

Glossary

Abrasion *Weathering* of surface material through friction as a result of sediment movement by wind, ice, ocean waves, or rivers

Acid sulfate soils Soils originally under *anaerobic* conditions that develop high acidic content through chemical reaction when exposed to oxygen

Adaptation Acquired and genetic traits that bring an organism into better harmony with its environment

Adiabatic Process of heating or cooling of gases in the atmosphere through expansion or contraction, in the absence of outside influences

Adiabatic lapse rate Change of temperature with altitude under adiabatic conditions, 1°C per 100 metres in a dry atmosphere, approximately 0.64°C in a saturated atmosphere

Aeolian Wind impacts on the landscape

Albedo Reflection of shortwave radiation off surfaces on the Earth or in the atmosphere, as a percentage of incoming radiation

Alluvium Unconsolidated sediment which has been transported and then deposited by fluvial action

Amphibians Animals that live their life cycle on both land and water, usually needing to breed in water. Cold-blooded organisms; includes frogs and newts

Anabatic wind Local wind that flows upslope as a result of differential solar heating between ridge tops and valleys; opposite of *katabatic winds*

Anaerobic Living matter that can survive without oxygen; conditions without oxygen

Angiosperms Flowering and seed-bearing plants that allow the circulation of water and minerals to the

whole plant; these are the dominant plants in many areas of the Earth

Angular momentum Differential movement of rotation of the Earth around its axis, depending on latitude

Anthropogenic Created or caused by humans

Anticline Uplift or raised fold of the Earth's surface created by crustal compression, opposite of *syncline*

Aquifers Layers of permeable rock or sediment that can hold water

Atmosphere The gases and particulate matter that surround the globe, above the surface of the Earth

Barometer Instrument to measure atmospheric pressure

Barrier dunes Sand dunes parallel to the beach and separated from the mainland by a lagoon

Basalt Extrusive, very fine-grained, dark-coloured igneous rock

Bedding planes Boundary surfaces that separate distinct layers within a rock

Bedrock Solid rock, fresh or relatively unweathered

Biodiversity The number of species in an area; the term can also be applied to richness and diversity of genetic forms

Biogeography The area of science that combines biology and geography and is concerned with how organisms are distributed and dispersed

Biomass The total mass of living matter in a community or area

Biome A large unit of land with a characteristic combination of plants, animals and climate, for example tropical rainforest or grassland

Biosphere Plant and animal components of the Earth's system, including human beings

Black body Material that absorbs and emits radiation perfectly or completely

Blocking high Stagnant synoptic high pressure system that retards or prevents the normal eastwards movement of other pressure systems in the atmosphere

Boabs Bottle trees with thick fibrous bark, usually found in tropical regions with distinct wet and dry seasons; one species in north-west Australia, about seven species in Madagascar and Africa

Braided Of a stream, consisting of numerous intertwined smaller channels that sometimes join together and then separate again

Buys Ballot's Law If you stand with your back to the wind in the southern hemisphere, the low pressure centre will be on your right

Carbohydrate Complex molecules built from sugars, here a result of *photosynthesis*

Carbon dioxide Atmospheric gas that absorbs wavelengths of longwave radiation from the Earth's surface, contributing to higher temperatures (see also *greenhouse warming*)

Centrifugal force An apparent force that causes air to move outwards when rotating around a central point

Chaos theory (Mathematical description of) the behaviour of dynamic air movements involving mixing within the atmosphere; these are non-linear and very sensitive to initial conditions, making prediction difficult

Chemical weathering The chemical breakdown of rocks and other Earth materials.

Chroma Colour, in this case associated with the Munsell colour system for soils

Circumpolar vortex In the upper troposphere and the lower stratosphere, circulation of air in a westerly direction around the polar regions; see also *jet stream*

Climate Combination of weather events and atmospheric conditions that occur at a location over a period of several years

Collision/coalescence Process that creates raindrop growth in clouds where the droplets collide and then merge

Commensal A form of symbiosis in which one species benefits and the other neither benefits nor is harmed

Concentration Indicates amount of a component material or gas within a given volume of substance, most often the atmosphere or water

Condensation Process of transfer from water vapour to liquid water in the atmosphere involving release of stored heat, which creates cloud, fog or dew; opposite of *evaporation*

Conifers Plants that bear cones as fruiting bodies; part of the group called *gymnosperms*

Continental drift Movement of land masses across the Earth's surface over geologic time scales; see also *plate tectonics*

Convection Mass upward movement of air creating vertical transport and mixing, opposite of *subsidence*

Convergence Contraction of airflow into a smaller volume; opposite of *divergence*

Coriolis force Apparent force created by the rotation of a solid Earth under a fluid atmosphere, affecting the horizontal direction of airflow in a manner depending on wind speed and latitude

Cryosphere Areas on the Earth containing snow and ice

Cuticles Surface cells of leaves, generally containing waxes in a cellulose matrix of cells

Cut-off low Middle troposphere low pressure system removed from the main atmospheric circulation, which usually moves very slowly and results in considerable precipitation

Cycads Generally palm-like plants that do not form flowers and that reproduce sexually by seeds that form in cone or cone-like structures

Cycle Repetitive occurrence over a set time scale

Deflation Removal of dry, loose, surface material by wind

Delta Unconsolidated material deposited in a fan shape at the mouth of a river

Density Mass within a volume of a substance or material, usually defined as a ratio

Denudation The wearing down of a land surface by the combined effects of weathering and erosion

Desertification Encroachment of desert-like conditions into surrounding areas under drier than normal climate conditions; effects have been enhanced by human activities

Detritivores Organisms that consume disintegrated organic matter

Dew Condensation of water vapour on objects at the Earth's surface, created from long-wave energy loss and resultant temperature reductions under clear sky conditions

Dew point temperature The temperature at which condensation will form and where relative humidity is 100%

Diatoms Tiny unicellular organisms, mostly species with silica skeletons; may live in any aquatic habitat including wet soils

Dispersal The process by which populations expand territory through the spread of propagules

Divergence Spread of airflow into a wide volume, opposite of *convergence*

Dome A rounded landform feature extending above the Earth's surface

Dyke Relatively narrow igneous intrusion along a vertical joint or fracture; may be more or less resistant to erosion than the surrounding rock

Ecozones Differentiation of ecotypes taking place in a gradual manner through time or space

Ecological drift A change in composition or structure of an ecosystem due to time since disturbance, such as fire

Ecosystem A defined community containing a mix of living organisms linked by energy and material transfer and interacting with its physical environment; its health depends on the balance between components, and the amount of human interference

Ecotones Transition areas between two ecosystems

Ecotypes Populations with particular genetic forms that relate to habitat differentiation

Ekman layer Thin layer at the surface of the ocean and within the planetary boundary layer containing changes in current or wind direction as a spiral with depth, due to *Coriolis force*

El Niño Warm pool of water in the eastern and central South Pacific Ocean that causes major rainfall reductions in eastern and northern Australia, opposite of *La Niña*

Endogenic Internal forces that create continental landforms

Energy Force times distance; different types of energy, such as radiant, nuclear, thermal or chemical, create varying forces over space and time

ENSO El Niño–southern oscillation, the reversed pressure oscillation between the western (high) and eastern (low) South Pacific Ocean, which creates an El Niño situation

Environment All aspects of one's surroundings, incorporating a range of ecosystems. Natural environments are untouched by humans; artificial environments such as cities are completely created by humans

Environmental gradients Gradual trend in environmental conditions in space or time, for example a temperature or moisture gradient

Erosion Removal and transport of surface material by water, waves, wind and ice

Eutrophication The process whereby nutrient enrichment, usually with phosphorus or nitrogen, leads to high rates of productivity

Evaporation Transfer of liquid water into water vapour through the application of heat; opposite of *condensation*

Exogenic External forces that shape the landscape, such as erosion or weathering

Fault line A fracture in the land surface that displaces rocks

Feedbacks Interactions between components within the system where a change in one creates changes in the others, sometimes on a continuous basis

Ferrell cell Generalised mid-latitude vertical and horizontal circulation around the globe

Flocculation Aggregation or combination of soil particles into larger components

Floodplain A river valley area over which flood water can spread, depositing alluvial material

Fluvial Pertaining to river flows and water movement on the landscape

Foehn winds Warm dry airflow down the leeward side of a mountain range, which causes major temperature increases due to adiabatic contraction

Fog Stratus cloud at ground level, reducing visibility to less than one kilometre

Folding Bending of rock layers caused by crustal compression forces

Foliage cover The area of leaf cover in an ecosystem expressed as a percentage of overall area

Food chain A series of organisms, each feeding on the one below in the chain gradient

Fracture Break in a rock layer or stratum caused by stress or compression

Friction Mechanical resistance to movement between two adjoining surfaces, for example airflow and the ground surface

Front Transition zone between two air masses unlike in temperature, which often creates instability and bad weather

Frost Frozen dew, formed when temperatures are below 0°C

Gastropods Legless, often slimy, animals that glide on a single foot; includes snails and slugs

Geostrophic wind Horizontal wind occurring in the upper troposphere when the pressure gradient force and Coriolis force balance

Glacial striations Gouge or scratch marks left on rocks indicating abrasion by material carried within glaciers

Glaciated landscapes Landforms affected or created by ice masses

Great Dividing Range (Eastern Highlands) Higher elevations extending roughly north to south that divide the eastern coastal zone of Australia from the interior

Greenhouse warming Absorption of longwave energy from the Earth's surface by gases and clouds which keep the atmosphere near the surface at about 15°C on average; emissions of greenhouse gases from

human activities add extra gases, causing a rise in this temperature

Ground-truthing The physical identification of something observed remotely, for example by aerial photography or from satellites

Gullies Steep-sided channels, sometimes discontinuous, in which water flows only after rains

Gymnosperms Terrestrial trees or shrubs that do not form flowers; they generally have simple or needle-like leaves and the seeds are formed within cones

Hadley cell Tropical convection cell in the general circulation that moves warm air polewards

Heat budget The relationship between net radiation, latent heat of evaporation, sensible heat, and heat movement into the soil and ocean, which is in a continuous state of shifting balance

Holistic Complete; in terms of the environment, considering all aspects of the environmental system

Hue Shade and type of colour, for example soil colour defined by the Munsell colour chart

Hybridisation The genetic blending of two genotypes, sometimes into breeding types, sometimes the offspring are sterile

Hydrologic cycle The complete relationship between the levels and interchange of water components, evaporation, precipitation, runoff and storage, between land, ocean and atmosphere

Hydrosphere The water components of the Earth: oceans, rivers and lakes

Hygroscopic (of a substance) Able to attract water vapour for condensation

Infrared (longwave) Radiation emitted from the Earth's surface and from the atmosphere, with wavelength longer than 0.75 μm and amount determined by temperature

Intertropical convergence zone The area along or near the equator where the rising branches of the Hadley cells in the northern and southern hemispheres meet

Inversion Increase in temperature with height in any layer of the atmosphere; this creates very stable conditions

Isobars On a weather map, lines showing equal atmospheric pressure

Isostacy Balance on the Earth's crust. Less dense continental crust 'floats' on denser mantle material. If sediments or ice build up or are removed, the continental crust readjusts by rising or falling relative to sea level

Isotherms Lines of equal temperature on a weather map, which help show spatial distributions

Isotopes Forms of an element with differing numbers of neutrons in the nucleus; for example the most common isotope of oxygen has 8 neutrons, but other oxygen isotopes exist with 9 or 10

Jet streams Vertically thin areas of very high winds in the upper troposphere, associated with the boundaries between the global circulation cells, and caused by rapid temperature changes (thermal winds)

Joints Fractures within a rock mass that do not involve rock displacement

Katabatic wind Local winds created through gravity moving air down a slope; opposite of *anabatic winds*

Land breeze Local airflow from land to ocean at night, caused by surface temperature differences, opposite of *sea breeze*

La Niña Describes the opposite of El Niño, where colder water than normal exists in the central Pacific, often resulting in greater rainfall than normal in eastern and northern Australia

Latent heat Heat stored in water vapour after evaporation occurs, to be released later during condensation; a smaller amount is stored in liquid water and released during freezing

Lava Molten material at the Earth's surface that originates from volcanoes; this material solidifies on cooling; see also *magma*

Leaching Transfer of minerals in *solution* downwards in a soil layer or sediments

Lightning Visual result of electric charge differences in a thunderstorm

Lignites Brown coals or ancient peats; usually contain abundant large and small fossils

Lithified (lithogenesis) The formation of rock from sediments

Lithosphere The land surface of the Earth and its contents

Loess Fine soil or dust deposited mainly by wind; often has a high nutrient content

Lunette Crescent-shaped dune on the lee side of a seasonal or ephemeral lake

Magma Molten material within the Earth that solidifies into rock when cooled at or near the Earth's surface; see also *lava*

Magnetic field The region in which magnetic forces would act on any magnetised body; determines compass needle direction

Maps Used to show spatial and sometimes temporal distributions of system and human components, covering various areas defined by the scale of the map (relative distance on the map compared to actual distance)

Marine transgressions The encroachment of marine and estuarine conditions on land, due to either rising sea level or land subsidence

Marsupials Mammals that nurture their young in a pouch; includes kangaroos and koalas

Matter Loosely defined as the material or substance that makes up physical objects

Meander A large bend or loop in a riverbed

Methane A major greenhouse gas; compound of hydrogen and carbon (CH₄) and emitted from any decaying material

Mixing ratio The ratio of the mass of water vapour to the mass of dry air in the atmosphere, used to calculate relative humidity and changes in atmospheric moisture

Monotremes Egg-laying mammals; includes platypus and echidna

Monsoon Seasonal reversal of winds between summer and winter in parts of the world, such as South-East Asia and northern Australia

Moraines Unsorted and unconsolidated material deposited at the snout or margins of a retreating glacier

Mutation A genetic change that is unusual or new in the make-up of a species.

Net primary production The resulting production produced by photosynthesis less the respiration and energy expenditure required to capture it

Net radiation The difference between shortwave radiation components from the Sun and longwave radiation from the Earth and atmosphere, usually positive in the tropics and negative in the polar regions

Net secondary production The gain in energy produced by heterotrophs (non-photosynthetic organisms)

Niche A term used to define the habitat and way of life of an organism

Noble gases A group of gases that are generally unreactive, including helium, argon and radon

Omnivores Organisms that consume both plant and animal foods

Orographic Airflow moving vertically up a mountainside or other barrier, which can lead to cooling and condensation

Outwash Unconsolidated sediments deposited from melting glaciers

Ozone A molecule consisting of three oxygen atoms (O_3), in contrast to normal oxygen, which has two (O_2); a component of photochemical smog in the lower atmosphere but a normal and important component of the upper atmosphere (the *ozone layer*)

Ozone layer (stratosphere) Natural layer of ozone gas (O_3) in the lower stratosphere, which absorbs the wavelengths of ultraviolet radiation deadly to life on Earth

Palaeomagnetic, paleomagnetism The remnant signal of Earth's magnetic fields trapped in crystals of rocks or sediments

Palynology Study of pollen grains and spores, generally from sediments, in order to reconstruct vegetation and environmental history

Pangaea A vast super-continent broken up by plate tectonics about 200 million years ago, forming the modern continents

Particulate Solid and liquid components in the atmosphere, separate from gases

Penplain Relatively flat landscape in 'old age' where erosion has removed almost all topographic relief

Permafrost Ground that is permanently frozen all year

Permeability Ability of rock or soil to allow infiltration of water

pH Measure of level of acidity or alkalinity in water or soil; neutral is pH of 7

Photosynthesis The processes used by green plants which trap energy to synthesise glucose from water and carbon dioxide

Phyllodinous The organs formed from leaf stems which then function as leaves for photosynthesis

Physiographic Physical landscape features associated with a defined area

Placentals Mammals that give birth to relatively well developed offspring after a long incubation period; excludes monotremes and marsupials; most mammals are placentals

Plant functional type A grouping of plants with similar traits that have developed in response to similar environments

Plate tectonics A theory that describes the surface of the Earth as a series of plates that shift slowly to reshape continents and ocean basins

Playa Inland basin of interior drainage, where a shallow fluctuating lake may exist

Polar stratospheric clouds High level very thin clouds consisting of ice or nitric acid that form over the polar regions in winter, in the very cold conditions inside the *circumpolar vortex*

Pollination The transfer of genetic material by pollen grains to the ovules of plants in order to achieve fertilisation and initiate seed formation

Precipitation Liquid (rain or dew or fog droplets) or solid (snow, ice, frost) condensed water that falls from the atmosphere to the Earth's surface

Predation The consuming of one individual by another, for example a carnivore eating another animal

Pressure (atmospheric) Stress or weight of the atmosphere; depending on altitude, temperature, density, and strength of gravitational attraction towards the surface

Pressure gradient force Created by variations in pressure in the fluid atmosphere, which causes air to move from areas of higher pressure towards areas of lower pressure

Primary productivity The energy fixed in an ecosystem by photosynthesis

Productivity The conversion of energy or food into biomass

Proteins Complex biological molecules built from amino acids; these are essential components of every cell

Pyroclastics Solid material ejected from volcanic eruptions

Rainshadow Area of reduced rainfall on the side of a mountain range, opposite to the side where most precipitation falls

Regolith Partly weathered rock and mineral material located above bedrock

Relative humidity The percentage of atmospheric moisture content, calculated from actual mixing ratio divided by saturation mixing ratio

Relief The physical configuration of the Earth's surface (see *topography*)

Reptiles Cold-blooded vertebrates, often egg-laying; includes snakes, lizards and turtles

Resprout The ability to form new shoots from dormant buds after disturbance, for example from fire or insect defoliation

Ridge An area of higher pressure in the upper troposphere that does not have closed circulation; opposite of *trough*

Rossby waves Long waves in the upper troposphere within the circumpolar vortex associated with the global westerly circulation, normally 4000–6000 kilometres in length

Salinisation (salinity) Increase in salt content of surface soil, mainly due to human impacts

Saltation Bouncing movement of along a river bed or in deserts of particles too heavy to be taken into suspension

Saturated (saturation) When the atmosphere can hold no more water vapour and condensation is occurring; relative humidity is 100%

Scale Comparison between the length shown on a map and the real length on the ground

Scarp A steep, linear slope separating generally lower-lying country from higher ground

Scattering The deflection of shortwave energy from a straight path by gases and particles in the atmosphere

Sclerophylly This term means 'leather-leaved' and refers to hard leaves; it is a mechanism to help reduce water loss

Sea breeze Local daytime airflow from sea to land in coastal areas, created by thermal differences between the surfaces, opposite of *land breeze*

Secondary productivity Productivity in a system above that produced by photosynthesis

Seismic waves Shock through the Earth's crust caused by plate movements; see also *tsunami*

Sensible heat Heat energy in the atmosphere that is a component of net radiation but does not include water (latent heat); usually associated with the temperature humans feel

Seral stages Identifiable stages of community development in an ecological succession

Serotiny (serotinous) The retention of seeds in fruit or cones on plants, common in some fire-prone species of trees and shrubs in Australia

Sheetwash (slopewash) Movement of water (runoff) down a slope, usually carrying eroded sediment

Shore platform A flat area of bedrock along an ocean shore

Shortwave radiation Radiation energy with a wavelength less than 0.75 μm which originates from very hot sources, such as the Sun

Soil profile Vertical column describing the physical characteristics and changes of soil with depth

Slopewash Rock or soil material that has moved down a slope due to gravity or water flows

Solar radiation Energy released from the Sun (temperature 6000 K) which enters the atmosphere from space, containing mostly short wavelengths (less than 0.75 μm) in contrast to the longwave energy released from the Earth and atmosphere

Solution Material dissolved in water

Southerly buster Summertime shallow frontal system along the coast of Victoria and New South Wales that brings rapid temperature reductions and a change in wind direction

Southern Oscillation The variation in pressure difference between the western (e.g. Darwin) and eastern (e.g. Easter Island) south Pacific Ocean, see also *El Niño*, *La Niña*, *ENSO*

Spatial distribution Variation of any component of a system across an area or volume

Specific heat The heat needed to raise the temperature of one gram of a substance by 1°C; the heat capacity of a substance

Spits Extensions of sand from the land into the ocean

Stability The level of vertical and horizontal mixing and turbulence in an atmospheric layer or in the atmosphere; the more stable the layer, the lower the amount of activity

Stalactites Mineral deposits hanging from the roof of a cave or cavern, which originate from very slow water movements

Stalagmites Mineral deposits on the floor of a cave or cavern, which originate from very slow dripping of water from above

Steppe Semi-arid grasslands, sometimes with a sparse shrub component

Stratigraphy Study of rock layers or strata, their order or sequence, and where they occur

Stratosphere The layer of the atmosphere immediately above the troposphere (above 10–12 kilometres altitude), where temperature increases with altitude; separated from the troposphere by the tropopause

Structural formation The structure or form of a vegetation community, for example forest or shrubland

Sublimation Transfer of water directly from the solid stage to the vapour stage, bypassing the liquid stage

Subsidence Sinking of air in the atmosphere, normally associated with high pressure, opposite of *convection*

Sub-surface heat flux Movement of energy downwards from the Earth or ocean surface

Succession Gradual changes in vegetation structure over time within an ecosystem

Syncline Depression or downfold of rock layers caused by compression, opposite of *anticline*

Synoptic Scale in the atmosphere where circulation variations relate to local to large regional weather and climate conditions

System Collection of processes organised in an orderly manner that has interactions, inputs and outputs; closed systems do not have any external connections, open systems do. See also *ecosystem*

Taphonomy The study of the processes that lead to the preservation of evidence in the fossil record

Taxonomic, taxonomy A level of classification in a standard classification scheme of organisms

Teleconnections Tendency for atmospheric processes to be related over large spatial scales, so that a change in one area affects other areas

Temperature Amount of warmth of any substance

Terrace A fairly flat area of sediment that has been deposited during stream floods, and which has since become stranded above flood height as the stream cuts down deeper; a relic floodplain.

Thermocline Boundary between the ocean surface layer and the deep ocean layers

Thermodynamics Study and analysis of heat and work relationships, especially important for cloud and precipitation processes in the atmosphere

Thunderstorm Large convective cloud system including lightning and thunder, often resulting in heavy rain and hail

Topography Overall description of all surface features, including both natural and anthropogenic; see *relief*

Tornado Intense atmospheric vortex, with very strong winds and very low central pressure, which originates from strong thunderstorms

Trade winds Consistent south-east (southern hemisphere) or north-east (northern hemisphere) global winds blowing between the subtropical highs and the intertropical convergence zone

Transpiration Release of moisture as water vapour from living plants

Trophic A hierarchical level in a food chain through which energy flows

Tropical cyclone Large rotating intense tropical storm with high winds and heavy rainfall, and very low central pressure

Tropopause Boundary between the troposphere and the stratosphere, located at about 10–12 kilometres altitude

Troposphere Layer of atmosphere directly above the surface where, in general, temperature and moisture decrease with height and where most day-to-day weather changes occur

Trough Area of lower pressure in the upper troposphere that does not have closed circulation; opposite of a *ridge*

Tsunami Ocean wave created by seismic activity on the sea bed

Turbidity Indicator of the amount of suspended sediment or pollutant material in water or air

Turbulence Irregular mixing and movement of components within a fluid system

Ultraviolet Shortwave energy of wavelengths less than 0.4 μm , originating from the Sun

Upwelling Upward movement of deep cold water to the surface of oceans

Urban heat island Increased temperatures in city areas caused by a combination of artificial heat releases from urban activities, and extra longwave radiation released from urban surfaces

Value The intensity (lightness or darkness) of colour associated with soil in the Munsell colour chart

Vicariance Speciation that arises from separation in space and time

Visible spectrum Radiated energy of wavelengths between 0.4 and 0.75 μm , which the human eye can see as colours

Volume The space taken up by a defined three-dimensional substance

Vortex See *circumpolar vortex*

Wake capture The collection of smaller water droplets and water vapour at the back of a large water droplet as it falls in a cloud

Walker circulation East–west orientated circulation over the southern hemisphere tropics, especially the Pacific, associated with ENSO

Water budget The calculation of the amount of change and storage within the *hydrologic cycle*

Water vapour Gas phase of water

Weather Short-term fluctuations in atmospheric conditions, or the state of the atmosphere at a specific point in time

Weathering Long-period decay of rock and minerals caused by physical, chemical or biological agents

Westerlies General atmospheric circulation in both hemispheres between the sub-tropical highs and the polar regions

Xeromorphy Adaptations that help plants to tolerate drought