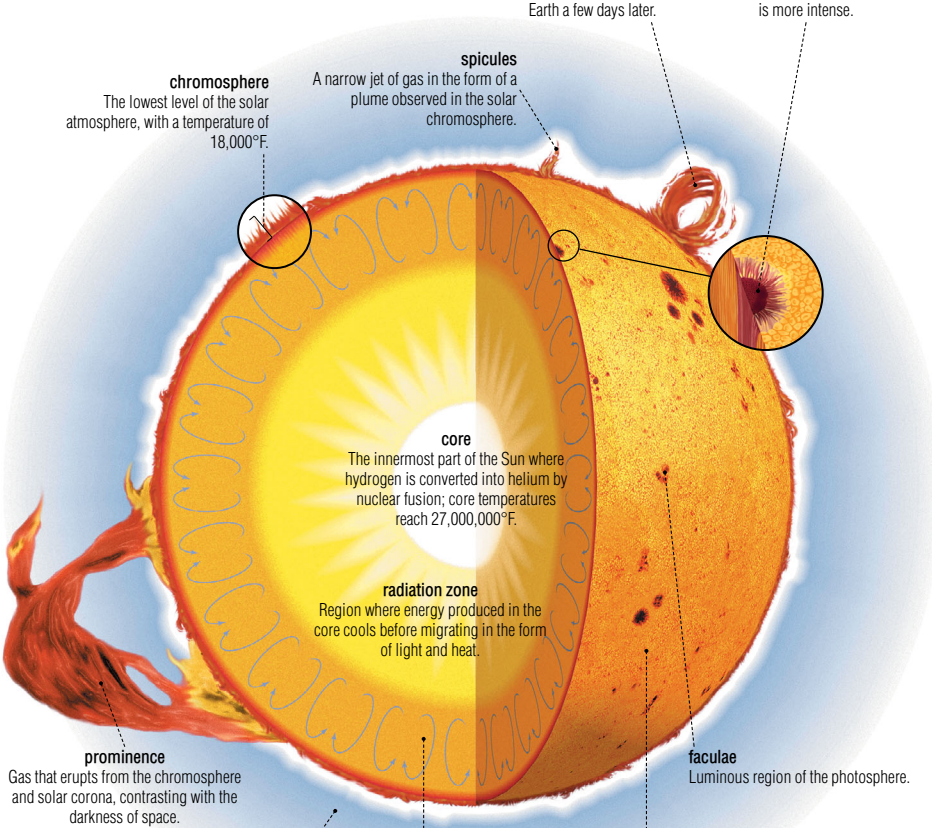
**Rhea**
Satellite of Saturn; its cratered surface is covered with ice as hard as rock.

**Titania**
The largest satellite of Uranus; its surface displays numerous valleys and faults.

# Sun

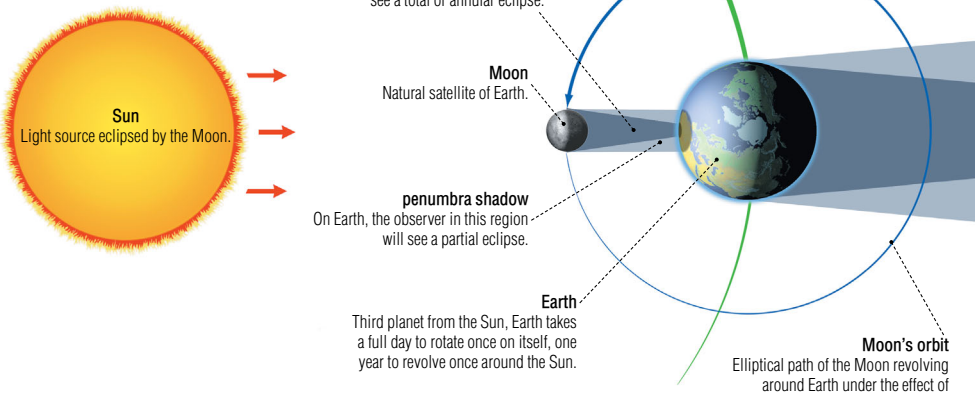
Star composed of 92.1% hydrogen atoms and 7.8% helium atoms, around which the planets gravitate; represents more than 99.8% of the solar system's total mass.

**structure of the Sun**
From the center to the periphery are the core, the radiation and convection zones, the photosphere, the chromosphere and the corona.



## solar eclipse

Obscuration of the Sun brought about by the passage of the Moon between Earth and the Sun.




## types of eclipses

There are three types of solar eclipse, based on the degree of obscuration.

**annular eclipse**
Occurs when the Moon comes between Earth and the Sun, reducing the latter to a luminous ring.

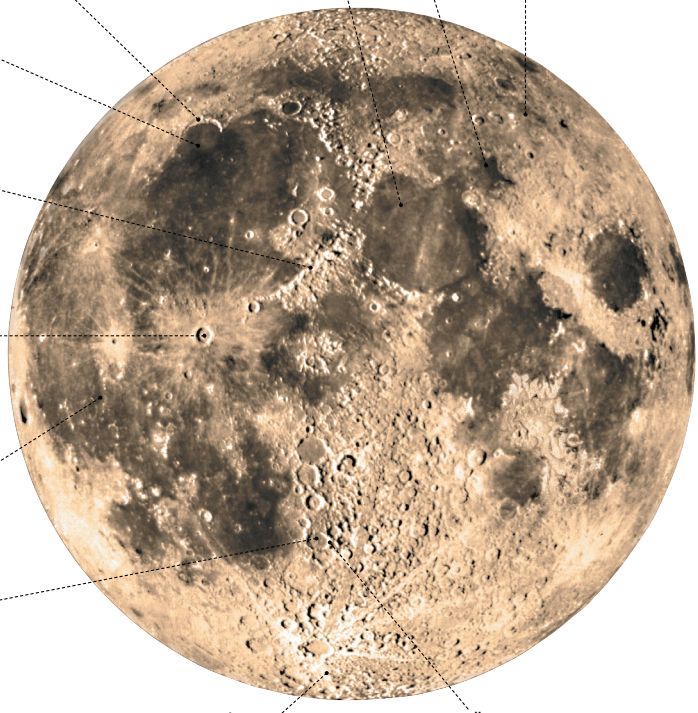
**partial eclipse**
Observed by anyone within the penumbra zone during an eclipse.

**total eclipse**
Occurs when the lunar disk completely covers the solar disk and only the Sun's corona remains visible.

# Moon

Earth's only natural satellite; devoid of water and atmosphere, it displays a highly uneven surface.

**lunar features**
Aspect of the Moon determined by past volcanic activity, meteorite impact and soil fractures.



**highland**
Designates bright regions riddled with craters; these oldest regions cover 85% of the surface.

**lake**
Small isolated plain of hardened lava.

**sea**
Designates the vast plains of hardened lava forming the dark regions; younger than the highlands, these cover 15% of the surface.

**cliff**
Steep rock face shaped by a sea.

**bay**
Small plain of hardened lava located along the edges of a sea.

**mountain range**
Vestiges of the walls of a once-large crater; semicircular in shape, it can span hundreds of miles.

**crater**
Circular basin dug out by the impact of a meteorite.

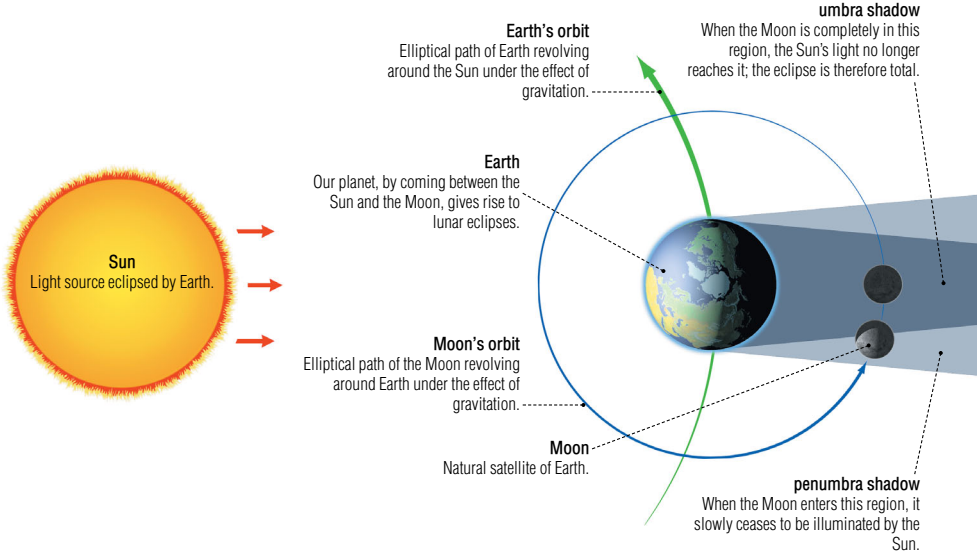
**ocean**
A very large sea.

**cirque**
Vast crater characterized by remarkable relief; varies between 12 and 120 mi in diameter.

**crater ray**
Band that radiates from a young crater, the result of matter ejected during a meteorite impact.

**wall**
Mountain usually surrounding a cirque.

**lunar eclipse**
Eclipse during which the Moon enters Earth's umbra shadow in part or in full.




**total eclipse**
Occurs when the Moon is completely within the umbra shadow and takes on a reddish appearance.

**partial eclipse**
When the Moon enters the umbra shadow, its bright side diminishes little by little.

**types of eclipses**
There are two types of eclipse based on the degree of obscuration: partial or total.

## Moon

**phases of the Moon**
Changes in the Moon's appearance over the course of a month; result from the movement of the Moon in relation to the Sun, as seen from Earth.

**new moon**
The Moon lies directly between Earth and the Sun; it is not visible, as the Sun's light is too brilliant.

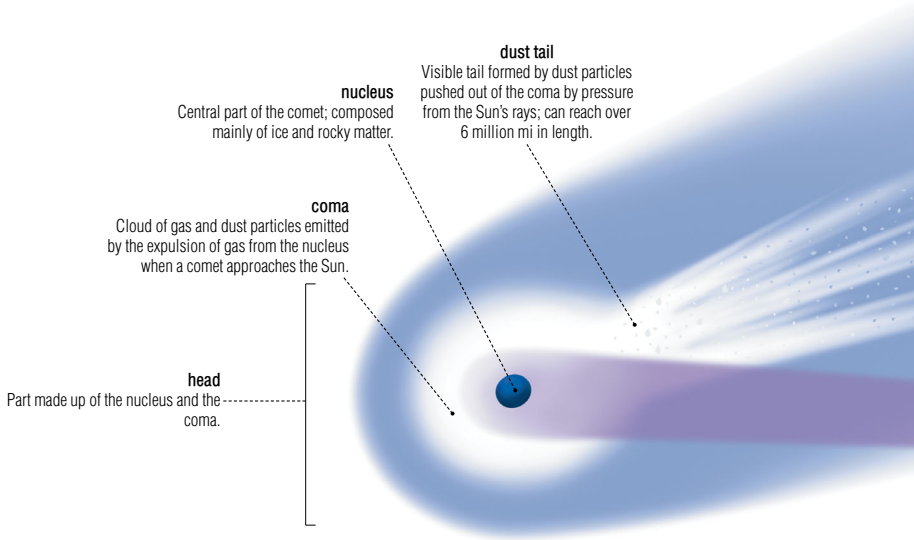
**new crescent**
The Moon is visible in the early evening in the shape of a thin crescent.

**first quarter**
The visible face of the Moon grows increasingly bright; the lunar crescent gradually changes until it forms a semi-circle after one week.

**waxing gibbous**
As the Moon moves away from the Sun, its shadow gradually recedes.

## comet

Small icy body that partially evaporates as it approaches the Sun; made up of a head with a solid core and tails composed of gas and dust.



## Moon

**full moon**
The visible face of the Moon is completely illuminated by the Sun's rays.

**waning gibbous**
As the Moon moves closer to the Sun, its shadow begins to obscure the Sun's disk.

**last quarter**
The bright side gradually recedes until it becomes a half-moon.

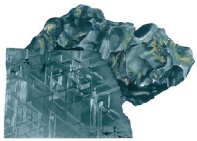
**old crescent**
The Moon lies to the right of the Sun and appears in the sky at dawn in the form of a thin crescent.

## comet

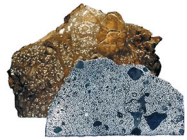
**ion tail**
Almost invisible tail formed by the gas of the coma pushed back by the solar wind; can reach several hundreds of millions of miles in length.

## meteorite

Fragment of rock, iron or another mineral that crashes into Earth instead of completely burning up as it crosses the atmosphere.



**iron meteorite**
Meteorite consisting mainly of iron and nickel, marked by small faults.



**stony-iron meteorite**
The rarest class of meteorites, characterized by the presence of almost equal quantities of rocky matter and metals.

**stony meteorites**
Meteorites composed mainly of rocky matter. Divided into two groups: chondrites and achondrites.

**chondrite**
The most common meteorite, characterized by the presence of rock or sulfurous matter in the form of minuscule spheres (chondrules).

**achondrite**
Meteorite whose composition is similar to that of certain terrestrial rocks; believed to come from the Moon or from Mars.

## star

A sphere of gas massive enough to generate light and heat through nuclear reactions that transform hydrogen into helium in its core.

**low-mass stars**
Stars whose mass is less than 1.5 times that of the Sun.

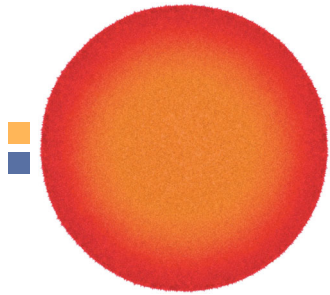
**massive stars**
Stars whose mass is more than 1.5 times that of the Sun; can be up to 50 times the mass of the Sun.

**black hole**
Results when the core of a massive star collapses; the gravitational force is so strong that not even light can escape.

**main-sequence star**
Star whose mass is sufficient to generate a nuclear reaction.

**neutron star**
Star formed of compressed neutrons, believed to be the residue of a supernova explosion.

**supernova**
A supergiant that collapses onto itself and explodes with such force that it releases more energy than millions of suns.



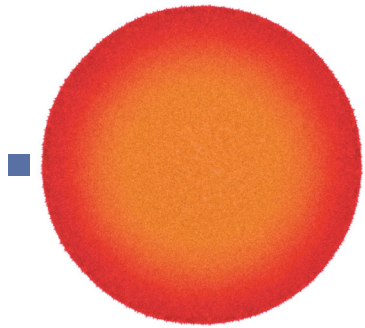
**red giant**
An old star whose hydrogen reserve has been exhausted; its luminosity can be 100 times that of the Sun.

**black dwarf**
Dead star, likely the residue of a dwarf that has totally exhausted its energy resources.

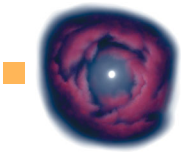
**nova**
A white dwarf that assimilates gaseous matter from a neighboring star, suddenly becoming extremely bright before it returns to its initial brightness.

**pulsar**
A neutron star that rotates rapidly on itself, thereby emitting regular radio waves.

**white dwarf**
An old, extremely dense star of faint luminosity, formed by the nucleus of a red giant contracting until it reaches the size of Earth.



**supergiant**
An old, extremely luminous star of considerable mass; its diameter can be as much as 100 times that of the Sun.



**planetary nebula**
Expanding gaseous envelope that corresponds to the external layer of a red giant that is gradually fading away.

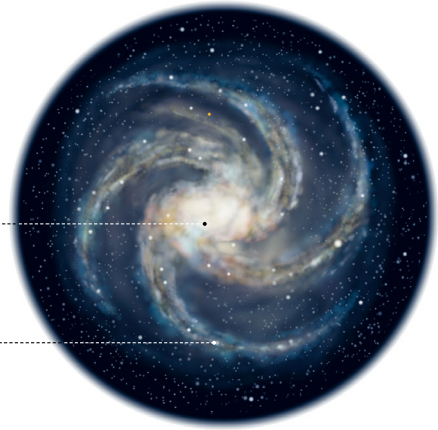
**brown dwarf**
Star whose mass is not sufficient to generate a nuclear reaction.

# galaxy

Grouping of stars and interstellar matter linked together by gravitation; each galaxy comprises an average of 100 billion stars.

**Milky Way**
Spiral galaxy composed of 200 to 300 billion stars, including the Sun; thought to be 10 billion years old.

**Milky Way (seen from above)**
From above, the Milky Way appears as a spiral that rotates on itself around a nucleus.



**nucleus**
Central region of the bulge; the densest and most luminous region.

**spiral arm**
Curved grouping of stars influenced by the rotation of the galaxy around its nucleus.

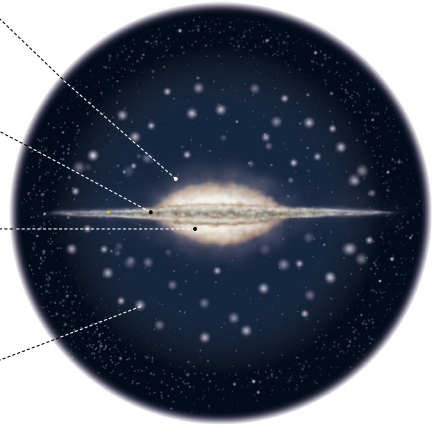
**Milky Way (side view)**
From the side, the Milky Way appears as a disk because its spiral arms are seen from the same angle.

**halo**
Region surrounding the galaxy, inhabited by isolated stars or groupings called globular clusters; the halo has a radius of about 50,000 light-years.

**disk**
The main part of the galaxy, made up of a bulge and attaching arms.

**bulge**
The central bulge of the Milky Way's disk; the densest region of the Milky Way, with a depth of 15,000 light-years.

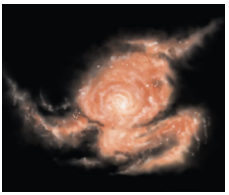
**globular cluster**
Cluster made up of hundreds of thousands of old stars.



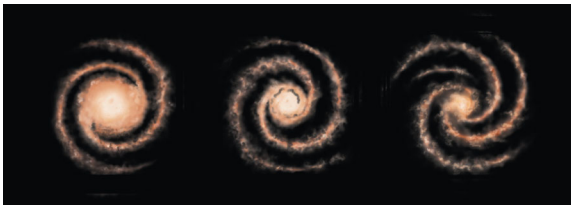
## Hubble's classification

Classification of galaxies according to their form, devised by astronomer Edwin Hubble in the 1920s; it is still used today.

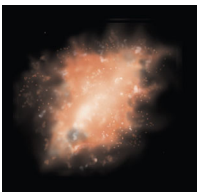
**barred spiral galaxy**
Galaxy crossed by a bar of stars and interstellar matter; the spiral arms emerge from the ends of the bar.



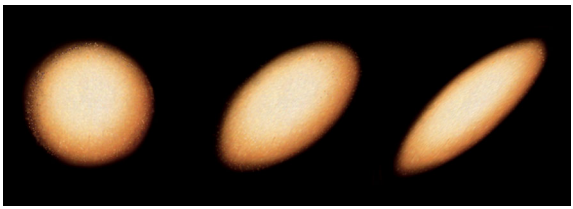
**type I irregular galaxy**
Rare type of galaxy that seems to possess spiral arms without displaying a specific symmetry.



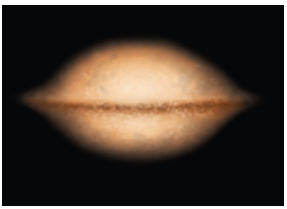
**normal spiral galaxy**
Galaxy composed of a large nucleus from which spiral arms emerge.



**type II irregular galaxy**
Rare type of galaxy whose structure obeys no specific symmetry.



**elliptical galaxy**
Spherical or oval galaxy with no spiral arms.



**lenticular galaxy**
Flat, lens-shaped galaxy with a large bulge but no arms.

# radio telescope

Instrument used to capture, concentrate and analyze radio waves emanating from a celestial body or a region of the celestial sphere.

**steerable parabolic reflector**
Type of adjustable radio telescope in the shape of a saucer; its power depends on its diameter.

**radio wave**
Invisible electromagnetic waves emitted by celestial bodies and collected on Earth using a radio telescope.

**first focal room**
Observation capsule used on occasion; located in the prime focus of the radio telescope.

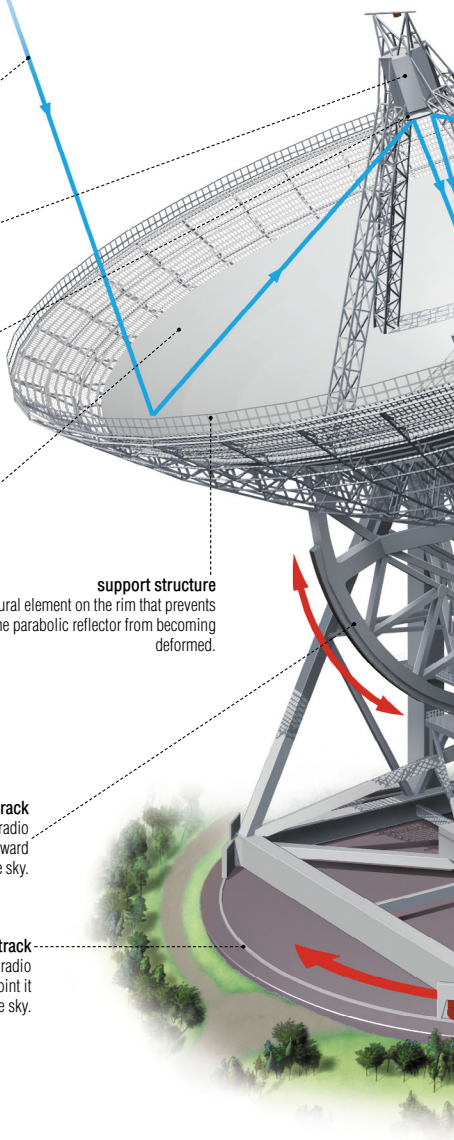
**secondary reflector**
Receives waves reflected by the parabolic reflector and directs them toward the receiver.

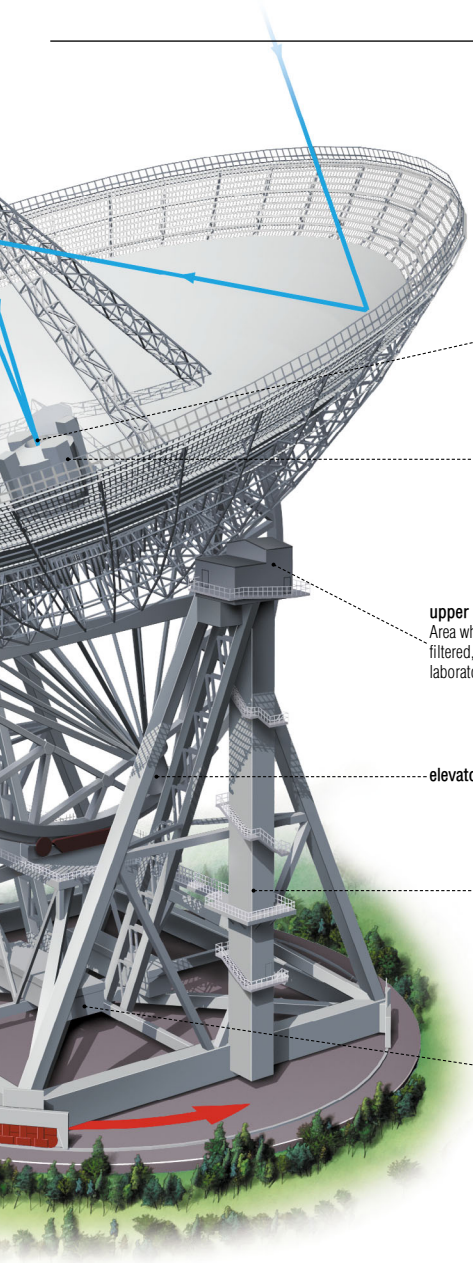
**parabolic reflector**
A surface often composed of fine wire-mesh that collects radio waves and causes them to converge on a single point.

**support structure**
Structural element on the rim that prevents the parabolic reflector from becoming deformed.

**rotating track**
Rail making it possible to turn the radio telescope vertically so as to point it toward a given region of the sky.

**circular track**
Rail making it possible to turn the radio telescope horizontally so as to point it toward a given region of the sky.





**receiver**
Device that amplifies waves before they are converted into an electrical signal.

**second focal room**
Secondary focus of the radio telescope that houses the radio receiver; used more often than the first focal room.

**upper laboratory**
Area where the electrical signal is filtered, digitized and transmitted to the laboratory.

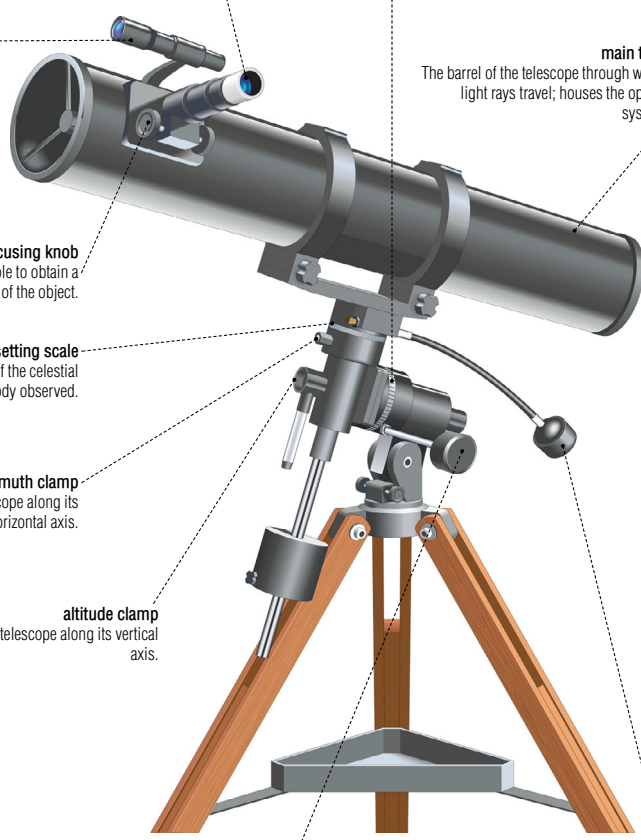
**elevator**

**counterweight**
Weight equal to that of the parabolic reflector; makes it possible to balance the whole.

**laboratory**
Area where astronomers analyze the digital signal to obtain information.

# reflecting telescope

Optical instrument that uses an objective mirror to observe celestial bodies.



**eyepiece**
Lens or system of lenses meant to magnify the image when placed before the eye.

**right ascension setting scale**
Graduated disk indicating the right ascension of the observed celestial body.

**finderscope**
Small low-magnification telescope with a wide field of view; serves to locate celestial bodies.

**main tube**
The barrel of the telescope through which light rays travel; houses the optical system.

**focusing knob**
Adjusting device that makes it possible to obtain a clear image of the object.

**declination setting scale**
Graduated disk indicating the declination of the celestial body observed.

**azimuth clamp**
Clamp serving to lock the telescope along its horizontal axis.

**altitude clamp**
Clamp serving to lock the telescope along its vertical axis.

**altitude fine adjustment**
Fine-tuning device that serves to position the telescope vertically.

**azimuth fine adjustment**
Fine-tuning device that serves to position the telescope horizontally.

# refracting telescope

Optical instrument that uses an objective lens to observe celestial bodies.

**eyepiece**
Lens or system of lenses meant to magnify the image when placed before the eye.

**finderscope**
Small low-magnification telescope with a wide field of view; serves to locate celestial bodies.

**main tube**
The barrel of a telescope housing the optical system; light rays travel through the main tube.

**declination setting scale**
Graduated disk indicating the declination of the celestial body observed.

**azimuth clamp**
Clamp serving to lock the telescope along its horizontal axis.

**altitude clamp**
Clamp serving to lock the telescope along its vertical axis.

**right ascension setting scale**
Graduated disk indicating the right ascension of the observed celestial body.

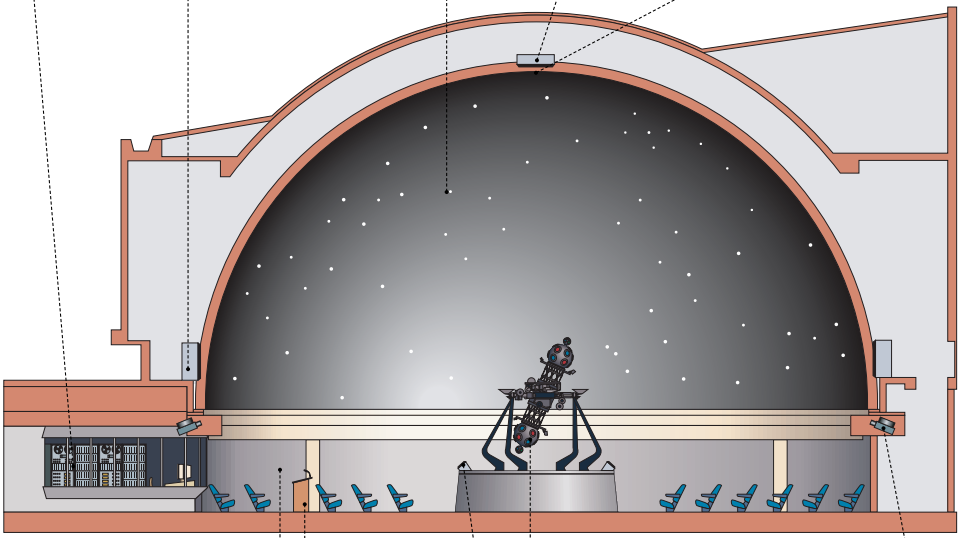
**tripod**
Stable three-legged stand of variable height.

**azimuth fine adjustment**
Fine-tuning device serving to position the telescope horizontally.

**altitude fine adjustment**
Fine-tuning device serving to position the telescope vertically.

# planetarium

Structure where a projector is used to simulate the movement of the celestial bodies on a dome representing half of the celestial sphere.



**control room**
Premises containing the various control and monitoring instruments required to produce a show.

**projection dome**
Screen representing half of the celestial dome; the aspect of the sky at different periods is projected onto the screen.

**tweeter**
Loudspeaker designed to reproduce the high frequencies of the sound signal.

**zenith**
Central point of the projection dome; simulates the center of the true celestial dome for an observer on the ground.

**midrange**
Loudspeaker designed to reproduce the middle frequencies of the sound signal.

**auditorium**
The planetarium's main room, built to receive the public during a show.

**planetarium projector**
Projector that reproduces and simulates the past, present and future movement of celestial bodies.

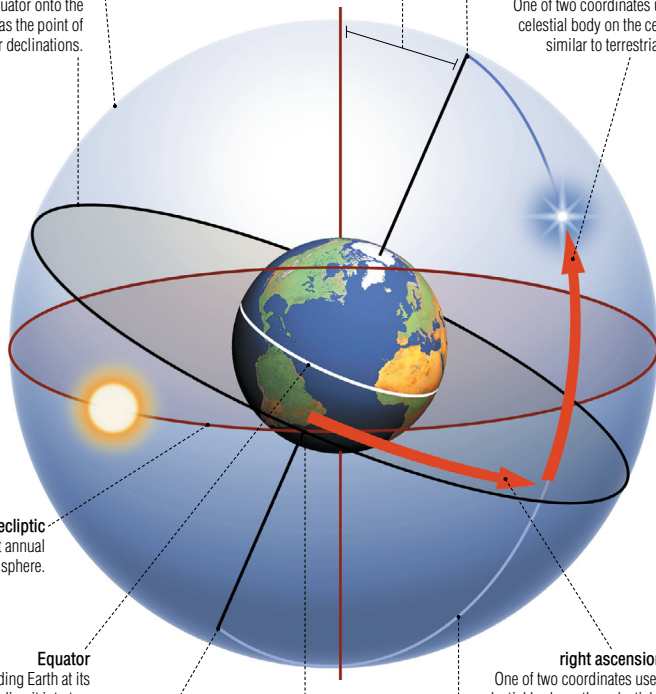
**control console**
Instrument that serves to manually execute various commands for purposes of producing a show.

**woofer**
Loudspeaker designed to reproduce the low frequencies of the sound signal.

**auxiliary projector**
Apparatus used to produce special effects.

# celestial coordinate system

Imaginary horizontal and vertical lines used to describe the position of an object on the celestial sphere.



**celestial sphere**
Imaginary sphere where celestial bodies are observed and positioned.

**inclination**
Angle formed between an imaginary line connecting the terrestrial poles and an imaginary line perpendicular to the ecliptic.

**North celestial pole**
Projection of the North terrestrial pole onto the celestial sphere.

**celestial equator**
Projection of the terrestrial Equator onto the celestial sphere; serves as the point of origin for declinations.

**declination**
One of two coordinates used to locate a celestial body on the celestial sphere; similar to terrestrial latitude.

**ecliptic**
Projection of the Sun's apparent annual path onto the celestial sphere.

**Equator**
Imaginary circle surrounding Earth at its widest circumference, dividing it into two hemispheres: the Northern hemisphere and the Southern hemisphere.

**right ascension**
One of two coordinates used to locate a celestial body on the celestial sphere; similar to terrestrial longitude.

**South celestial pole**
Projection of the South terrestrial pole onto the celestial sphere.

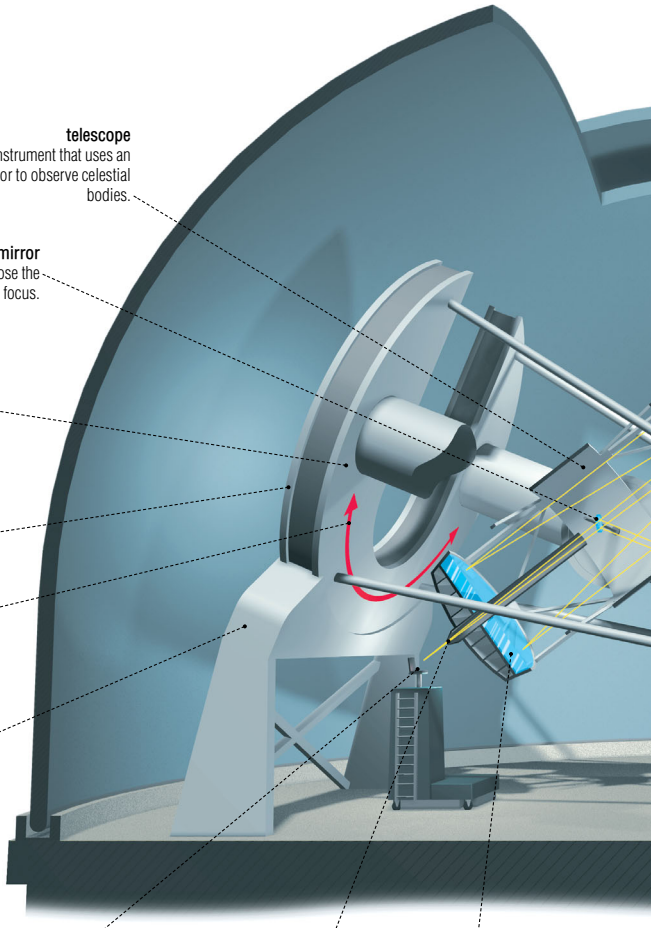
**vernal equinox**
Point at which the ecliptic and the celestial equator intersect; serves as the point of origin for right ascensions.

**celestial meridian**
Projection of a terrestrial meridian onto the celestial sphere.

# astronomical observatory

Building specially designed to house a large telescope.

**cross section of an astronomical observatory**



**telescope**
Optical instrument that uses an objective mirror to observe celestial bodies.

**flat mirror**
Adjustable mirror making it possible to choose the location of the focus.

**horseshoe mount**
Mount used to support a large telescope and point it toward the celestial pole.

**hour angle gear**
Drive mechanism allowing the telescope to follow the polar axis.

**polar axis**
Axis parallel to Earth's axis of rotation; its rotation is opposite to that of Earth, making it possible to capture fixed images of an observed celestial body.

**telescope base**
Pedestal on which the telescope mount rests.

**observation post**
Area where most observations are carried out.

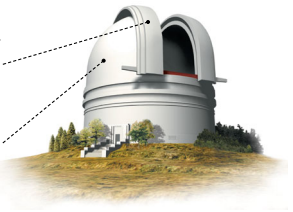
**Cassegrain focus**
Focal point where the image forms; located behind the primary mirror.

**primary mirror**
Mirror that reflects the light of celestial bodies, directing it toward the prime focus.

**secondary mirror**
Mirror that intercepts light and redirects it toward the Cassegrain focus through a hole in the center of the primary mirror.

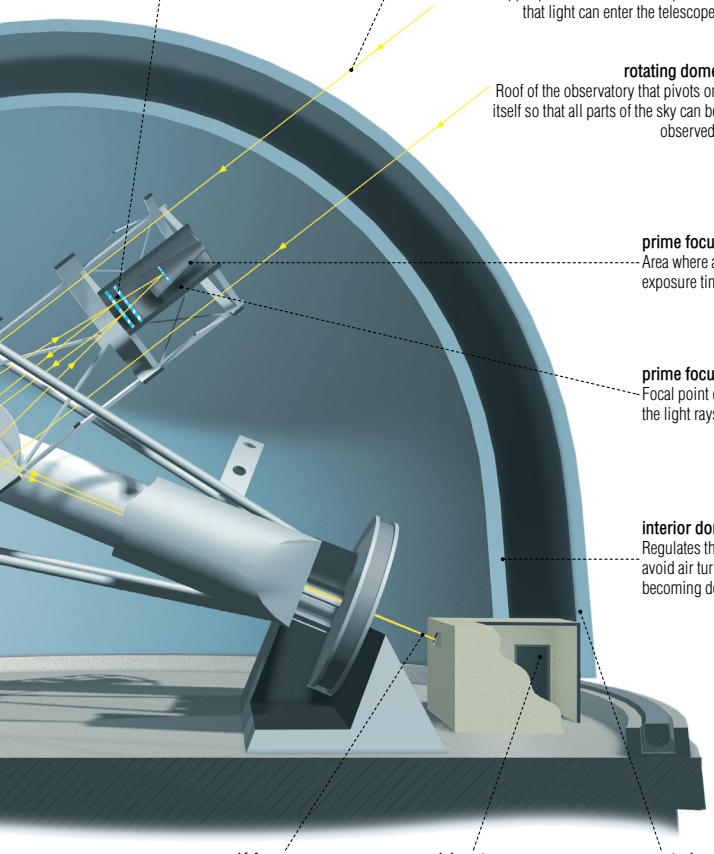
**light**
Emitted by the celestial body, light is sent back toward the Cassegrain focus by the primary and secondary mirrors.

**observatory**



**dome shutter**
Upper part of the dome that opens so that light can enter the telescope.

**rotating dome**
Roof of the observatory that pivots on itself so that all parts of the sky can be observed.



**prime focus observing capsule**
Area where astronomers once gathered to monitor the exposure time of photographic plates.

**prime focus**
Focal point of the primary mirror where the light rays concentrate.

**interior dome shell**
Regulates the temperature of the telescope so as to avoid air turbulence and prevent the mirror from becoming deformed.

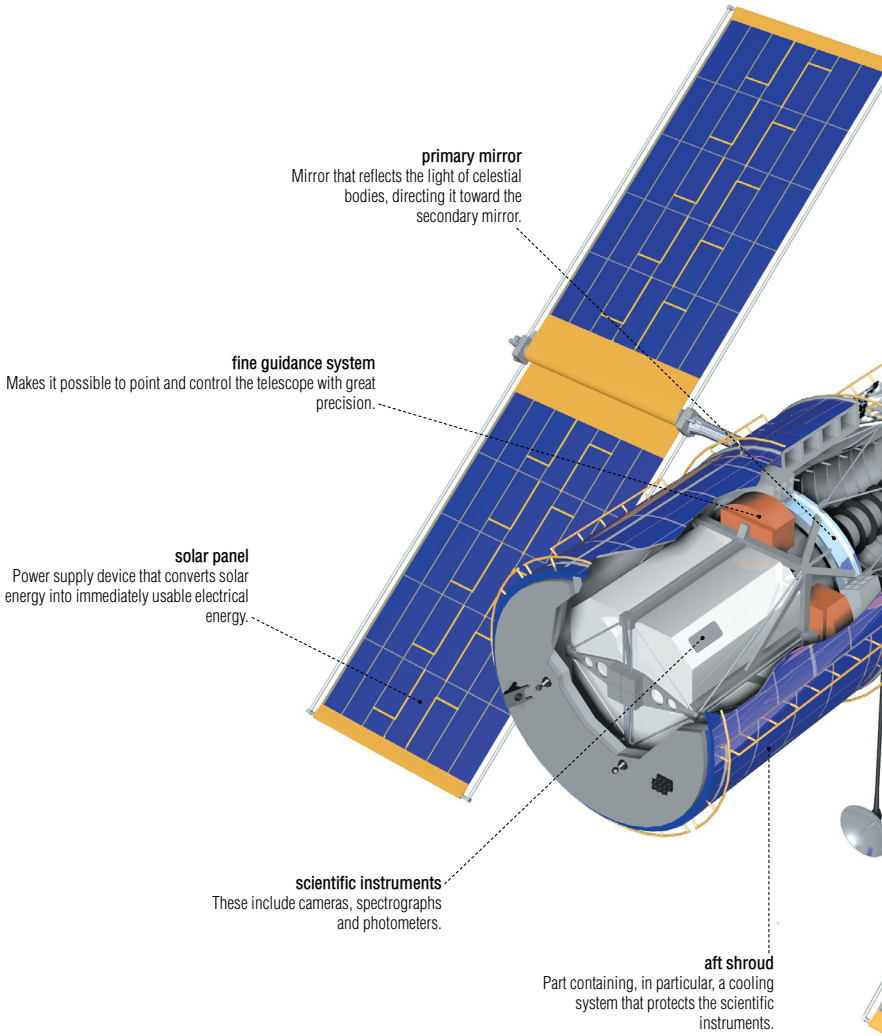
**coudé focus**
Focal point located at a distance from the telescope, obtained using a series of mirrors; stationary, it is used to conduct complex analyses and experiments.

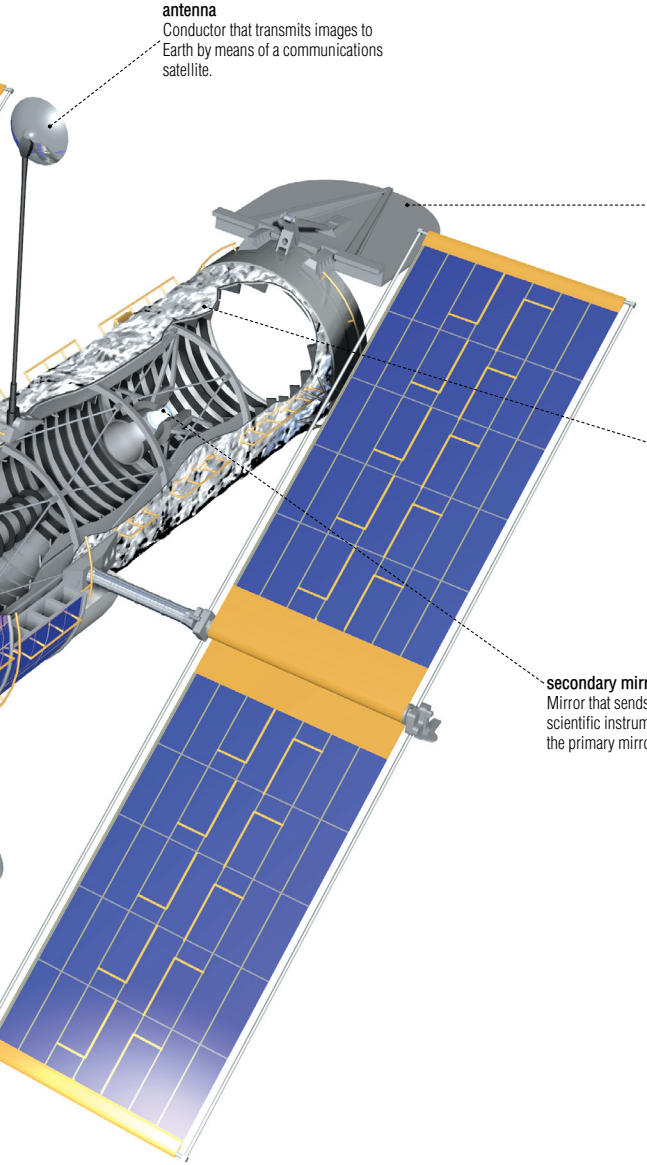
**laboratory**
Area where the chemical composition of observed celestial bodies is studied using spectroscopy.

**exterior dome shell**
Protects against foul weather.

# Hubble space telescope

Telescope placed in orbit above Earth's atmosphere (370 mi), making it possible to observe the universe as never before.

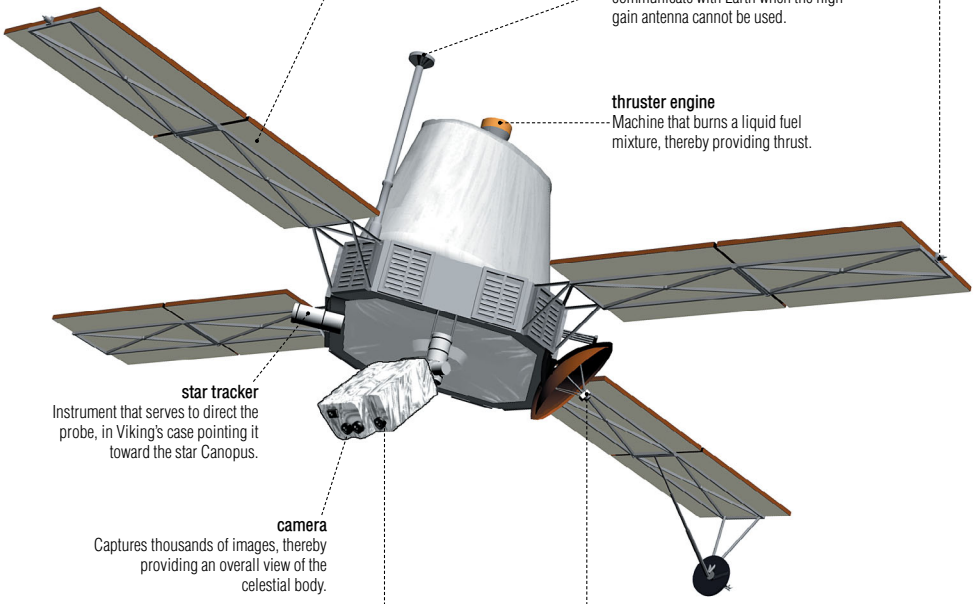



antenna
Conductor that transmits images to Earth by means of a communications satellite.
aperture door
Panel that opens and closes over the telescope's optical system.
light shield
Prevents stray light from entering the telescope.
secondary mirror
Mirror that sends light back toward the scientific instruments through a hole in the primary mirror.

# space probe

Unmanned craft launched in the direction of a celestial body in the solar system for purposes of studying it.

**orbiter (Viking)**
Part of the probe that flies over a celestial body before placing itself in orbit around the latter and studying it; the two Viking orbiters were launched in 1975.



**attitude control thruster**
Small rocket engine that directs the orbiter to the desired position.

**solar panel**
Power supply device that converts solar energy into immediately usable electrical energy.

**low gain antenna**
Secondary antenna used to communicate with Earth when the high gain antenna cannot be used.

**thruster engine**
Machine that burns a liquid fuel mixture, thereby providing thrust.

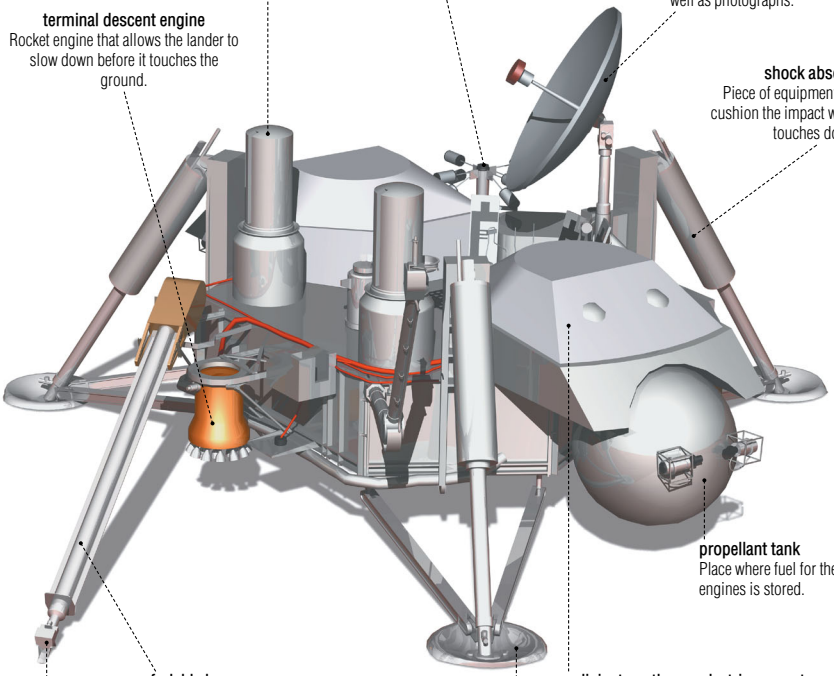
**star tracker**
Instrument that serves to direct the probe, in Viking's case pointing it toward the star Canopus.

**camera**
Captures thousands of images, thereby providing an overall view of the celestial body.

**infrared thermal mapper**
Instrument used to analyze the surface and atmosphere of a celestial body by measuring its temperature variations.

**high gain antenna**
Principal antenna pointed toward Earth to transmit large quantities of scientific data as well as photographs.

**lander (Viking)**
Spacecraft designed to touch down on the surface of the celestial body so as to study it.



**camera**
Two cameras make it possible to obtain three-dimensional color images of the celestial body's surface.

**UHF antenna**
Antenna used to establish radio contact with the orbiter.

**high gain antenna**
Principal antenna pointed toward Earth to transmit large quantities of scientific data as well as photographs.

**terminal descent engine**
Rocket engine that allows the lander to slow down before it touches the ground.

**shock absorber**
Piece of equipment deployed to cushion the impact when the lander touches down.

**propellant tank**
Place where fuel for the descent engines is stored.

**furlable boom**
Mobile extension arm serving to dig into the soil and collect samples.

**radioisotope thermoelectric generator**
Device that supplies electrical power; converts the heat released by the radioactive decay of a substance it contains into electricity.

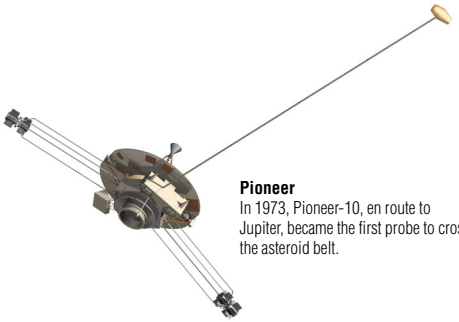
**collector head**
Shovel used to collect soil samples, which are analyzed on-site.

**temperature sensor**
Instrument that measures the surface temperature of the celestial body.

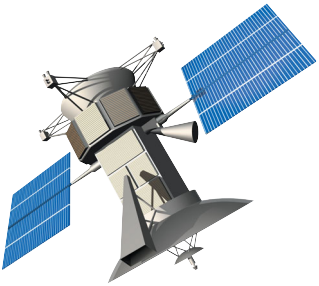
space probe

## examples of space probes

Since the end of the 1950s, over 125 space probes have been launched to study the planets and satellites of the solar system.



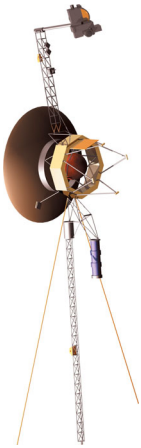
**Pioneer**
In 1973, Pioneer-10, en route to Jupiter, became the first probe to cross the asteroid belt.

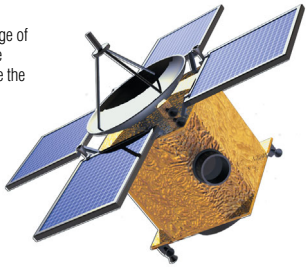


**Magellan**
Placed in orbit around Venus in 1990, Magellan is mapping 98% of its surface.

**Deep Impact**
American probe launched in January 2005; it studied the composition of Comet Tempel-1 by causing a collision between the comet and an impactor.

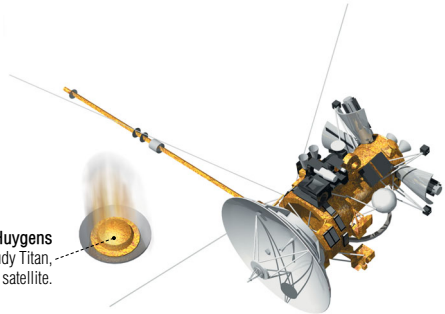
**Voyager**
Voyager 1 and 2 transformed our knowledge of giant planets; over 27 years after they were launched in 1977, they continue to explore the distant confines of the solar system.



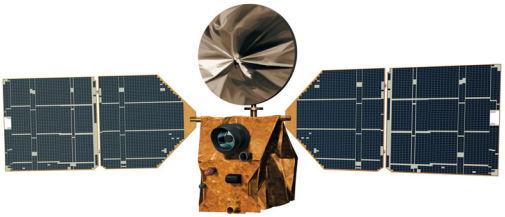


**NEAR**
This probe thrust into orbit around the asteroid Eros in 2000 and landed on it in 2001.

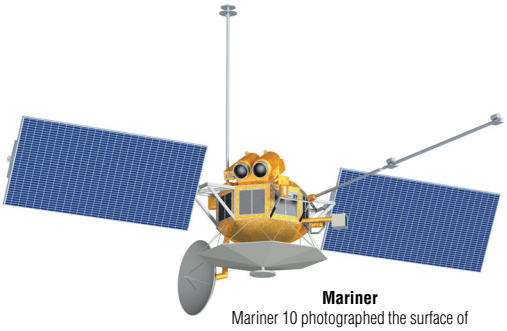
**Cassini**
The Cassini probe will study Saturn, its rings and natural satellites; Cassini is scheduled to release the Huygens probe.



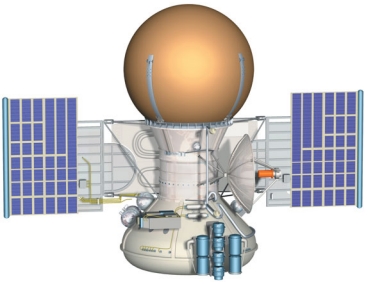
**Huygens**
Huygens was designed to study Titan, Saturn's largest satellite.



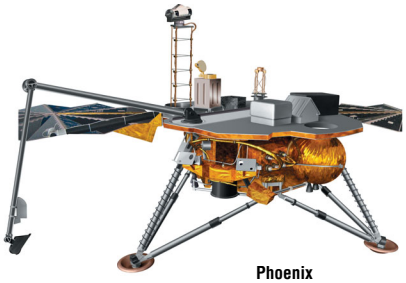
**Mars Reconnaissance Orbiter**
American probe launched in 2005; placed in orbit around Mars, its mission is to study the planet's surface, atmosphere, and climate.



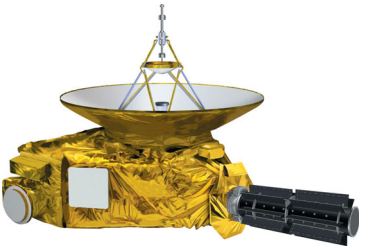
**Mariner**
Mariner 10 photographed the surface of the planet Mercury three times in the mid-1970s, revealing a world quite similar to that of our Moon.



**Venera**
In 1975, Venera-9 transmitted the first photograph of the Venusian soil before it was crushed by the planet's atmospheric pressure.

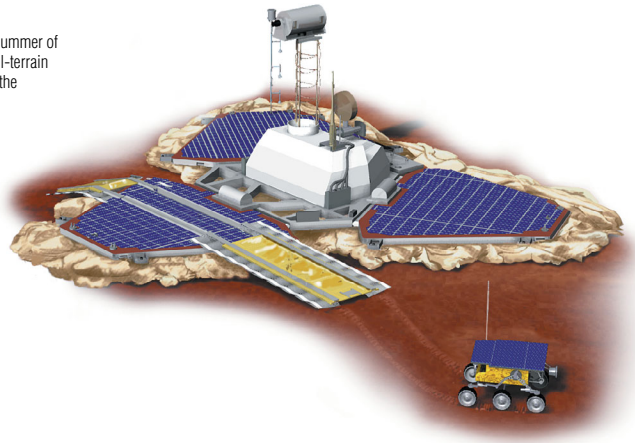


**Phoenix**
American probe launched in August 2007, which landed on Mars in May 2008; it is studying the soil in the planet's arctic region.



**New Horizons**
This American probe, launched in 2006, will be the first to reach Pluto and its satellite, Charon, in 2015; it will then study the Kuiper belt.

**Pathfinder**
Pathfinder landed on Mars in the summer of 1997. There, it deployed a small all-terrain vehicle named Sojourner to study the composition of the surface.

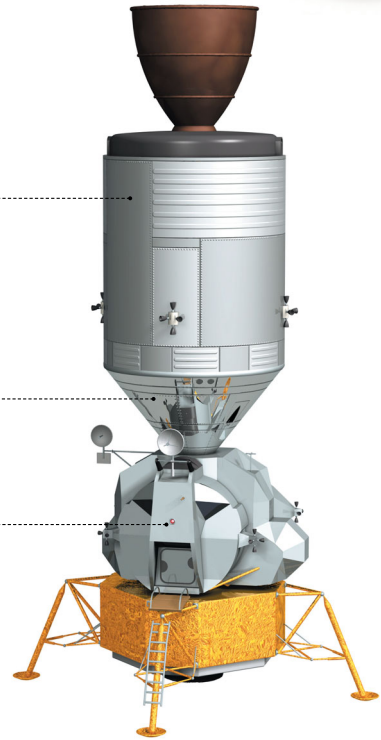


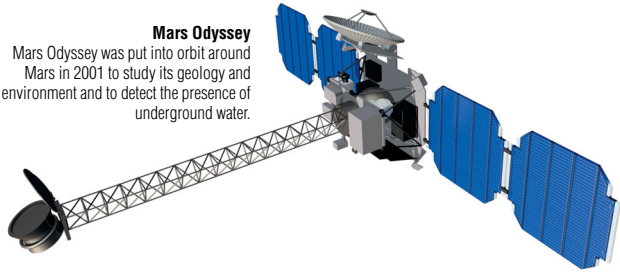
**Apollo**
Manned craft that enabled six crews to land on the Moon between 1969 and 1972. On July 20, 1969, Neil Armstrong and Buzz Aldrin became the first men to explore another world.

**service module**
Houses the main propulsion system and supplies energy, electricity, water and other provisions.

**command module**
Section of the craft where the crew resided during the mission; one astronaut stayed on board during the Moon landing. It was the only section of the Apollo craft to return to Earth.

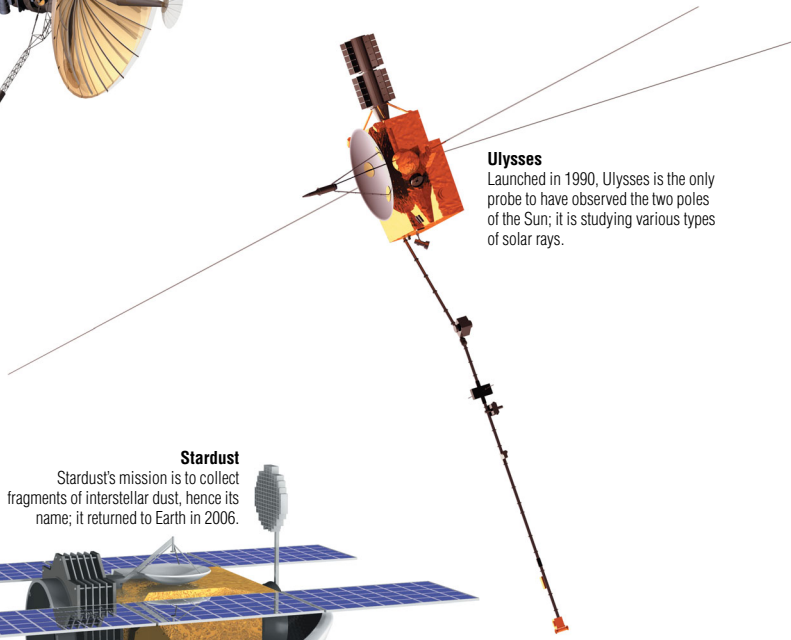
**lunar module**
Inhabited section of the craft; enabled two men to walk on the Moon and spend a few days there before returning to dock with the Apollo capsule.



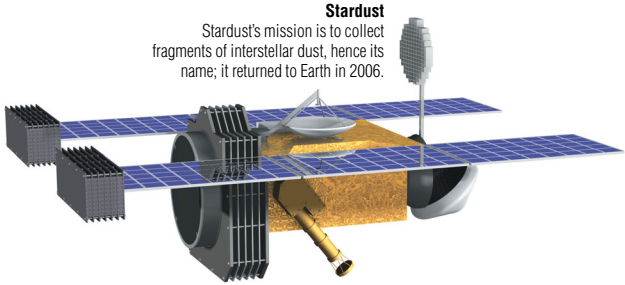


**Mars Odyssey**
Mars Odyssey was put into orbit around Mars in 2001 to study its geology and environment and to detect the presence of underground water.

**Galileo**
The first probe to thrust into orbit around Jupiter (1995), Galileo is also exploring the planet's four largest satellites.



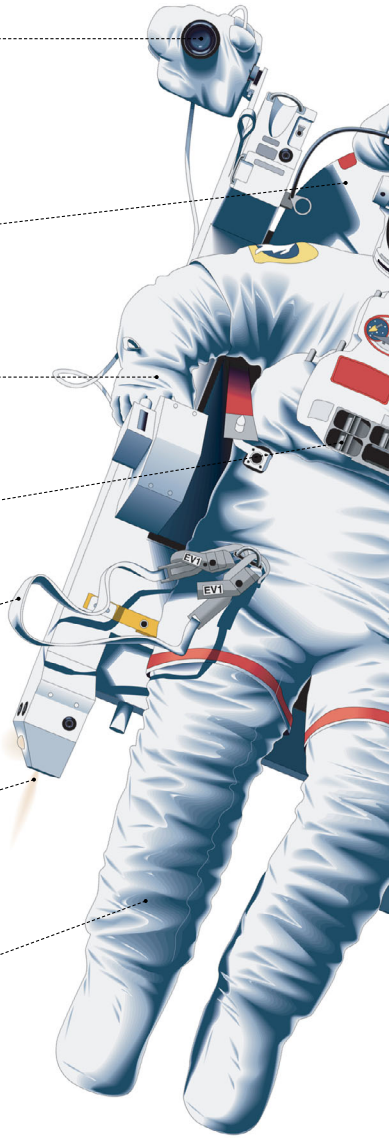
**Ulysses**
Launched in 1990, Ulysses is the only probe to have observed the two poles of the Sun; it is studying various types of solar rays.



**Stardust**
Stardust's mission is to collect fragments of interstellar dust, hence its name; it returned to Earth in 2006.

# spacesuit

A pressurized watertight suit that provides the astronaut with oxygen and protects against solar rays and meteorites during space walks.




**35 mm still camera**
A single-objective reflex camera that uses 35 mm film to capture an image.

**life support system**
Module that contains, in particular, a supply of oxygen, a cooling system and a carbon dioxide disposal system.

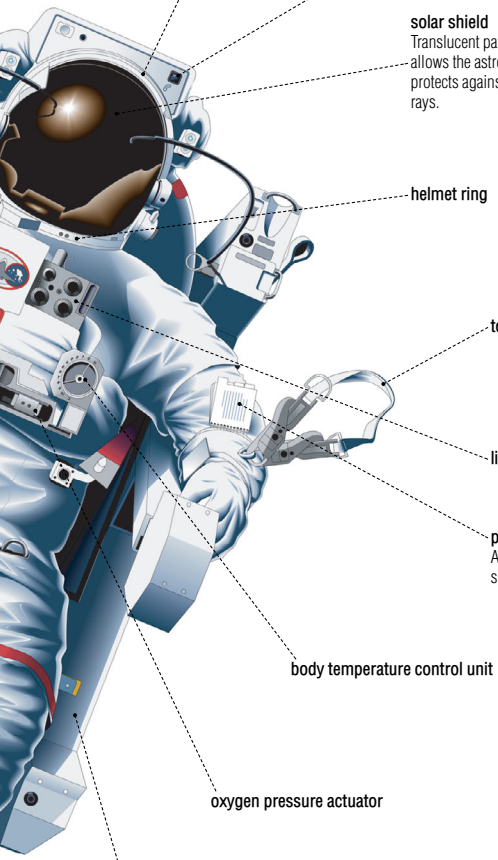
**glove**
Covered with silicone at the fingertips to provide touch sensitivity and insulated so that objects heated by the Sun can be picked up.

**communications volume controls**

**safety tether**
Connects the astronaut to the shuttle, also providing a certain mobility.

**thruster**
Gives the astronaut the push needed to move away from the shuttle and to walk in space.

**protection layer**
Protects the astronaut from heat, cold and small meteorites.



**helmet**
Plastic shell that covers the head, allowing the astronaut to breathe and to see.

**color television camera**

**solar shield**
Translucent part of the helmet that allows the astronaut to see and protects against the Sun's ultraviolet rays.

**helmet ring**

**tool tether**

**life support system controls**

**procedure checklist**
A booklet containing the procedures to follow during space walks.

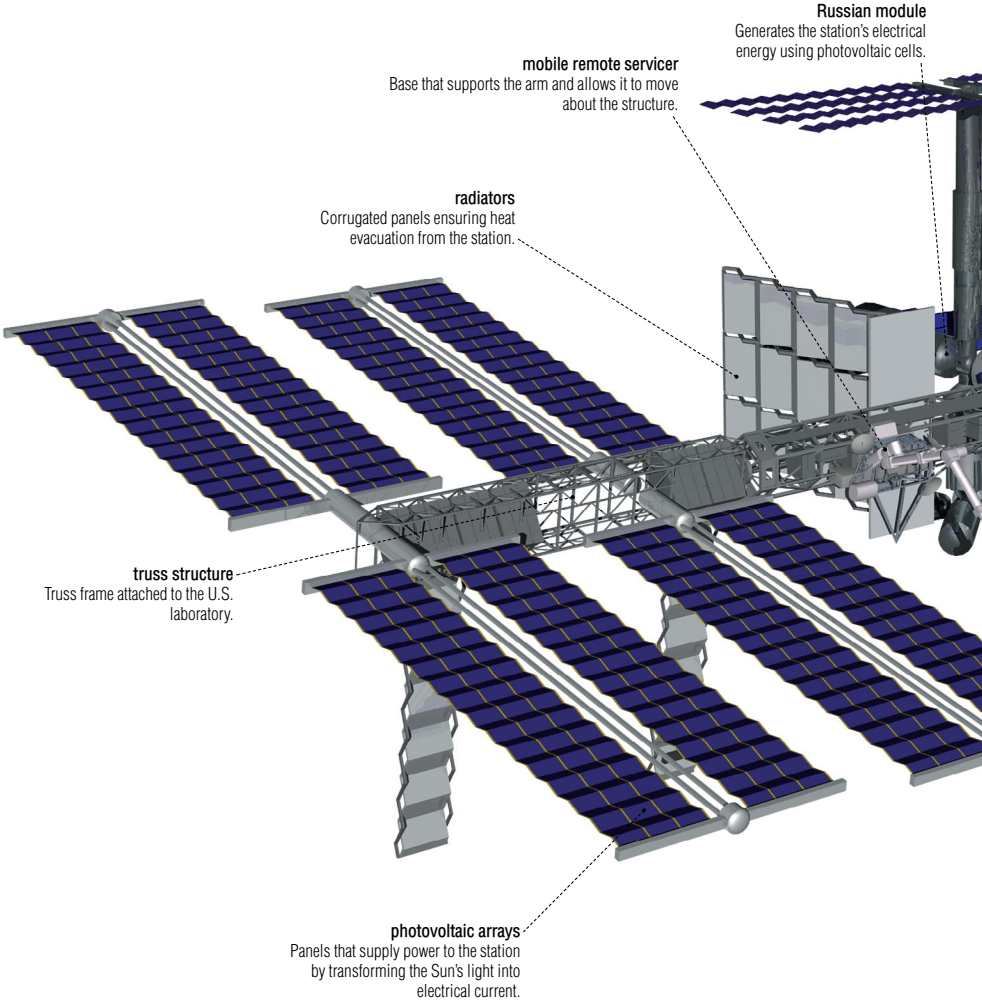
**body temperature control unit**

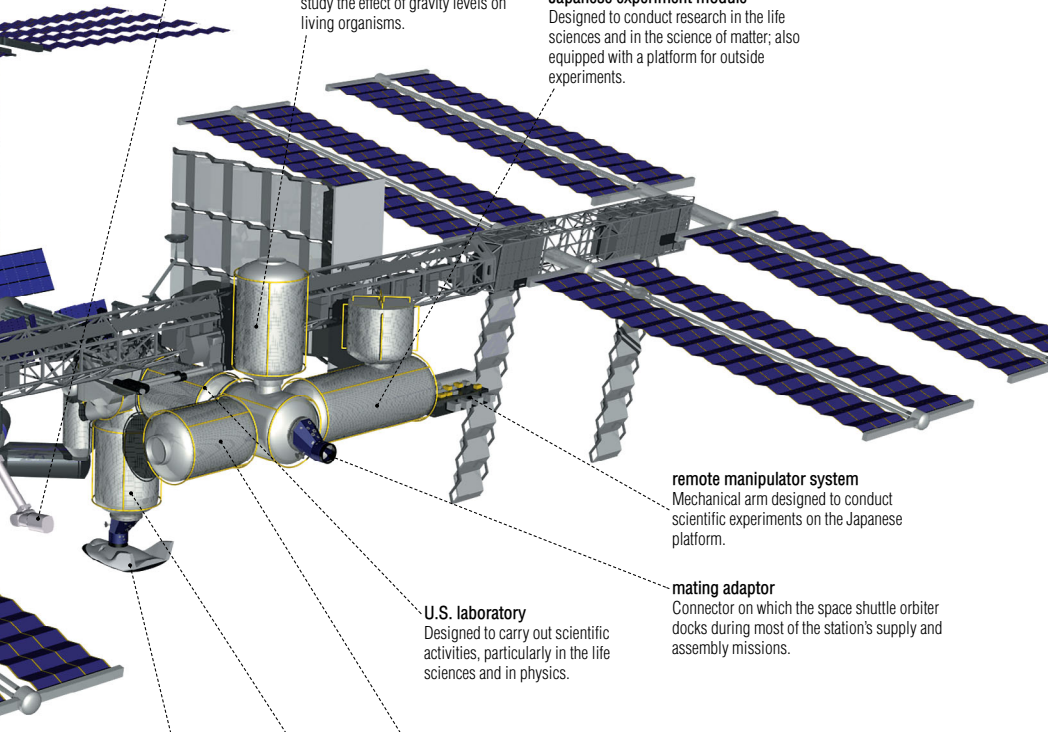
**oxygen pressure actuator**

**manned maneuvering unit**
Instrument equipped with outlets used to connect various instruments and a propulsion system enabling the astronaut to move around the shuttle.

# international space station

Complex made up of some 10 modules in orbit around Earth; built and assembled by 15 countries, it is used to conduct scientific and technological research on weightlessness.





**remote manipulator system**
This mechanical arm is used to lift heavy loads during the assembly of the station and to perform maintenance work.

**centrifuge module**
Module used to create variable artificial gravity, making it possible to study the effect of gravity levels on living organisms.

**Japanese experiment module**
Designed to conduct research in the life sciences and in the science of matter; also equipped with a platform for outside experiments.

**remote manipulator system**
Mechanical arm designed to conduct scientific experiments on the Japanese platform.

**mating adaptor**
Connector on which the space shuttle orbiter docks during most of the station's supply and assembly missions.

**U.S. laboratory**
Designed to carry out scientific activities, particularly in the life sciences and in physics.

**European experiment module**
Designed to conduct research in the life and materials sciences, in physics and in numerous other technologies.

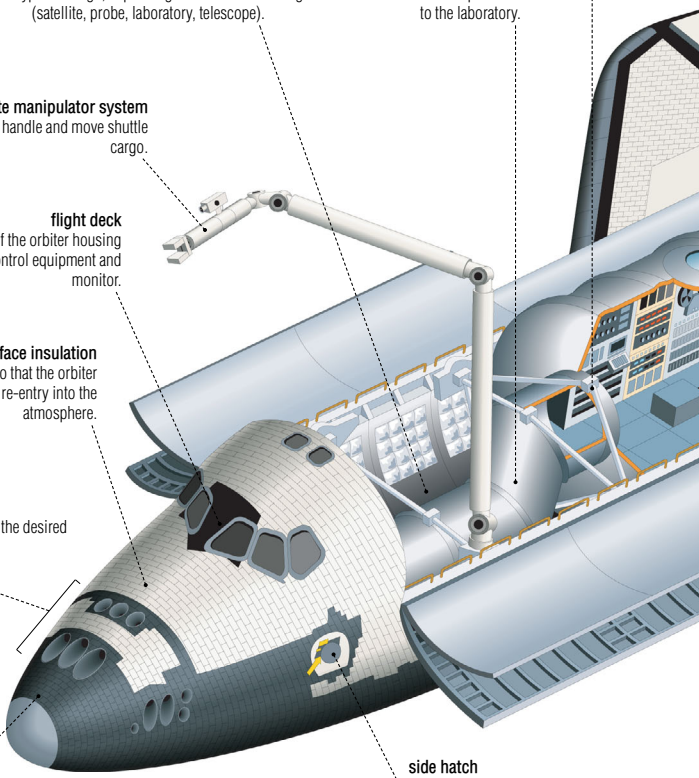
**crew return vehicle**
Vehicle used to bring the crew back to Earth in case of emergency.

**U.S. habitation module**
Designed to accommodate six persons; contains a kitchen, roomettes, a bathroom and first-aid equipment.

# space shuttle

Reusable manned space vehicle composed of an orbiter, two rockets and a fuel tank.

**orbiter**
The only part of the shuttle to fly in orbit; can transport 13 tons of material and five to seven astronauts.



**hatch**
Opening that provides access to the communications tunnel.

**cargo bay**
Shuttle compartment that stores various types of cargo, depending on the mission (satellite, probe, laboratory, telescope).

**communication tunnel**
Corridor that allows the astronauts to go from the orbiter crew compartment to the laboratory.

**remote manipulator system**
Mechanical arm used to handle and move shuttle cargo.

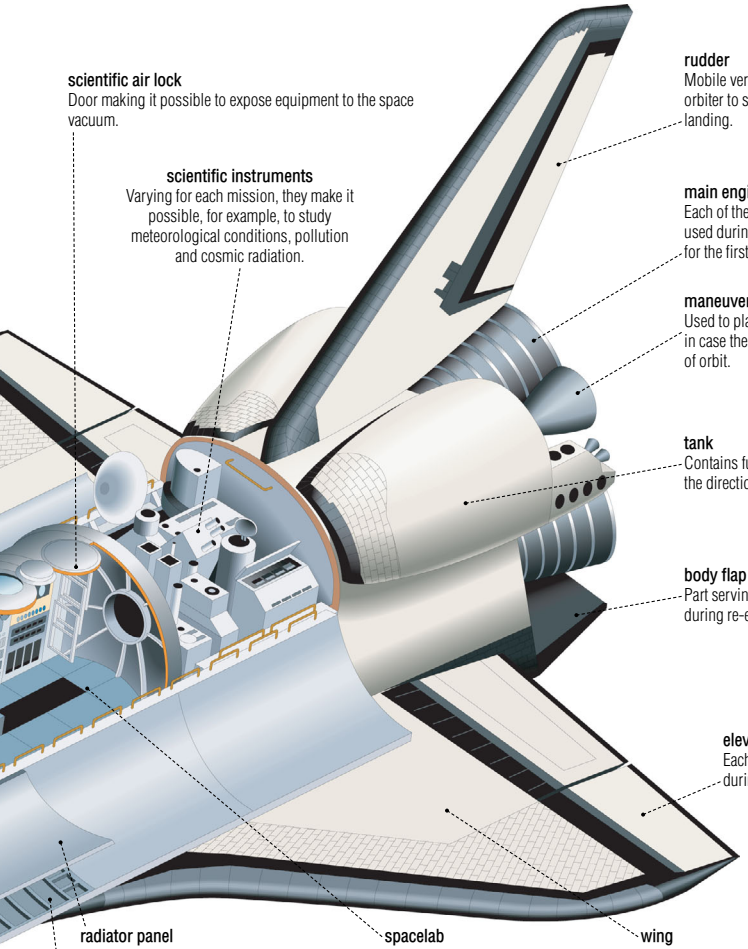
**flight deck**
Forward section of the orbiter housing the crew, flight-control equipment and monitor.

**surface insulation**
Protects against heat so that the orbiter does not burn up on re-entry into the atmosphere.

**attitude control thrusters**
Small rocket engines that direct the orbiter to the desired position.

**heat shield**
Protects the orbiter nose from heat caused by friction when the vehicle enters the atmosphere; covered with carbon fiber, it can withstand temperatures over 2,900°F.

**side hatch**
Door allowing the crew to embark and disembark before the launch and after the return to Earth.



**scientific air lock**
Door making it possible to expose equipment to the space vacuum.

**scientific instruments**
Varying for each mission, they make it possible, for example, to study meteorological conditions, pollution and cosmic radiation.

**rudder**
Mobile vertical part that allows the orbiter to set its direction when landing.

**main engine**
Each of the orbiter's three tail engines used during takeoff; these only function for the first 8 min. of flight.

**maneuvering engine**
Used to place the vehicle in orbit, to provide thrust in case the orbit changes and to take the vehicle out of orbit.

**tank**
Contains fuel for the maneuvering engines and the directional control thrusters.

**body flap**
Part serving as a thermal shield for the motors during re-entry into the atmosphere.

**elevon**
Each of the two ailerons controls pitching during landing.

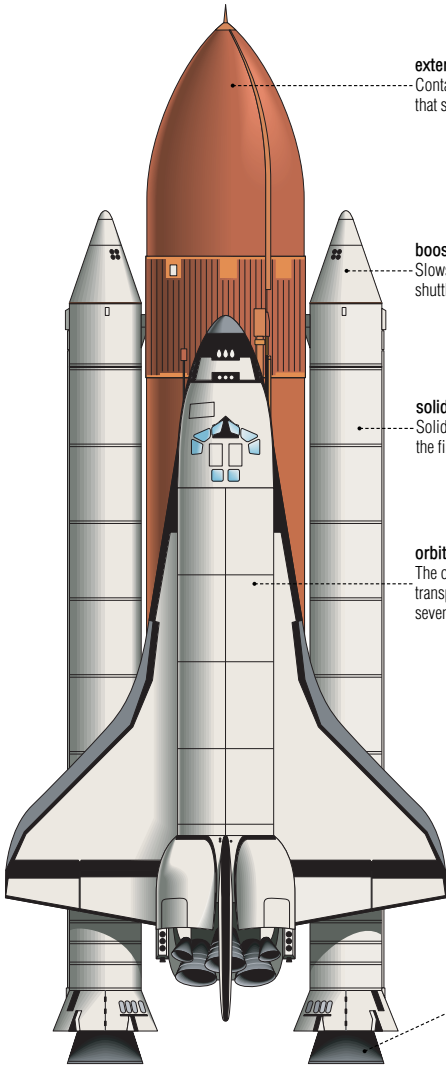
**radiator panel**
Discharges into space the heat produced by the functioning of onboard equipment.

**spacelab**
Area where scientific experiments on weightlessness are carried out.

**wing**
Horizontal surface acted on by aerodynamic forces that keep the orbiter aloft in the atmosphere.

**cargo bay door**
Remains open in orbit so as to expose the content of the cargo bay to space.

**space shuttle at takeoff**
On takeoff, the space shuttle is made up of an orbiter, two rockets and an external fuel tank.



**external fuel tank**
Contains the liquid fuel (oxygen and hydrogen) that supplies the three engines of the orbiter tail.

**booster parachute**
Slows the rocket's fall after it separates from the space shuttle some two minutes after takeoff.

**solid rocket booster**
Solid-fuel thruster that provides most of the lift during the first few minutes of flight, after which it separates.

**orbiter**
The only part of the shuttle to fly in orbit; transports 13 tons of material and five to seven astronauts.

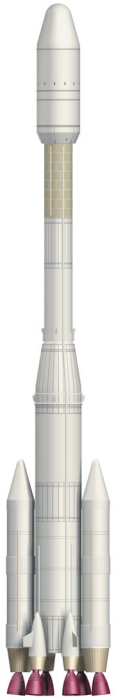
**nozzle**
The end portion of a rocket from which combustion gases escape, thereby creating the thrust needed to propel the craft.

# space launcher

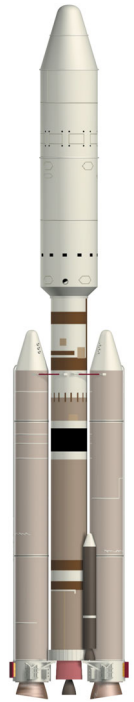
Rocket that serves to place satellites in Earth's orbit or to send probes into the solar system.

**examples of space launchers**

**Delta II**
In service since 1989, this highly versatile launcher places meteorological and communications satellites in orbit.



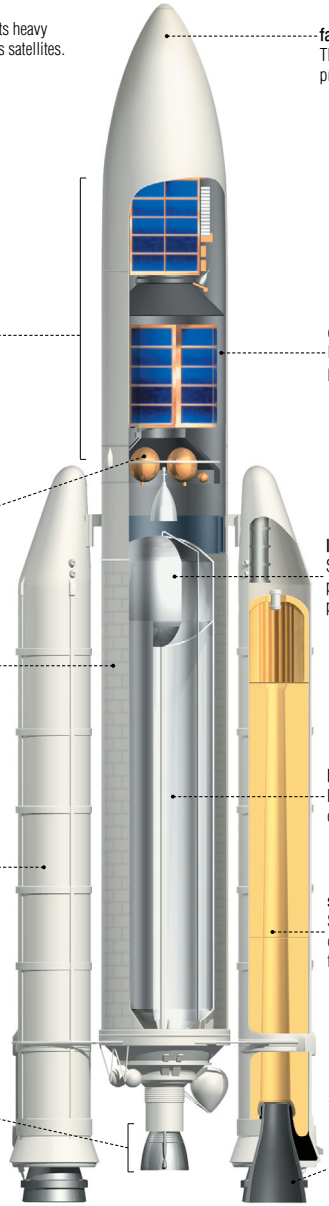
**Ariane IV**
European Space Agency launcher; in service from 1989 to 1997.



**Titan IV**
In service since 1989, this U.S. launcher serves, in particular, to launch large military satellites.

**Saturn V**
In service from 1967 to 1973, the most powerful rocket ever built served to launch the Apollo missions; the only launcher never to have failed.

**cross section of a space launcher (Ariane V)**
In service since 1996, this European launcher transports heavy payloads, including the most powerful communications satellites.



**fairing**
The tip of the launcher that houses and protects the payload.

**payload**
Space probe or satellite carried by the launcher.

**dual launch structure**
Module used to insert two independent payloads into orbit.

**storable propellant upper stage**
Upper stage used to propel the payload toward its final orbit.

**liquid oxygen tank**
Serves to burn liquid hydrogen, thereby providing the energy needed for rocket propulsion.

**main cryogenic stage**
Central body that ensures propulsion after the solid booster stage separates.

**liquid hydrogen tank**
Hydrogen, burned on contact with liquid oxygen, serves as engine fuel.

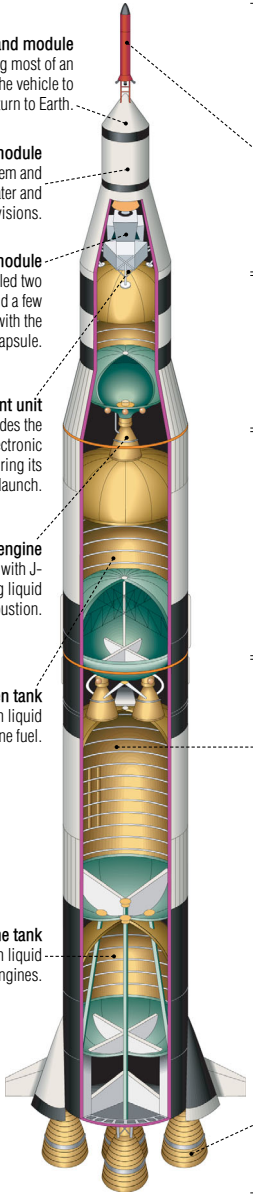
**solid booster stage**
Provides the main thrust during takeoff before separating from the main cryogenic stage.

**solid rocket booster**
Solid-fuel thruster that provides most of the lift during the first few minutes of flight, after which it separates.

**rocket engine**
Ensures launcher propulsion by means of liquid hydrogen combustion in contact with liquid oxygen.

**nozzle**
The end portion of a rocket from which combustion gases escape, thereby creating the thrust needed to propel the craft.

**cross section of a space launcher (Saturn V)**
Saturn V served as the launcher for the U.S. Apollo lunar exploration program.



**command module**
Capsule inhabited by the crew during most of an Apollo mission; the only part of the vehicle to return to Earth.

**service module**
Houses the main propulsion system and supplies energy, electricity, water and other provisions.

**lunar module**
Inhabited section of the craft; enabled two men to walk on the Moon and spend a few days there before returning to dock with the Apollo capsule.

**instrument unit**
The brain of the rocket; includes the computers and all of the electronic equipment that controls the rocket during its launch.

**J-2 engine**
The second and third stages are equipped with J-2 engines; these provide thrust using liquid oxygen-hydrogen combustion.

**liquid hydrogen tank**
Hydrogen, burned on contact with liquid oxygen, serves as engine fuel.

**kerosene tank**
Kerosene, burned on contact with liquid oxygen, serves as fuel for F-1 engines.

**launch escape system**
Makes it possible, in the event of damage, to separate the command module from the rest of the launcher and to pull it.

**payload**
Includes the Apollo craft, the lunar module and the third stage; the latter, after being placed in Earth's orbit, soars toward the Moon.

**third stage**
At an altitude of 92 mi, the third-stage engine begins to run, allowing the launcher to place itself in orbit before making its way toward the Moon.

**second stage**
At an altitude of 38.8 mi, the five second-stage engines ignite, burning for 6 min. 30 sec. before they are jettisoned.

**liquid oxygen tank**
Contains liquid oxygen used to burn kerosene.

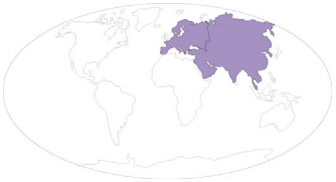
**first stage**
Equipped with five F-1 engines that give the launcher the thrust it needs to leave the launchpad; jettisoned after 2 min. 30 sec. of flight.

**F-1 engine**
The first stage is equipped with five; it provides thrust using kerosene-liquid oxygen combustion.

# configuration of the continents

The continents are vast tracts of land surrounded by water; they cover about 30% of the Earth's surface.

**planisphere**
Map depicting the Earth's two hemispheres.



**Eurasia**
Composed of Europe and Asia, Eurasia represents about 39% of the world's land; it forms a true continent that geographers have distinguished for historical and ethnographic reasons.

**Arctic Ocean**
The smallest of the oceans (5.8 million mi²), bordered by the northern coasts of Asia, America and Europe; it is largely covered with pack ice.

**Bering Sea**
Northern part of the Pacific between Kamchatka (in Asia) and Alaska; it is deepest in its southern portion.

**North America**
Its area (9.3 million mi²) represents about 16% of the world's land; the Central American isthmus is an extension of North America.

**South America**
Represents 12% of the world's land; linked to North America by Central America; it includes the Andes in the west and plains and plateaus in east and central regions.

**Oceania**
Continent that represents 6% of the world's land and features a great many islands in the Pacific and Indian oceans; Australia is its true continent.

**Indian Ocean**
Relatively small ocean (29 million mi²) located between Africa, Asia and Australia; it has high water temperatures and is dotted with numerous islands.

**Europe**
Western extremity of the vast Eurasian continent that, by convention, is separated from Asia by the Ural Mountains; it covers a relatively small area.

**Asia**
The largest and most populous continent, Asia represents 32% of the world's land; it is dominated by imposing mountain ranges.

**Australia**
The world's largest island (3 million mi²) is sparsely inhabited in spite of its size; because of its isolation, Australia's wildlife is unique.

**Africa**
Continent that represents about 20% of the world's land; two-thirds of its surface lies north of the Equator. Characterized by very hot climates, Mediterranean in the north and south, tropical and arid elsewhere.

## configuration of the continents

**Antarctica**
The only uninhabited continent (5 million mi²), located inside the south polar circle; 98% of its surface is covered with an ice cap. Antarctica holds 90% of the Earth's freshwater reserves.

**Antarctic Circle**
Parallel of latitude at 66°34' S that marks the polar zone, where days and nights last 24 hours during solstices.

**Drake Passage**
Almost 560 mi wide, it separates Tierra del Fuego from Antarctica and connects the Atlantic to the Pacific; its currents are very powerful.

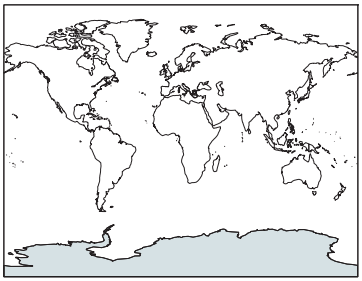
**Weddell Sea**
Sea northwest of Antarctica, partly delimited by the Antarctic Peninsula; more than half of its surface is covered with pack ice.

**Antarctic Peninsula**
Extends far beyond the polar circle and includes several mountain systems; parts that crumble away from its tip form small islands.

**Filchner Ice Shelf**
Fed by adjacent continental ice sheets and by local precipitation; it borders the Weddell Sea.

**Marie Byrd Land**
Region at an altitude of over 6,500 feet.

**Pacific Ocean**
From the polar circle to the continent, this ocean is called the Antarctic.




**Atlantic Ocean**
From the polar circle to the continent, this ocean is called the Antarctic.

**South Pole**
Point of the terrestrial surface at the southern extremity of the Earth's axis of rotation; the Norwegian Amundsen and his expedition first reached it in 1911.

**Queen Maud Land**
Oldest and largest part of Antarctica, Queen Maud Land also forms its continental shelf.

**Amery Ice Shelf**
Its immense size makes it one of the world's most remarkable ice shelves.

**Wilkes Land**
Region of the Antarctic continent that takes its name from a 19th-century American mariner and explorer.

**Indian Ocean**
From the polar circle to the continent, this ocean is called the Antarctic.

**Transantarctic Mountains**
Mountain chain that is an extension of the Andes Cordillera in South America; its peaks reach heights of more than 13,000 feet.

**Ross Ice Shelf**
Immense ice shelf beginning at the edge of the continent's southern slope.

## configuration of the continents

**Oceania**
Continent that represents about 6% of the world's land and features a great many islands scattered between the Pacific and Indian oceans; Australia is its true continent.

**Papua New Guinea**
The eastern part of New Guinea belongs to Oceania, while the western part of the island is in Asia.

**Torres Strait**
Some 105 mi wide, the Torres Strait connects the Pacific and Indian oceans; it is named after a 17th-century Spanish mariner.

**Gulf of Carpentaria**
Gulf bounded by Cape York to the east and Arnhem Land to the west.

**Indian Ocean**
Relatively small ocean (29 million mi²) located between Africa, Asia and Australia; it has high water temperatures and is dotted with numerous islands.

**Great Sandy Desert**
The northernmost desert of Australia is also the world's second largest desert (730,000 mi²) after the Sahara.

**Great Victoria Desert**
Southernmost desert of Australia.

**Lake Eyre North**
Variable in size, Australia's largest lake is a salt lake.

**Great Australian Bight**
Located in the Indian Ocean south of Australia, it is known for its strong winds and rough waters.

**Bass Strait**
Some 125 mi wide and relatively shallow, it separates continental Australia from Tasmania.

**Tasmania**
Island and federal state of Australia, from which it is separated by the Bass Strait.

**Melanesia**
Part of Oceania (370,000 mi²) that includes Papua New Guinea, the Solomon Islands, Vanuatu, New Caledonia and Fiji.

**Pacific Ocean**
The world's largest ocean (69 million mi²), the Pacific covers 30% of the Earth's surface, more than all of the continents put together.

**Great Barrier Reef**
Coral reef extending over 1,500 mi; a Unesco World Heritage Site, it provides a habitat for numerous forms of marine life.

**Fiji Islands**
Archipelago composed of 326 islands, some 100 of which are inhabited; its principal islands are Viti Levu and Vanua Levu.

**Coral Sea**
Westernmost part of the Pacific Ocean; its warm waters (from 77°F to 82°F) are subject to currents that reverse, depending on the season.

**New Caledonia**
Mountainous island, humid and volcanic; it is surrounded by a barrier reef enclosing the world's largest lagoon.

**Great Dividing Range**
Mountain range extending 2,200 mi; it includes Mount Kosciusko (7,310 feet), Australia's highest peak.

**Tasman Sea**
Part of the Pacific Ocean located between Australia, Tasmania and New Zealand. Named after a 17th-century Dutch mariner.

**Cook Strait**
Some 9.3 mi wide, Cook Strait separates New Zealand's two islands.

**New Zealand**
Archipelago composed of a northern volcanic island, the most populated island, and a southern island crossed by a mountain range that is deeply cut with glacial valleys.

## configuration of the continents

**North America**
The Appalachians constitute the principal relief on the eastern part of the continent, while in the west, a high mountain chain (the Rocky Mountains and the Sierra Madre) follows the coast from Alaska to Mexico.

**Beaufort Sea**
Part of the Arctic Ocean between Alaska and the Arctic archipelago.

**Mackenzie River**
Canada's longest river (2,635 mi).

**Bering Strait**
Some 62 mi wide, it connects the Pacific Ocean to the Arctic Ocean.

**Aleutian Islands**
Archipelago that is an extension of Alaska; it is composed of 150 islands and islets stretching over more than 1,000 mi.

**Gulf of Alaska**
Northeast part of the Pacific Ocean, bordering Alaska.

**Hudson Bay**
Vast gulf that opens onto the Atlantic Ocean through the Hudson Strait; the bay is frozen seven months a year.

**Rocky Mountains**
Eastern margin of the western cordilleras, extending from Alaska to Mexico.

**Grand Canyon**
The longest gorge in the world (220 mi); the Colorado River flows through it.

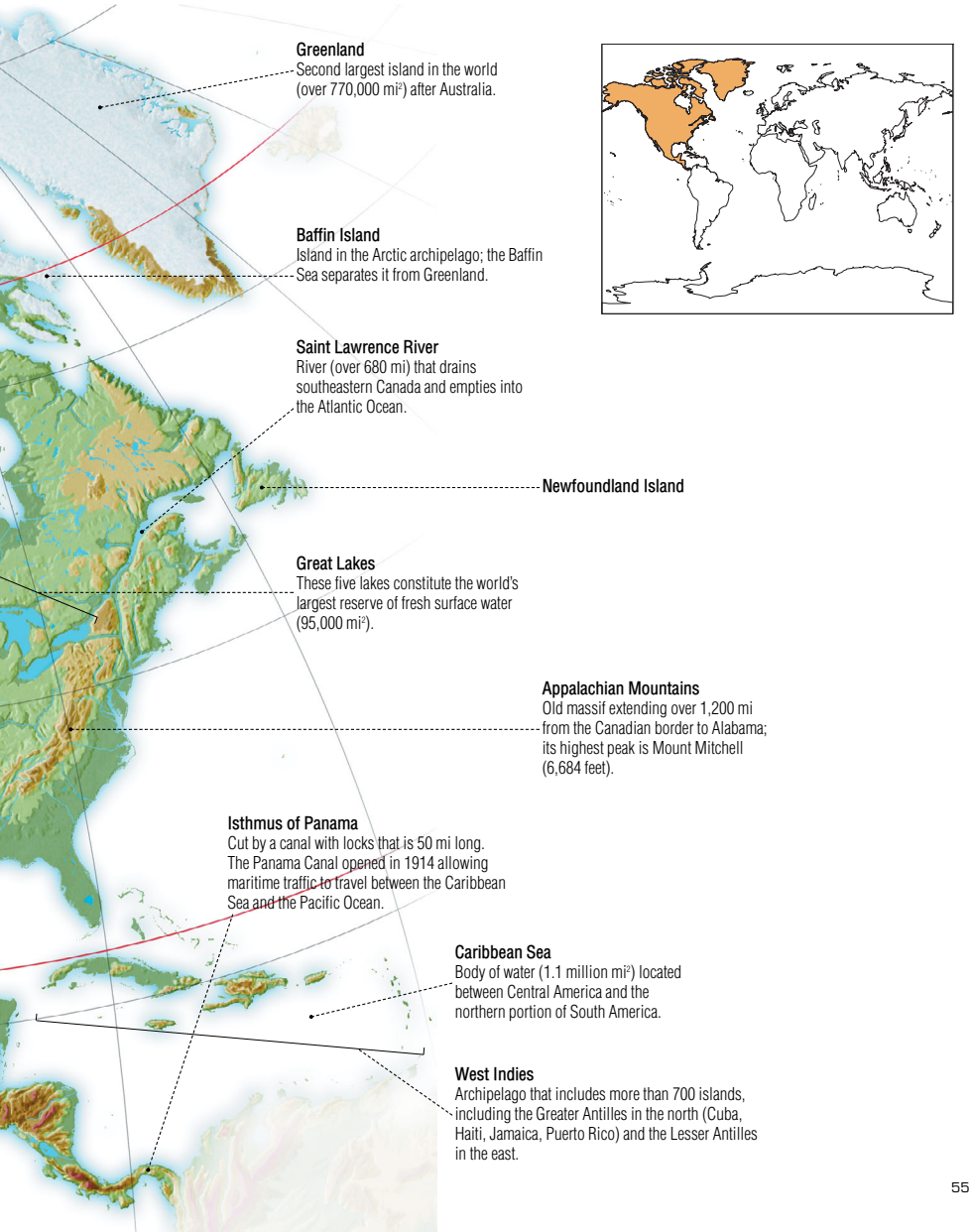
**Mississippi River**
The Mississippi (2,350 mi) drainage basin covers the entire area between the Rocky Mountains and the Appalachians.

**Gulf of Mexico**
Part of the Atlantic located between the U.S., Mexico and Cuba.

**Gulf of California**
Separates the Baja California peninsula from the continent.

**Yucatan Peninsula**
Vast plateau characterized by aridity in the northwest and abundant precipitation in the south, where a dense forest grows.

**Central America**
Extends from the Isthmus of Tehuantepec in Mexico to the Isthmus of Panama.



**Greenland**
Second largest island in the world (over 770,000 mi²) after Australia.

**Baffin Island**
Island in the Arctic archipelago; the Baffin Sea separates it from Greenland.

**Saint Lawrence River**
River (over 680 mi) that drains southeastern Canada and empties into the Atlantic Ocean.

**Newfoundland Island**

**Great Lakes**
These five lakes constitute the world's largest reserve of fresh surface water (95,000 mi²).

**Appalachian Mountains**
Old massif extending over 1,200 mi from the Canadian border to Alabama; its highest peak is Mount Mitchell (6,684 feet).

**Isthmus of Panama**
Cut by a canal with locks that is 50 mi long. The Panama Canal opened in 1914 allowing maritime traffic to travel between the Caribbean Sea and the Pacific Ocean.

**Caribbean Sea**
Body of water (1.1 million mi²) located between Central America and the northern portion of South America.

**West Indies**
Archipelago that includes more than 700 islands, including the Greater Antilles in the north (Cuba, Haiti, Jamaica, Puerto Rico) and the Lesser Antilles in the east.

## configuration of the continents

**South America**
Linked to North America by Central America, its main features are the Andes Cordillera in the west and the plains and plateaus of the central and eastern regions.

**Gulf of Panama**
Bounded in the north by the Isthmus of Panama, its coast is uneven and dotted with islands.

**Orinoco River**
River in Venezuela (1,340 mi) that empties into the Atlantic through a vast delta; the volume of its flow is considerable.

**Andes Cordillera**
Longest mountain chain in the world (5,000 mi) and the second highest, it follows the western coast of South America; its highest peak is Aconcagua (22,834 feet).

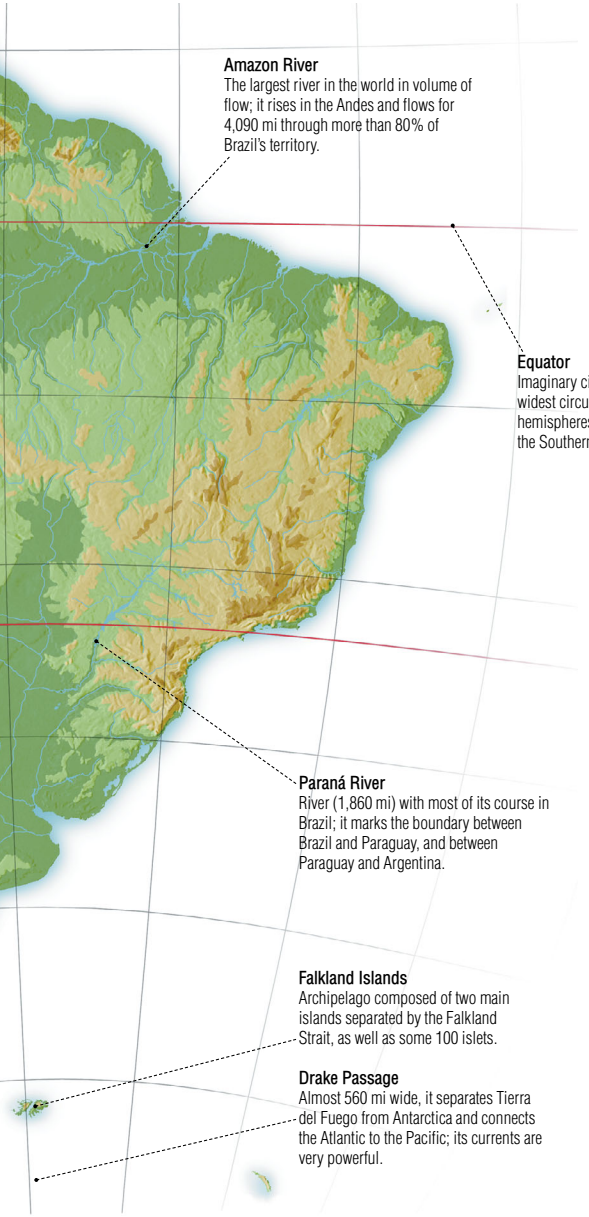
**Lake Titicaca**
Located in the Andes Cordillera between Peru and Bolivia; at an elevation of 12,500 feet, it is the highest navigable lake in the world.

**Atacama Desert**
Among the driest deserts on the planet, receiving only a few inches of rain per year.

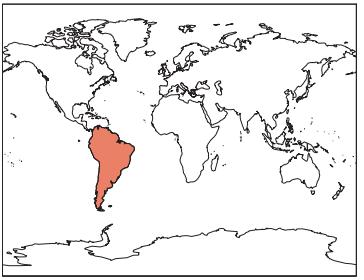
**Patagonia**
Plateau in Chile and Argentina; it is divided into Andean Patagonia with a humid climate and abundant vegetation, and the Patagonian plateau, which is dry and sparse.

**Tierra del Fuego**
Archipelago separated from the continent by the Magellan Strait; its cold damp climate results in perpetual snows from as low as 2,300 feet.

**Cape Horn**
Southernmost point of South America, only 620 mi from Antarctica; famous for its storms and dangerous reefs and shoals.



**Amazon River**
The largest river in the world in volume of flow; it rises in the Andes and flows for 4,090 mi through more than 80% of Brazil's territory.



**Equator**
Imaginary circle surrounding Earth at its widest circumference, dividing it into two hemispheres: the Northern hemisphere and the Southern hemisphere.

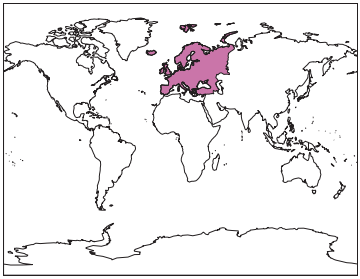
**Paraná River**
River (1,860 mi) with most of its course in Brazil; it marks the boundary between Brazil and Paraguay, and between Paraguay and Argentina.

**Falkland Islands**
Archipelago composed of two main islands separated by the Falkland Strait, as well as some 100 islets.

**Drake Passage**
Almost 560 mi wide, it separates Tierra del Fuego from Antarctica and connects the Atlantic to the Pacific; its currents are very powerful.

## configuration of the continents

**Europe**
Western extremity of the vast Eurasian continent that, by convention, is separated from Asia by the Ural Mountains; it covers a relatively small area.



**Iceland**
Volcanic island subject to regular earthquakes; it has over 3,100 mi of coastline.

**Norwegian Sea**
Section of the Atlantic between Norway to Iceland.

**Scandinavian Peninsula**
Vast Nordic peninsula that includes Norway, Sweden and part of Finland.

**North Sea**
Relatively shallow sea (220,000 mi²) in the North Atlantic and bordered by the coasts of Europe; some major European ports are located along its estuaries.

**Irish Sea**
Section of the Atlantic that separates Great Britain from Ireland.

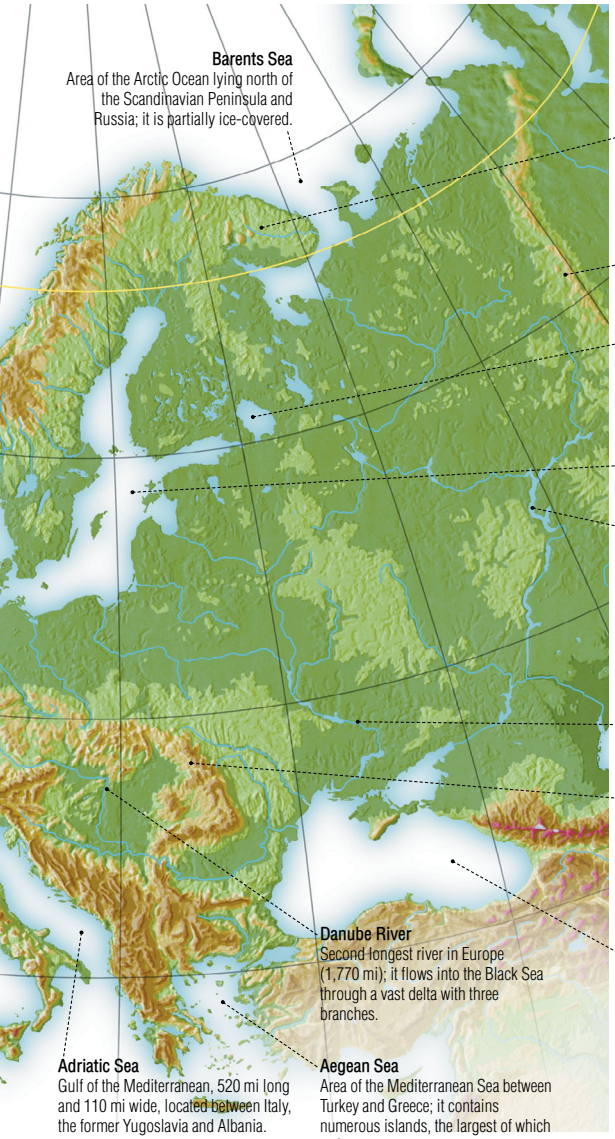
**English Channel**
Relatively shallow sea between France and England; its extreme tides cause strong currents, making navigation difficult.

**Alps**
Largest mountain mass in Europe, extending 750 mi; Mont Blanc (15,771 feet) is its highest peak.

**Strait of Gibraltar**
Channel (9 mi wide) between Spain and Morocco; it connects the Mediterranean to the Atlantic and is an important shipping route.

**Pyrenees**
Mountain range whose northern slope is in France and whose southern slope is in Spain; Pico de Aneto (11,169 feet) is its highest peak.

**Mediterranean Sea**
One of the world's largest inland seas, bordered by Europe, Africa and Asia; it connects to the Atlantic Ocean through the Strait of Gibraltar.



**Barents Sea**
Area of the Arctic Ocean lying north of the Scandinavian Peninsula and Russia; it is partially ice-covered.

**Kola Peninsula**
Mostly mountainous peninsula located in Russia, above the Arctic polar circle.

**Ural Mountains**
Mountain range extending 1,500 mi from the Caspian Sea to the Arctic; it is traditionally considered the boundary between Europe and Asia.

**Lake Ladoga**
Europe's largest lake (6,800 $mi^2$) is located in Russia; it empties into the Baltic Sea.

**Baltic Sea**
Generally shallow inland sea that is low in salt content and devoid of major tides; it freezes along its coasts.

**Volga River**
The longest river in Europe (2,300 mi) is ice-covered three to four months per year; its spring flood is substantial.

**Dnieper River**
River in Russia (1,350 mi) whose flow is slow but abundant; it is a major communications artery.

**Carpathian Mountains**
Mountain range in central Europe, lower than the Alps; its highest point is at an elevation of 8,711 feet.

**Black Sea**
Inland sea (162,000 $mi^2$) between Eastern Europe and Asia; it opens into the Mediterranean through two straits, the Dardanelles and the Bosporus.

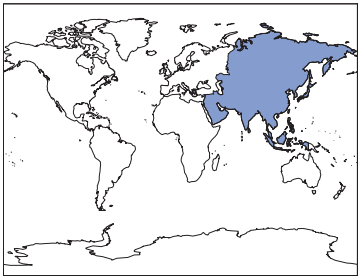
**Danube River**
Second longest river in Europe (1,770 mi); it flows into the Black Sea through a vast delta with three branches.

**Adriatic Sea**
Gulf of the Mediterranean, 520 mi long and 110 mi wide, located between Italy, the former Yugoslavia and Albania.

**Aegean Sea**
Area of the Mediterranean Sea between Turkey and Greece; it contains numerous islands, the largest of which is Crete.

## configuration of the continents

**Asia**
The largest and most populous continent, Asia represents 32% of the world's land; it is dominated by imposing mountain ranges.



**Aral Sea**
Sea once connected to the Caspian Sea; it is now an immense salt lake.

**Caspian Sea**
The world's largest lake (140,000 mi²), located between Europe and Asia; it has no link to an ocean and is diminishing in size.

**Persian Gulf**
Gulf (500 mi long) bordered by Saudi Arabia, Iran and Iraq; it is also called the Arabian Gulf and is an important maritime trade route.

**Gulf of Oman**
The narrowest part of the Arabian Sea; it connects to the Persian Gulf through the Strait of Hormuz.

**Arabian Peninsula**
Vast semiarid peninsula; it holds 50% of the world's oil supply.

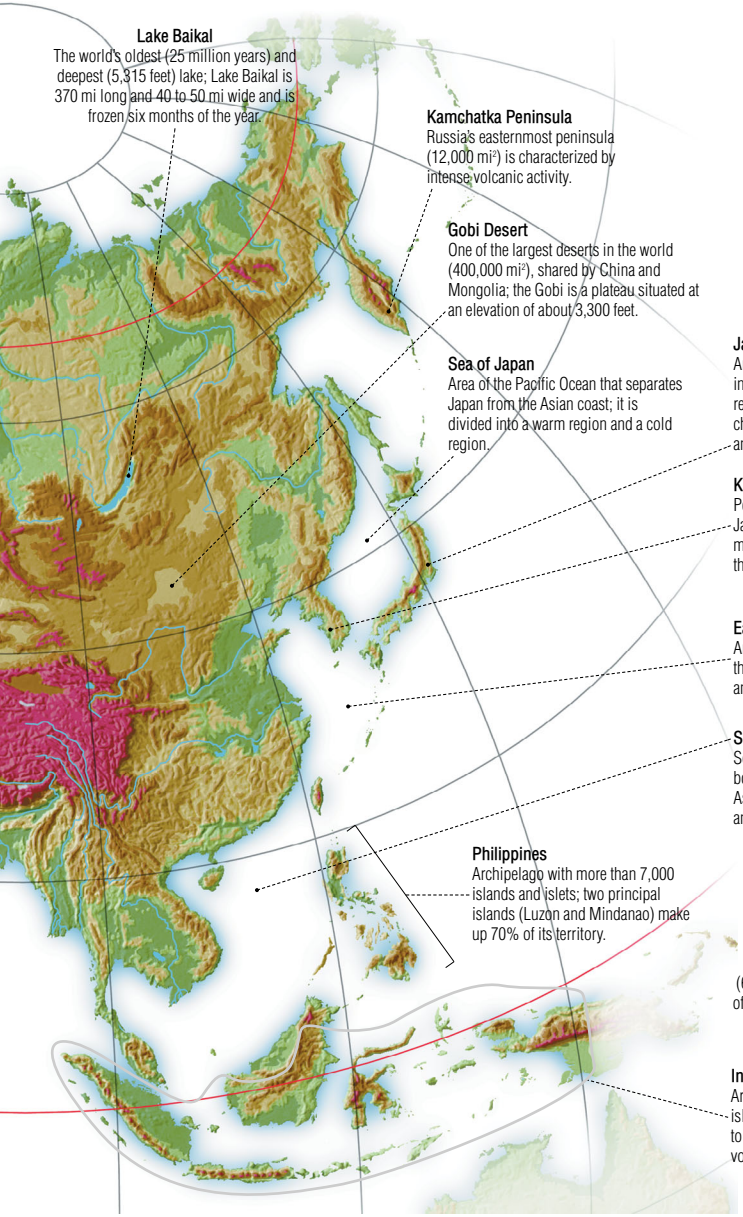
**Arabian Sea**
Area of the Indian Ocean between India and the Arabian Peninsula; the Gulf of Oman is an arm of the Arabian Sea.

**Gulf of Aden**
Northwestern arm of the Indian Ocean between southern Saudi Arabia and northeastern Africa; it connects to the Red Sea through the strait of Bab El Mandeb.

**Himalayas**
The world's highest mountain range; it contains some ten peaks above 26,000 feet, including Everest (29,035 feet).

**Indian Ocean**
Relatively small ocean (29 million mi²) located between Africa, Asia and Australia; it has high water temperatures and is dotted with numerous islands.

**Bay of Bengal**
Area of the Indian Ocean between India and the Indochinese Peninsula; the Ganges River empties into this bay through the world's largest delta.



**Lake Baikal**
The world's oldest (25 million years) and deepest (5,315 feet) lake; Lake Baikal is 370 mi long and 40 to 50 mi wide and is frozen six months of the year.

**Kamchatka Peninsula**
Russia's easternmost peninsula (12,000 mi²) is characterized by intense volcanic activity.

**Gobi Desert**
One of the largest deserts in the world (400,000 mi²), shared by China and Mongolia; the Gobi is a plateau situated at an elevation of about 3,300 feet.

**Sea of Japan**
Area of the Pacific Ocean that separates Japan from the Asian coast; it is divided into a warm region and a cold region.

**Japan**
Archipelago made up of 1,000 islands, including four main islands that represent 95% of its territory; it is characterized by intense volcanic activity and frequent earthquakes.

**Korean Peninsula**
Peninsula that delimits the Sea of Japan; its climate is marked by monsoons in summer and typhoons in the fall.

**East China Sea**
Area of the China Sea between Korea, the Ryukyu Islands (south of Japan) and Taiwan.

**South China Sea**
Southern part of the China Sea bordering the entire southeast coast of Asia as well as Borneo, the Philippines and Taiwan.

**Philippines**
Archipelago with more than 7,000 islands and islets; two principal islands (Luzon and Mindanao) make up 70% of its territory.

**Pacific Ocean**
The world's largest ocean (69 million mi²), the Pacific covers 30% of the Earth's surface, more than all of the continents put together.

**Indonesia**
Archipelago with almost 14,000 islands extending 3,100 mi from west to east; it is the world's most active volcanic zone.

## configuration of the continents

**Africa**
Continent that represents about 20% of the world's land; two-thirds of its surface lies north of the Equator. Characterized by very hot climates, Mediterranean in the north and south, tropical and arid elsewhere.

**Atlas Mountains**
Mountain chain composed of several ranges; it extends from Tunisia to Morocco, where Jebel Toubkal is its highest peak (13,665 feet).

**Lake Chad**
Large lake, shallow and marshy, the vestige of what was once a sea; it continues to diminish in size and could one day dry up.

**Sahara Desert**
Largest desert in the world (3 million mi²); it covers one-quarter of Africa.

**Senegal River**
River (1,050 mi) forming the boundary between Senegal and Mauritania; it empties into the Atlantic.

**Niger River**
Africa's third longest river (2,600 mi) after the Nile and the Congo.

**Gulf of Guinea**
Gulf extending from Ivory Coast to Gabon; its waters are warm.

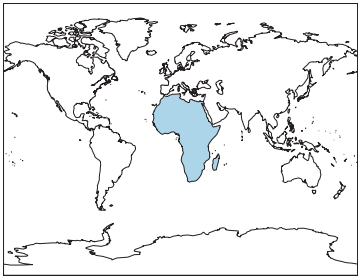
**Atlantic Ocean**
The world's second largest ocean; it covers 20% of the Earth's surface.

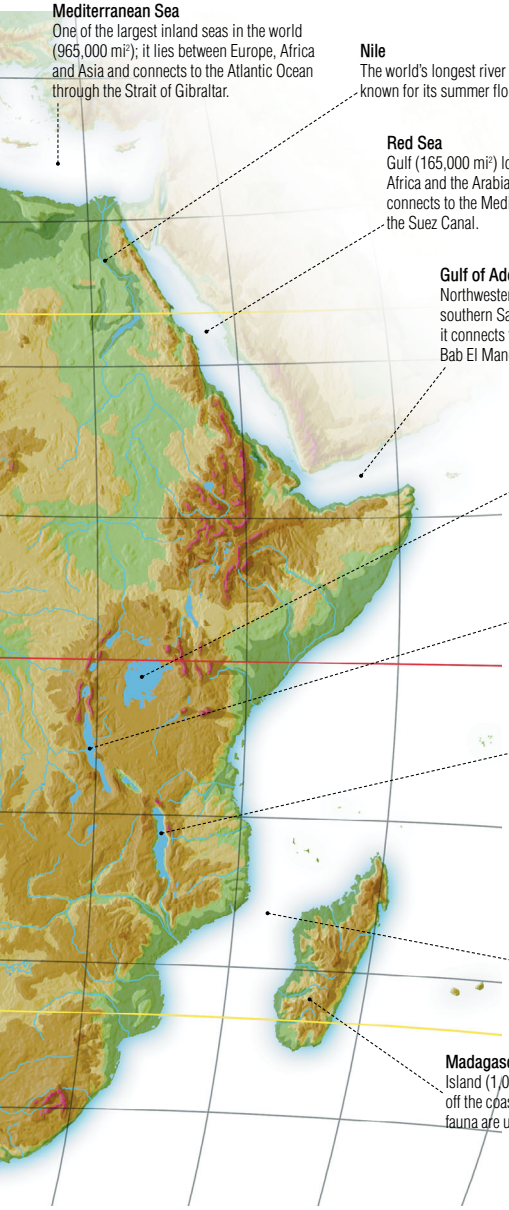
**Congo River**
Second longest river in Africa (2,850 mi) and the world's second river in size of drainage basin and volume of flow.

**Kalahari Desert**
Semiarid region bordering the Namib Desert; the north is marshy while the south is characterized by very sparse vegetation.

**Namib Desert**
Arid region extending 1,250 mi along the Atlantic coast. Frequent fog brings the equivalent of 2 in of annual rainfall.

**Cape of Good Hope**
Former island now connected to the continent by a ridge of sand; located only 90 mi to the west of Africa's southernmost point.





**Mediterranean Sea**
One of the largest inland seas in the world (965,000 mi²); it lies between Europe, Africa and Asia and connects to the Atlantic Ocean through the Strait of Gibraltar.

**Nile**
The world's longest river (4,150 mi) is known for its summer flooding.

**Red Sea**
Gulf (165,000 mi²) located between Africa and the Arabian Peninsula; it connects to the Mediterranean through the Suez Canal.

**Gulf of Aden**
Northwestern arm of the Indian Ocean between southern Saudi Arabia and northeastern Africa; it connects to the Red Sea through the strait of Bab El Mandeb.

**Lake Victoria**
Africa's largest lake (26,000 mi²) is relatively shallow; it is bordered by Uganda, Kenya and Tanzania.

**Lake Tanganyika**
The world's deepest lake (4,710 feet) after Lake Baikal; it empties into the Congo River.

**Lake Malawi**
Lake shared by Malawi, Tanzania and Mozambique; it is 310 mi long and 30 mi wide.

**Indian Ocean**
Relatively small ocean (29 million mi²) located between Africa, Asia and Australia; it has high water temperatures and is dotted with numerous islands.

**Mozambique Channel**
Arm of the Indian Ocean between the African continent and Madagascar.

**Madagascar**
Island (1,000 mi long); because it is isolated off the coast of Africa, Madagascar's flora and fauna are unique.

# cartography

A collective term for the techniques and graphic arts used to develop and produce maps based on direct observation or documentation.

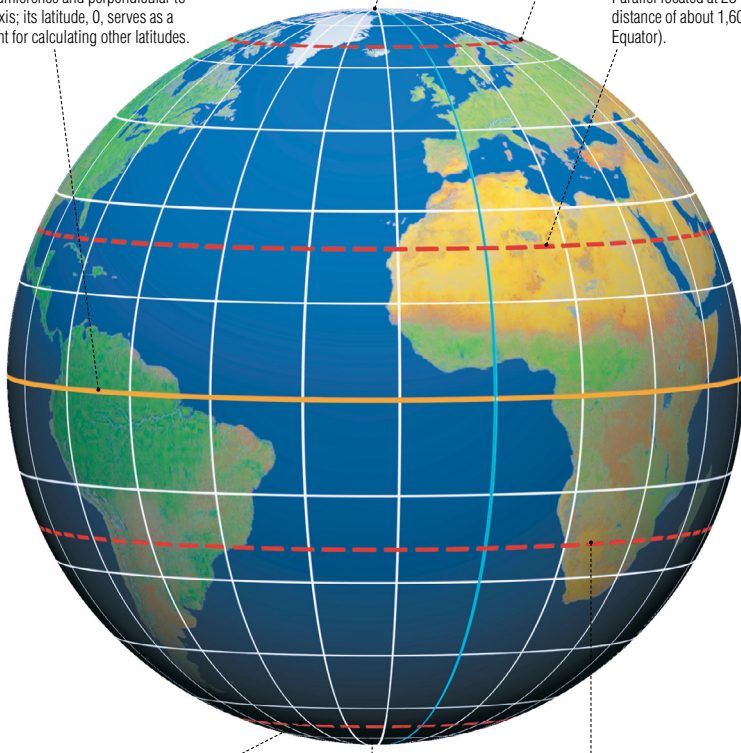
**Earth coordinate system**
The intersection of two imaginary lines, longitude and latitude, makes it possible to locate a precise point on the Earth's surface.

**North Pole**
Point on the Earth's surface at the northern extremity of the axis of rotation, where the meridians converge.

**Arctic Circle**
Parallel of latitude 66°34' N; it marks the polar zone, where days and nights last 24 hours during solstices.

**Equator**
Imaginary line encircling the Earth at its greatest circumference and perpendicular to the polar axis; its latitude, 0, serves as a reference point for calculating other latitudes.

**Tropic of Cancer**
Parallel located at 23°26' N latitude (a distance of about 1,600 mi from the Equator).



**Antarctic Circle**
Parallel of latitude at 66°34' S that marks the polar zone, where days and nights last 24 hours during solstices.

**South Pole**
Point on the Earth's surface at the southern extremity of the axis of rotation, where the meridians converge.

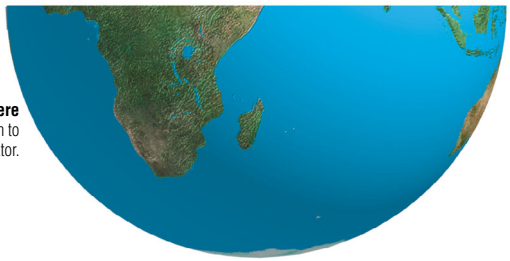
**Tropic of Capricorn**
Parallel located at 23°26' N latitude (a distance of about 1,600 mi from the Equator).

## hemispheres

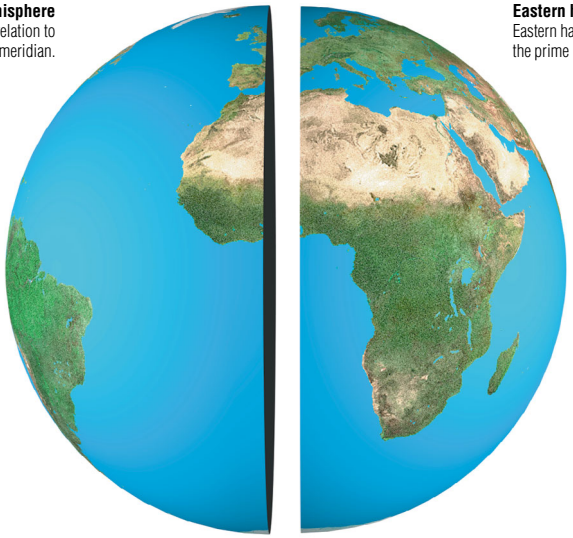
The globe is divided by convention into four half spheres, using the Greenwich meridian or the Equator as a reference point.

**Northern hemisphere**
Northern half of the globe in relation to the Equator.

**Southern hemisphere**
Southern half of the globe in relation to the Equator.



**Western hemisphere**
Western half of the globe in relation to the prime meridian.



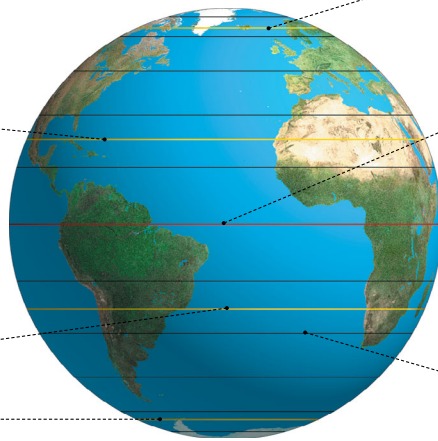
**Eastern hemisphere**
Eastern half of the globe in relation to the prime meridian.

## grid system

Collective term for the parallels and meridians that form an imaginary grid over the Earth's surface, making it possible to locate a specific point.

**lines of latitude**
Coordinate of a point on the Earth's surface indicating, in degrees, its distance from the Equator.

**Arctic Circle**
Parallel of latitude 66°34' N; it marks the polar zone, where days and nights last 24 hours during solstices.



**Tropic of Cancer**
Parallel located at 23°26' N latitude (a distance of about 1,600 mi from the Equator).

**Equator**
Imaginary line encircling the Earth at its greatest circumference and perpendicular to the polar axis; its latitude, 0, serves as a reference point for calculating other latitudes.

**Tropic of Capricorn**
Parallel located at 23°26' N latitude (a distance of about 1,600 mi from the Equator).

**parallel**
Imaginary circle whose plane is parallel to the Equator.

**Antarctic Circle**
Parallel of latitude at 66°34' S that marks the polar zone, where days and nights last 24 hours during solstices.

**lines of longitude**
Coordinate of a point on the Earth's surface indicating, in degrees, its distance from the prime meridian.

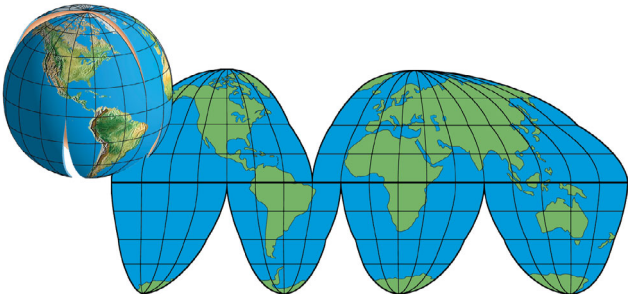
**Eastern meridian**
Imaginary line connecting the poles and perpendicular to the Equator; located east of the Greenwich meridian.

**prime meridian**
Chosen by convention as the meridian of origin; its longitude, 0, divides the Eastern and Western hemispheres.

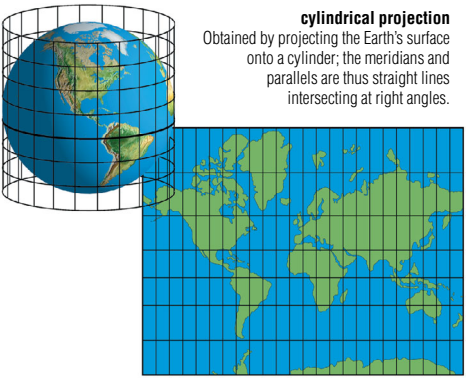
**Western meridian**
Imaginary line connecting the poles and perpendicular to the Equator; located west of the Greenwich meridian.

## map projections

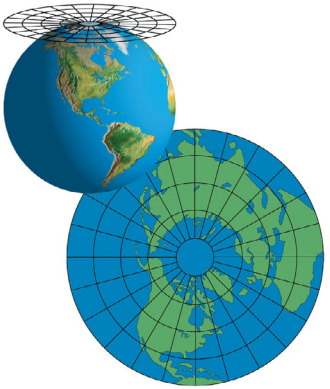
Representation of the Earth's surface on a plane.



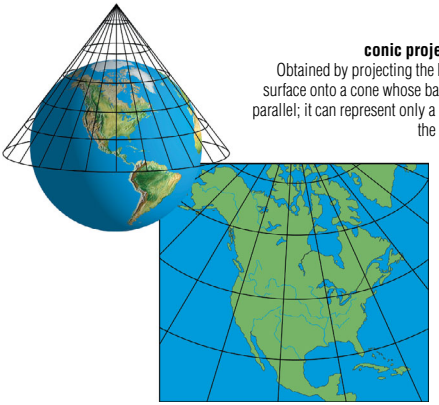
**interrupted projection**
Results in a map that is not continuous but cut off, the divisions often placed in the middle of the oceans; it is used to represent the continents.



**cylindrical projection**
Obtained by projecting the Earth's surface onto a cylinder; the meridians and parallels are thus straight lines intersecting at right angles.

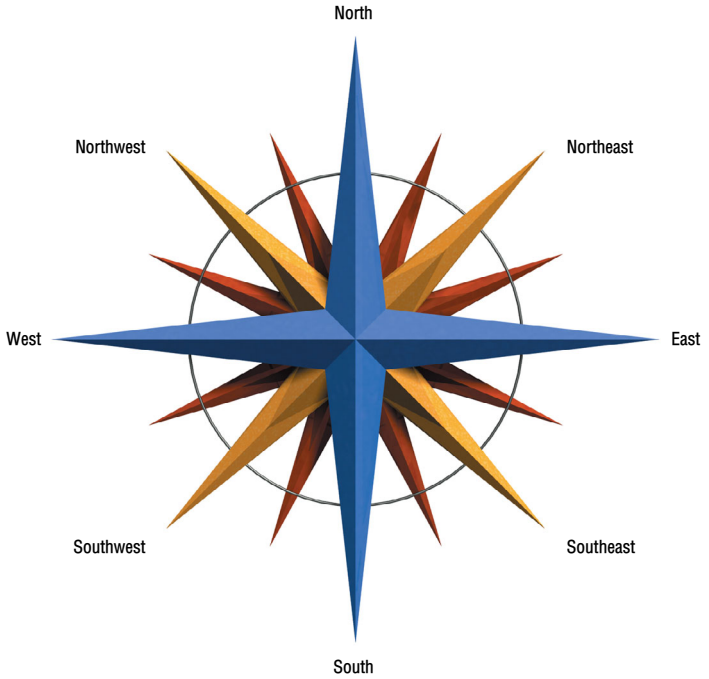


**plane projection**
Produced on a plane placed in such a way that it is tangent to a point on the Earth's surface; it can represent only one hemisphere.



**conic projection**
Obtained by projecting the Earth's surface onto a cone whose base is a parallel; it can represent only a part of the globe.

**compass card**
Star indicating the cardinal points and the intermediary directions; it is reproduced on compass dials, marine charts and so forth.



**political map**
Type of map representing various countries and their territorial or administrative units.


**province**
Territorial division run by a government elected by the population (in Canada) or appointed by a central authority (China).

**internal boundary**
Boundary marking the territorial limits of a province or state within a federated state.

**state**
Each of the territories constituting a federation; the United States is divided into 50 states.

**capital**
City where the government is located.

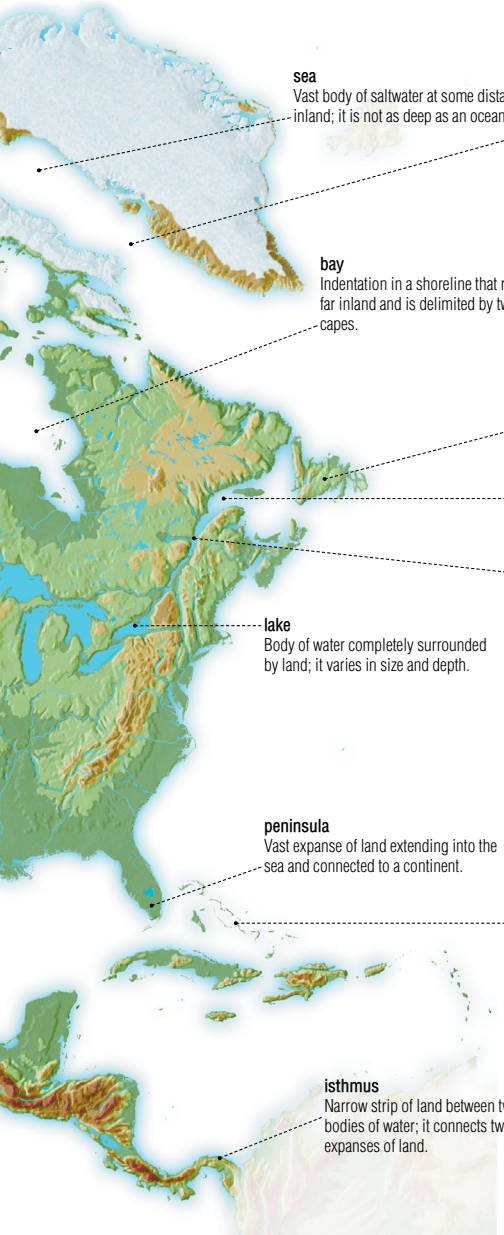
**city**
Major urban center, characterized by a concentrated settlement whose activities revolve around industry, commerce, services and administration.

**international boundary**
Boundary marking a country's territorial limits.

**country**
Territory inhabited by a citizenry and administered by a government; its borders are clearly established.

## cartography

**physical map**
Type of map representing the Earth's surface (topography, watercourses, aquatic areas) using various techniques (contour lines, colors).



**sea**
Vast body of saltwater at some distance inland; it is not as deep as an ocean.

**strait**
Natural arm of a sea between two coasts; it connects two bodies of water.

**bay**
Indentation in a shoreline that reaches far inland and is delimited by two capes.

**island**
Expanse of land completely surrounded by water.

**river estuary**
Mouth of a river that is influenced by the tides; it forms an indentation in the coastline that varies in width and depth.

**river**
Major watercourse fed by numerous smaller rivers; it empties into the sea.

**lake**
Body of water completely surrounded by land; it varies in size and depth.

**ocean**
Vast body of saltwater covering a large part of the Earth's surface and separating the continents.

**peninsula**
Vast expanse of land extending into the sea and connected to a continent.

**archipelago**
Group of islands.

**isthmus**
Narrow strip of land between two bodies of water; it connects two larger expanses of land.

## cartography

**urban map**
Precise and detailed representation of an area of a city, usually on a large scale.

**railroad station**
Collective term for the network of rails and the structures needed to transport travelers and goods by train.

**bridge**
Structure allowing a communications route to span a natural obstacle or another communications route.

**railroad line**
Communications route composed of two parallel rails along which trains travel.

**suburbs**
All the cities surrounding a big city on which they depend economically.

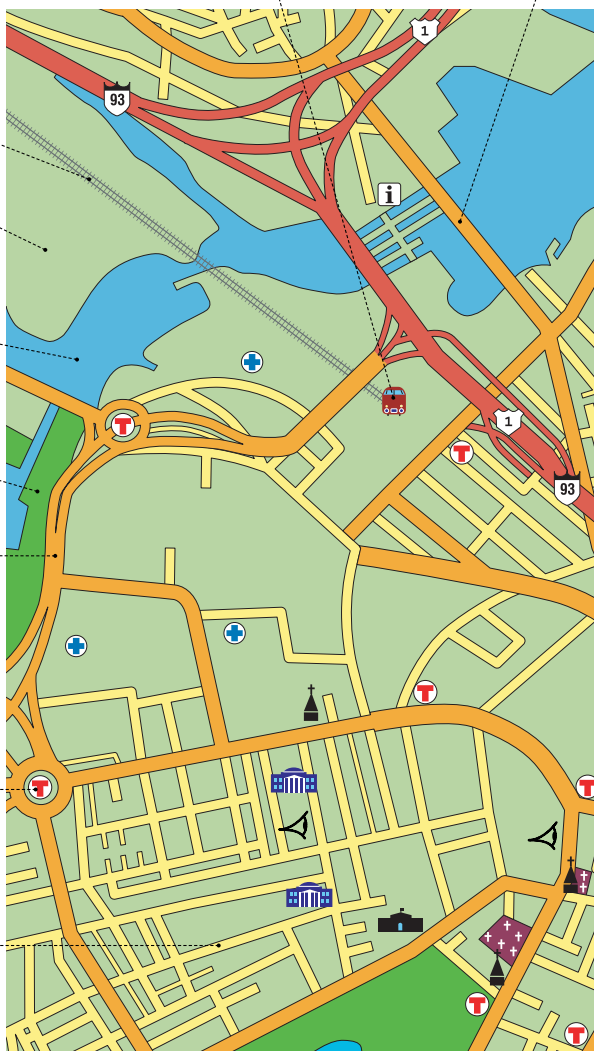
**river**
Major watercourse fed by numerous smaller rivers; it empties into the sea.

**woods**
Small tract of land covered with trees.

**circular route**
High-speed road that circles the downtown area, making it possible to divert traffic away from downtown or connect two outlying communities.

**traffic circle**
Junction where several roads converge on a roadway that circles a round, central island; traffic moves in one direction only.

**avenue**
Thoroughfare larger than a street; it services a district or an area of a city.



**cemetery**
Place where the dead are buried.

**park**
Area of a city where trees are planted; it is used for leisure.

**monument**
Structure that commemorates a historic event or holds aesthetic, religious or symbolic value.

**public building**
Large building that houses public services.

**highway**
Large thoroughfare with separate one-way lanes and no crossing streets; reserved for high-speed traffic.

**street**
Thoroughfare built inside a city and usually lined with buildings.

**district**
Administrative area of a large city.

**boulevard**
Very large, high-volume thoroughfare connecting various parts of a city.

## cartography

**road map**
Map that uses lines to indicate a network of roads; it often features information for tourists.

**highway**
Large thoroughfare with separate one-way lanes and no crossing streets; reserved for high-speed traffic.

**highway number**

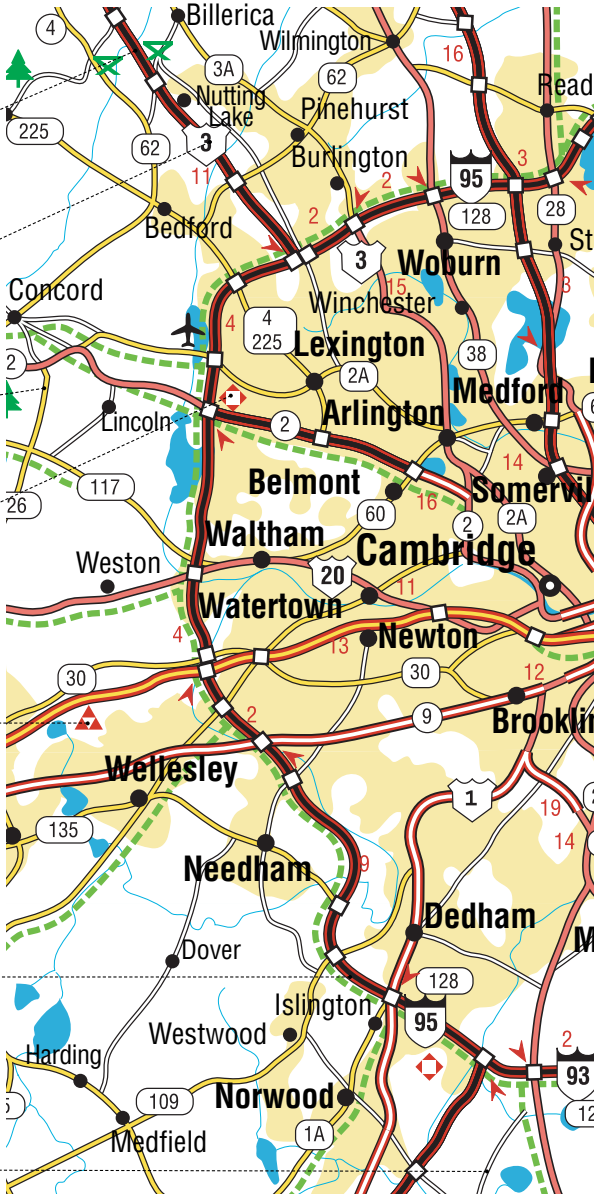
**scenic route**
Road offering particularly scenic landscapes for travelers.

**rest area**

**service area**
Area built alongside a highway, featuring a gas station, restaurant, lodging and tourist information.

**belt highway**
Branch of a highway built around an urban center to facilitate inbound and outbound access and to absorb through traffic.

**secondary road**
Road connecting two regional urban centers of lesser importance.




**road**
Communications route connecting two distant geographic points, usually urban centers.

**road number**

**airport**
Location that contains all the technical and commercial facilities needed to support air traffic.

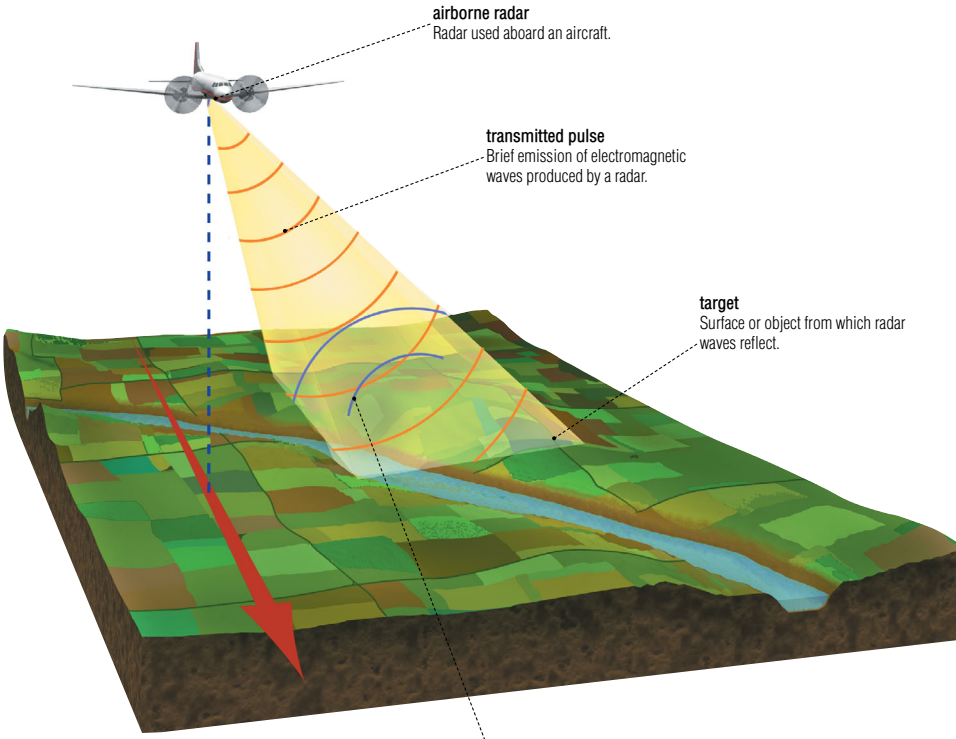
**point of interest**
Area especially developed to showcase a unique or attractive feature.

**national park**
Zone that the government designates with a view to protecting its natural resources; access is granted under certain conditions.

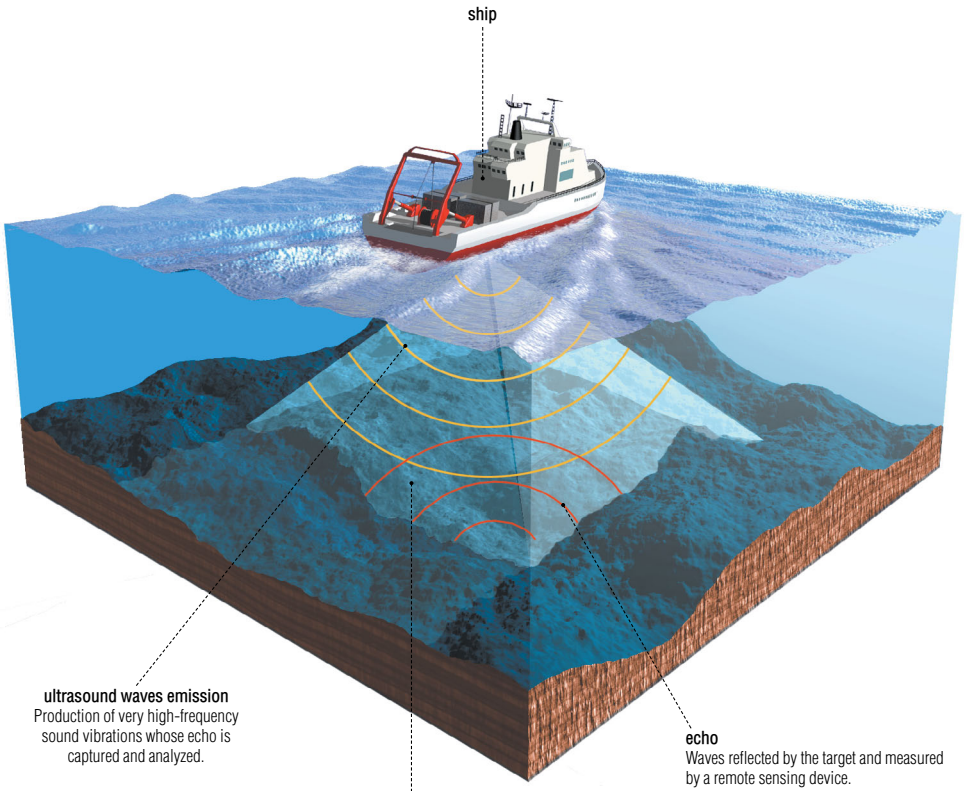
# remote sensing

Technique that uses electromagnetic waves to obtain information about the Earth's surface and atmosphere from a distance.

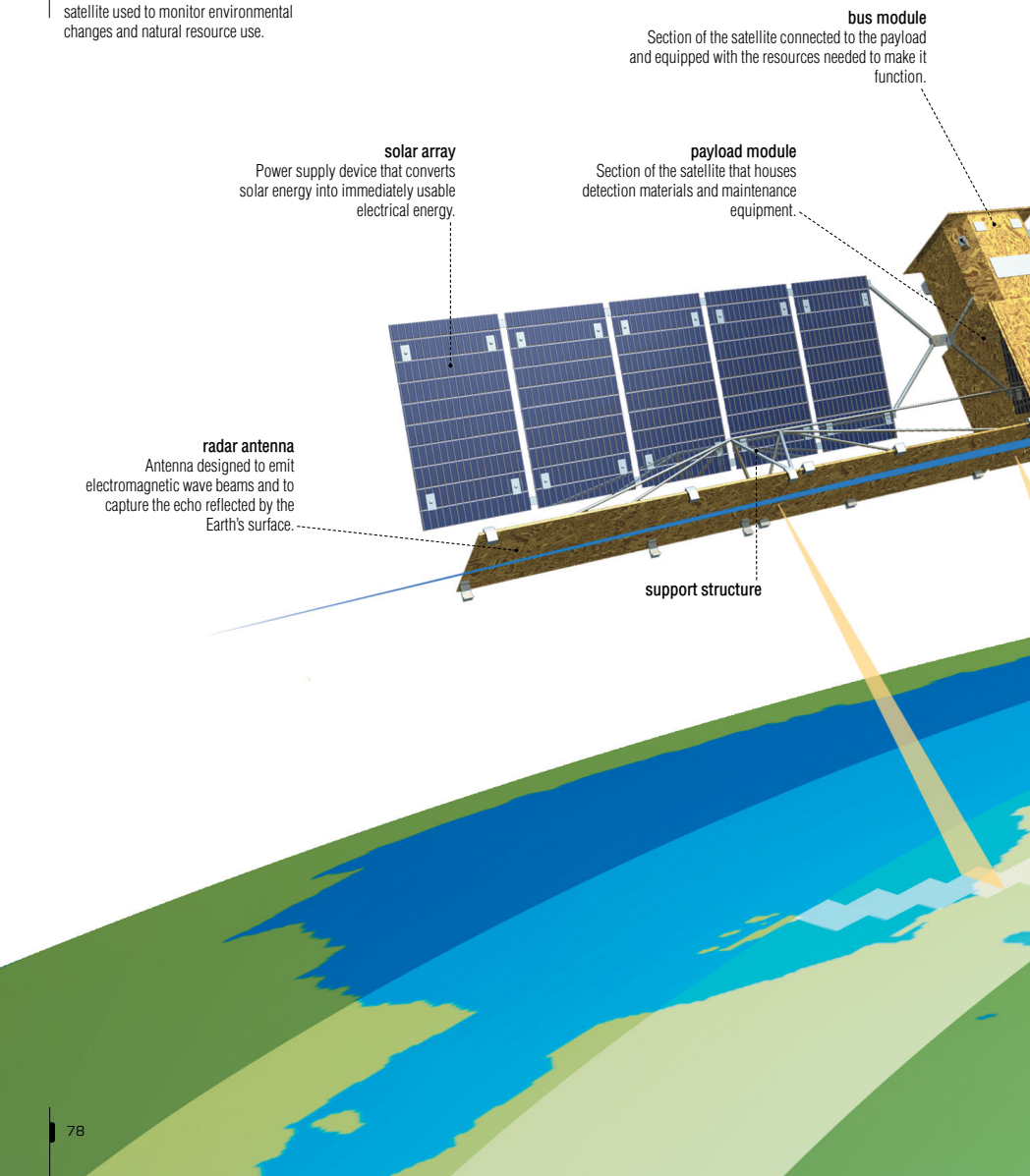
**radar**
Detection device that emits electromagnetic waves and receives their echoes.

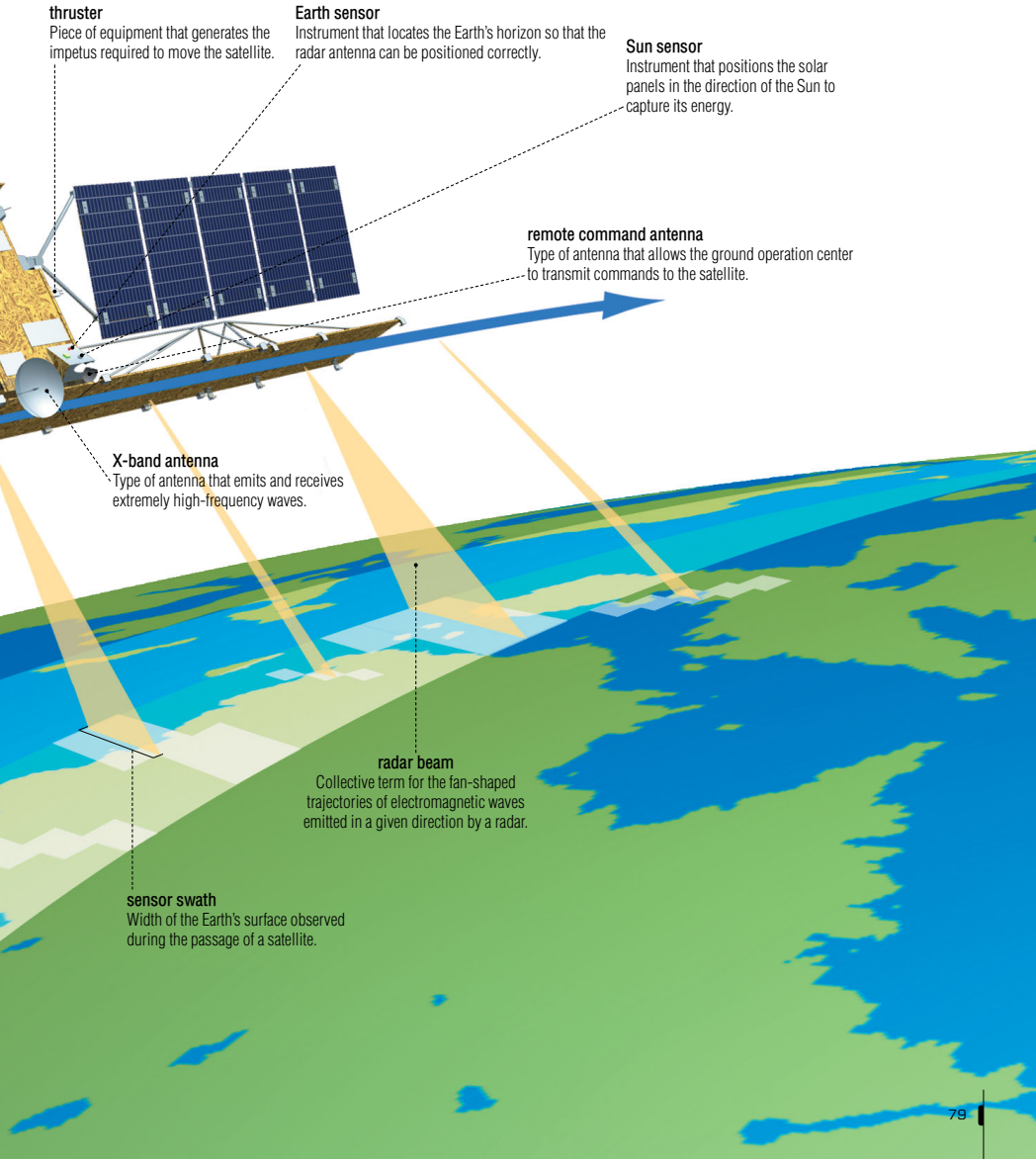


**sonar**
Detection system emitting ultrasound; it is used for detection mainly in a marine environment.



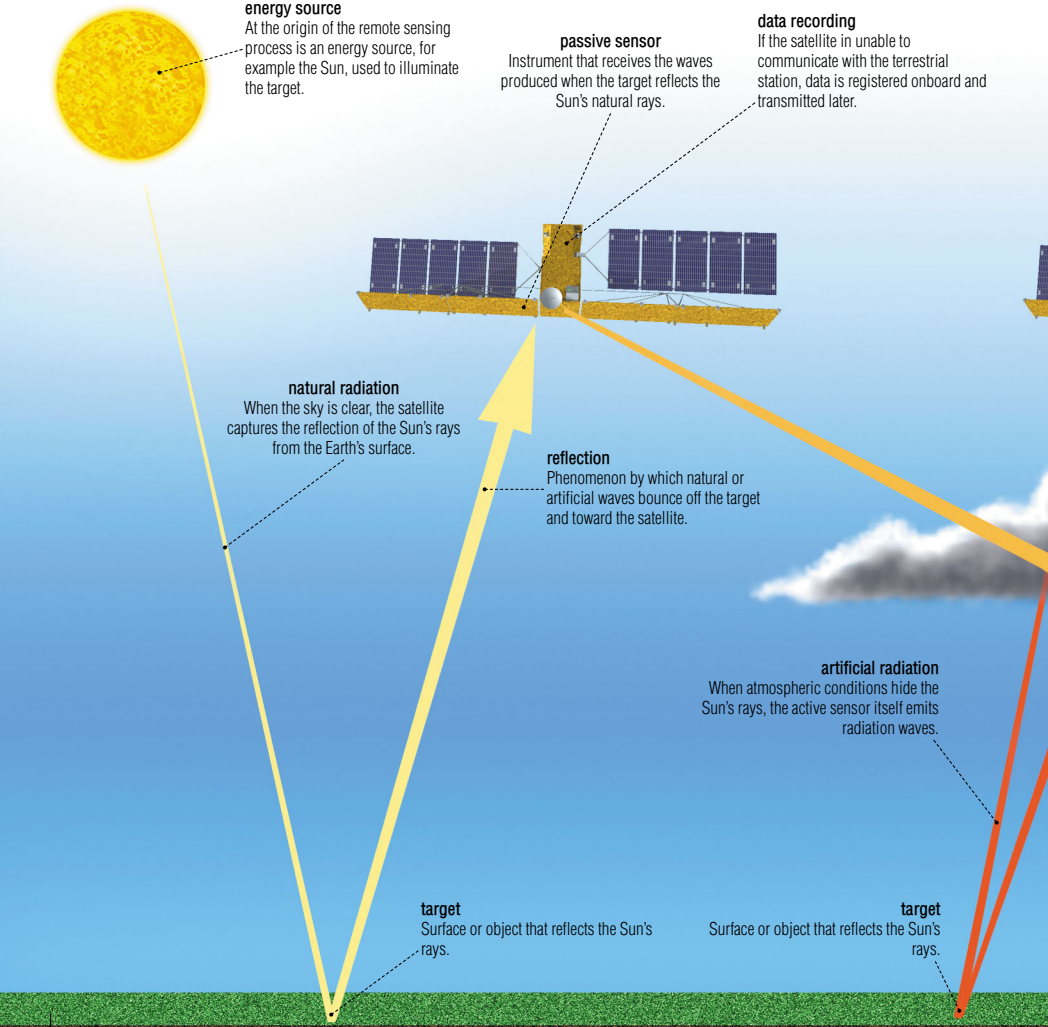
**Radarsat satellite**
Canadian-built Earth observation satellite used to monitor environmental changes and natural resource use.

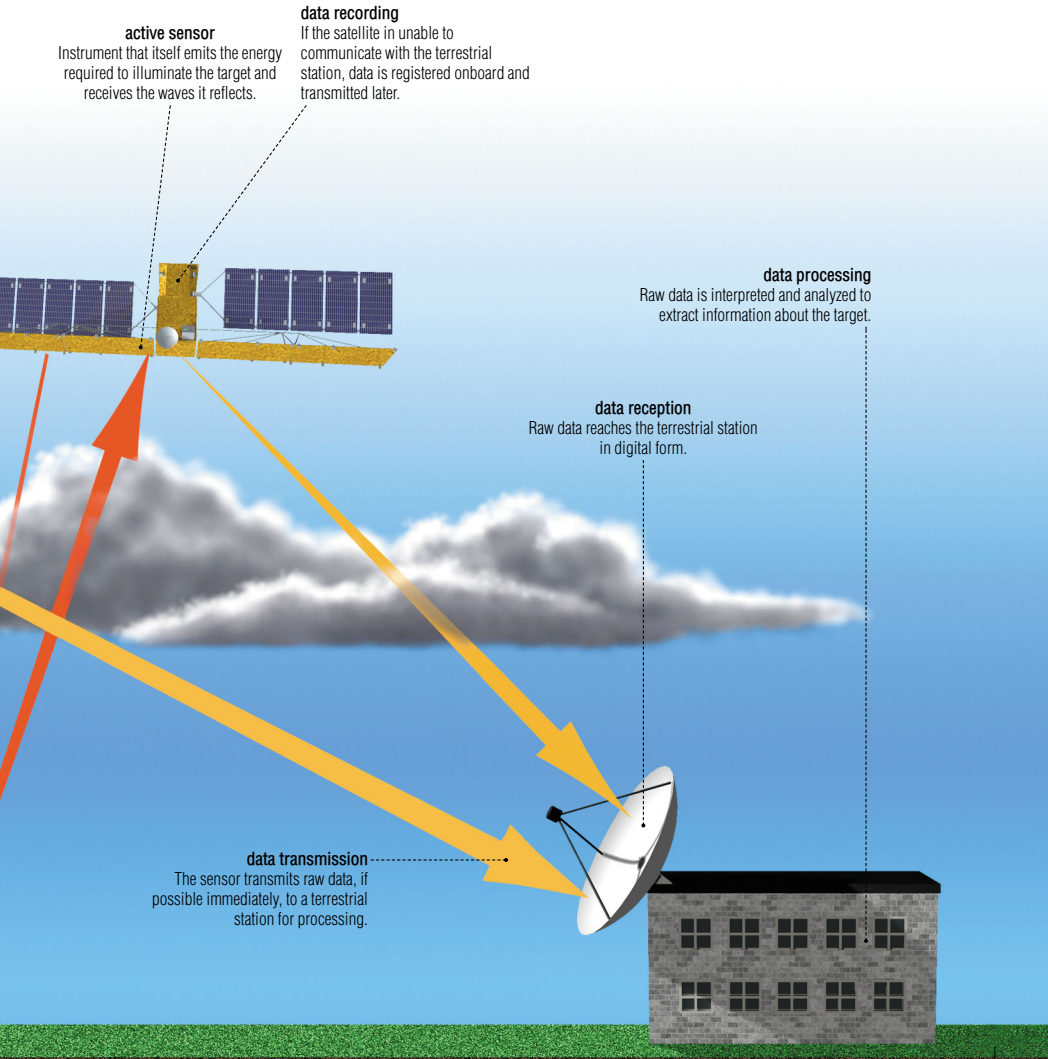



thruster
Piece of equipment that generates the impetus required to move the satellite.
Earth sensor
Instrument that locates the Earth's horizon so that the radar antenna can be positioned correctly.
Sun sensor
Instrument that positions the solar panels in the direction of the Sun to capture its energy.
remote command antenna
Type of antenna that allows the ground operation center to transmit commands to the satellite.
X-band antenna
Type of antenna that emits and receives extremely high-frequency waves.
radar beam
Collective term for the fan-shaped trajectories of electromagnetic waves emitted in a given direction by a radar.
sensor swath
Width of the Earth's surface observed during the passage of a satellite.

## remote sensing

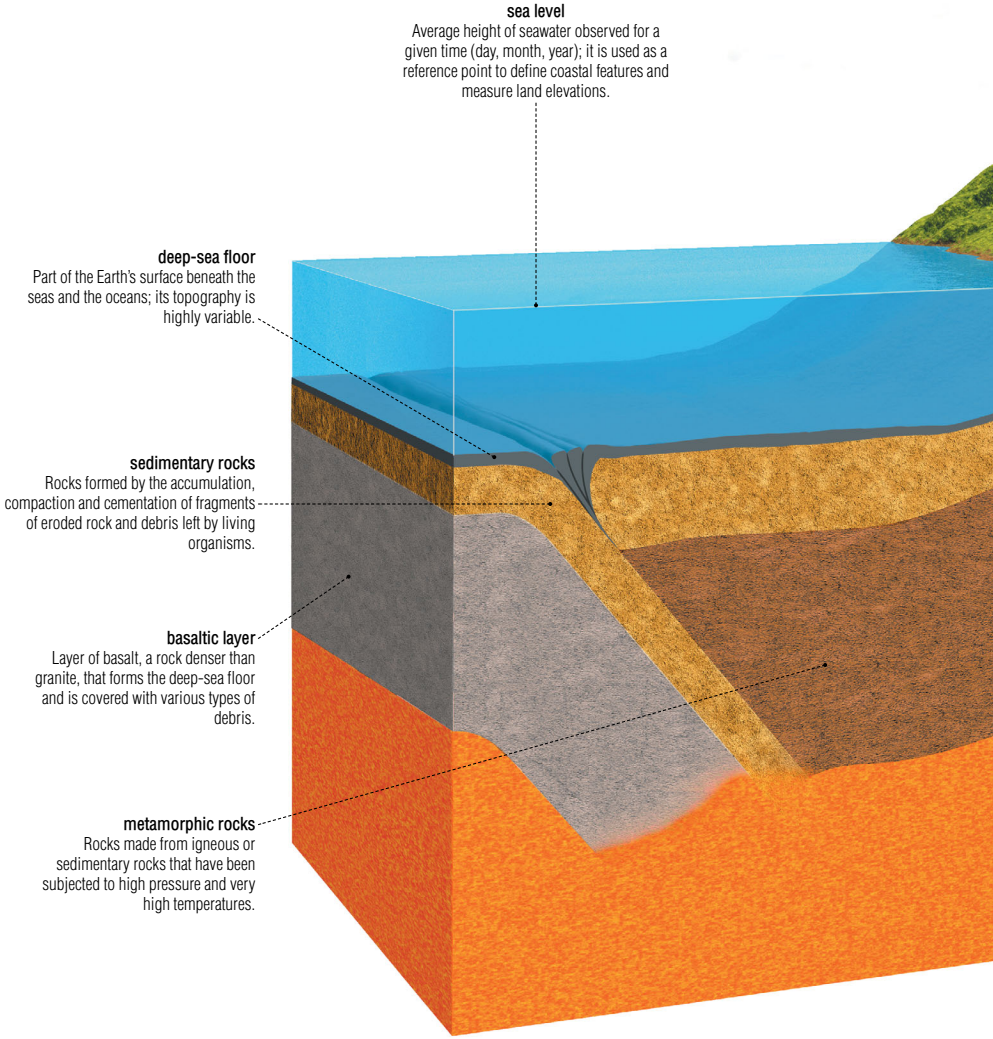
**satellite remote sensing**
Observation of the Earth's surface and atmosphere by a satellite equipped with a sensor.



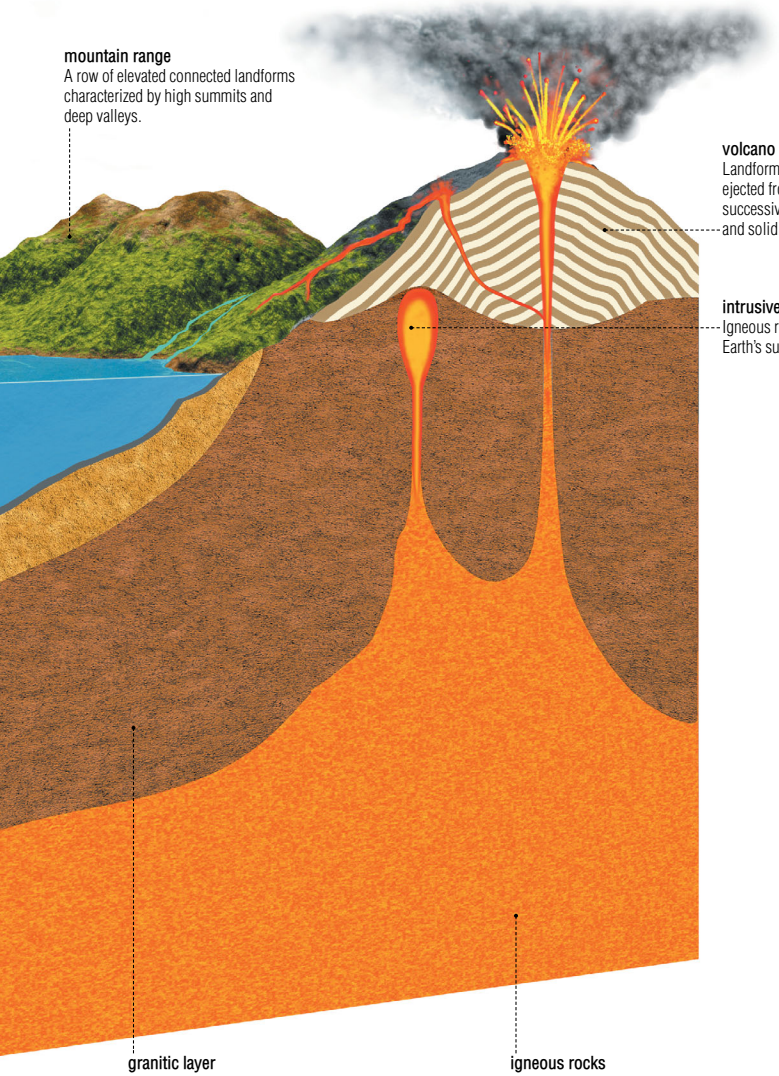

active sensor
Instrument that itself emits the energy required to illuminate the target and receives the waves it reflects.
data recording
If the satellite in unable to communicate with the terrestrial station, data is registered onboard and transmitted later.
data processing
Raw data is interpreted and analyzed to extract information about the target.
data reception
Raw data reaches the terrestrial station in digital form.
data transmission
The sensor transmits raw data, if possible immediately, to a terrestrial station for processing.

# section of the Earth's crust

The Earth's crust, continental and oceanic, is composed mainly of sedimentary, metamorphic and igneous rock.



section of the Earth's crust



**mountain range**
A row of elevated connected landforms characterized by high summits and deep valleys.

**volcano**
Landform built up as lava and ash are ejected from the upper mantle during successive eruptions, accumulating and solidifying on the surface.

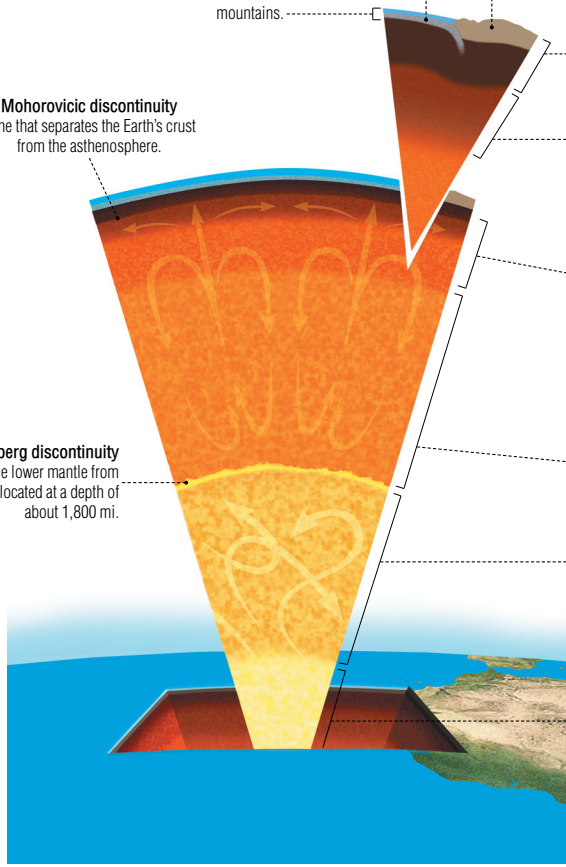
**intrusive rocks**
Igneous rocks that have risen close to the Earth's surface.

**granitic layer**
Layer of granite that gives the continents their essential form.

**igneous rocks**
Rock formed from molten magma that has cooled and solidified inside the Earth; also called magmatic rock.

# structure of the Earth

The Earth is formed of three concentric layers: the core, the mantle and the crust; these are separated by transition zones called discontinuities.



**oceanic crust**
Layer forming the ocean floor; it is thinner, denser and younger than the continental crust.

**continental crust**
Layer varying in thickness from 20 to 45 mi and composed mainly of granite. It forms a number of distinct landforms: the continents.

**Earth's crust**
Solid layer at the Earth's surface whose thickness varies from 6 mi beneath the oceans to 35 mi beneath the mountains.

**lithosphere**
Layer from 30 to 60 mi thick that comprises the Earth's crust and the solid part of the upper mantle; it is divided into tectonic plates.

**Mohorovicic discontinuity**
Zone that separates the Earth's crust from the asthenosphere.

**asthenosphere**
Layer of the upper mantle with a thickness of 125 mi; it is composed of molten rock, on top of which the lithospheric plates slide.

**upper mantle**
Layer of hard rock nearly 390 mi thick; it is made up of the asthenosphere and the base of the lithosphere.

**lower mantle**
Little-known layer with a thickness of about 1,420 mi; its slow-moving currents, called convection currents, are caused by temperature variations.

**Gutenberg discontinuity**
Zone separating the lower mantle from the core; it is located at a depth of about 1,800 mi.

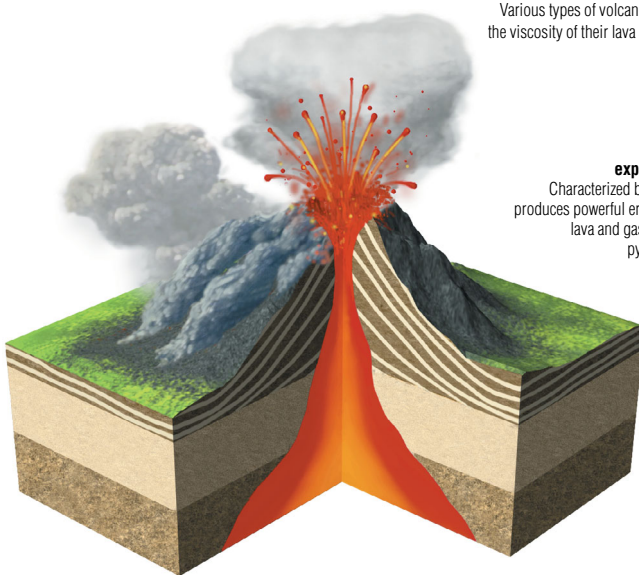
**outer core**
Composed of molten metal, it is 1,130 mi thick; the magnetic field is caused by electric currents circulating inside the outer core.

**inner core**
Composed of iron and nickel, it is subject to so much pressure that it remains in a solid state in spite of temperatures higher than 9,000°F; its diameter is 1,000 mi.

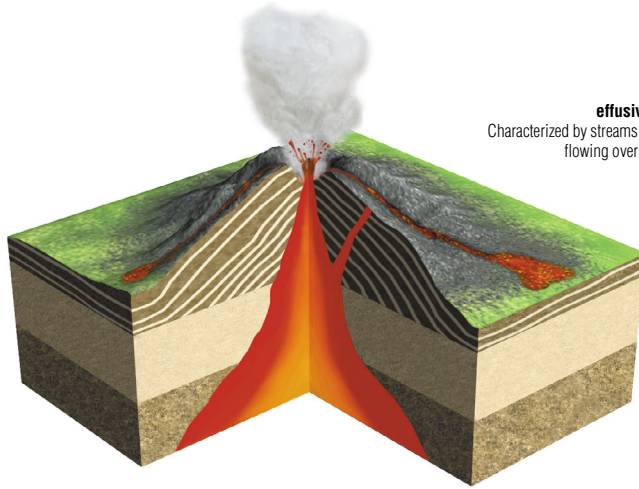
# volcano

Landform built up as lava and ash are ejected from the upper mantle during successive eruptions, accumulating and solidifying on the surface.

**examples of volcanoes**
Various types of volcanoes are characterized by the viscosity of their lava and the violence of their eruptions.



**explosive volcano**
Characterized by viscous lava, it produces powerful eruptions of rocks, lava and gas; it also releases pyroclastic surges.



**effusive volcano**
Characterized by streams of fluid lava flowing over large areas.

# volcano

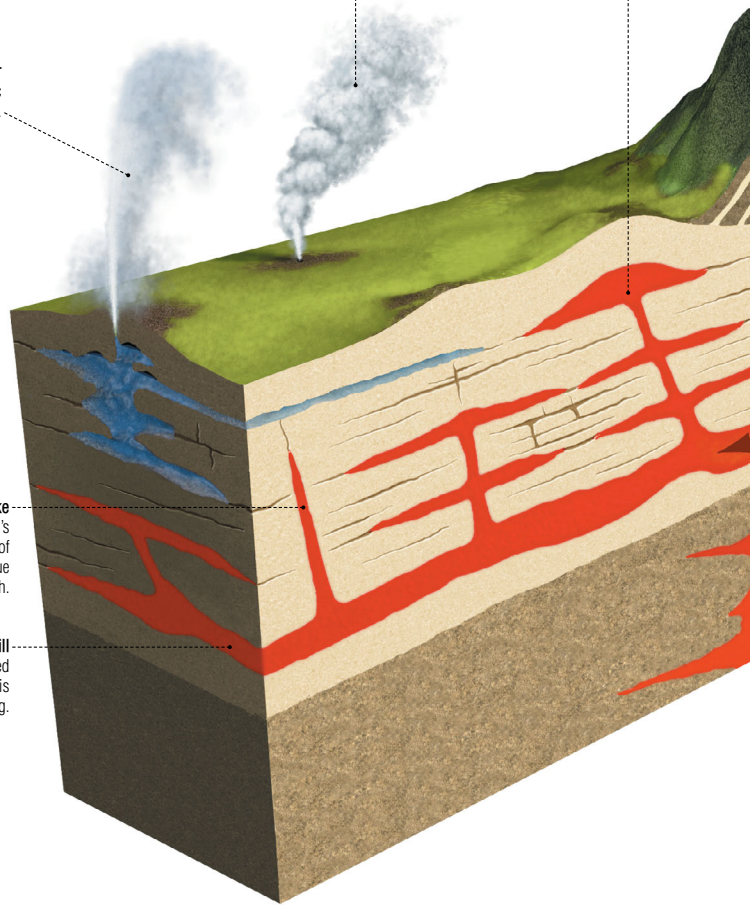
**volcano during eruption**
Eruption of magmatic matter (molten rock, ash, gas) from the upper mantle; it can last several years.

**cloud of volcanic ash**
Ash is formed of particles less than 0.08 in in diameter; it is composed of pulverized magma and ground rock.

**fumarole**
Regular emission of gas from a fissure on the Earth's surface.

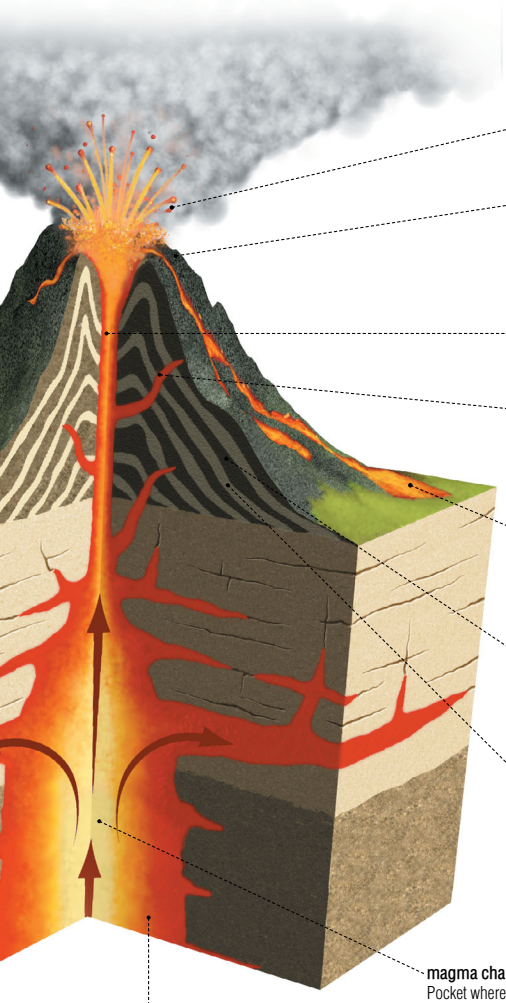
**laccolith**
Mass of magma that enters the Earth's crust and then solidifies, causing a deformation on the Earth's surface.

**geyser**
Hot water spring that ejects sporadic jets of water and vapor.



**dike**
Mass of magma that enters the Earth's crust and then solidifies in the form of bladelike shafts that are vertical or oblique to the layers of the Earth.

**sill**
Layer of magma that has solidified between the layers of the Earth's crust; it is about 30 feet thick and several miles long.



**volcanic bomb**
Mass of magma ejected high into the air where it solidifies; it can be very large.

**crater**
Depression whose center features a chimney through which lava, gas and volcanic ejecta escape.

**main vent**
Conduit along which lava and other volcanic ejecta rise.

**side vent**
Small rise that appears on the side of the volcano and is fed by the main vent.

**lava flow**
Lava mass pouring from a volcano at average speeds of 980 feet per hour; it can reach temperatures as high as 2,200°F.

**lava layer**
Layer of volcanic rock formed by cooled lava.

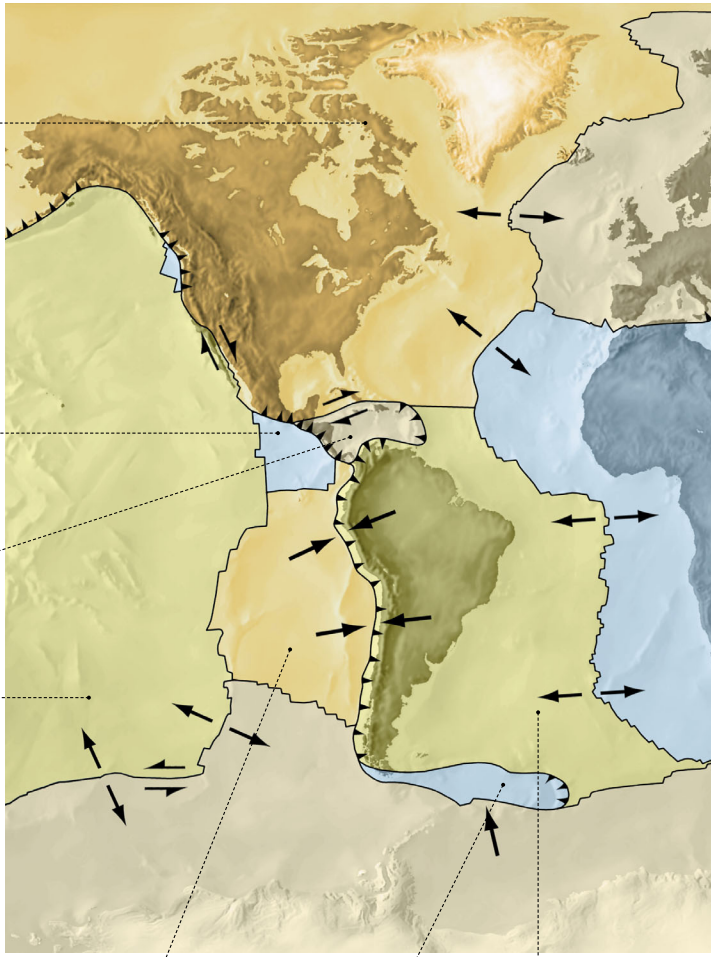
**ash layer**
Ash and lava form the layers that shape the volcano over time.

**magma chamber**
Pocket where magma accumulates before rising to the surface.

**magma**
Molten rock and gas under very high pressure that can reach extremely high temperatures.

# tectonic plates

Immense portions of the lithosphere that slide over the asthenosphere; this shifting movement shapes the Earth's topography.



**North American Plate**
Together with the Pacific Plate, this plate creates the San Andreas Fault (750 mi), which extends from the Gulf of California to San Francisco.

**Cocos Plate**
Plate along the coast of Mexico and Central America; it is sinking beneath the North American Plate and the Caribbean Plate.

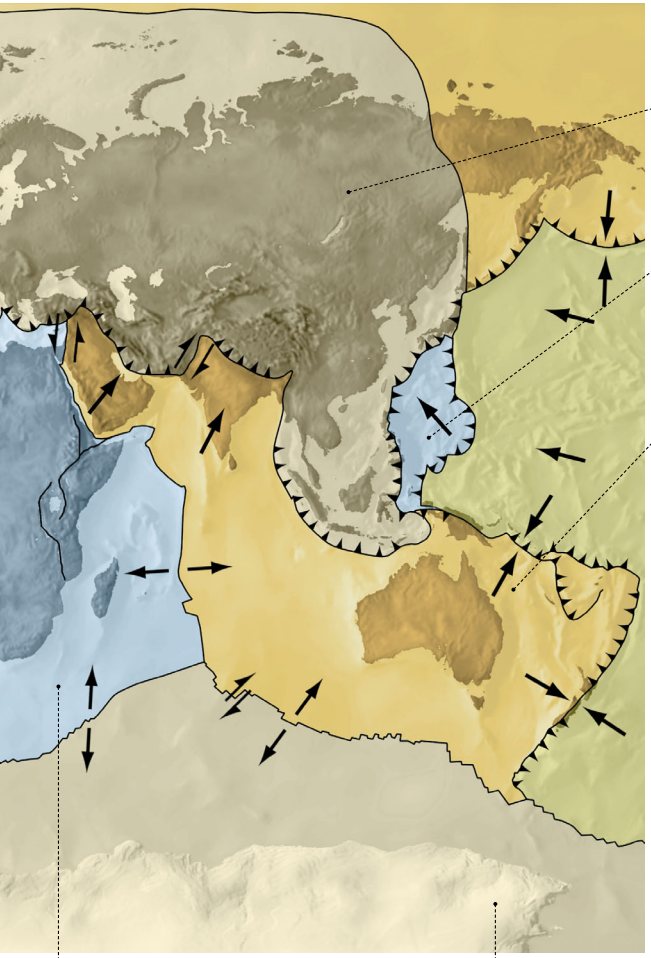
**Caribbean Plate**
Plate subducting under the American plates; the Caribbean Plate created the islands of the Lesser Antilles.

**Pacific Plate**
The only entirely oceanic plate, it is also among the most rapidly shifting plates (4 in per year).

**Nazca Plate**
One of the most rapidly shifting plates, moving 3 in per year.

**Scotia Plate**
Small plate under which the Antarctic Plate and part of the South American Plate are sliding.

**South American Plate**
Plate that forms the Andes cordillera by means of subduction with the Nazca Plate.



**Eurasian Plate**
Plate converging with the Australian-Indian Plate; it created the Himalayas.

**Philippine Plate**
Plate that forms the Philippines archipelago by means of subduction with the Eurasian Plate.

**Australian-Indian Plate**
Plate that is moving north 3 in per year; it forms the Red Sea by means of divergence from the African Plate.

**subduction**
Phenomenon by which an oceanic plate slides under a continental plate or under another oceanic plate, resulting in a trench.

**transform plate boundaries**
Plates that slide against each other, triggering earthquakes along faults of the same name.

**convergent plate boundaries**
Plates that collide, triggering either subduction or folding, which results in the creation of mountains.

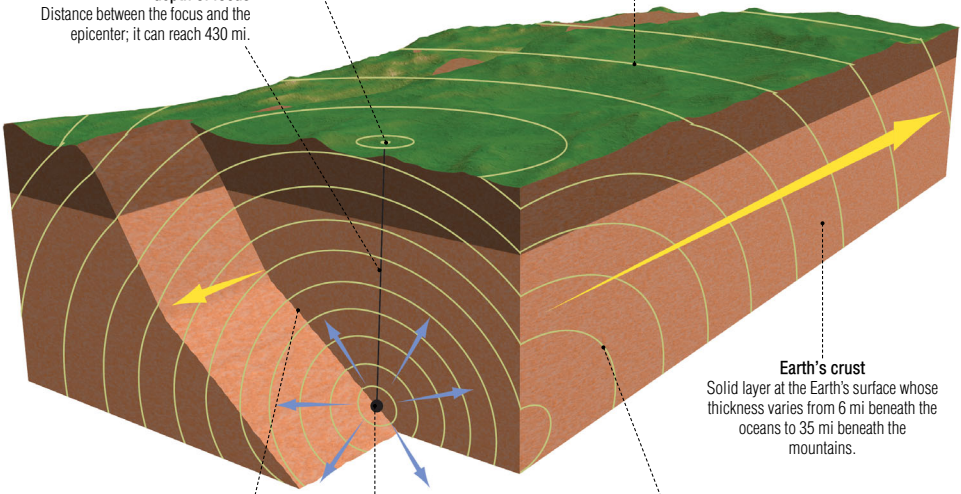
**divergent plate boundaries**
Plates that are moving apart, causing magma to appear, which solidifies to generate a new crust.

**African Plate**
Plate that, diverging from the South American Plate, forms an underwater mountain chain.

**Antarctic Plate**
The largest plate; it is stationary.

# earthquake

Sudden tremor in a region of the Earth's crust caused by one rock mass sliding against another.



**epicenter**
Point on the Earth's surface located directly over the focus, where the most violent tremors are felt.

**isoseismal line**
Curved line connecting the points on the Earth's surface that have been subject to tremors of the same intensity.

**depth of focus**
Distance between the focus and the epicenter; it can reach 430 mi.

**Earth's crust**
Solid layer at the Earth's surface whose thickness varies from 6 mi beneath the oceans to 35 mi beneath the mountains.

**fault**
Fracture in the Earth's crust separating two blocks that slide against one another during an earthquake.

**focus**
Point in the Earth's crust where an earthquake is triggered. Also called the hypocenter.

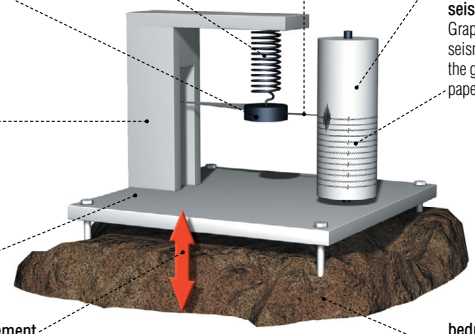
**seismic wave**
Vibrations generated at the focus that disperse in all directions, causing shaking of the Earth's surface.

## seismographs

Instruments that record seismic wave amplitude at a given point on the Earth's surface.

### vertical seismograph

Instrument that measures vertical ground movement.



**spring**
It keeps the mass from moving.

**mass**
Independent of ground movement, it remains stationary during an earthquake, thus serving as a reference for measuring the amplitude of tremors.

**pillar**
Very solid vertical support.

**stand**
Horizontal support that is secured to the ground.

**vertical ground movement**

**pen**
Writing instrument that converts ground movement into a line.

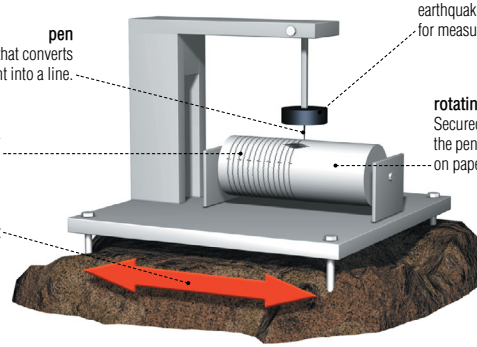
**rotating drum**
Secured to the ground, it rotates under the pen, recording ground movements on paper.

**seismogram**
Graphic representation produced by a seismograph; the stronger the tremors, the greater the oscillations on the paper.

**bedrock**
Extremely hard rock mass joined with the subsoil.

### horizontal seismograph

Instrument used to measure horizontal ground movements.



**pen**
Writing instrument that converts ground movement into a line.

**seismogram**
Graphic representation produced by a seismograph; the stronger the tremors, the greater the oscillations on the paper.

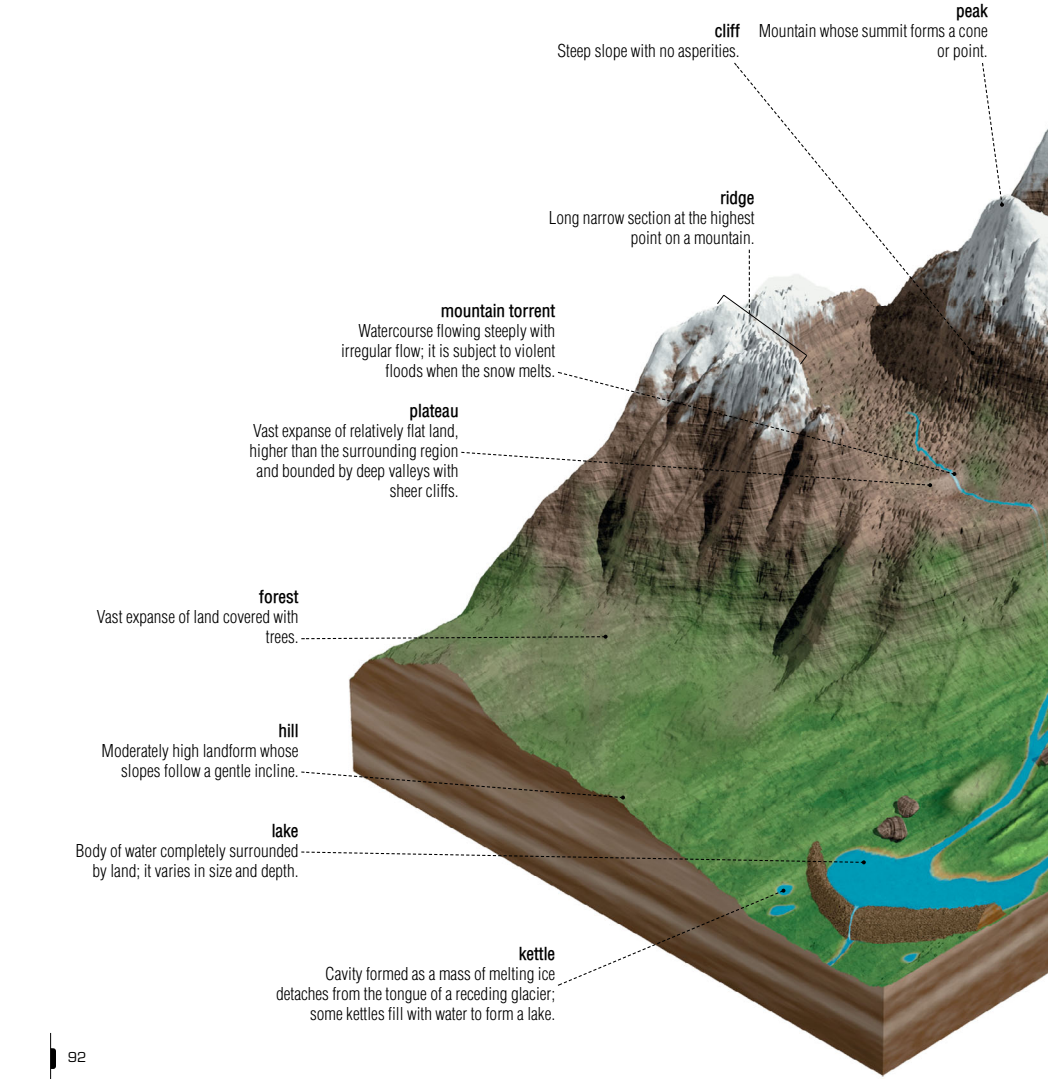
**horizontal ground movement**

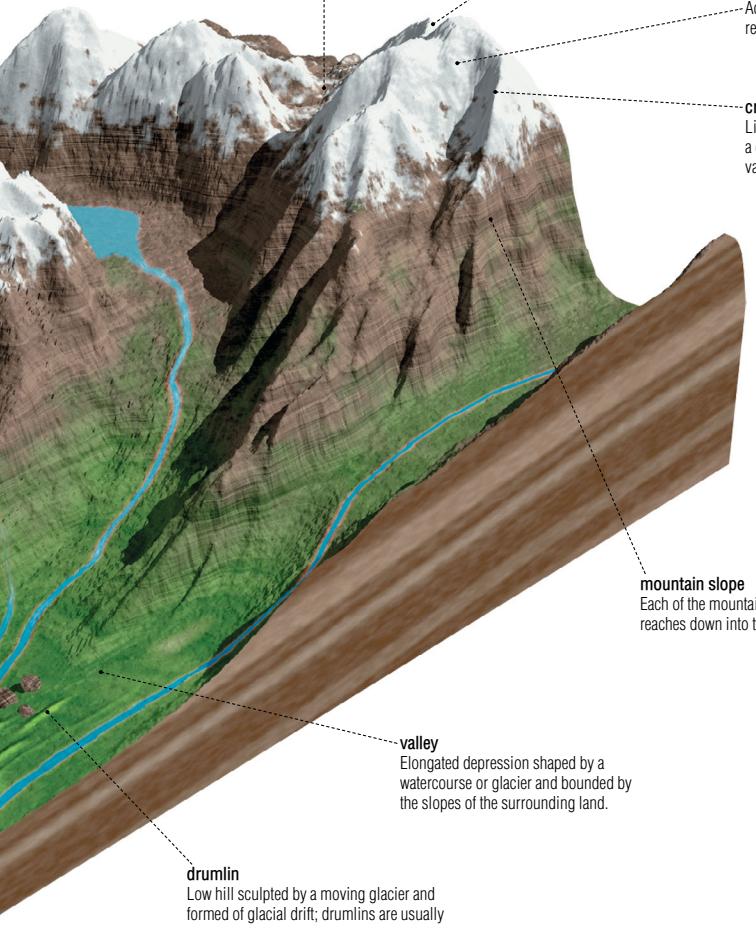
**mass**
Independent of ground movement, it remains stationary during an earthquake, thus serving as a reference for measuring the amplitude of tremors.

**rotating drum**
Secured to the ground, it rotates under the pen, recording ground movements on paper.

# mountain

Elevated landform characterized by steep slopes; it is usually part of a chain.





**spur**
A lower mountain chain bordering a principal chain.

**pass**
Depression in a mountain landscape that creates a passage.

**summit**
The highest point on the mountain.

**perpetual snows**
Accumulations of snow on the highest reaches of a mountain that never melt.

**crest**
Line intersecting two mountain slopes; a crest can run all the way into the valley.

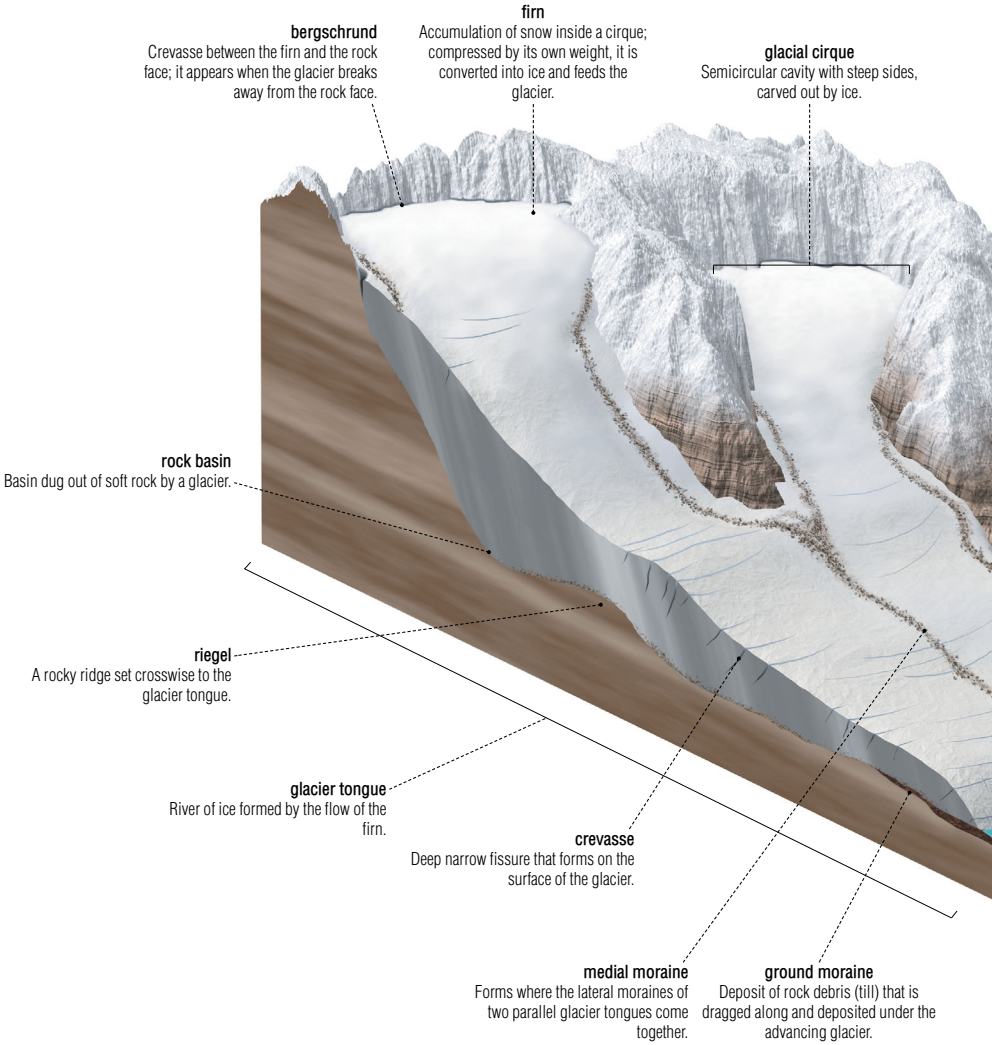
**mountain slope**
Each of the mountain faces that reaches down into the valley.

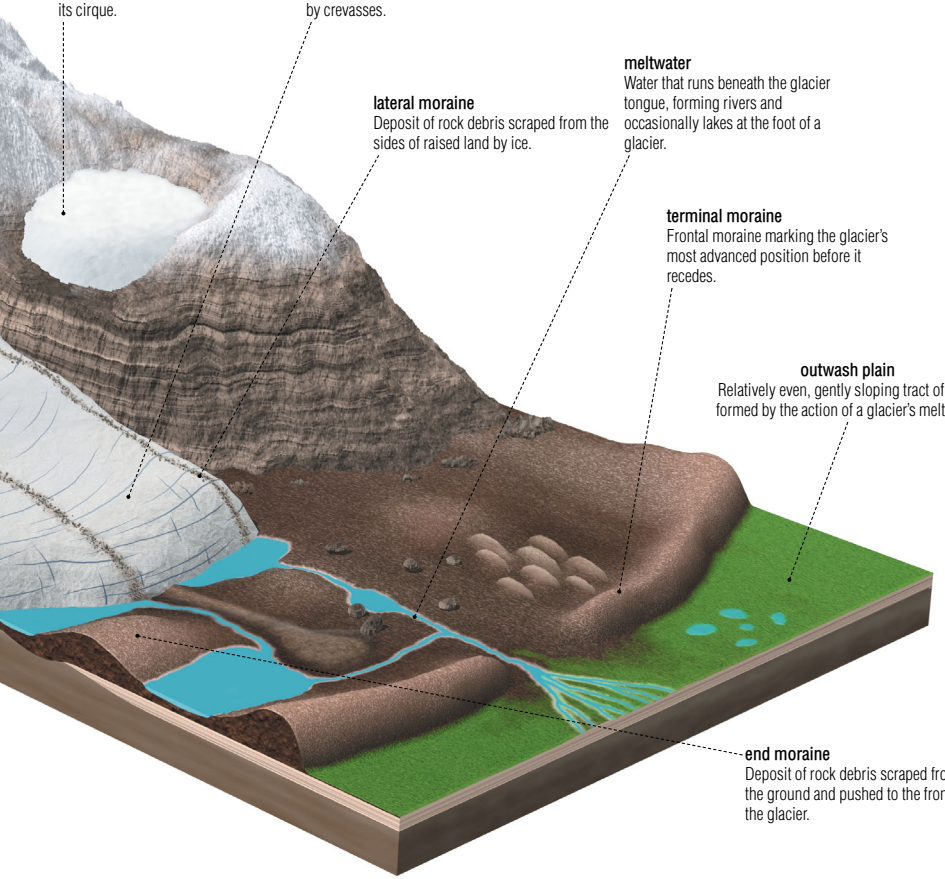
**valley**
Elongated depression shaped by a watercourse or glacier and bounded by the slopes of the surrounding land.

**drumlin**
Low hill sculpted by a moving glacier and formed of glacial drift; drumlins are usually found in parallel groupings.

# glacier

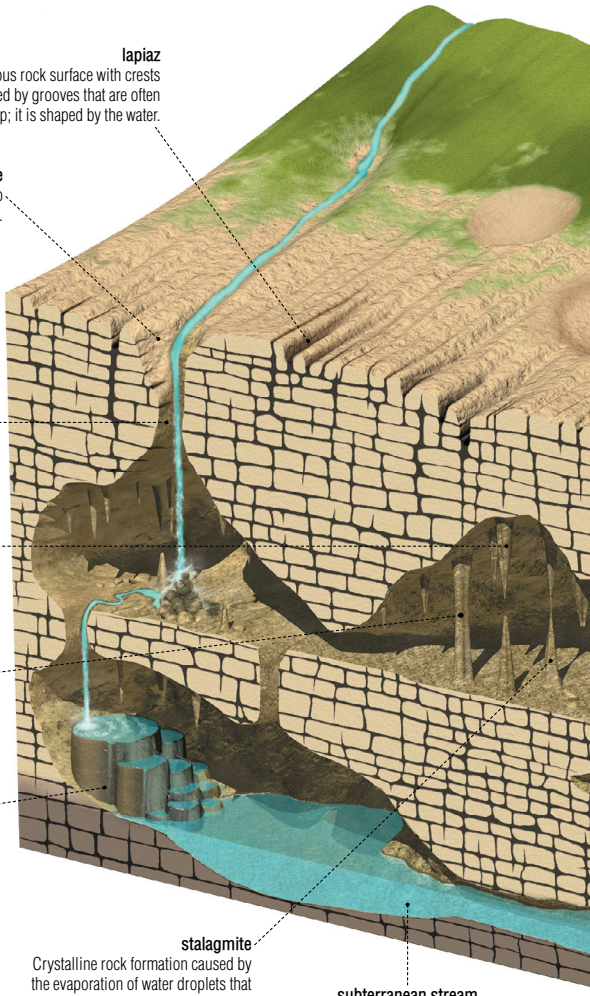
Mass of ice resulting from the accumulation and compression of snow; it moves under its own weight.




hanging glacier
Glacier with no tongue that remains in its cirque.
serac
Chaotic mass of unstable ice bordered by crevasses.
lateral moraine
Deposit of rock debris scraped from the sides of raised land by ice.
meltwater
Water that runs beneath the glacier tongue, forming rivers and occasionally lakes at the foot of a glacier.
terminal moraine
Frontal moraine marking the glacier's most advanced position before it recedes.
outwash plain
Relatively even, gently sloping tract of land, formed by the action of a glacier's meltwater.
end moraine
Deposit of rock debris scraped from the ground and pushed to the front of the glacier.

# cave

Natural underground cavity that results from the slow dissolution and erosion of rock by water.



**lapiaz**
Calcareous rock surface with crests separated by grooves that are often deep; it is shaped by the water.

**pothole**
Natural well connecting a sinkhole to an underground swallow hole.

**swallow hole**
Deep hole connecting the ground surface to an underground gallery; it is caused by the collapse of the cave's vault.

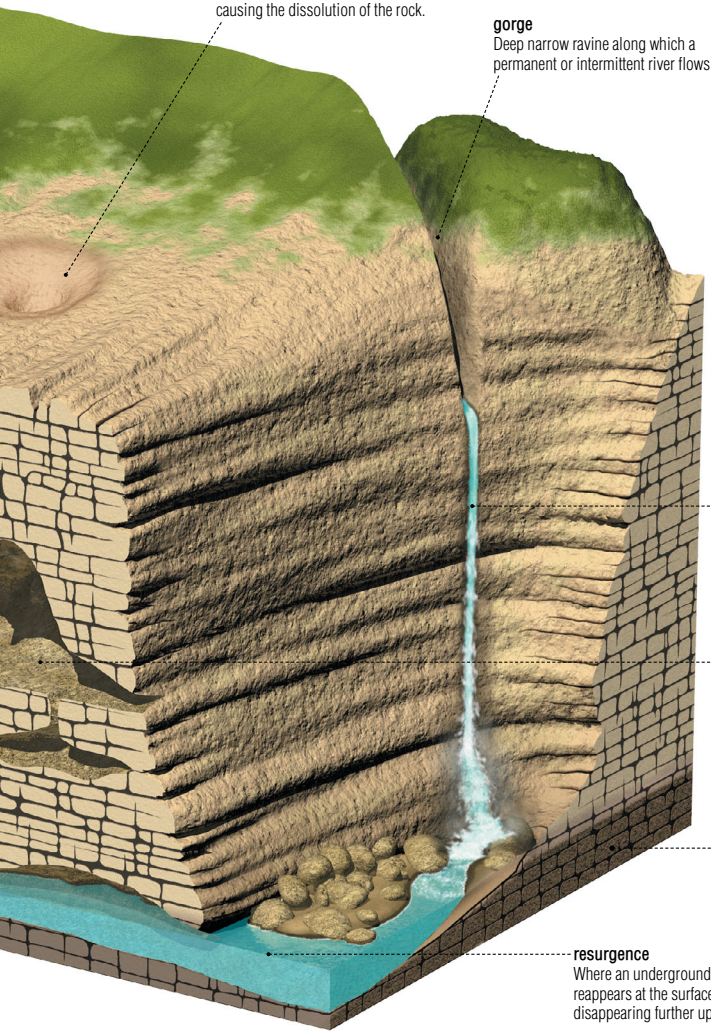
**stalactite**
Crystalline rock formation caused by the partial evaporation of water droplets from the vault of the cave.

**column**
Crystalline rock formation that results when a stalactite meets a stalagmite.

**gour**
Small basins hollowed out by water.

**stalagmite**
Crystalline rock formation caused by the evaporation of water droplets that fall on the floor of the cave.

**subterranean stream**
Watercourse that flows through underground cavities.



**sinkhole**
Basin formed by continuous water infiltration into calcareous rock, causing the dissolution of the rock.

**gorge**
Deep narrow ravine along which a permanent or intermittent river flows.

**waterfall**
Almost vertical flow of a watercourse, caused by a sudden change in the level of its bed.

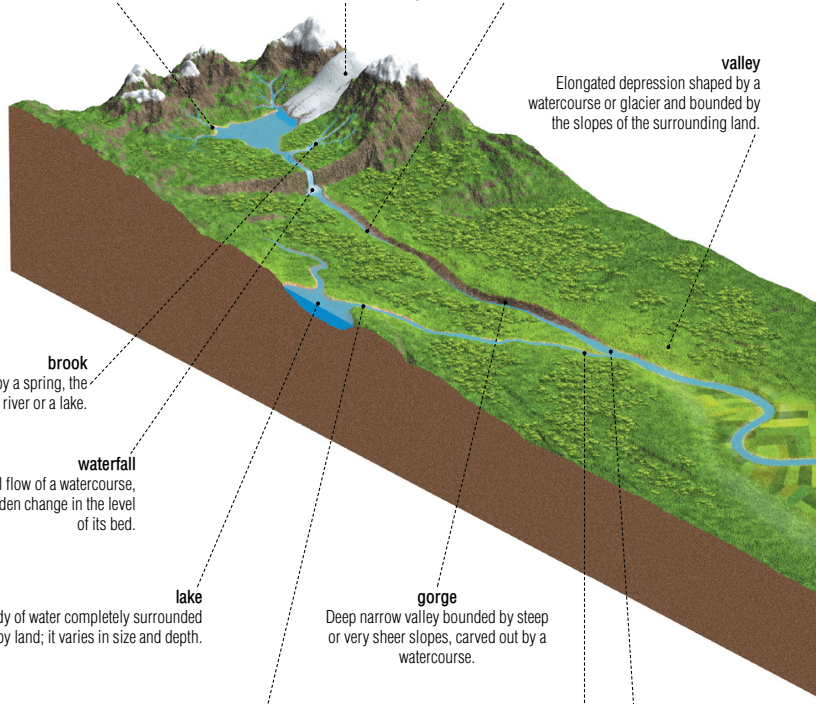
**dry gallery**
Underground corridor that forms when the water table drops.

**water table**
Vast expanse of underground water fed by rainwater filtering through the earth; it supplies springs and can be collected in wells.

**resurgence**
Where an underground watercourse reappears at the surface after disappearing further upstream.

# watercourse

Natural flow of water that varies in size, depending on the ground slope and the number of tributaries.



**spring**
Point where underground water rises to the surface; it may be the source of a watercourse.

**glacier**
Mass of ice resulting from the accumulation and compression of snow; it moves under its own weight.

**river**
Natural watercourse of minor or intermediate size that empties into another watercourse.

**valley**
Elongated depression shaped by a watercourse or glacier and bounded by the slopes of the surrounding land.

**brook**
Small watercourse fed by a spring, the tributary of a river or a lake.

**waterfall**
Almost vertical flow of a watercourse, caused by a sudden change in the level of its bed.

**lake**
Body of water completely surrounded by land; it varies in size and depth.

**gorge**
Deep narrow valley bounded by steep or very sheer slopes, carved out by a watercourse.

**effluent**
Watercourse from a lake or glacier.

**affluent**
Watercourse that flows into a larger watercourse or a lake.

**confluent**
Point where two or more watercourses meet.

**river**
Major watercourse fed by numerous smaller rivers; it empties into the sea.

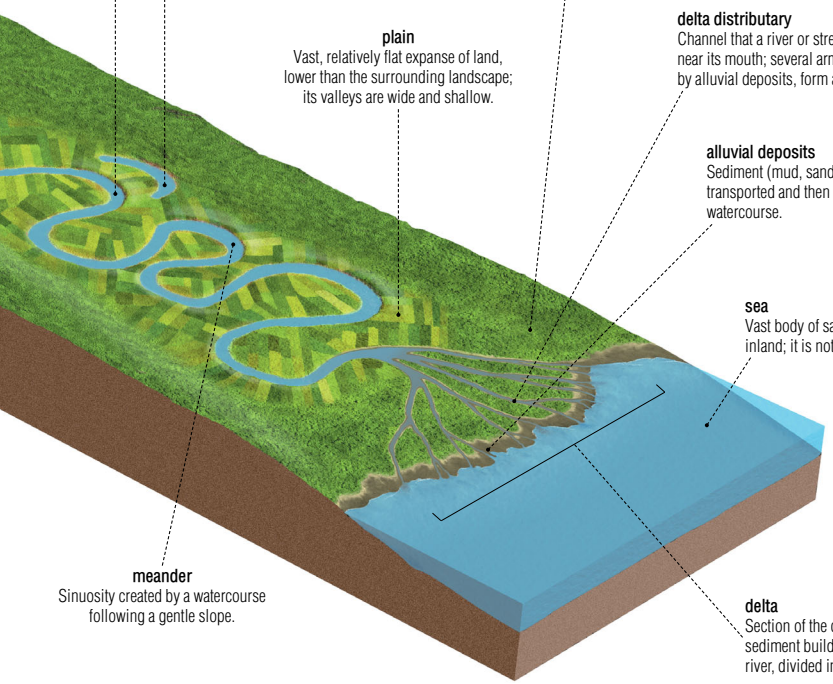
**oxbow**
Meander left behind by the watercourse, forming a crescent-shaped lake.

**floodplain**
Level surface bordering a watercourse; it is subject to periodic flooding.

**plain**
Vast, relatively flat expanse of land, lower than the surrounding landscape; its valleys are wide and shallow.

**delta distributary**
Channel that a river or stream follows near its mouth; several arms, separated by alluvial deposits, form a delta.

**alluvial deposits**
Sediment (mud, sand, gravel, pebbles) transported and then deposited by a watercourse.



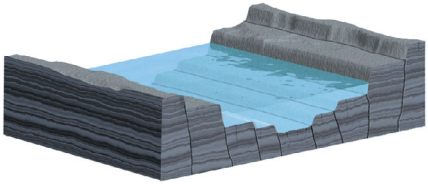
**sea**
Vast body of saltwater at some distance inland; it is not as deep as an ocean.

**meander**
Sinuosity created by a watercourse following a gentle slope.

**delta**
Section of the coastline where sediment builds up at the mouth of a river, divided into several arms.

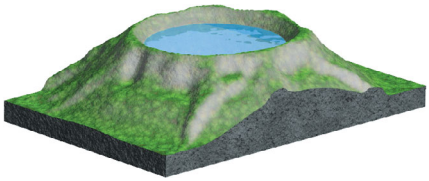
# lakes

Bodies of water varying in size and completely surrounded by land.

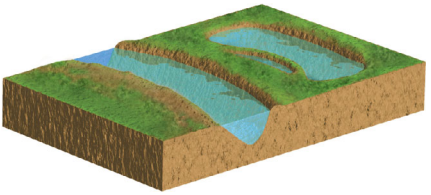


**tectonic lake**
Lake that occupies a natural basin resulting from a collapse of the Earth's crust.

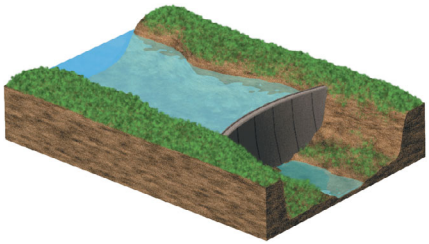
**glacial lake**
Lake that fills a basin dug out by a glacier, whose meltwater then forms the lake.



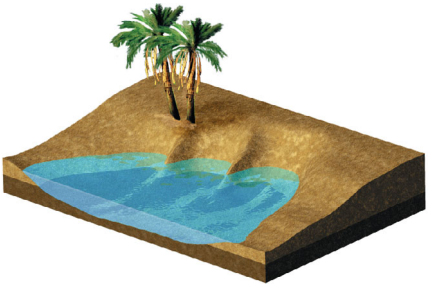
**volcanic lake**
Lake that fills the crater of an extinct volcano.



**oxbow lake**
Lake that occupies the oxbow of a watercourse.



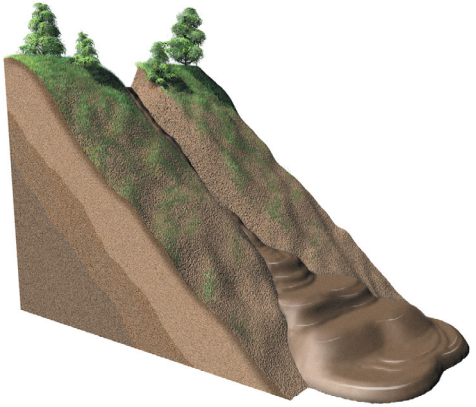
**artificial lake**
Lake created when a dam is built on a watercourse.



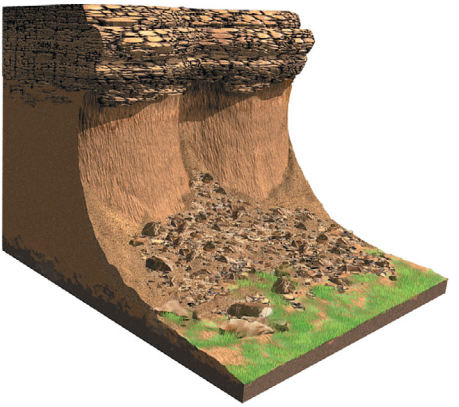
**oasis**
Desert zone made fertile by the presence of underground or surface water.

# landslides

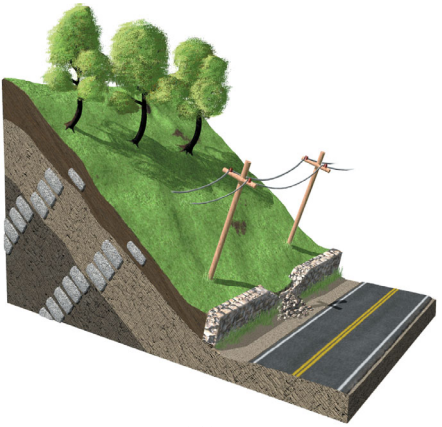
Ground movements that vary in speed, depending on the slope's gradient, the nature of the soil and what triggers it.



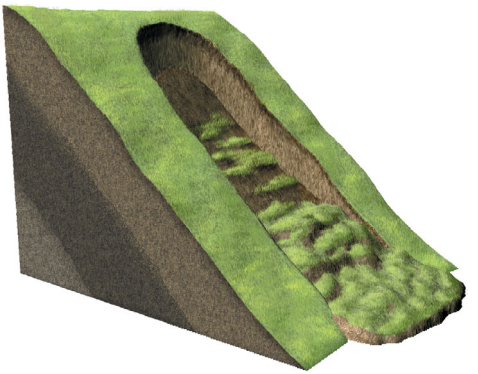
**mudflow**
Sudden flow of mud along a slope; it occurs when torrential rains quickly saturate the soil.



**rockslide**
Rock mass that suddenly detaches and falls from the top of a steep slope; it is caused by freeze-thaw action or by gravity.



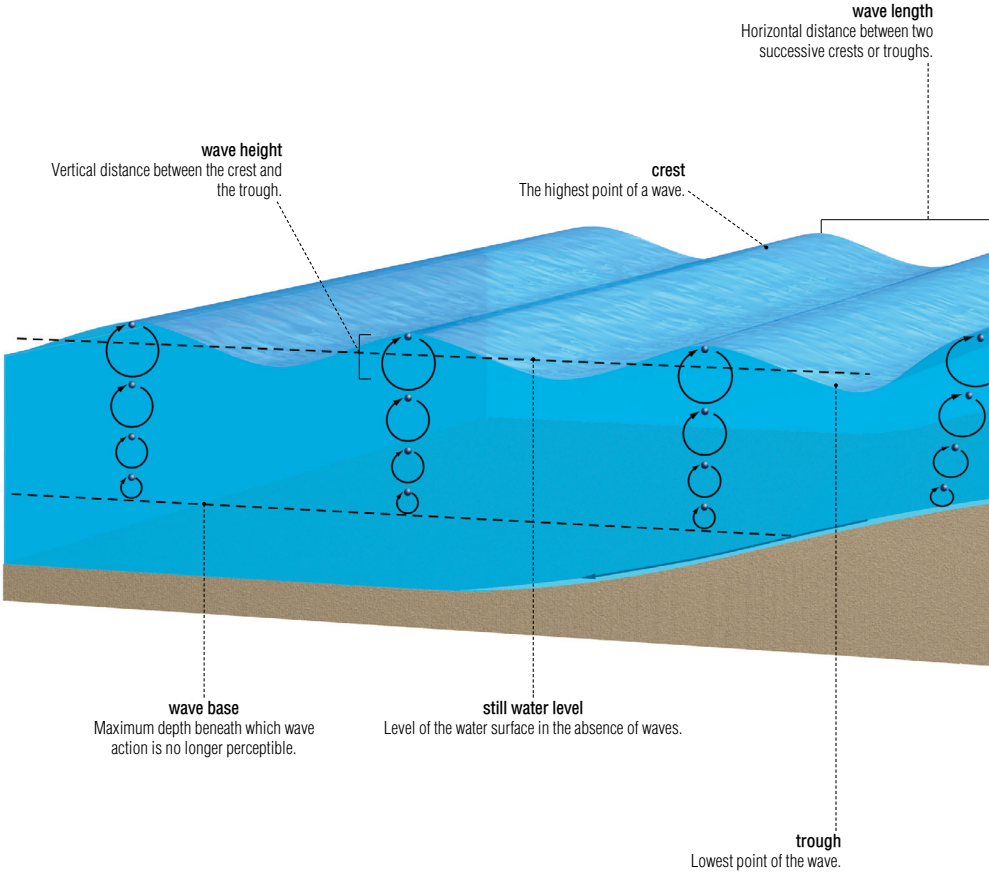
**creep**
Very slow, imperceptible movement of earth along a slope, caused mainly by alternating wet and dry periods.

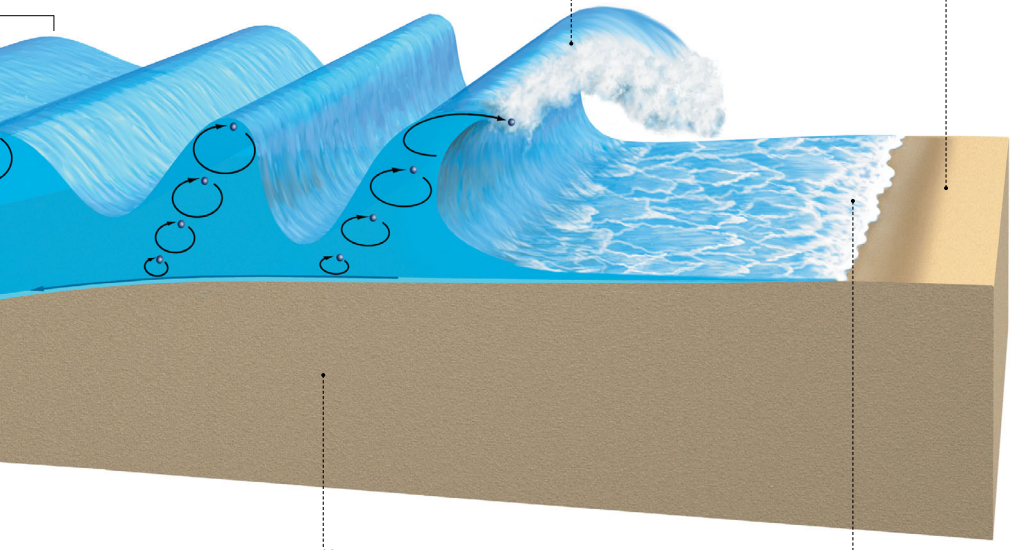


**earthflow**
The upper section of a sloping water-soaked terrain that collapses, forming a tongue of land the length of the slope.

# wave

Undulation caused by the wind on the surface of a sea or lake.





**breaker**
High wave that breaks on the coast.

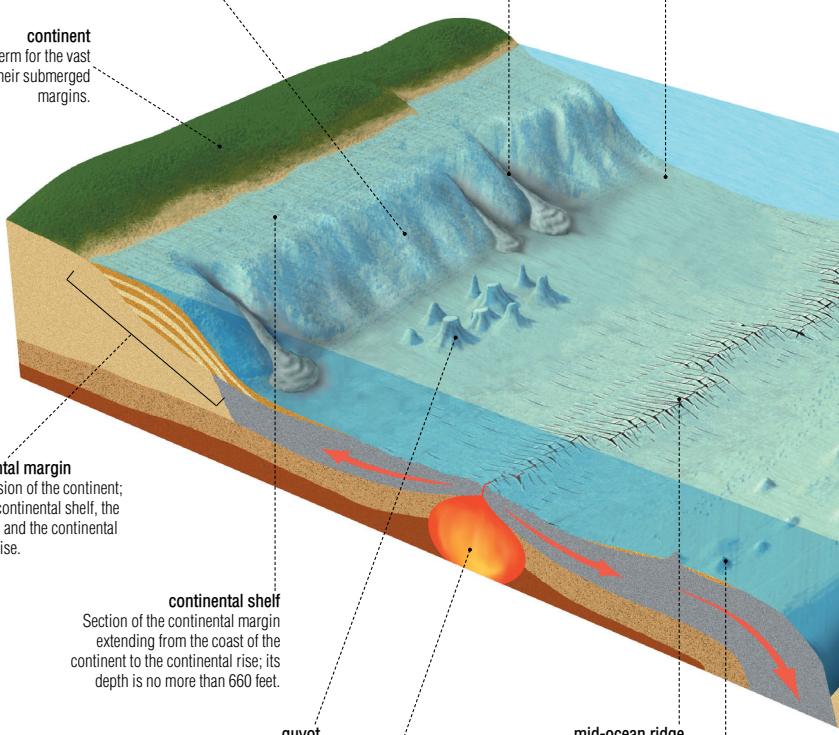
**shore**
Strip of land where the sea meets the land.

**sand bar**
Accumulation of sediment at the bottom of the sea, close to the shoreline; it is sometimes exposed at low tide.

**foam**
Whitish froth that forms on the water surface when a wave breaks.

# ocean floor

Part of the Earth's surface beneath the seas and the oceans; its topography is highly variable.



**continental slope**
Slope of a few degrees that extends from the continental shelf; it is 660 to 6,600 feet deep.

**submarine canyon**
Deep valley that is frequently the extension of a river; it ends in a sediment buildup.

**continental rise**
Gently sloping section of the continental margin; it connects the continental slope to the abyssal plain.

**continent**
A collective term for the vast landmasses and their submerged margins.

**continental margin**
Underwater extension of the continent; it comprises the continental shelf, the continental slope and the continental rise.

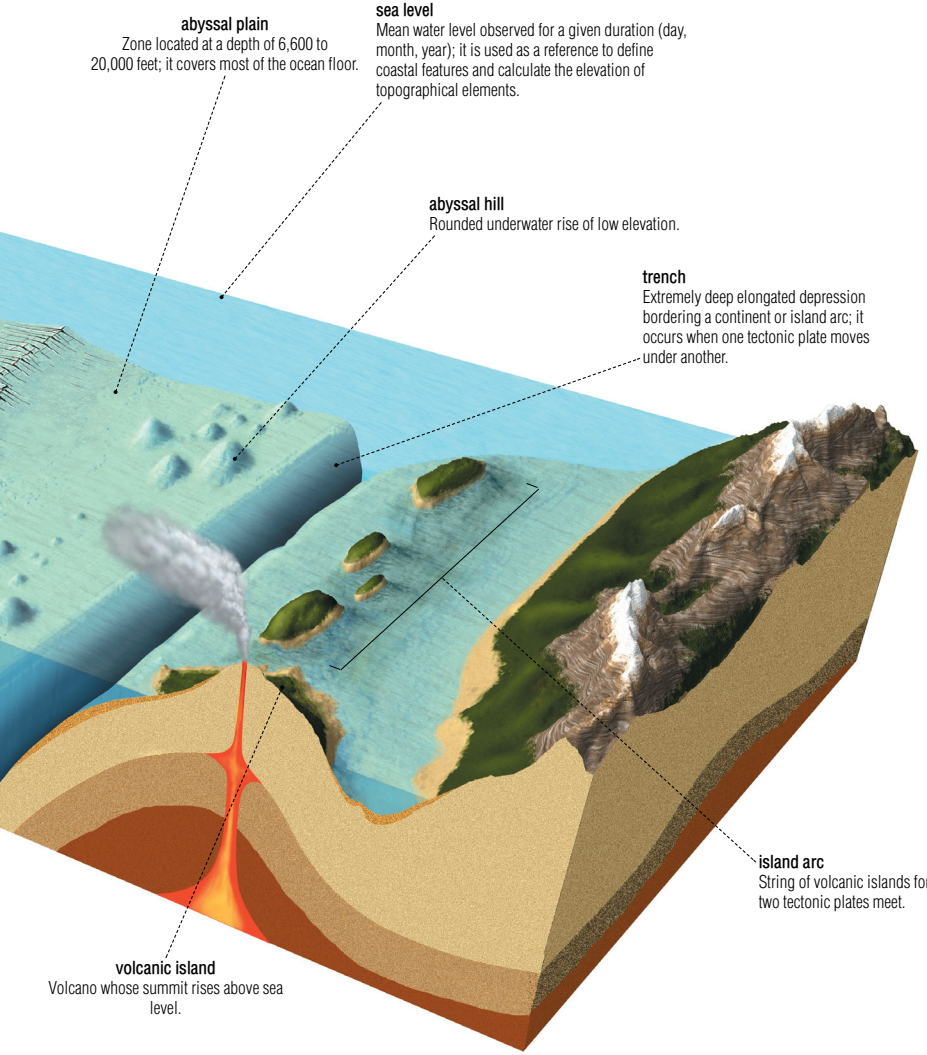
**continental shelf**
Section of the continental margin extending from the coast of the continent to the continental rise; its depth is no more than 660 feet.

**guyot**
Ancient volcano whose summit has been cut off by erosion and then submerged.

**mid-ocean ridge**
Group of underwater mountain chains criss-crossing the oceans; it is formed by an outpouring of magma.

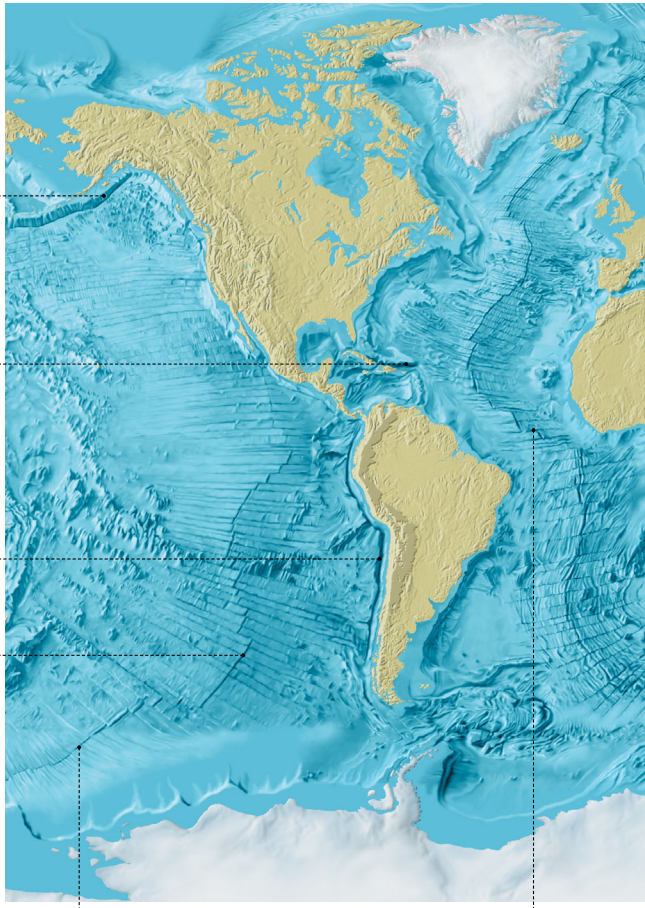
**magma**
Molten rock and gas under very high pressure that can reach extremely high temperatures.

**seamount**
Isolated mountain of volcanic origin featuring a pointed summit.


abyssal plain
Zone located at a depth of 6,600 to 20,000 feet; it covers most of the ocean floor.
sea level
Mean water level observed for a given duration (day, month, year); it is used as a reference to define coastal features and calculate the elevation of topographical elements.
abyssal hill
Rounded underwater rise of low elevation.
trench
Extremely deep elongated depression bordering a continent or island arc; it occurs when one tectonic plate moves under another.
island arc
String of volcanic islands formed when two tectonic plates meet.
volcanic island
Volcano whose summit rises above sea level.

# ocean trenches and ridges

Trench: very deep, elongated cavity bordering a continent or an island arc; it forms when one tectonic plate slides beneath another. Ridge: underwater mountain range that criss-crosses the oceans and is formed by rising magma in a zone where two plates are moving apart.



**Aleutian Trench**
Trench (25,600 feet) extending from Alaska to the Kamchatka Peninsula; it results from the Pacific Plate sliding beneath the North American Plate.

**Puerto Rico Trench**
Trench located off the coast of Puerto Rico, on the boundary between the South American and Caribbean plates; it features the deepest point in the Atlantic Ocean (27,493 feet).

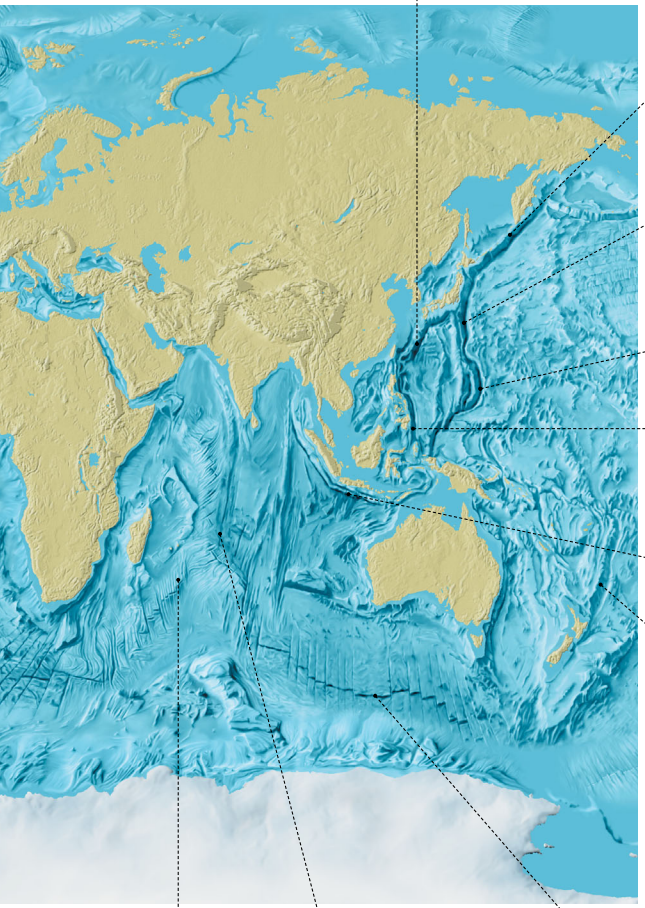
**Peru-Chile Trench**
Trench (26,460 feet) bordering South America; the world's longest trench (3,700 mi), it is located on the boundary between the Nazca Plate and the South American Plate.

**East Pacific Rise**
Ridge that marks the boundary between the Pacific and Cocos Islands plates to the north, and the Pacific and Nazca plates to the south.

**Pacific-Antarctic Ridge**
Mountain range separating the Pacific and Antarctic plates; it joins the eastern Pacific Ridge off the coast of South America.

**Mid-Atlantic Ridge**
Ridge about 7,000 mi long, located in the middle of the Atlantic Ocean; some of its mountains reach the surface, forming islands such as Iceland.

**Ryukyu Trench**
Trench (24,629 feet) located near the Ryukyu Islands; it marks the boundary between the Philippine Plate and the Eurasian Plate.



**Kuril Trench**
Trench (34,587 feet) located northeast of Japan; it results from the Pacific Plate sliding beneath the Eurasian Plate.

**Japan Trench**
Trench (27,929 feet) located east of Japan, on the boundary between the Pacific Plate and the Eurasian Plate; this zone is marked by intense seismic activity.

**Mariana Trench**
Cavity located near the Mariana Islands, where the Pacific Plate and the Philippine Plate converge; it is the world's deepest trench (about 36,000 feet).

**Philippine Trench**
Trench bordering the eastern Philippines, reaching depths of 34,578 feet; it results from the Philippine Plate sinking beneath the Eurasian Plate.

**Java Trench**
Trench located south of Indonesia, between the Australian-Indian and the Eurasian Plates; it is the deepest point in the Indian Ocean (24,440 ft).

**Kermadec-Tonga Trench**
Cavity located north of New Zealand, where the Pacific Plate meets the Australian-Indian Plate; it reaches depths of 35,702 feet.

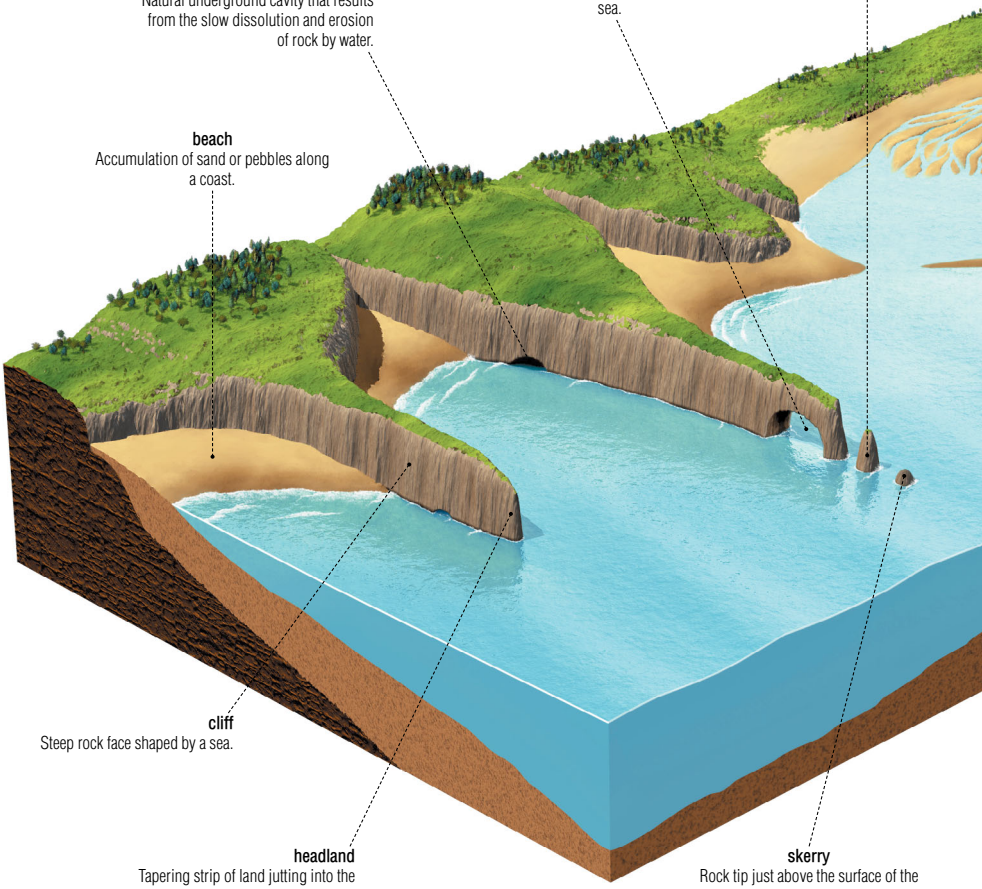
**Southwest Indian Ridge**
Ridge separating the African and Antarctic plates; it joins the Mid-Indian and Southeast Indian ridges off the coast of Madagascar.

**Mid-Indian Ridge**
Mountain range in the middle of the Indian Ocean that separates the African and Australian-Indian plates.

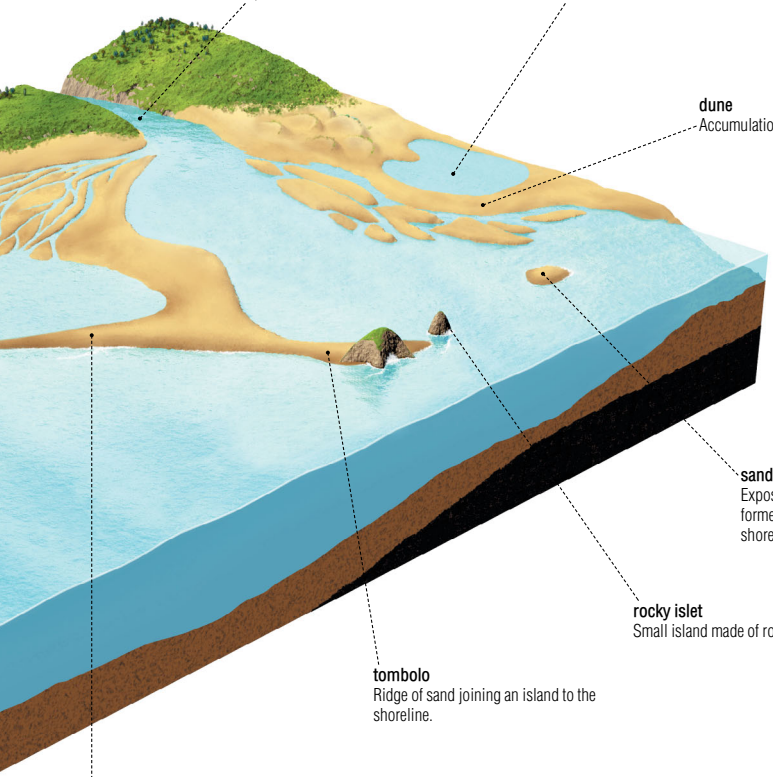
**Southeast Indian Ridge**
Ridge separating the Antarctic Plate from the Australian-Indian Plate; its topography is more regular than the topography of the Southwest Indian and Mid-Indian ridges.

# common coastal features

Area where the land meets the sea; its features vary depending on climate, wind, sea and the type of rocks of which it is composed.



## common coastal features



**river estuary**
Mouth of a river that is influenced by the tides; it forms an indentation in the coastline that varies in width and depth.

**lagoon**
Shallow expanse of seawater separated from the sea by a ridge of sand or a barrier island.

**dune**
Accumulation of sand shaped by the wind.

**sand island**
Exposed summit of a sand deposit formed near or occasionally far from a shoreline.

**rocky islet**
Small island made of rock.

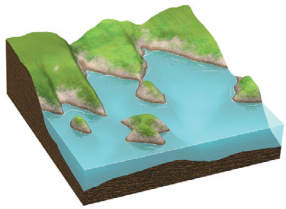
**tombolo**
Ridge of sand joining an island to the shoreline.

**spit**
Elongated ridge of sand or pebbles extending into the water.

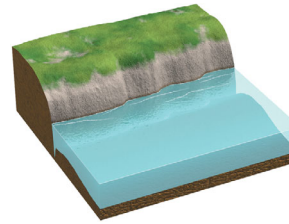
# common coastal features

## examples of shorelines

Shoreline: strip of land where the sea meets the land.

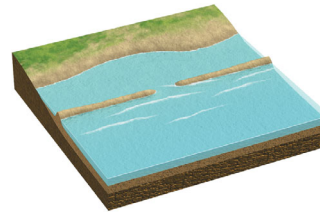


**rias**
Shoreline whose ancient coastal valleys have been filled by the sea.



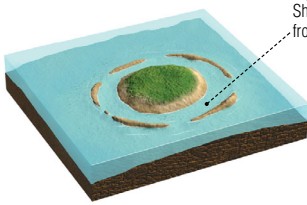
**shore cliff**
Steep rock-faced shoreline shaped by the sea.

**delta**
Section of the coastline where sediment builds up at the mouth of a river, divided into several arms.

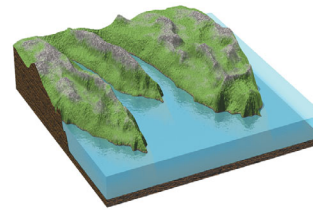


**barrier beach**
Usually narrow ridge of sand or pebbles bordering the shoreline.

**lagoon**
Shallow expanse of water separated from the sea by a coral reef.



**atoll**
Ring-shaped coral-reef island enclosing a lagoon and often a central island.



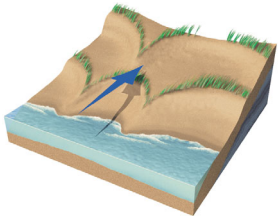
**fjords**
Deep glacial valleys filled with seawater and cutting into the shoreline.

# desert

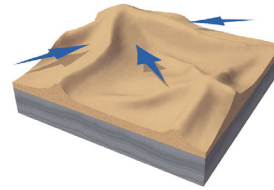
Hot region where aridity (less than 4 in of annual rainfall) is such that plant and animal life is almost nonexistent.

**examples of dunes**

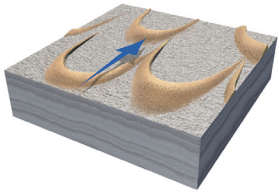
Dune: accumulation of sand transported by the wind, found in deserts and along coasts.



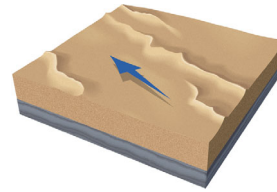
**parabolic dune**
Crescent-shaped coastal dune whose arms point into the wind; vegetation often keeps it in place.



**complex dune**
Star-shaped dune that forms where winds blowing in various directions meet.

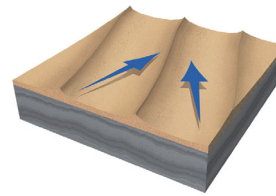


**crescentic dune**
Moving crescent-shaped dune whose arms extend in the same direction as the wind.



**chain of dunes**
Dunes aligned in the same direction, parallel to the wind.

**transverse dunes**
Dunes that form perpendicular to the direction of the wind.



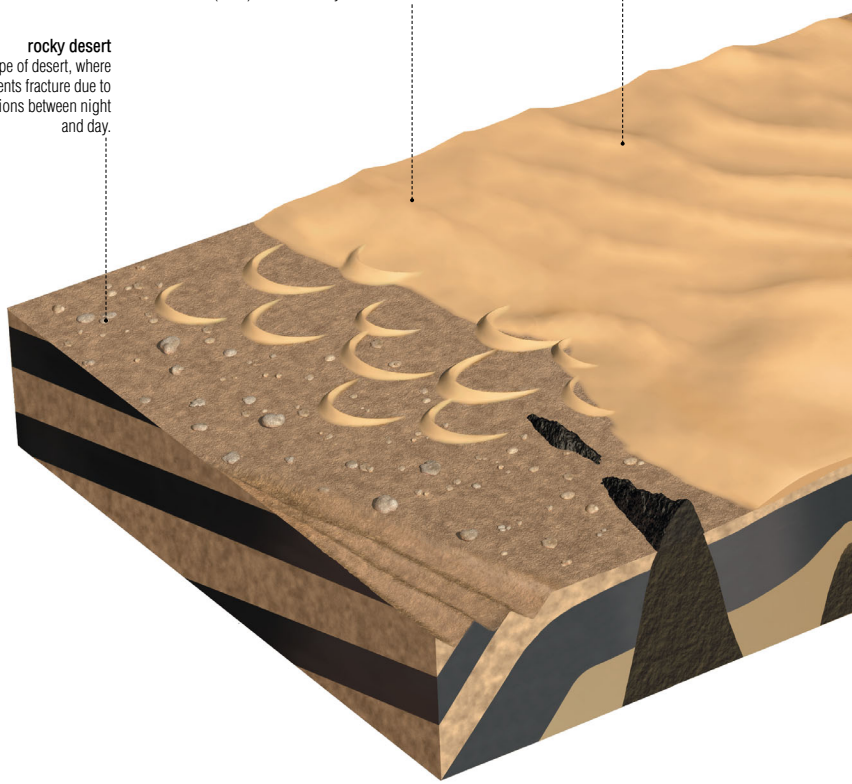
**longitudinal dunes**
Narrow elongated dunes that form when the wind blows in two convergent directions.

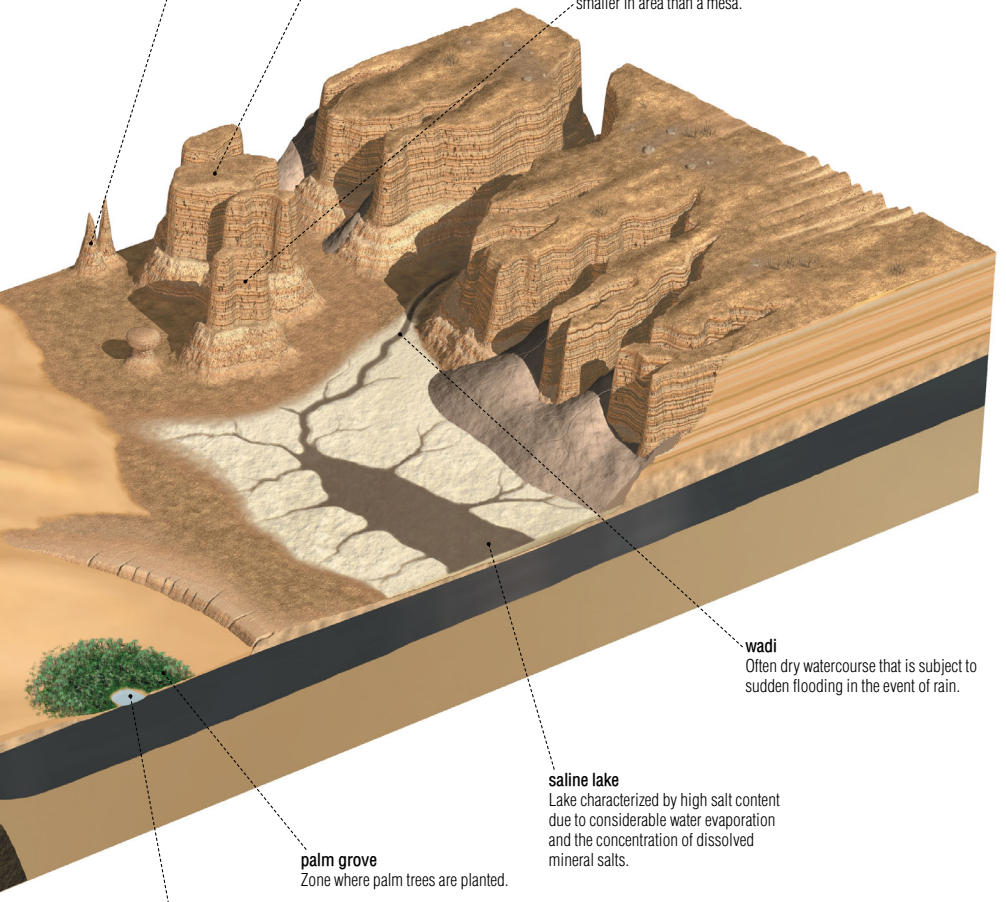
# desert

**dune**
Accumulation of sand transported by the wind, found in deserts and along coasts.

**sandy desert**
Desert where minuscule grains of rock (sand) form dunes by wind action.

**rocky desert**
Most common type of desert, where rock fragments fracture due to temperature variations between night and day.





**needle**
Tapering pointed column of rock shaped by the wind.

**mesa**
Isolated plateau with a flat summit and very steep sides; it features a layer of rock that is resistant to erosion.

**butte**
Rocky hill shaped by erosion, with steep sides and a flat summit; it is smaller in area than a mesa.

**wadi**
Often dry watercourse that is subject to sudden flooding in the event of rain.

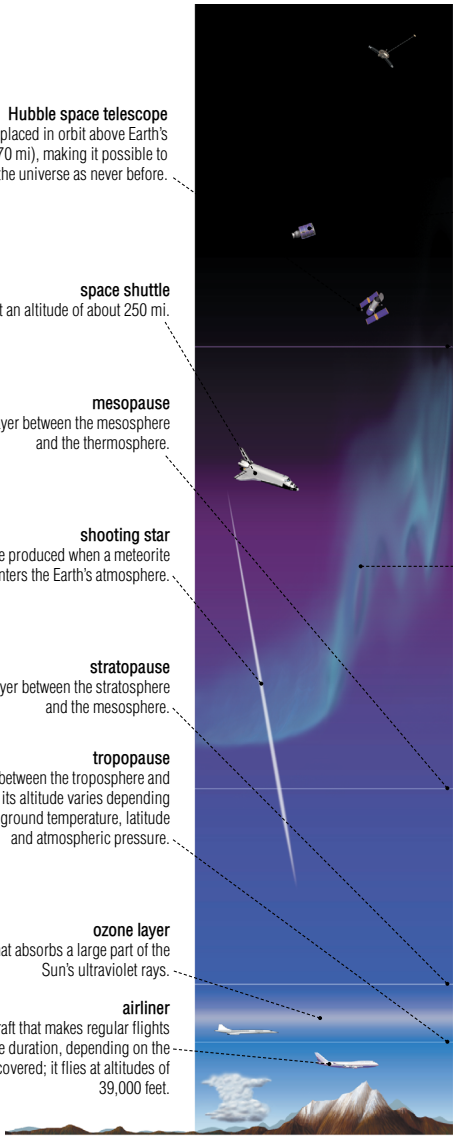
**saline lake**
Lake characterized by high salt content due to considerable water evaporation and the concentration of dissolved mineral salts.

**palm grove**
Zone where palm trees are planted.

**oasis**
Desert zone made fertile by the presence of underground or surface water.

# profile of the Earth's atmosphere

Atmosphere: layer of air that surrounds the Earth and is composed mainly of nitrogen (78%) and oxygen (21%); its density decreases with altitude.




**Hubble space telescope**
Telescope placed in orbit above Earth's atmosphere (370 mi), making it possible to observe the universe as never before.

**space shuttle**
It orbits at an altitude of about 250 mi.

**mesopause**
Thin transition layer between the mesosphere and the thermosphere.

**shooting star**
Luminous trace produced when a meteorite burns up as it enters the Earth's atmosphere.

**stratopause**
Thin transition layer between the stratosphere and the mesosphere.

**tropopause**
The boundary between the troposphere and the stratosphere; its altitude varies depending on the season, ground temperature, latitude and atmospheric pressure.

**ozone layer**
Layer of gas that absorbs a large part of the Sun's ultraviolet rays.

**airliner**
Commercial aircraft that makes regular flights of variable duration, depending on the distance covered; it flies at altitudes of 39,000 feet.

**exosphere**
The outermost region of the atmosphere, where low-density gases disperse into space.

**artificial satellite**
Observation spacecraft placed in orbit around the Earth.

**thermopause**
Thin transition layer between the thermosphere and the exosphere.

**thermosphere**
Layer that absorbs a large portion of solar radiation, leading to a steady increase in its temperature.

**polar lights**
Luminous phenomenon that occurs at high altitudes near the Earth's poles.

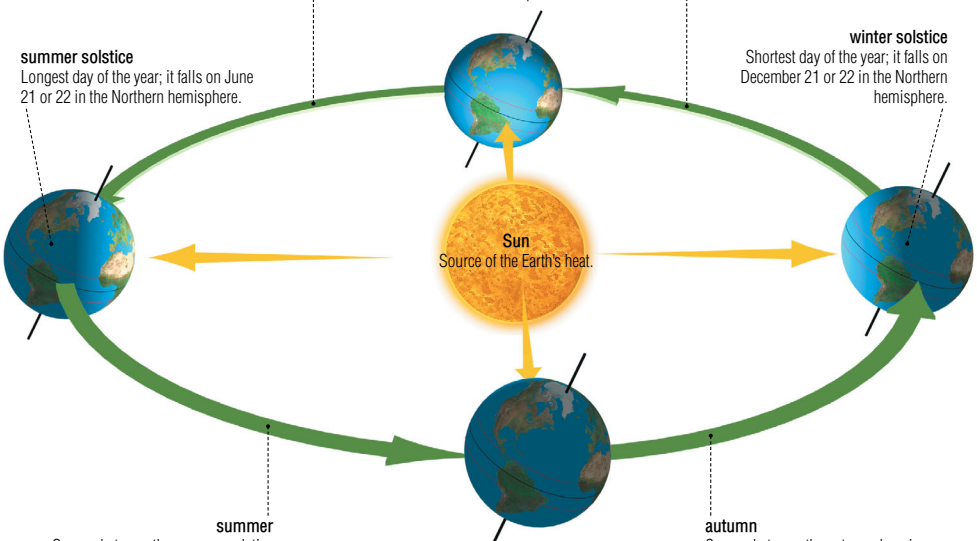
**mesosphere**
The atmosphere's coldest layer, where temperatures decrease with altitude.

**stratosphere**
Highly stable layer of air where temperatures increase with altitude due to the absorption of solar radiation by the ozone layer.

**troposphere**
The most dense layer, which produces most of the meteorological phenomena and where temperatures decrease with altitude.

# seasons of the year

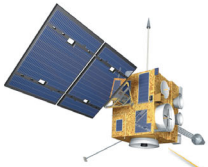
Periodic climate changes over the course of a year; they are a function of the Earth's inclination toward the Sun and its rotation around it.



# meteorological forecast

Scientific method that makes it possible to forecast atmospheric conditions in a particular region for a given period.

**weather satellite**
Observation spacecraft that studies the atmosphere and transmits data to Earth, making it possible to forecast the weather on the ground.



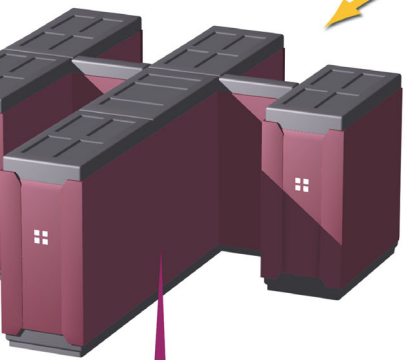
**aircraft weather station**
Aircraft equipped with meteorological observation instruments; it reports on the state of the atmosphere at various altitudes.

**buoy weather station**
Buoy equipped with an automatic weather station that transmits data about atmospheric conditions on the water.

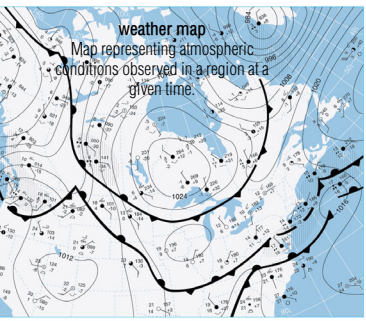
**ocean weather station**
Ship equipped with meteorological observation instruments that report on atmospheric conditions on the oceans.

**sounding balloon**
Pressurized balloon equipped with measurement instruments used to collect atmospheric data (up to an altitude of 20 mi), which it then transmits to the ground by radio signal.

**data processing**
Data from weather stations and satellites is centralized and processed with a view to forecasting weather and producing maps.

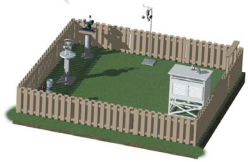


**weather radar**
Instrument that detects the presence and movement of clouds and precipitation.



**weather map**
Map representing atmospheric conditions observed in a region at a given time.

**land station**
Collective term for the facilities and instruments required to perform meteorological observations at ground level.



# weather map

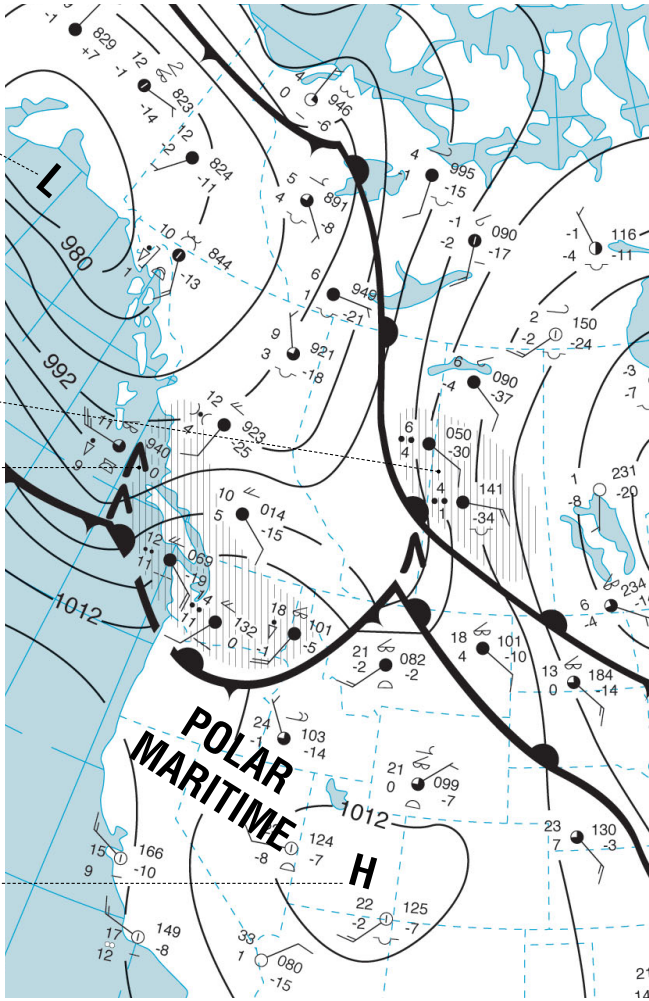
Map representing atmospheric conditions observed in a region at a given time.

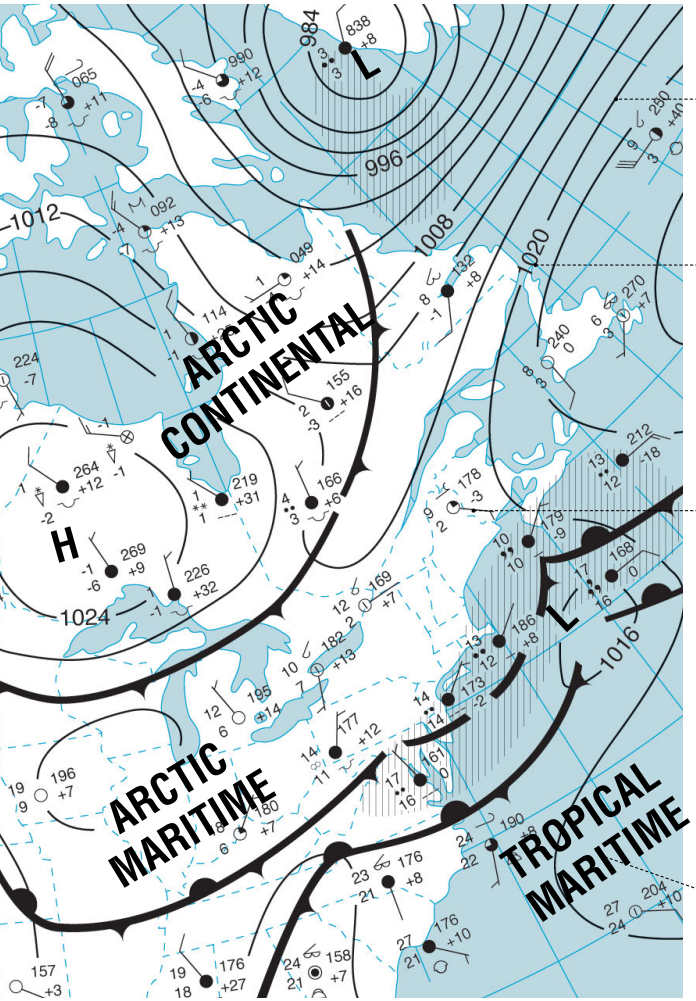
**low-pressure center**
Zone characterized by relatively low pressure that increases as a function of distance from its center.

**precipitation area**
Zone in which atmospheric water content condenses and falls from the clouds in liquid or solid form.

**trough**
Elongated zone in which atmospheric pressure is relatively low.

**high-pressure center**
Zone characterized by relatively high pressure that decreases as a function of the distance from its center.






**isobar**
Curve connecting the points on the Earth's surface that have the same atmospheric pressure.

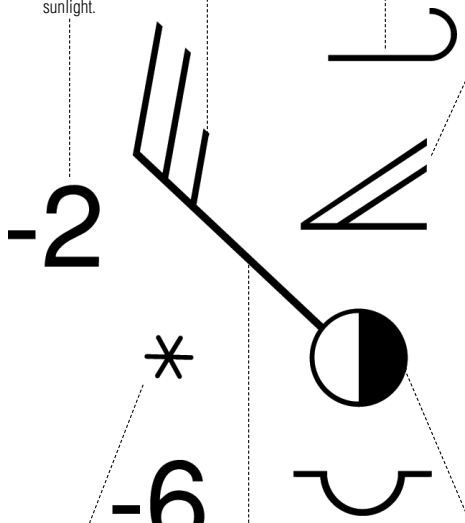
**barometric pressure**
Measurement of the force that air exerts at a given point on the Earth's surface; it is expressed in millibars.

**wind direction and speed**

**type of the air mass**
Air mass: a vast moving body of air; it takes on the climatic characteristics of the region lying below it.

# station model

Method of representing information collected by an observation station on a weather map using symbols and numbers.




**wind speed**
Wind speed is indicated by barbs and pennants whose values must be added.

**air temperature**
Sensation of heat or cold (°F) measured using an open-air thermometer shielded from direct sunlight.

**type of high cloud**
Type of cloud observed at altitudes higher than 20,000 feet.

**type of middle cloud**
Type of cloud observed at altitudes between 6,500 and 20,000 feet.

**sea-level pressure**
Reference pressure that corresponds to the pressure observed at sea level; it is expressed in inches of mercury.

**barometric tendency**
Variation in atmospheric pressure during the three hours preceding observation.

**pressure change**
Positive or negative value that corresponds to the difference between the pressure reading and sea-level pressure; it is expressed in inches of mercury.

**sky coverage**
Proportion of the sky covered with cloud.

**type of low cloud**
Type of cloud observed between ground level and an altitude of 6,500 feet.

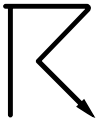
**present state of weather**
Type of precipitation (present weather) noted at the moment of observation.

**temperature of dew point**
Temperature (°F) at which water vapor in the air begins to condense; it is used to calculate humidity in the air.

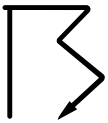
**wind direction**
Wind direction is indicated by the position of the wind shaft.

# international weather symbols

Standardized map symbols used to record observations from meteorological stations all over the world.



**thunderstorm**
Meteorological phenomenon manifested by lightning, thunder and gusts of wind, usually accompanied by rain showers or hail.



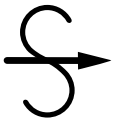
**heavy thunderstorm**
Storm with winds higher than 57 mph, hail or heavy rain.

**lightning**
Brief but intense luminous phenomenon caused by an electrical discharge between two clouds or between a cloud and the ground.

**tornado**
Swirling column of air that extends from the ground to the base of a cumulonimbus; it produces violent winds that can reach 300 mph.

**tropical storm**
Low-pressure zone accompanied by precipitation and winds between 37 and 74 mph.

**hurricane**
Tropical cyclone comprised of a low-pressure zone accompanied by violent precipitation and winds between 74 and 185 mph.



**sandstorm or dust storm**

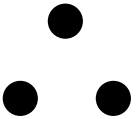
**present weather**
All atmospheric phenomena observed, with the exception of clouds; this includes forms of precipitation as well as optical and electrical phenomena.

**light intermittent rain**
Rain: precipitation of water droplets produced when the air temperature is higher than 32°F.

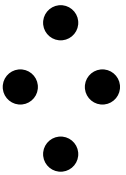
**moderate intermittent rain**

**heavy intermittent rain**

**light continuous rain**



**moderate continuous rain**



**heavy continuous rain**

# international weather symbols

**light intermittent drizzle**
Drizzle: uniform continuous precipitation of water droplets that fall very slowly and are between 0.008 and 0.02 in in diameter.

**light intermittent snow**
Snow: precipitation of ice crystals produced when the air temperature is lower than 32°F.

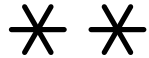
**moderate intermittent drizzle**

**moderate intermittent snow**

**thick intermittent drizzle**

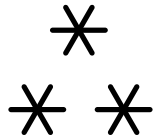
**heavy intermittent snow**

**light continuous drizzle**



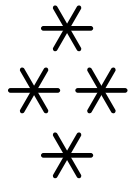
**light continuous snow**

**moderate continuous drizzle**



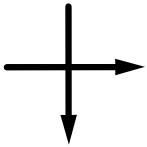
**moderate continuous snow**

**thick continuous drizzle**

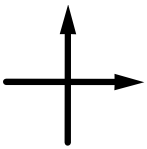


**heavy continuous snow**

**sleet**
Precipitation in the form of water droplets or wet snow that freezes before it touches the ground.



**drifting snow low**
Snow that the wind blows into drifts no higher than 6 feet.



**drifting snow high**
Snow that the wind blows into drifts higher than 6 feet.

**freezing rain**
Precipitation in the form of raindrops that freeze on impact with the ground or with objects, forming a layer of ice.

**snow shower**
Sudden abundant and short-lived precipitation of ice crystals produced when the air temperature is lower than 32°F.

**rain shower**
Sudden abundant and short-lived precipitation of water droplets produced when the air temperature is higher than 32°F.

**mist**
Light fog that does not limit visibility to 0.6 mi.

**fog**
Condensation of water vapor resulting in the suspension of microscopic droplets that reduce visibility to less than 0.6 mi.

**haze**
Mist composed of minuscule particles of dust, smoke, sand and other impurities; it gives the air a murky quality.

**smoke**
Solid or liquid particles suspended in the air; they are produced by various forms of combustion.

**hail shower**
Sudden abundant and short-lived precipitation of solid ice, usually in the form of pellets that vary from 0.2 to 2 in in diameter.

**squall**
Sudden and short-lived increase in wind speed often accompanied by showers and thunderstorms.

# international weather symbols

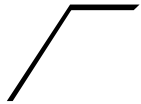
## wind

Displacement of air caused by variations in pressure between two regions of the atmosphere.

**wind arrow**
Symbol that uses the position of the shaft to indicate wind direction and the number of barbs and pennants to indicate wind speed.

**calm**
Symbol indicating the absence of wind.

**shaft**
Symbol of a wind blowing at a speed lower than 3 mph.



**barb**
Symbol of a wind blowing between 9 and 14 mph.

**half barb**
Symbol of a wind blowing between 3 and 8 mph.

**pennant**
Symbol of a wind blowing between 55 and 60 mph.

## fronts

Contact surface between two air masses with different temperatures and pressure.

**upper cold front**
Front of a cold air mass that does not touch the Earth's surface and slides over a colder air mass.

**surface cold front**
Front consisting of a cold air mass that touches the ground and displays a warm air mass.

**surface warm front**
Front consisting of a warm air mass that touches the ground and displays a cold air mass.

**occluded front**
A composite front that forms when a cold front overtakes a warm front, which it pushes to a higher altitude before joining another cold front.

**upper warm front**
Front consisting of a warm air mass that does not touch the ground and slides over a colder air mass.

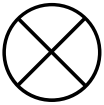
**stationary front**
Front that moves very slowly owing to the parallel movement of hot and cold air masses.

## sky coverage

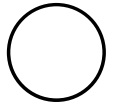
Proportion of the sky covered with cloud.

**cloudy sky**

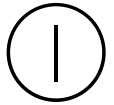
**overcast sky**



**obscured sky**



**cloudless sky**



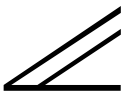
**clear sky**

## clouds

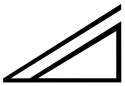
Fine droplets of water or ice crystal suspended in the atmosphere; the World Meteorological Organization classifies them according to 10 types.

**cumulonimbus**
Very imposing cloud that can reach a thickness of 6 mi and whose base is very dark; it can trigger violent precipitation.

**stratocumulus**
Gray and white cloud arranged in more or less continuous rolled layers; it does not usually trigger precipitation.



**altostratus**
Gray sheet that can completely cover the sky but allows the Sun to be seen without a halo phenomenon; it can trigger heavy precipitation.



**nimbostratus**
Cloud in the form of a dark layer sufficiently thick to block out the Sun; it triggers continuous precipitation.

**altocumulus**
Cloud composed of large white or gray flecks that sometimes form parallel layers; it foreshadows the arrival of a depression.



**stratus**
Gray cloud forming a continuous veil that is similar to fog, though it never touches the ground; it can trigger light precipitation.

**cumulus**
Fair-weather cloud with very clear contours; it has a gray, flat base and a white top with rounded protuberances.

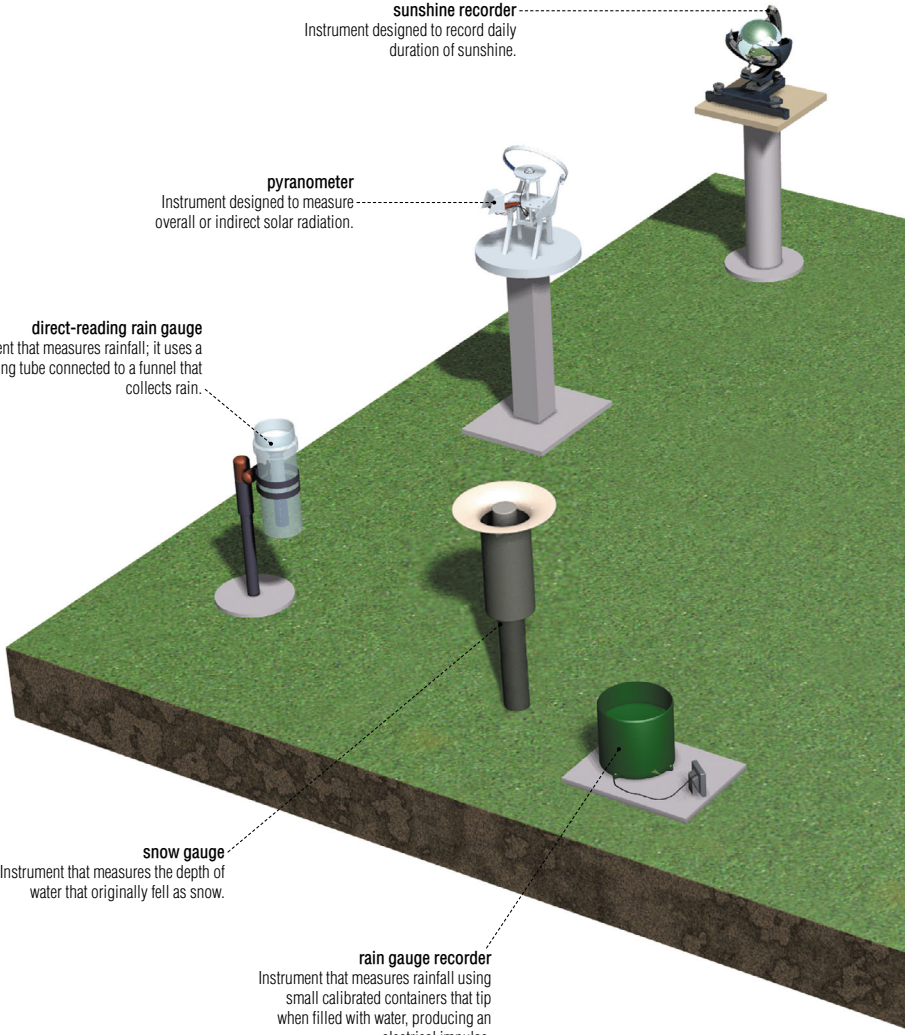
**cirrus**
Cloud in the form of wisps or separate strips; it usually appears in advance of a depression.

**cirrostratus**
Whitish layer that can completely cover the sky and that creates a halo around the Sun.

**cirrocumulus**
Cloud formed of white or gray flecks or strips, often arranged in rows.

# meteorological station

The installations and instruments required to conduct meteorological observations on the ground.



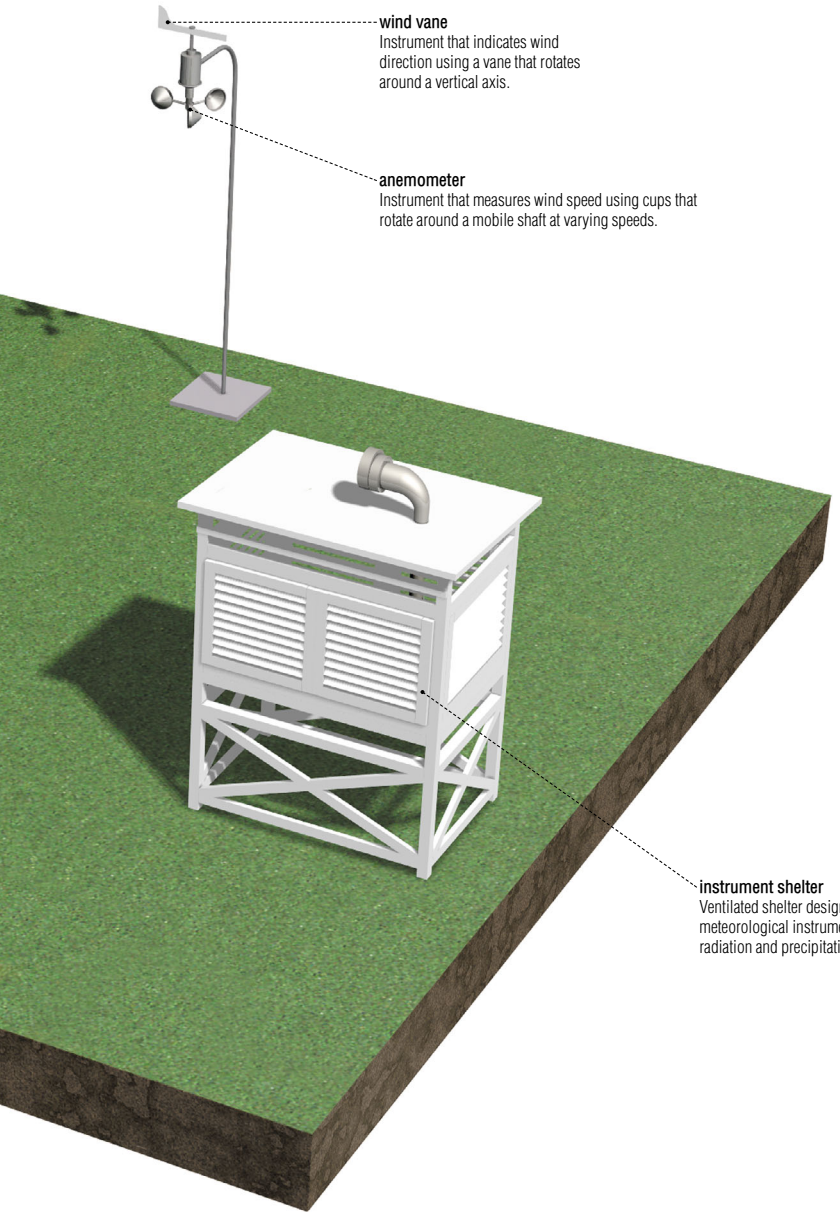
**sunshine recorder**
Instrument designed to record daily duration of sunshine.

**pyranometer**
Instrument designed to measure overall or indirect solar radiation.

**direct-reading rain gauge**
Instrument that measures rainfall; it uses a measuring tube connected to a funnel that collects rain.

**snow gauge**
Instrument that measures the depth of water that originally fell as snow.

**rain gauge recorder**
Instrument that measures rainfall using small calibrated containers that tip when filled with water, producing an electrical impulse.



**wind vane**
Instrument that indicates wind direction using a vane that rotates around a vertical axis.

**anemometer**
Instrument that measures wind speed using cups that rotate around a mobile shaft at varying speeds.

**instrument shelter**
Ventilated shelter designed to protect meteorological instruments from solar radiation and precipitation.

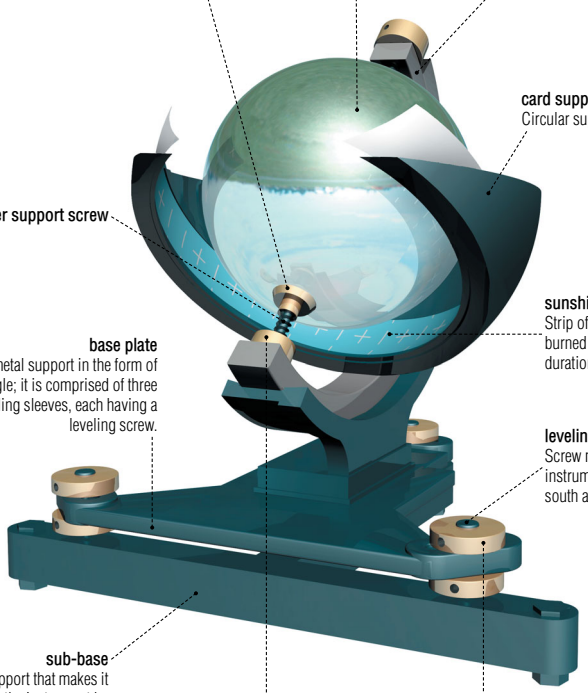
# meteorological measuring instruments

Instruments designed to measure air temperature and humidity, sunshine, atmospheric pressure, precipitation and wind.

## measure of sunshine

Sunshine: direct sunlight to which a given area is exposed.

**sunshine recorder**
Instrument designed to record daily duration of sunshine.



**lower sphere clamp**
Two clamps secure the glass sphere into the position required to obtain an exact measure of sunshine; this position is based on the coordinates of the meteorological station.

**glass sphere**
In the manner of a magnifying glass, it concentrates the Sun's rays on the sunshine card.

**sphere support**

**card support**
Circular support for the sunshine card.

**lower support screw**

**sunshine card**
Strip of paper, calibrated in hours, that is burned by the Sun's rays; it registers the duration of sunshine.

**base plate**
Stationary metal support in the form of a triangle; it is comprised of three coupling sleeves, each having a leveling screw.

**leveling screw**
Screw making it possible to level the instrument along its two axes, north-south and east-west.

**sub-base**
Adjustable metal support that makes it possible to level the instrument by means of leveling screws.

**check nut**

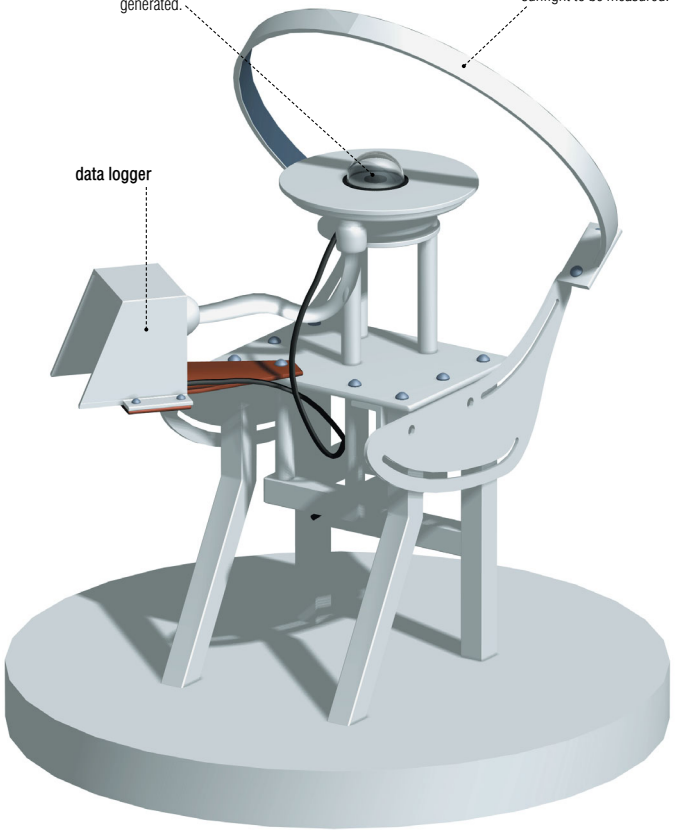
**lock nut**
The nut of the leveling screw, which tightens to secure the base plate in a given position.

**measure of sky radiation**
Sky radiation: indirect solar radiation that passes through cloud and diffuses on the Earth's surface.

**pyranometer**
Instrument designed to measure overall or indirect solar radiation.

**sensor**
It converts indirect solar energy into electricity: the higher the levels of sky radiation, the more electrical current is generated.

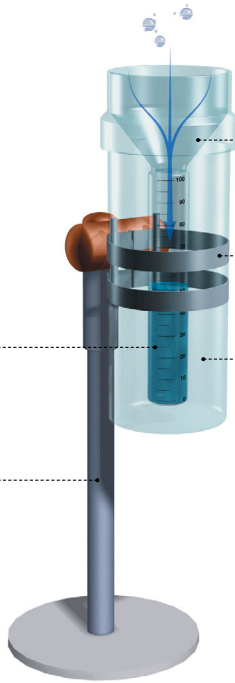
**shadow band**
It shields the pyranometer from direct sunlight, allowing only indirect sunlight to be measured.



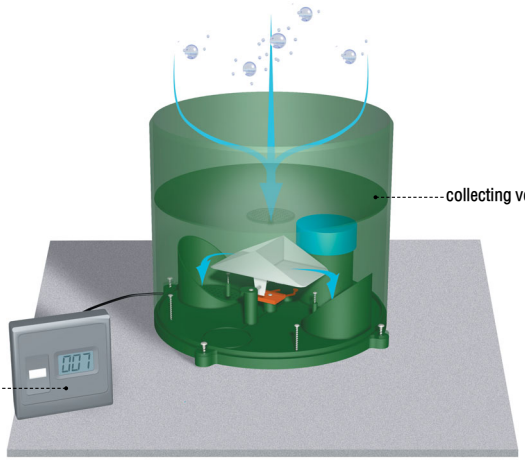
## measure of rainfall

Rainfall: quantity of water that falls to the ground during a given period.

**direct-reading rain gauge**
Instrument that measures rainfall; it uses a measuring tube connected to a funnel that collects rain.



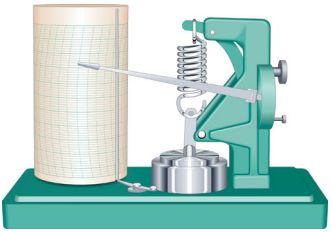

**rain gauge recorder**
Instrument that measures rainfall using small calibrated containers that tip when filled with water, producing an electrical impulse.



## measure of air pressure

Air pressure: force exerted by an atmospheric air column on a given surface; it is expressed in inches of mercury.

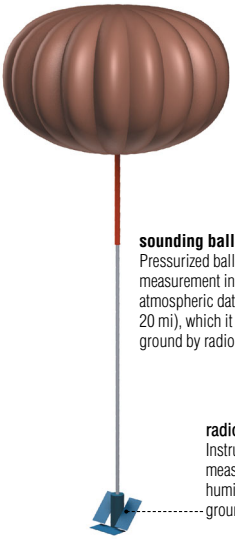
**mercury barometer**
Instrument that measures atmospheric pressure using a mercury column that rises and falls with variations in air pressure.



**barograph**
Instrument that measures variations in air pressure for a given interval.

## upper-air sounding

Technique used to measure the pressure, temperature and humidity of air as well as wind speed and wind direction at various altitudes.

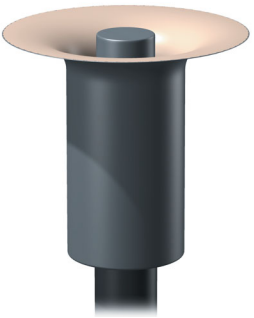


**sounding balloon**
Pressurized balloon equipped with measurement instruments used to collect atmospheric data (up to an altitude of 20 mi), which it then transmits to the ground by radio signal.

**radiosonde**
Instrument composed of sensors that measure the pressure, temperature and humidity of air; it then relays the data to ground level using a radio transmitter.

## measure of snowfall

Measurement of the depth of snow accumulation.

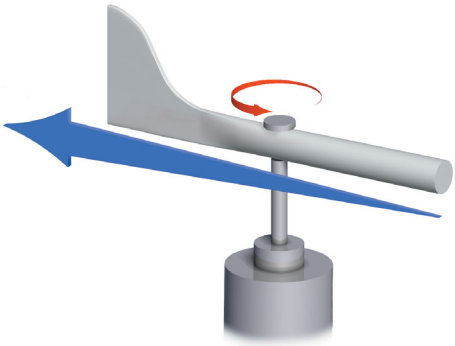


**snow gauge**
Instrument that measures the depth of water that originally fell as snow.

# meteorological measuring instruments

## measure of wind direction

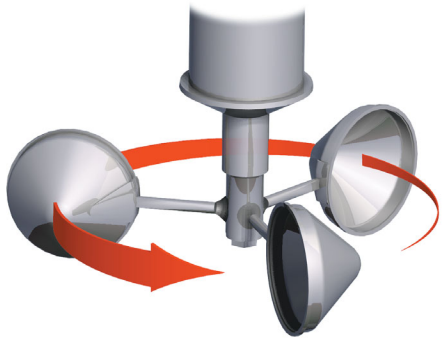
Wind direction: the point on the horizon from which the wind is blowing.



**wind vane**
Instrument that indicates wind direction using a vane that rotates around a vertical axis.

## measure of wind strength

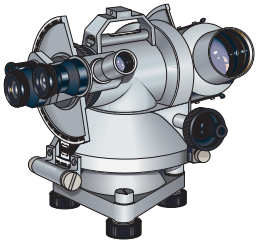
Wind speed: it is usually expressed in miles per hour.



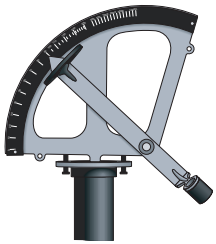
**anemometer**
Instrument that measures wind speed using cups that rotate around a mobile shaft at varying speeds.

## measure of cloud ceiling

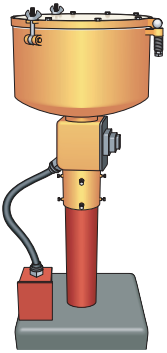
Cloud ceiling: altitude of the base of the clouds, expressed in feet.



**theodolite**
Instrument used to measure angles whose intervals indicate the height of a given point in relation to another.



**alidade**
Instrument whose sighting axis, by moving along a calibrated circle, measures a cloud's angle in relation to the horizon, and thus its height.



**ceiling projector**
Spotlight whose point of luminous impact on a cloud serves as a reference for an alidade or theodolite sighting.

## measure of temperature

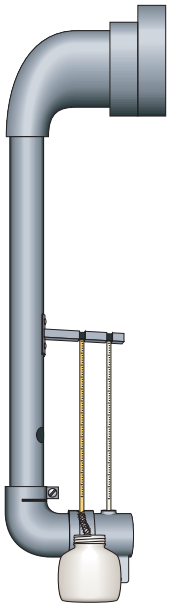
Measurement of heat or cold, carried out with a thermometer exposed to the air and shielded from direct sunlight.

**minimum thermometer**
Mercury thermometer that records the lowest temperature for a given period.

**maximum thermometer**
Mercury thermometer that records the highest temperature for a given period.

## measure of humidity

Humidity refers to the amount of water vapor in the air.



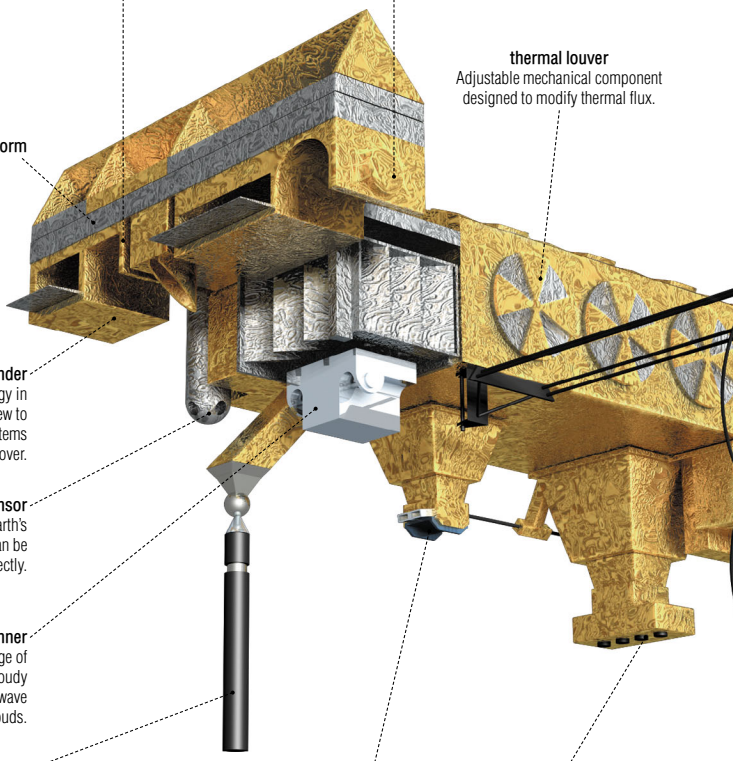
**psychrometer**
Instrument comprised of wet and dry thermometers that register air humidity.

**hygrograph**
Instrument that registers variations in the moisture content of the air by measuring the deformation of an object that is affected by humidity.

# weather satellites

Observation spacecraft that study the atmosphere and transmit data to Earth, making it possible to forecast the weather on the ground.

**polar-orbiting satellite**
Satellite that travels in a polar orbit around the globe 14 times per day; this allows it to cover the entire surface of the globe, due to the Earth's rotation.



**Sun sensor**
Instrument that positions the solar panels in the direction of the Sun to capture its energy.

**radiometer**
Instrument designed to measure electromagnetic radiation energy at a given frequency.

**thermal louver**
Adjustable mechanical component designed to modify thermal flux.

**instrument platform**

**infrared sounder**
Instrument that measures thermal energy in clouds and on the Earth's surface with a view to capturing nighttime images of weather systems and cloud cover.

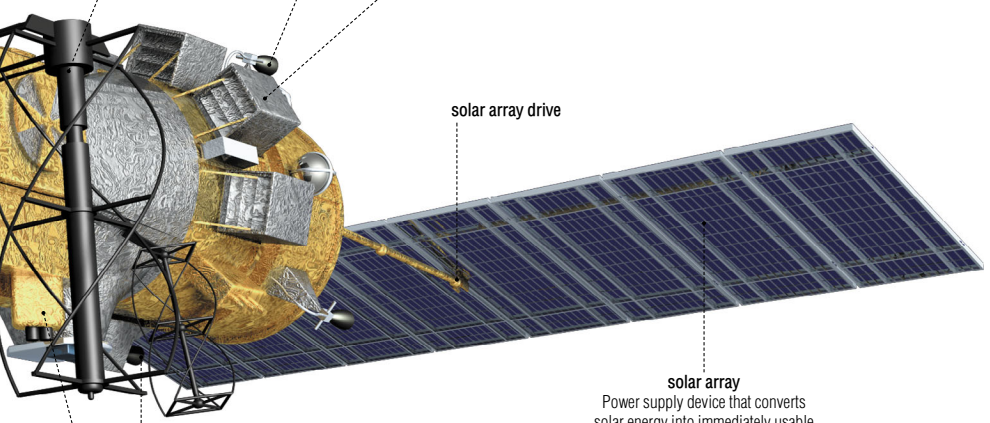
**Earth sensor**
Instrument that locates the Earth's horizon so that the antenna can be positioned correctly.

**microwave scanner**
Instrument that produces an image of an observed area even in cloudy conditions since microwave frequencies pass through clouds.

**antenna**
Device that emits and receives radio waves.

**Earth radiation scanner**
Radiometer that analyzes a region of the globe by means of repeated scans.

**Earth radiation sensor**
Radiometer that measures solar radiation and reflection in the Earth's atmosphere.



**search-and-rescue antennas**
Device that picks up distress signals emitted by ships or aircraft and makes it possible to determine their location.

**reaction engine assembly**
Micromotor that makes it possible to direct a satellite to the desired position.

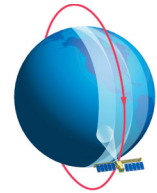
**battery modules**

**solar array drive**

**solar array**
Power supply device that converts solar energy into immediately usable electrical energy.

**S-band antenna**
Antenna that enables a satellite to transmit the data it collects to the terrestrial station.

**ultraviolet spectrometer**
Instrument that monitors ozone levels in the Earth's atmosphere.



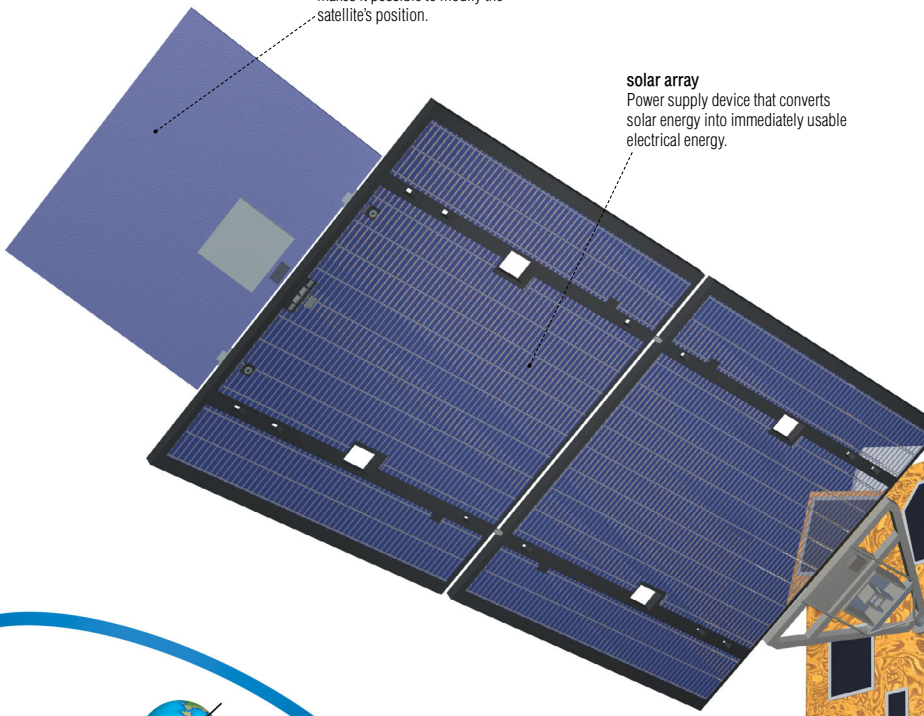
**polar orbit**
Orbit in which the satellite circles the Earth at an altitude of 530 mi, passing over both poles.

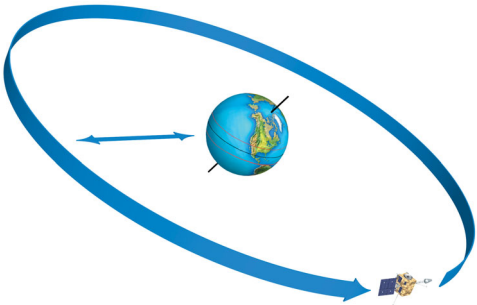
## weather satellites

**geostationary satellite**
A satellite that travels in a geostationary orbit, allowing it to observe a considerable area of the Earth's surface on a continuous basis.

**trim tab**
Adjustable mechanical component that makes it possible to modify the satellite's position.

**solar array**
Power supply device that converts solar energy into immediately usable electrical energy.





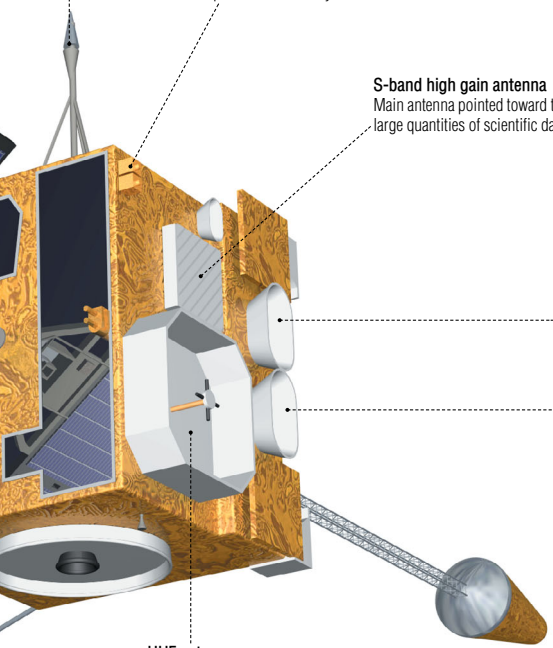
**geostationary orbit**
Orbit in which the satellite is synchronized with the Earth's rotation, making it appear stationary at an altitude of 22,300 mi above the Equator.

**magnetometer**
Instrument designed to measure the Earth's magnetic field.

**telemetry and command antenna**
It allows terrestrial stations to monitor satellite operations and transmit commands to the satellite.

**Earth sensor**
Instrument that locates the Earth's horizon so that the antenna can be positioned correctly.

**S-band high gain antenna**
Main antenna pointed toward the Earth to transmit large quantities of scientific data.



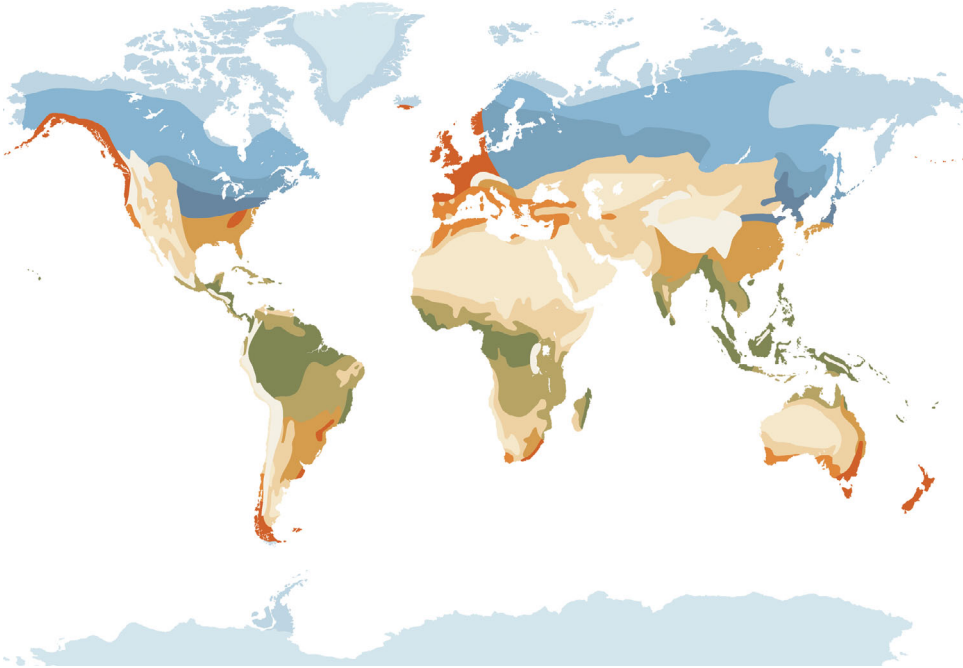
**sounder**
Radiometer designed to measure temperature and humidity at different altitudes in the atmosphere.

**imager**
Radiometer that generates images of clouds and of the surface of the Earth and the oceans.

**UHF antenna**
Antenna that provides a radio link with terrestrial stations.

# climates of the world

Climate is a collective term for the atmospheric conditions (temperature, humidity, air pressure, wind, precipitation) that characterize a given region.



**tropical climates**
Climates that are hot year-round and are characterized by alternating dry and rainy seasons.

**tropical rain forest**
Tropical, typically humid marine climate that fosters luxuriant vegetation and dense forests.

**tropical wet-and-dry (savanna)**
Tropical continental climate, with an extended dry season and vegetation composed of tall grasses and scattered trees.

**highland climates**
Climates where temperatures decrease and precipitation increases with altitude.

**highland**

## cold temperate climates

Climates with four clearly defined seasons, with cold winters and cool summers.

**humid continental-hot summer**
Climate characterized by a large annual range of temperature and relatively low rainfall. Summers are quite hot in these regions.

**humid continental-warm summer**
Climate characterized by a large annual range of temperature and relatively low annual rainfall. Summers are quite cool in these regions.

**subarctic**
Climate characterized by long, very cold winters and short cool summers; precipitation falls mainly in the summer.

## warm temperate climates

Climates with four clearly defined seasons, including a mild winter and a hot or cool summer.

**humid subtropical**
Climate characterized by hot summers and mild winters, with precipitation distributed evenly throughout the year.

**Mediterranean subtropical**
Climate characterized by hot dry summers, intermediary seasons and mild rainy winters.

**marine**
Climate characterized by a limited annual range of temperature and by precipitation distributed throughout the year.

## polar climates

Extremely cold dry climates.



**polar tundra**
Region where the thaw lasts only four or five months and where only mosses, lichen and a few shrubs survive the cold.



**polar ice cap**
The Earth's coldest region (as cold as -130°F), where the temperature, always below 32°F, creates a permanent ice cover.

## dry climates

Climates characterized by very low precipitation.



**steppe**
Region with hot summers and very cold winters; it is devoid of trees and covered with herbaceous plants adapted to arid climates.



**desert**
Hot region where aridity (less than 4 in of annual rainfall) is such that plant and animal life is almost nonexistent.

# clouds

Fine droplets of water or ice crystal suspended in the atmosphere; the World Meteorological Organization classifies them according to 10 types.

**high clouds**
Clouds at an altitude higher than 20,000 feet and composed of ice crystals; these clouds do not generate precipitation.

**cirrostratus**
Whitish layer that can completely cover the sky and that creates a halo around the Sun.

**middle clouds**
Clouds at an altitude of 6,500 to 20,000 feet and composed of water droplets and ice crystals.

**altostratus**
Gray sheet that can completely cover the sky but allows the Sun to be seen without a halo phenomenon; it can trigger heavy precipitation.

**altocumulus**
Cloud composed of large white or gray flecks that sometimes form parallel layers; it foreshadows the arrival of a depression.

**low clouds**
Clouds that do not exceed 6,500 feet in altitude and are composed of water droplets occasionally mixed with ice crystals; they sometimes generate continuous precipitation.

**stratocumulus**
Gray and white cloud arranged in more or less continuous rolled layers; it does not usually trigger precipitation.

**nimbostratus**
Cloud in the form of a dark layer sufficiently thick to block out the Sun; it triggers continuous precipitation.

**stratus**
Gray cloud forming a continuous veil that is similar to fog, though it never touches the ground; it can trigger light precipitation.

**cirrocumulus**
Cloud formed of white or gray flecks or strips, often arranged in rows.

**cirrus**
Cloud in the form of wisps or separate strips; it usually appears in advance of a depression.

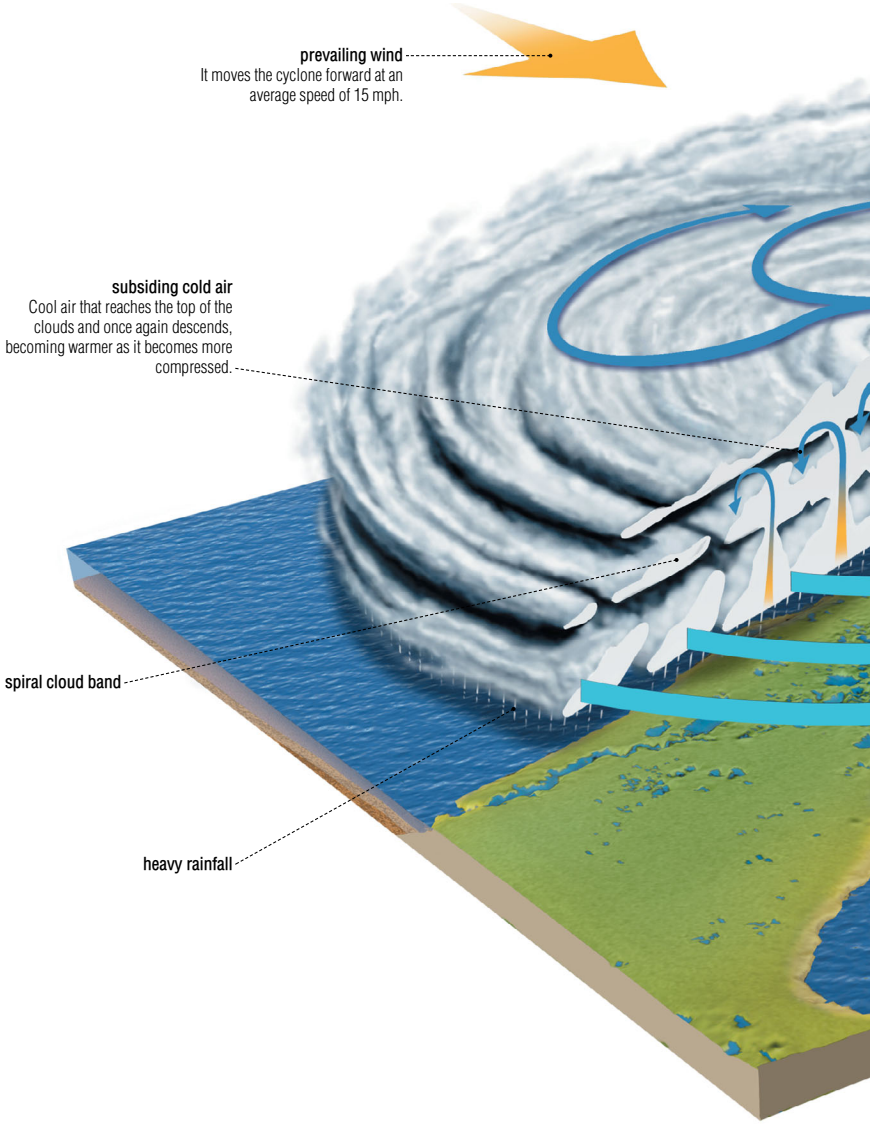
**clouds of vertical development**
Clouds whose base is at low altitude but extend very high; the two types are cumulus and cumulonimbus.

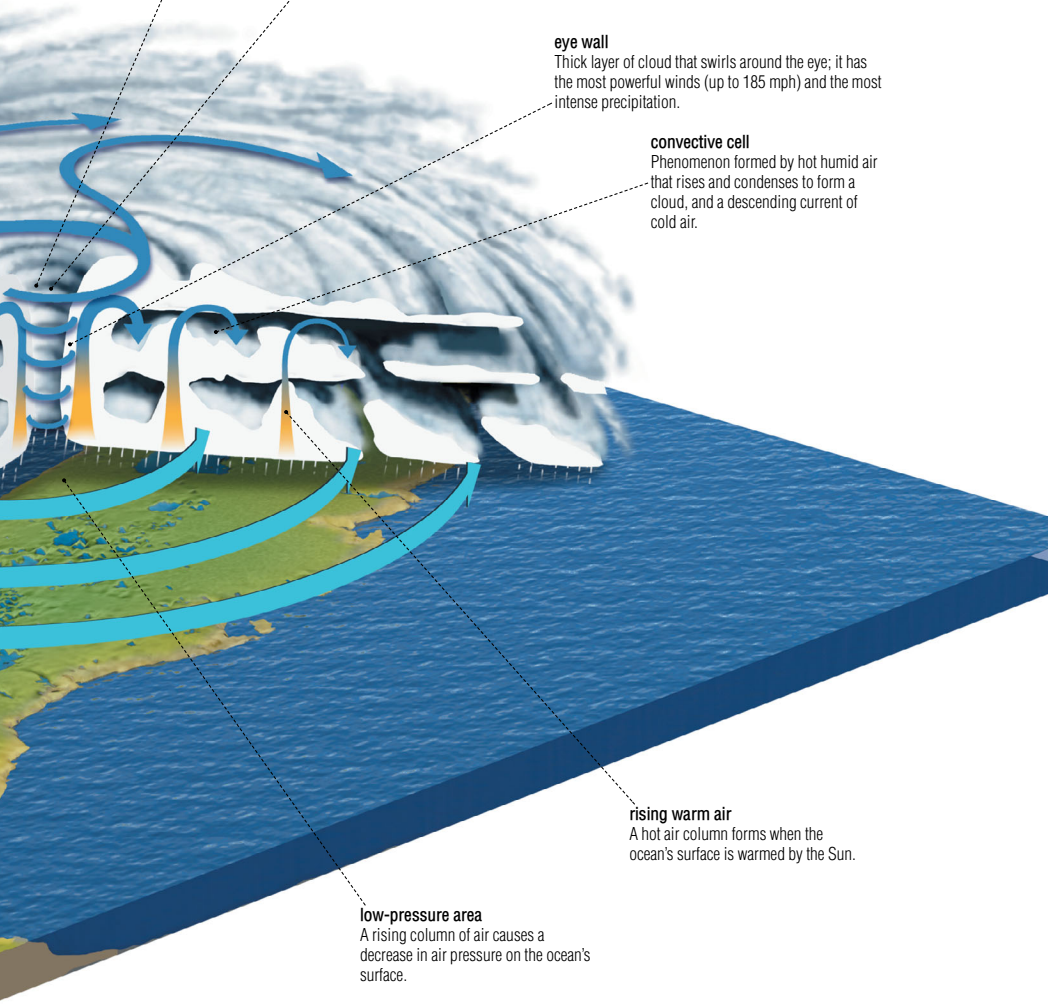
**cumulonimbus**
Very imposing cloud that can reach a thickness of 6 mi and whose base is very dark; it can trigger violent precipitation.

**cumulus**
Fair-weather cloud with very clear contours; it has a gray, flat base and a white top with rounded protuberances.

# tropical cyclone

Low-pressure zone that forms in the intertropical region and is marked by violent precipitation and swirling winds of 74 to 185 mph.





**eye**
Relatively calm zone in the center of the cyclone, with light winds and very few clouds; it is about 20 mi in diameter.

**high-pressure area**
Column of ascending air that causes a rise in upper air pressure, at the top of the most developed clouds.

**eye wall**
Thick layer of cloud that swirls around the eye; it has the most powerful winds (up to 185 mph) and the most intense precipitation.

**convective cell**
Phenomenon formed by hot humid air that rises and condenses to form a cloud, and a descending current of cold air.

**rising warm air**
A hot air column forms when the ocean's surface is warmed by the Sun.

**low-pressure area**
A rising column of air causes a decrease in air pressure on the ocean's surface.

# tornado and waterspout

**waterspout**
Tornado that occurs over the sea and is not as violent as a tornado on land.

**tornado**
Swirling column of air that extends from the ground to the base of a cumulonimbus; it produces violent winds that can reach 300 mph.

**wall cloud**
Ring-shaped cloud mass, usually the first sign that a tornado is imminent.

**funnel cloud**
Cloud that extends from another cloud's base and reaches the ground; extremely high winds whirl around it.

**debris**
Cloud of dust and debris swept up from the ground.

# precipitations

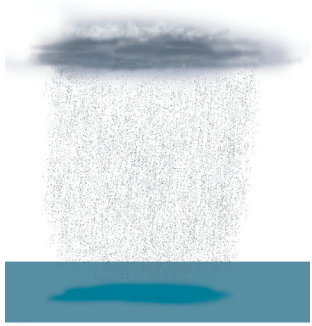
Collective term for water particles in the atmosphere that fall or are deposited on the ground in solid or liquid form.

**rain forms**

By international convention, precipitation in the form of rain is classified according to the quantity that falls.

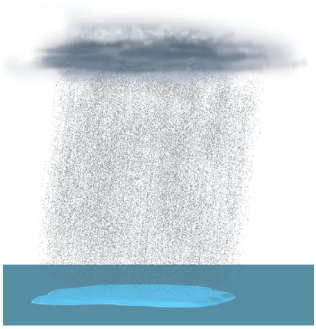
**drizzle**

Uniform continuous precipitation of slow-falling water droplets between 0.008 and 0.02 in in diameter.



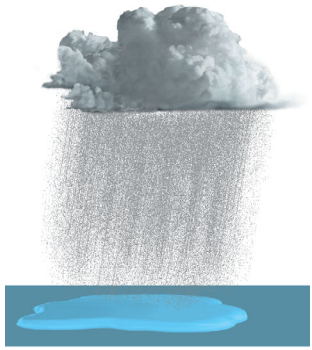
**light rain**

Precipitation of water drops over 0.02 in in diameter; it results in accumulations of 0.1 in per hour.



**moderate rain**

Precipitation that results in 0.1 to 0.3 in accumulation per hour.

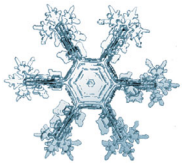


**heavy rain**

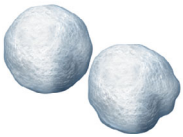
Precipitation that results in over 0.3 in accumulation per hour.

## snow crystals

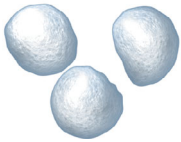
Ice crystals whose form depends on temperature and humidity; they fall separately or in agglomerations of flakes.



**stellar crystal**
Star-shaped crystal with six branches.



**hail**
Hard, usually spherical ice crystal that varies between 0.2 and 2 in in diameter; it is formed of concentric layers of clear opaque ice.



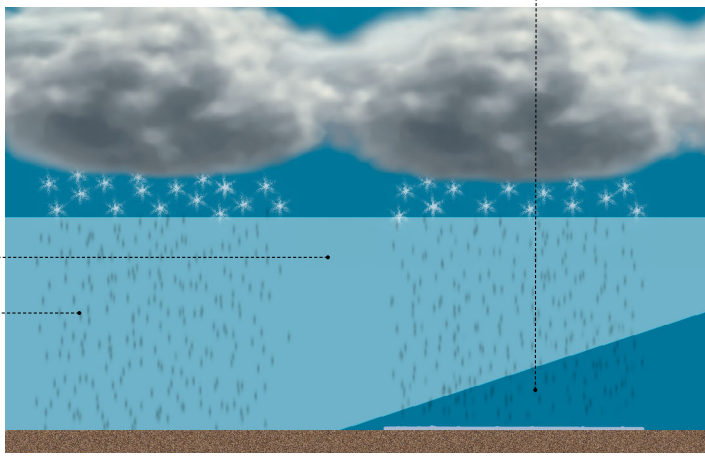
**sleet**
Ice crystal less than 0.2 in in diameter that results from rain drops or snow flakes freezing before they touch the ground.

**snow pellet**
Opaque ice crystal less than 0.2 in in diameter that froze inside a cloud.

## winter precipitations

During the winter, water can fall in various forms, depending on the air temperature.

**freezing rain**
Precipitation in the form of raindrops that freeze on impact with the ground or with objects, forming a layer of ice.



**warm air**

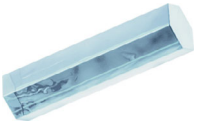
**rain**
Precipitation of water droplets produced when the air temperature is higher than 32°F.

**capped column**
Ice crystal that is identical to the column, except for the thin hexagon-shaped cap at each extremity.

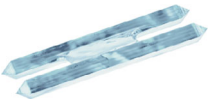
**irregular crystal**
Ice crystal with no defined shape resulting from the agglomeration of several crystals.

**spatial dendrite**
Ice crystal characterized by complex branches similar to those of a tree.

**plate crystal**
Ice crystal in the form of a thin hexagonal plate that is occasionally hollow.



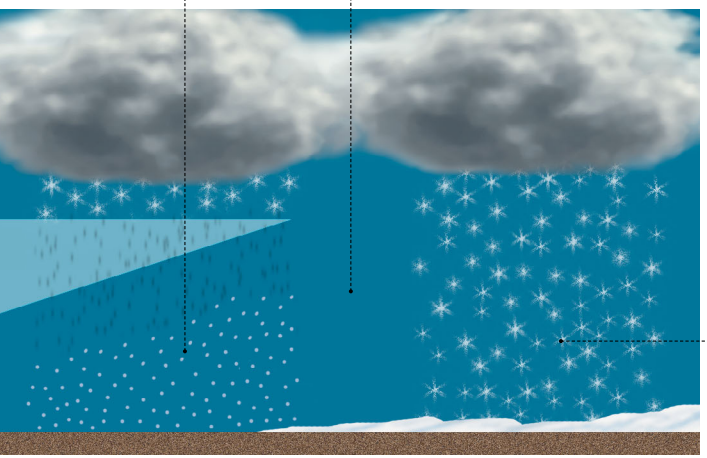
**column**
Short translucent ice crystal with flat extremities; it is prism-shaped and occasionally hollow.



**needle**
Translucent prism-shaped ice crystal; it is long and narrow and has pointed ends.

**sleet**
Precipitation in the form of water droplets or wet snow that freezes before it touches the ground.

**cold air**

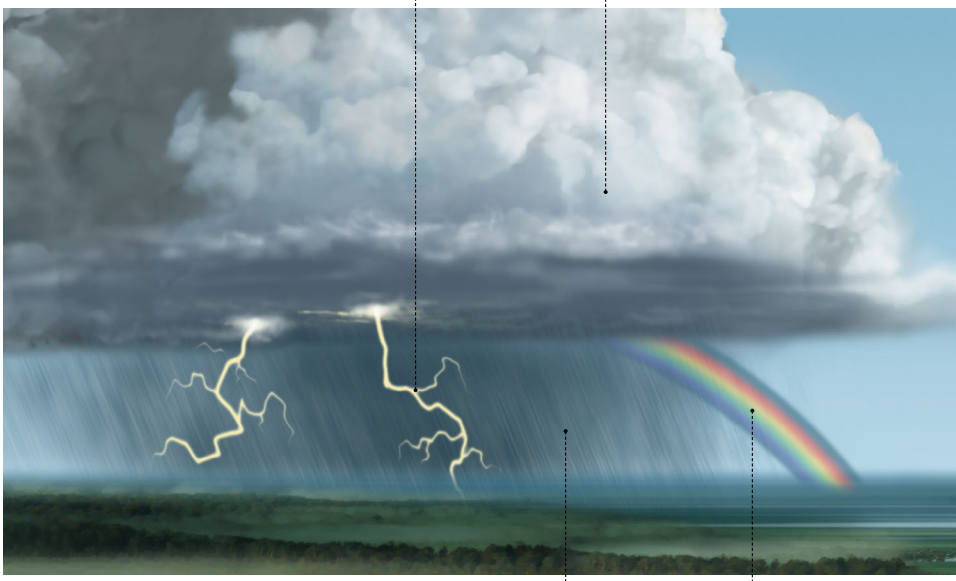


**snow**
Precipitation of ice crystals produced when the air temperature is below 32°F.

**stormy sky**
A thunderstorm is characterized by lightning, thunder and gusts of wind, usually accompanied by rain showers or hail.

**lightning**
Brief but intense luminous phenomenon caused by an electrical discharge between two clouds or between a cloud and the ground.

**cloud**
The very imposing cloud that generates thunderstorms is the cumulonimbus; it can reach a thickness of 6 mi and its base is very dark.



**rain**
Precipitation of water droplets produced when the air temperature is higher than 32°F.

**rainbow**
Luminous arc formed of bands of color; during a shower, it is visible in the opposite direction to the Sun.

**dew**
Condensation of water vapor in the air that settles on cold surfaces in droplet form.

**rime**
Deposit of ice crystals on surfaces whose temperature is close to 32°F; it is caused by the condensation of water vapor in the air.

**mist**
Light fog that does not limit visibility to 0.6 mi.

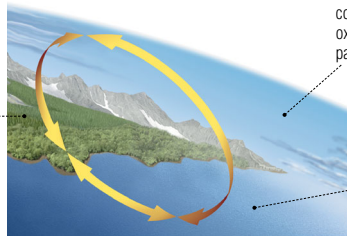
**frost**
Layer of ice on the ground or on an object; it is caused by the condensation of fine rain when the temperature is hovering around 32°F.

**fog**
Condensation of water vapor resulting in the suspension of microscopic droplets that reduce visibility to less than 0.6 mi.

# vegetation and biosphere

**structure of the biosphere**
Biosphere: the part of the Earth's covering where life is possible; it extends from the floor of the oceans to the summit of the highest mountains (about 12 mi).

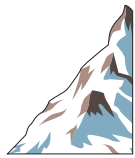
**atmosphere**
Layer of air that surrounds the Earth and is composed mainly of nitrogen (78%) and oxygen (21%); only its lower portion is part of the biosphere.



**lithosphere**
Outer layer of the Earth's crust; only its upper portion, to a depth of 1 mi, is part of the biosphere.

**hydrosphere**
A collective term for the planet's waters, including the oceans, seas, lakes, watercourses and underground water systems.

**elevation zones and vegetation**
Types of vegetation vary depending on temperature and rainfall, which in turn depend on altitude.



**glacier**
Mass of ice resulting from the accumulation and compression of snow; it moves under its own weight.

**tundra**
Plant formation that grows in relatively arid regions; it includes mosses, lichens, grasses, bushes and dwarf trees.

**coniferous forest**
Forest composed mainly of softwood trees with evergreen leaves in the form of needles or scales.

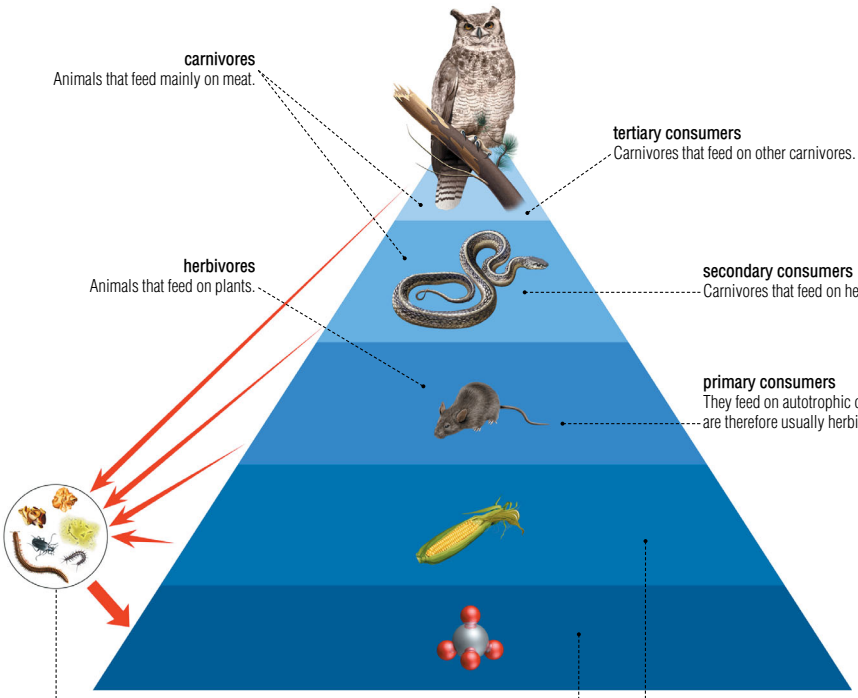
**mixed forest**
Forest composed of conifers and deciduous trees.

**deciduous forest**
Forest composed mainly of trees with broad leaves that grow back every year.

**tropical forest**
Dense, highly varied forest in the intertropical zone, where precipitation is abundant and regular.

# food chain

Order of the relationships of predation and dependence among living organisms.



**carnivores**
Animals that feed mainly on meat.

**tertiary consumers**
Carnivores that feed on other carnivores.

**herbivores**
Animals that feed on plants.

**secondary consumers**
Carnivores that feed on herbivores.

**primary consumers**
They feed on autotrophic organisms and are therefore usually herbivores.

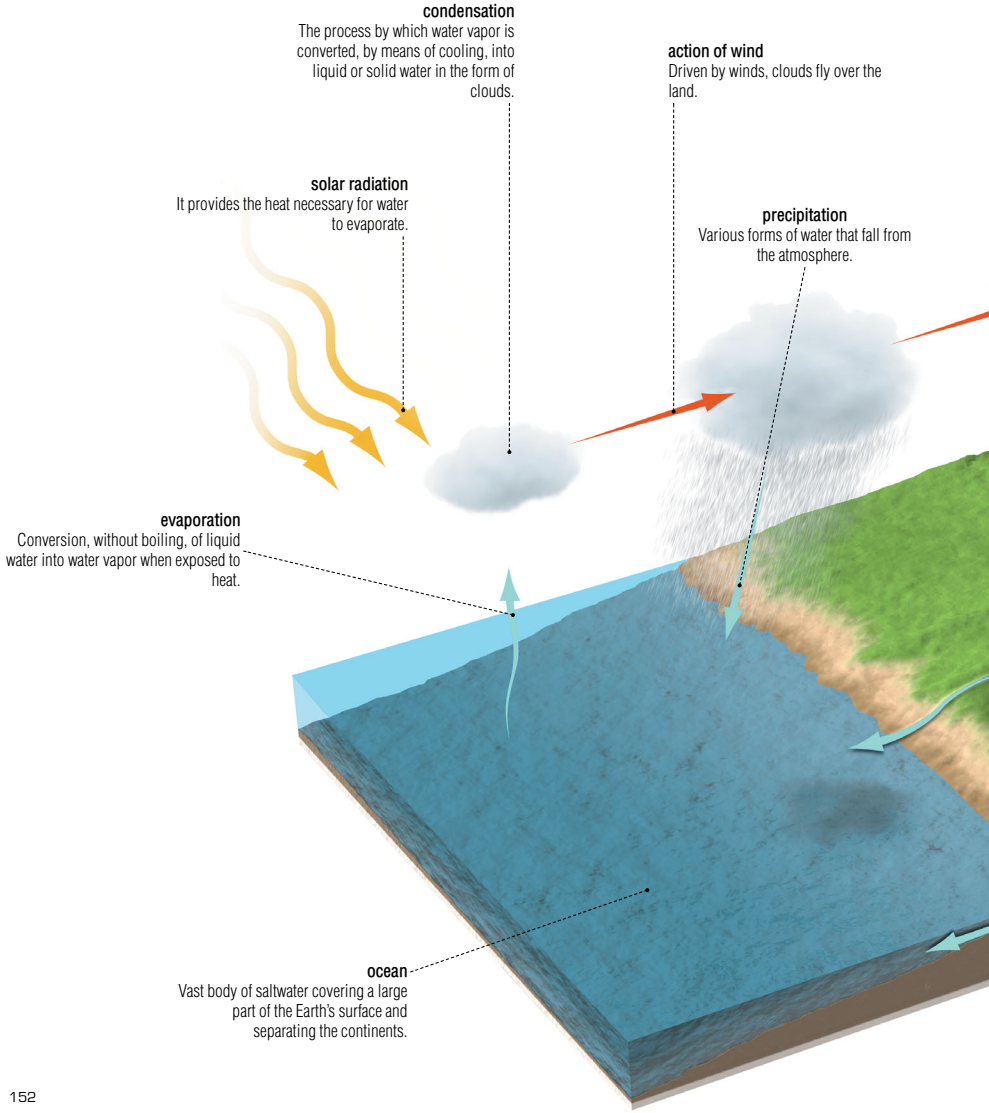
**decomposers**
Organisms that break down organic matter (dead animals, excrement, plant residue) into mineral components that can be reused by plants.

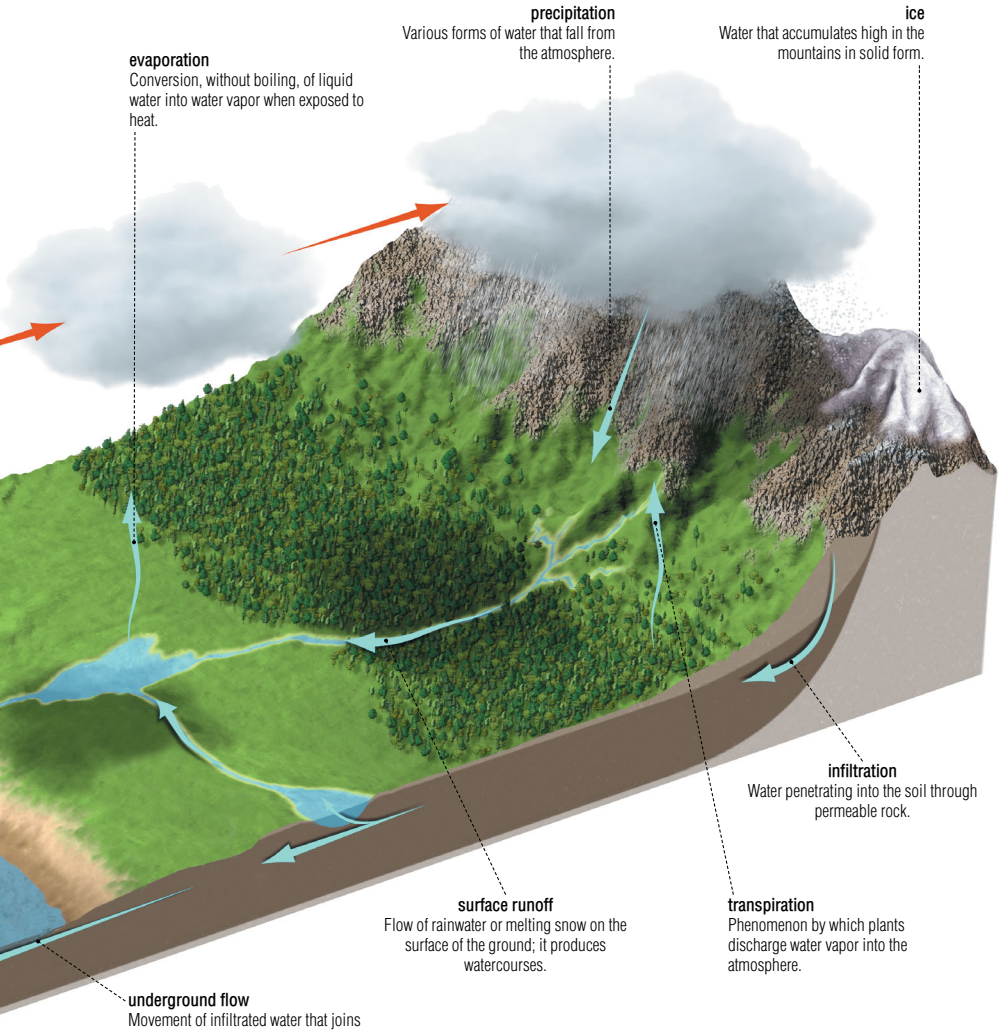
**inorganic matter**
Matter of mineral origin, converted by bacteria; the nitrogen, salts and water it retains serve as food for plants.

**basic source of food**
Vegetables are at the base of the food chain for all other consumers; they are eaten raw or converted into meat by animals.

# hydrologic cycle

Continuous circulation of water in its different states (liquid, solid and gaseous) between the oceans, the atmosphere and the Earth's surface.

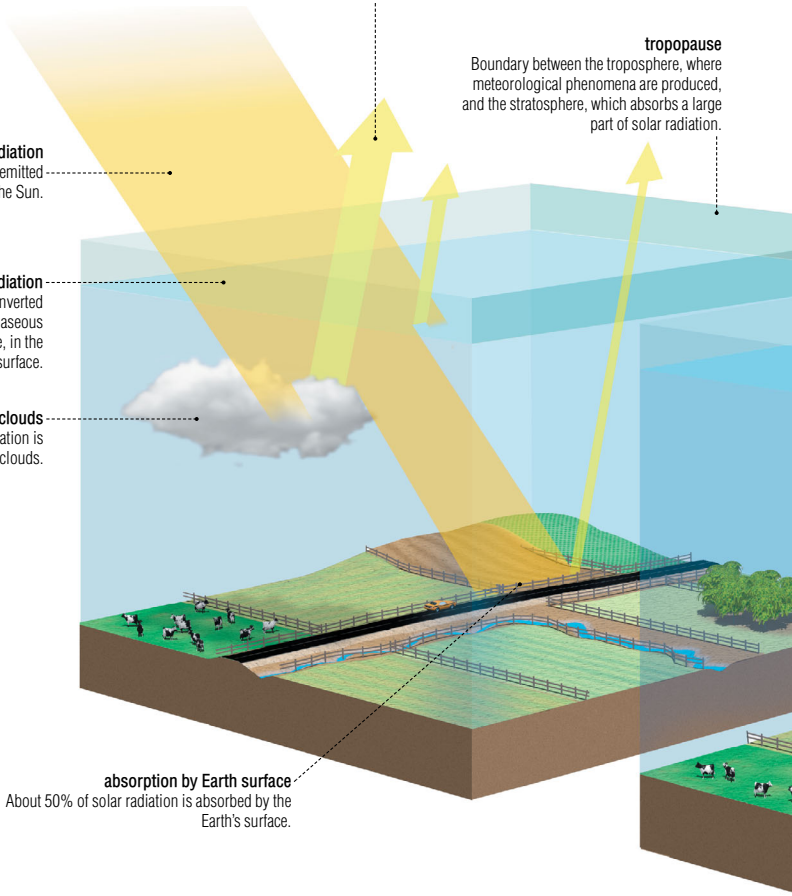



precipitation
Various forms of water that fall from the atmosphere.
ice
Water that accumulates high in the mountains in solid form.
evaporation
Conversion, without boiling, of liquid water into water vapor when exposed to heat.
infiltration
Water penetrating into the soil through permeable rock.
surface runoff
Flow of rainwater or melting snow on the surface of the ground; it produces watercourses.
transpiration
Phenomenon by which plants discharge water vapor into the atmosphere.
underground flow
Movement of infiltrated water that joins a watercourse on the surface or flows directly into lakes or the ocean.

# greenhouse effect

Warming of the atmosphere that occurs when certain gases absorb part of the solar radiation reflected by the Earth.

**natural greenhouse effect**
The greenhouse effect is an indispensable natural phenomenon; without it, the average temperature, currently 59°F, would be no higher than 0°F.

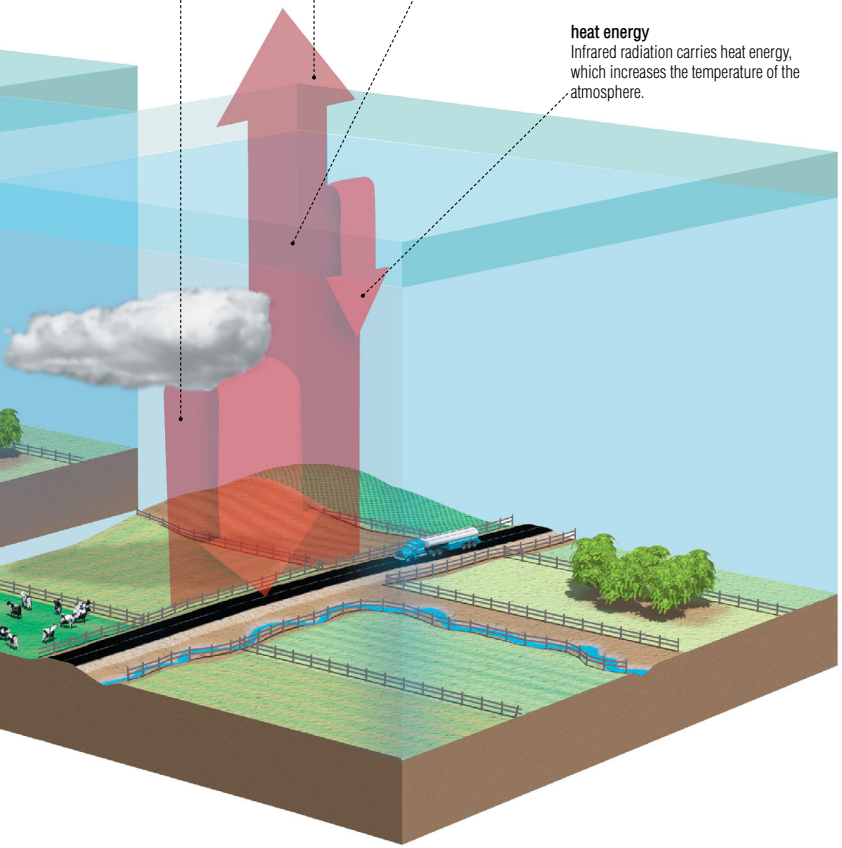


**heat loss**
Part of the infrared rays reflected by the Earth's surface is not absorbed and dissipates in space.

**infrared radiation**
The Earth's surface reflects infrared radiation, part of which is retained in the atmosphere by greenhouse gases and clouds.

**greenhouse gas**
Gas that traps heat in the atmosphere; composed mainly (60%) of carbon dioxide ($CO_2$), methane (15%) and CFCs (12%).

**heat energy**
Infrared radiation carries heat energy, which increases the temperature of the atmosphere.

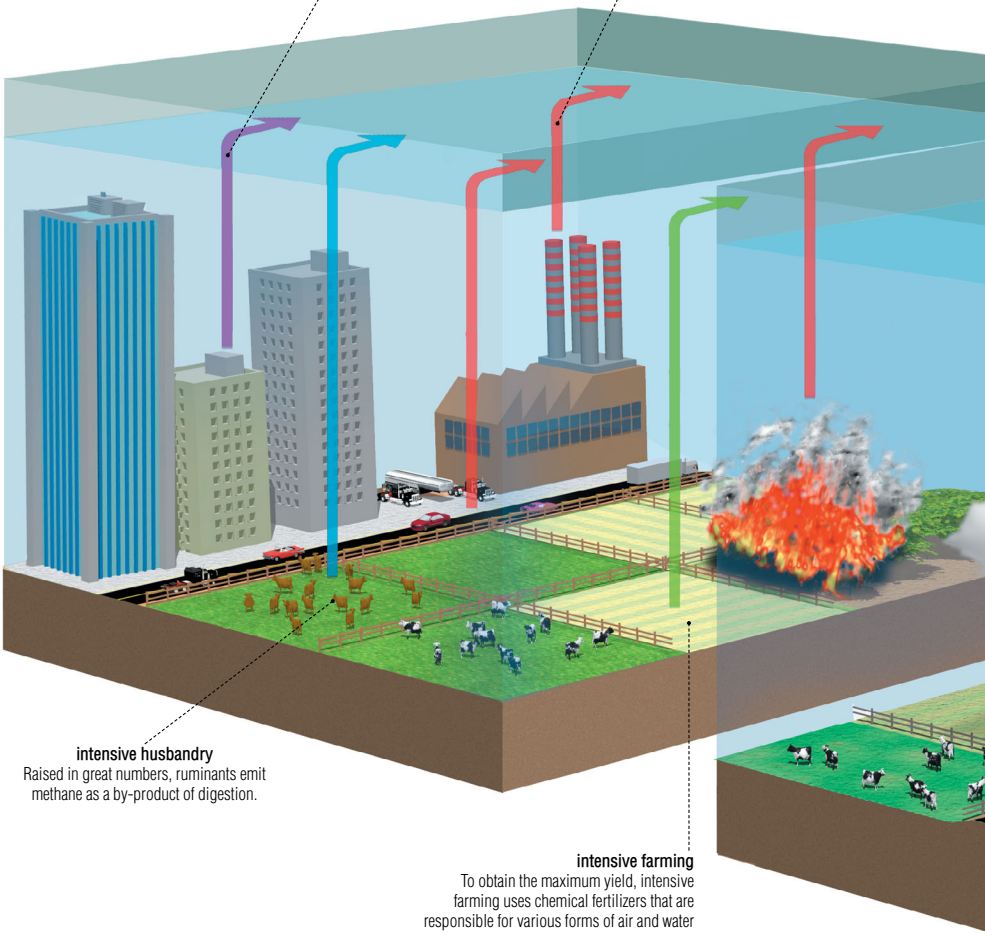


## greenhouse effect

**enhanced greenhouse effect**
Human activity constantly emits greenhouse gases, which trap ever more heat in the atmosphere.

**air conditioning system**
Air conditioning systems use chlorofluorocarbons (CFCs) that absorb infrared rays and damage the ozone layer.

**fossil fuel**
The combustion of wood and fossil fuels (coal, oil, natural gas) emits carbon dioxide and methane into the atmosphere.

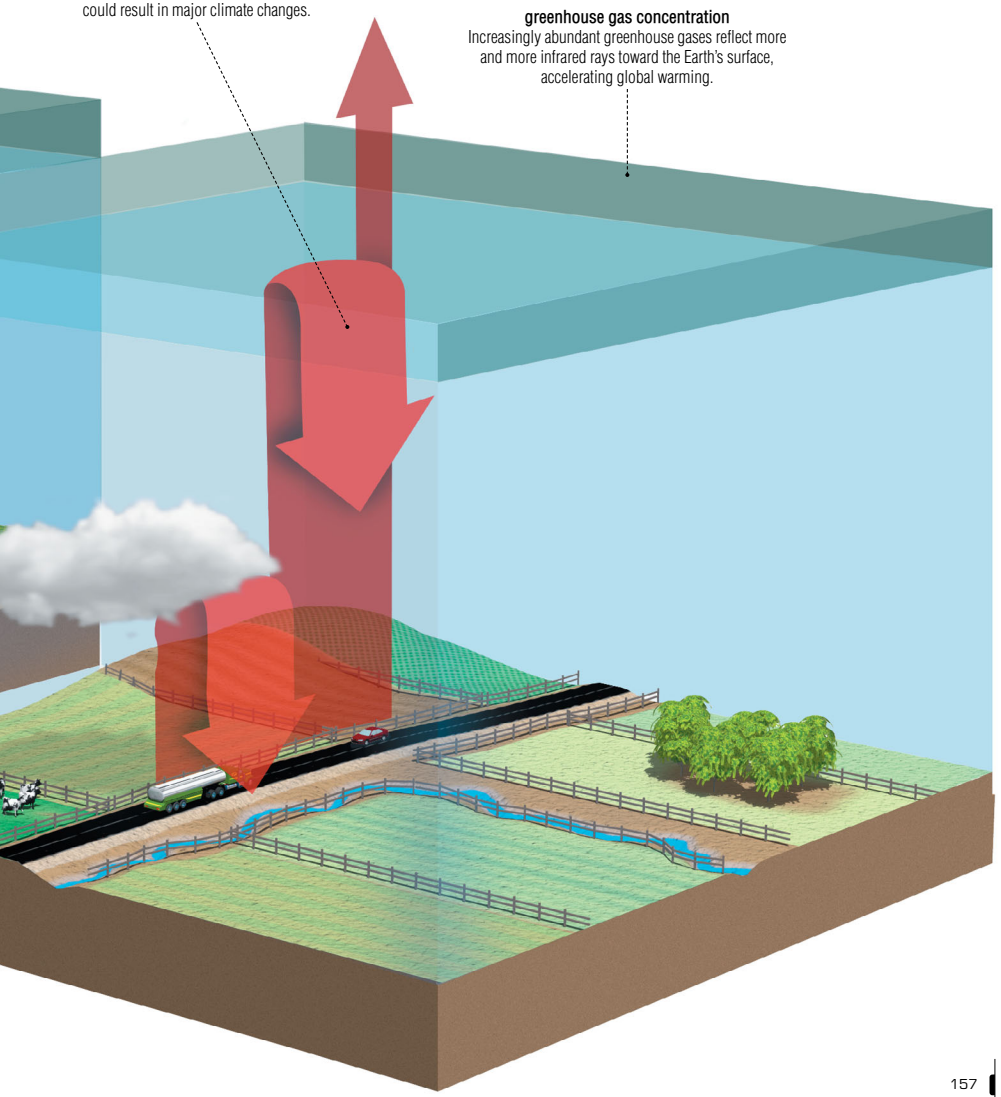


**intensive husbandry**
Raised in great numbers, ruminants emit methane as a by-product of digestion.

**intensive farming**
To obtain the maximum yield, intensive farming uses chemical fertilizers that are responsible for various forms of air and water pollution.

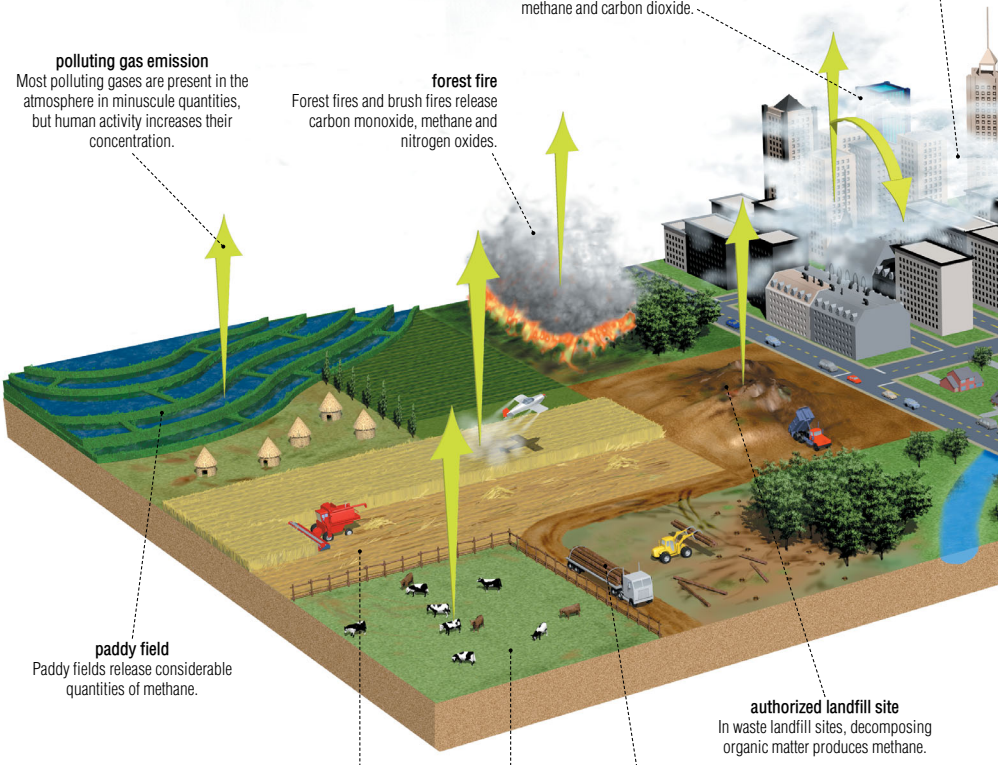
**global warming**
Temperatures have increased by 0.5% in the last century; continued rises in temperature could result in major climate changes.

**greenhouse gas concentration**
Increasingly abundant greenhouse gases reflect more and more infrared rays toward the Earth's surface, accelerating global warming.



# air pollution

The presence in the atmosphere of large quantities of particles or gases produced by human activity; these are harmful to both animal and plant life.



**smog**
Harmful haze resulting from the presence of polluting gases; it forms over cities under specific meteorological conditions.

**air pollutants**
The principal air pollutants are sulfur dioxide, nitrogen oxides, hydrocarbons, methane and carbon dioxide.

**polluting gas emission**
Most polluting gases are present in the atmosphere in minuscule quantities, but human activity increases their concentration.

**forest fire**
Forest fires and brush fires release carbon monoxide, methane and nitrogen oxides.

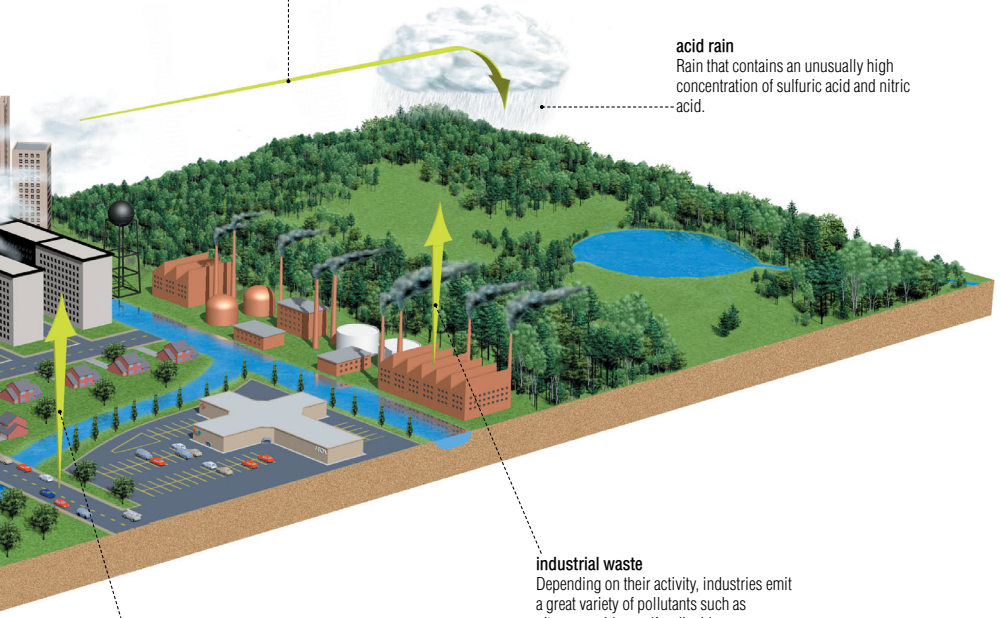
**paddy field**
Paddy fields release considerable quantities of methane.

**authorized landfill site**
In waste landfill sites, decomposing organic matter produces methane.

**soil fertilization**
Nitrogen fertilizers used to fertilize the soil also release nitrogen oxides.

**intensive husbandry**
Bacteria involved in the digestion of ruminants also trigger the emission of methane into the air.

**deforestation**
Large-scale deforestation leads to increased carbon dioxide levels in the atmosphere since plants alone absorb and retain this gas.



**wind**
Polluted clouds are carried by the wind, sometimes traveling thousands of miles; their pollutants then fall in the form of acid rain.

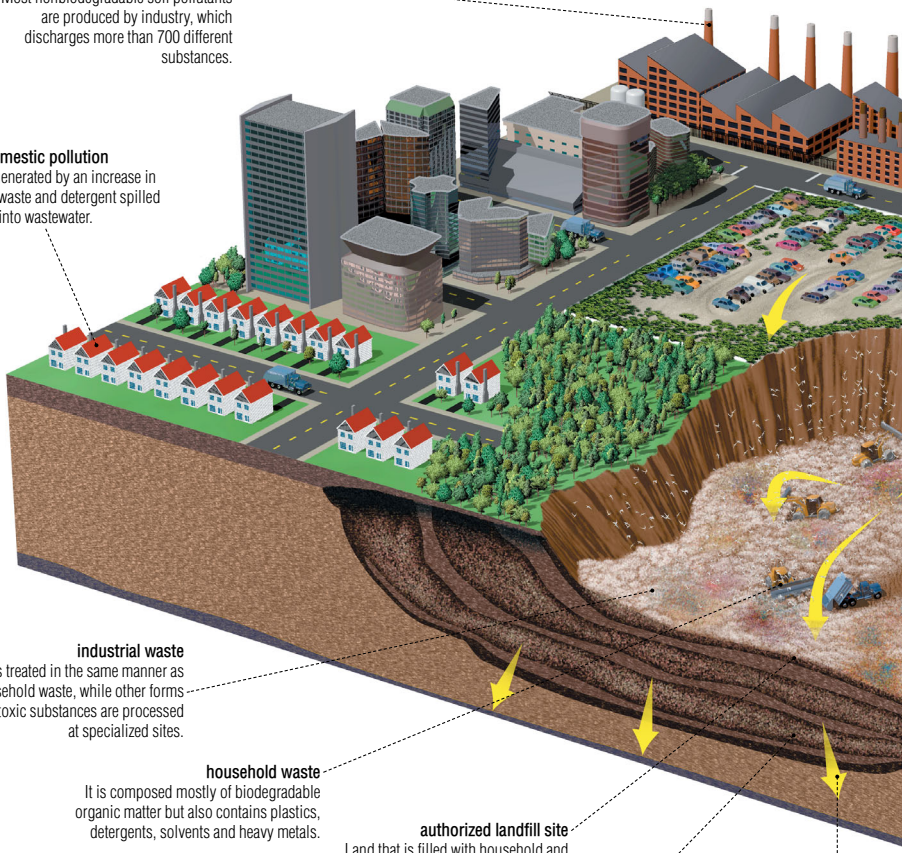
**acid rain**
Rain that contains an unusually high concentration of sulfuric acid and nitric acid.

**industrial waste**
Depending on their activity, industries emit a great variety of pollutants such as nitrogen oxides, sulfur dioxide, ozone, heavy metals and hydrocarbons.

**motor vehicle pollution**
Motor vehicle exhaust contains carbon particles, nitrogen oxides, sulfur dioxide and hydrocarbons.

# land pollution

Numerous factors contribute to soil pollution (e.g., household and industrial waste, fertilizers, pesticides).



**industrial pollution**
Most nonbiodegradable soil pollutants are produced by industry, which discharges more than 700 different substances.

**domestic pollution**
Pollution generated by an increase in household waste and detergent spilled into wastewater.

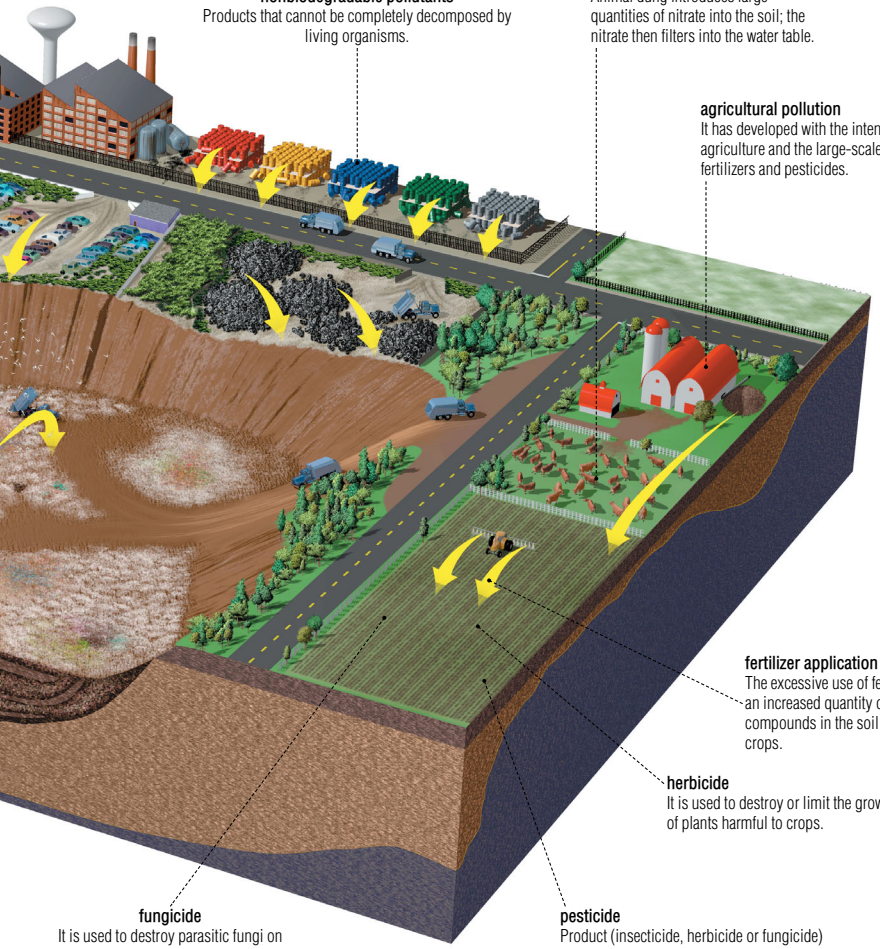
**industrial waste**
Some of it is treated in the same manner as household waste, while other forms containing toxic substances are processed at specialized sites.

**household waste**
It is composed mostly of biodegradable organic matter but also contains plastics, detergents, solvents and heavy metals.

**authorized landfill site**
Land that is filled with household and industrial waste and then covered with successive layers of earth.

**waste layers**
Each waste layer is sealed using a plastic film or a base layer of clay.

**intrusive filtration**
In spite of the sealing of waste layers, rainwater runoff allows certain pollutants to seep into the subsoil.



**nonbiodegradable pollutants**
Products that cannot be completely decomposed by living organisms.

**intensive husbandry**
Animal dung introduces large quantities of nitrate into the soil; the nitrate then filters into the water table.

**agricultural pollution**
It has developed with the intensification of agriculture and the large-scale use of fertilizers and pesticides.

**fertilizer application**
The excessive use of fertilizers leads to an increased quantity of mineral compounds in the soil and in farmed crops.

**herbicide**
It is used to destroy or limit the growth of plants harmful to crops.

**fungicide**
It is used to destroy parasitic fungi on crops.

**pesticide**
Product (insecticide, herbicide or fungicide) that destroys harmful organisms. It sometimes enters the food chain and affects flora and fauna.

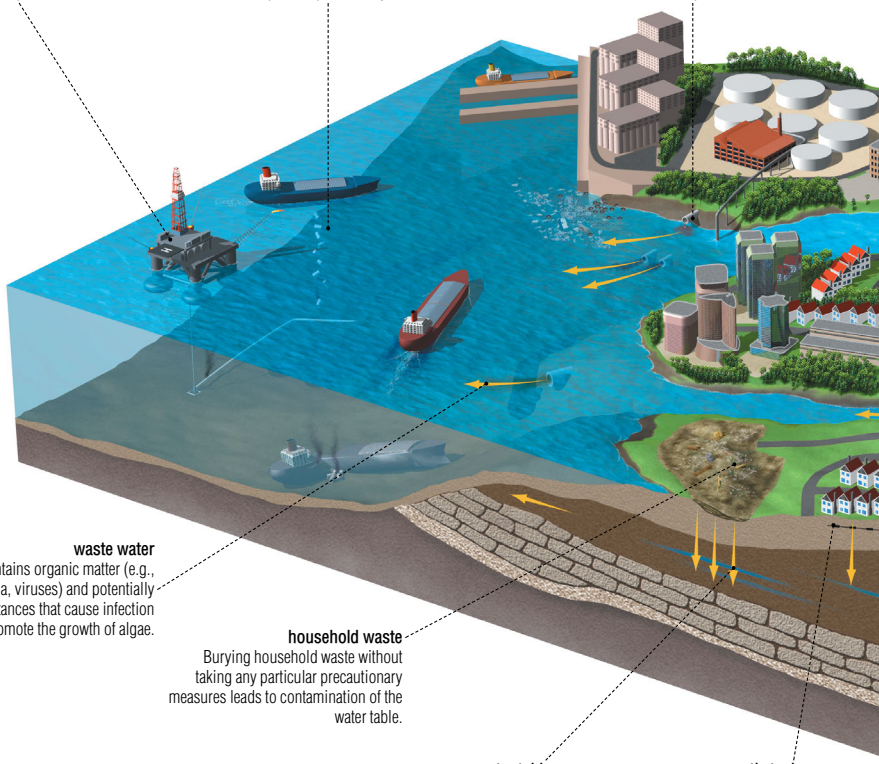
# water pollution

The cycle of the Earth's waters is continuous, carrying and spreading pollutants introduced by human activity all around the planet.

**oil pollution**
Pollution caused by leaks from refineries and offshore drilling platforms, by ships emptying their fuel tanks at sea and by oil spills.

**nuclear waste**
Radioactive nuclear waste was once immersed at the bottom of the ocean; it has a life span of up to 1,000 years.

**industrial waste**
Industrial waste is highly variable; its principal components are lead, mercury, cadmium, hydrocarbons and acid deposits.



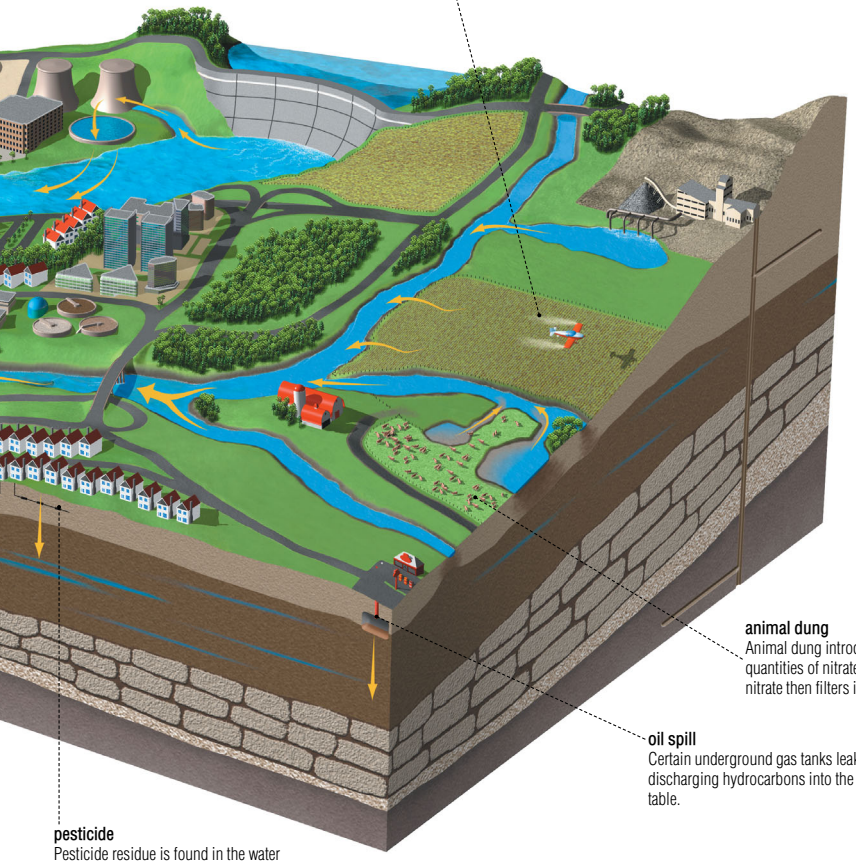
**waste water**
Untreated, it contains organic matter (e.g., bacteria, viruses) and potentially pathogenic substances that cause infection and promote the growth of algae.

**household waste**
Burying household waste without taking any particular precautionary measures leads to contamination of the water table.

**water table**
Vast expanse of underground water fed by rainwater filtering through the earth; it supplies springs and can be collected in wells.

**septic tank**
Wastewater leakage from a dwelling's underground tank contaminates the water table.

**intensive farming**
To achieve maximum production, intensive farming uses chemical fertilizers responsible for various forms of air and water pollution.



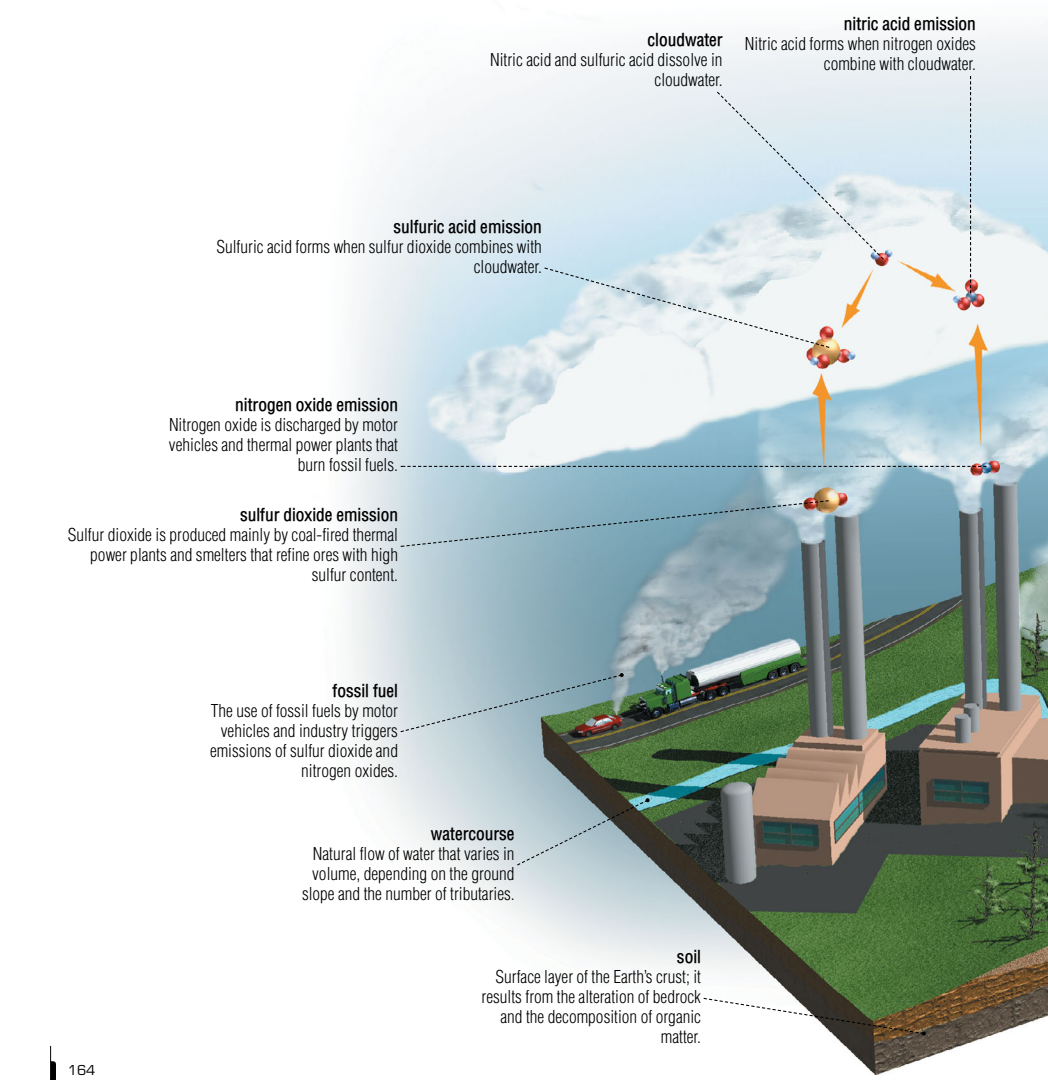
**animal dung**
Animal dung introduces large quantities of nitrate into the soil; the nitrate then filters into the water table.

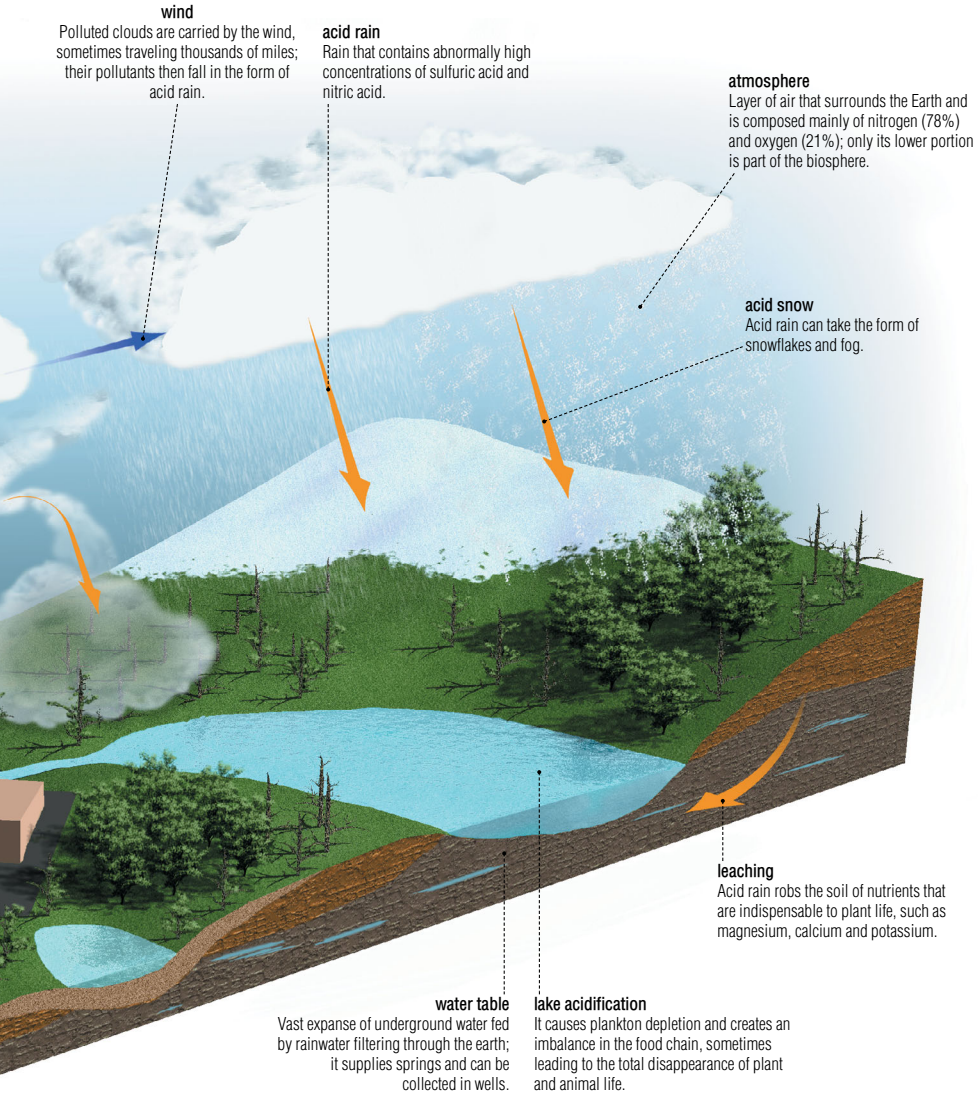
**oil spill**
Certain underground gas tanks leak, discharging hydrocarbons into the water table.

**pesticide**
Pesticide residue is found in the water table and in watercourses; it makes water unfit for consumption.

# acid rain

Rain that contains abnormally high concentrations of sulfuric acid and nitric acid.





**wind**
Polluted clouds are carried by the wind, sometimes traveling thousands of miles; their pollutants then fall in the form of acid rain.

**acid rain**
Rain that contains abnormally high concentrations of sulfuric acid and nitric acid.

**atmosphere**
Layer of air that surrounds the Earth and is composed mainly of nitrogen (78%) and oxygen (21%); only its lower portion is part of the biosphere.

**acid snow**
Acid rain can take the form of snowflakes and fog.

**leaching**
Acid rain robs the soil of nutrients that are indispensable to plant life, such as magnesium, calcium and potassium.

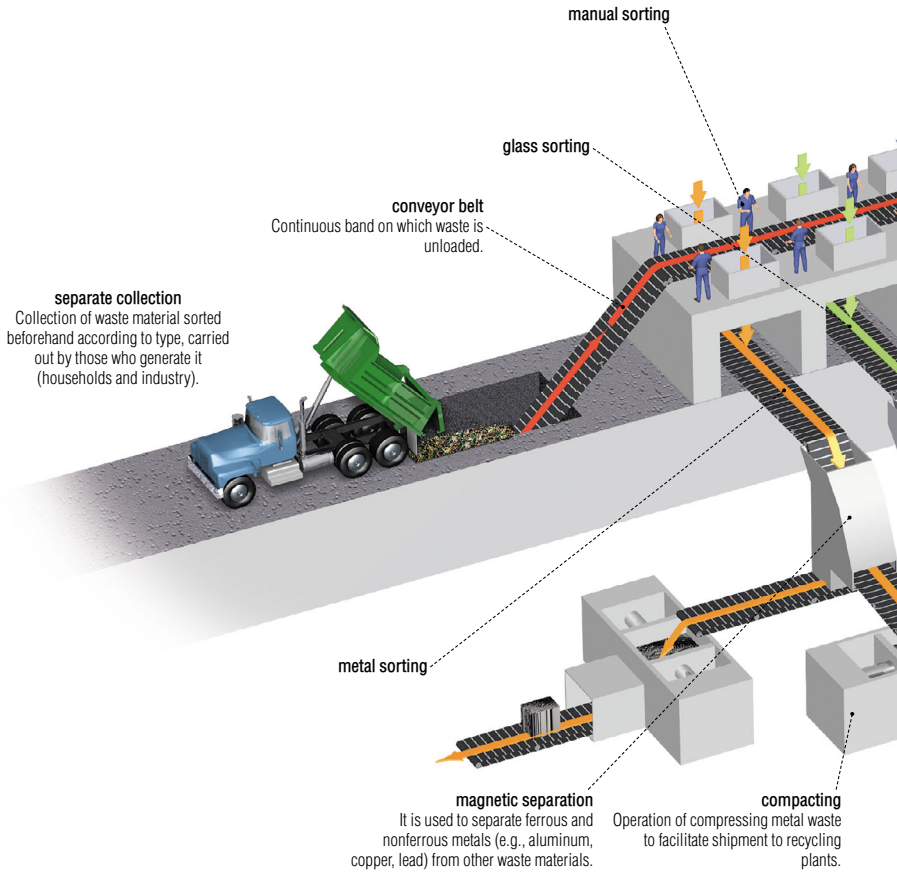
**water table**
Vast expanse of underground water fed by rainwater filtering through the earth; it supplies springs and can be collected in wells.

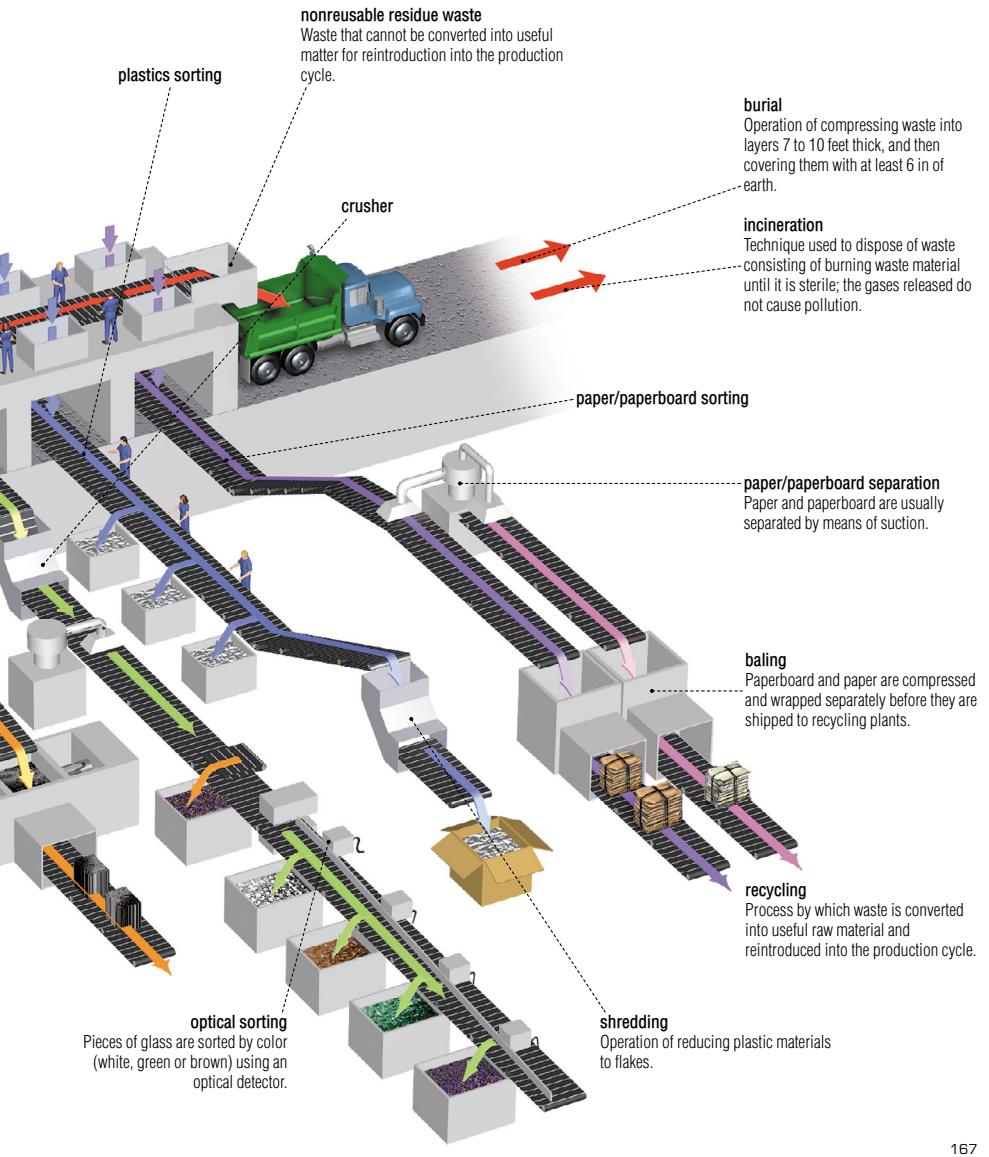
**lake acidification**
It causes plankton depletion and creates an imbalance in the food chain, sometimes leading to the total disappearance of plant and animal life.

# selective sorting of waste

Its goal is to extract recyclable material from trash.

**sorting plant**
Facility that receives and sorts recyclable material and then delivers it to a recycling center.




plastics sorting
nonreusable residue waste
Waste that cannot be converted into useful matter for reintroduction into the production cycle.
crusher
burial
Operation of compressing waste into layers 7 to 10 feet thick, and then covering them with at least 6 in of earth.
incineration
Technique used to dispose of waste consisting of burning waste material until it is sterile; the gases released do not cause pollution.
paper/paperboard sorting
paper/paperboard separation
Paper and paperboard are usually separated by means of suction.
baling
Paperboard and paper are compressed and wrapped separately before they are shipped to recycling plants.
recycling
Process by which waste is converted into useful raw material and reintroduced into the production cycle.
optical sorting
Pieces of glass are sorted by color (white, green or brown) using an optical detector.
shredding
Operation of reducing plastic materials to flakes.

## recycling containers

Containers used to collect specific types of recyclable waste material such as glass, plastic, metal and waste oil.

**paper collection unit**
High-volume public container used by the citizens of a community to dispose of paper (e.g., newspapers, packaging).

**recycling bin**
Small-volume household container used to collect recyclable household waste.

**glass collection unit**
High-volume public container used by the citizens of a community to dispose of glass containers.

**glass recycling container**
High-volume container used by the tenants of a building to dispose of glass.

**aluminum recycling container**
High-volume container used by the tenants of a building to dispose of metal containers.

**paper recycling container**
High-volume container used by the tenants of a building to dispose of paper (e.g., newspapers, packaging).

# ENGLISH INDEX

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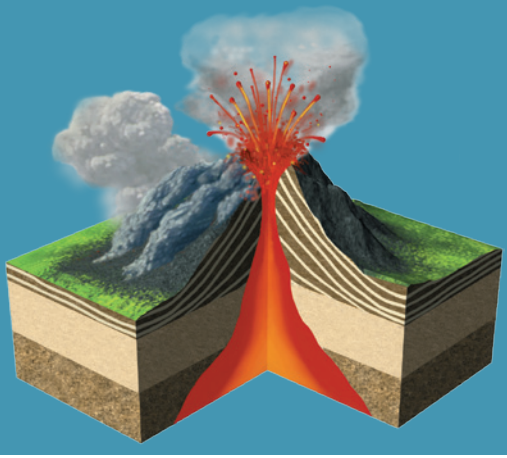
# THE VISUAL DICTIONARY OF



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