

Glossary

A horizon: A mineral horizon formed at or near the surface in the zone of removal of materials in solution and suspension, or maximum in situ accumulation of organic carbon, or both.

acid sulfate soil: A soil which is potentially extremely acidic ($\text{pH} < 3.5$), because large amounts of reduced forms of sulfur are oxidized to sulfuric acid when soil is drained or excavated.

active acidity: The activity of hydrogen ions in the aqueous phase of a soil. It is measured and expressed as a pH value.

adhesion: Molecular attraction that holds the surfaces of unlike substances in contact. For example, water is attracted to clay particles by adhesion.

adsorption: The process by which atoms, molecules, or ions are taken up from the soil solution or soil atmosphere and retained on the surfaces of solids by chemical or physical binding.

adsorption complex: A collection of various organic and inorganic substances in the soil that are capable of adsorbing ions and molecules.

aerobic respiration: A form of respiration in the presence of oxygen, in which the terminal electron acceptor is oxygen, leading to the formation of water. This process yields maximum energy.

agric horizon: A mineral soil horizon in which clay, silt and humus, derived from an overlying cultivated and fertilized layer, have accumulated (Soil Taxonomy).

agricultural bio-ecosystems: Managed ecosystems which are maintained by the input of solar and fossil energy, that contain natural and altered biotic and abiotic resource materials, and man-made artifacts. These systems are regulated by bio-physical and cultural information and control.

albeluvic tonguing: The penetration of distinct bleached, iron- and clay-depleted horizon material into brownish horizons of clay accumulation (WRB).

albic horizon: A mineral soil horizon from which clay and free iron oxides have been removed or in which the oxides have been segregated to the extent that the color of the horizon is determined primarily by the color of the primary sand and silt particles, rather than by the coatings on these particles (Soil Taxonomy).

amorphous material: Noncrystalline constituents of soils.

anaerobic respiration: A form of respiration in the absence of oxygen, in which the terminal electron acceptors may be nitrate or sulfate ions or other substances. This process yields less energy than aerobic respiration.

andic: Soil properties related to the volcanic origin of materials. The properties include organic carbon content, bulk density, phosphate retention, and iron and aluminum, extractable with ammonium oxalate.

anthropic epipedon: A surface layer of mineral soil that has the same requirements as the mollic epipedon with respect to color, thickness, organic carbon content, consistence and base saturation, but that has >110 mg P / kg soluble in 0.05 M citric acid, or is dry >300 days (cumulative) during the period when not irrigated. The anthropic epipedon forms under long-continued cultivation and fertilization (Soil Taxonomy).

aquic moisture regime: A reducing moisture regime in a soil that is virtually free of dissolved oxygen because it is saturated by ground water or by water of the capillary fringe. (L. *aqua*, water) (Soil Taxonomy).

arable soil: A soil which is suitable for the production of cultivated crops in an economical and practical manner.

argic horizon: The argic horizon (from L. *argilla*, white clay) is a subsurface horizon which has a distinctly higher clay content than the overlying horizon. The textural differentiation may be caused by an illuvial accumulation of clay, by predominant pedogenetic formation of clay in the subsoil or destruction of clay in the surface horizon, by selective surface erosion of clay, by biological activity, or by a combination of two or more of these different processes. However, a mere lithological discontinuity, such as may occur in alluvial deposits, does not qualify as an argic horizon (WRB).

argillic horizon: A mineral soil horizon that is characterized by the illuvial accumulation of phyllosilicate clays. The argillic horizon has a certain minimum thickness depending on the thickness of the solum, a minimum quantity of clay in comparison with an overlying eluvial horizon depending on the clay content of the eluvial horizon, and usually has coatings of oriented clay on the surface of pores or peds or bridging sand grains (Soil Taxonomy).

aridic and torric moisture regimes: A soil moisture regime that has no water available for plants for more than half the cumulative time that the soil temperature at 50 cm below the surface is >5 °C, and has no period as long as 90 consecutive days when there is water for plants while the soil temperature at 50 cm is continuously >8 °C. (L. *aridus*, dry, and L. *torridus*, hot and dry) (Soil Taxonomy).

ash: The substance remaining after the ignition of plant material.

atmosphere: The air surrounding the Earth. The atmosphere has no precise upper limit, but for all practical purposes, the absolute top can be regarded as being at about 200 km.

atoms: The smallest part of an element that can exist chemically.

available nutrients: The amount of soil nutrient in chemical forms accessible to plant roots, or the compounds likely to be convertible to such forms during the growing season.

b: A buried soil horizon.

B horizon: A mineral horizon characterized by one or more of the following:

1. An enrichment in silicate clay, iron, aluminum, or humus.
2. A prismatic or columnar structure that exhibits pronounced coatings or stainings associated with significant amounts of exchangeable sodium.
3. An alteration by hydrolysis, reduction, or oxidation to give a change in color or structure from the horizons above or below, or both.

basal spacing: The distance between similar faces of adjacent layers.

base-forming cations: Those cations that form strong (strongly dissociated) bases by reaction with hydroxyl, e.g., potassium hydroxide forms K^+ and OH^- ions. In most soils, Ca^{2+} , Mg^{2+} , K^+ and Na^+ predominate. Historically, these are called bases because they are the cations of strong bases.

biocycling: The cycling of materials through microorganisms, plants and animals.

biogeochemical cycle: The movement of chemical elements from organism to physical environment to organism in more or less circular pathways.

biosphere: The part of the Earth's environment in which living organisms are found, and with which they interact to produce a steady-state system, effectively a whole planet ecosystem.

biota: (Soil Organisms) Microbes, plants and animals occupying an area together.

boulders: Rock fragments over 600 mm in diameter.

bound H and Al: These forms of hydrogen and aluminum ions are tightly held by pH-dependent sites on organic and mineral colloids.

braided stream: A stream whose form consists of a number of small channels separated by bars. The bars may be barren and unstable as at glacial margins, where rapid changes occur.

buffer: A solution that resists a change in pH when an acid or alkali is added, or when the solution is diluted. Examples of natural buffers are H_2CO_3/HCO_3^- and $H_2PO_4^-/H_2PO_4^{2-}$.

c: A cemented (irreversible) pedogenic horizon. Ortstein, placic, and duric horizons are examples.

C horizon: A mineral horizon comparatively unaffected by the pedogenic processes operative in A and B, except gleying, and the accumulation of carbonates and more soluble salts.

ca: A horizon of secondary carbonate enrichment where the concentration of lime exceeds that in the unenriched parent material.

calcareous soil: A soil containing sufficient calcium carbonate, often with magnesium carbonate, to effervesce visibly when treated with cold 0.1 N hydrochloric acid.

calcic horizon:

1. A mineral soil horizon of secondary carbonate enrichment that is >15 cm thick, has a CaCO_3 equivalent of >150 g / kg, and has at least 50 g / kg more calcium carbonate equivalent than the underlying C horizon (Soil Taxonomy).
2. The calcic horizon (from L. *calx*, lime) is a horizon in which secondary calcium carbonate (CaCO_3) has accumulated either in a diffuse form (calcium carbonate present only in the form of fine particles of 1 mm or less, dispersed in the matrix) or as discontinuous concentrations (pseudomycelia, cutans, soft and hard nodules, or veins). The accumulation may be in the parent material, or in subsurface horizons, but it can also occur in surface horizons as a result of erosion (WRB).

cambic horizon:

1. A mineral soil horizon that has a texture of loamy very fine sand or finer, has soil structure rather than rock structure, contains some weatherable minerals, and is characterized by the alteration or removal of mineral material as indicated by mottling or gray colors, stronger chromas or redder hues than in underlying horizons, or by the removal of carbonates. The cambic horizon lacks cementation or induration and has too few evidences of illuviation to meet the requirements of the argillic or spodic horizon (Soil Taxonomy).
2. The cambic horizon (from L. *cambiare*, to change) is a subsurface horizon showing evidence of alteration relative to the underlying horizons. It lacks the set of properties diagnostic for a ferralic, argic, natric or spodic horizon and the dark colors, organic matter content and structure of a histic, folic, mollic or umbric horizon (WRB).

capillary: A tube of small diameter.

capillary action: (capillarity) The process by which soil moisture may move in any direction through the fine (i.e., capillary) pores of the soil, under the influence of surface tension forces between the water and individual soil particles. Soil moisture in this state is called capillary moisture. It exists as a film or skin of moisture on soil particles, and may be drawn above the water-table by capillary action and into plant roots by the process of osmosis.

capillary pores: In these pores the shape of the interface between air and water is determined by the configuration of pores and by forces on the interface. The resulting interface is called the capillary meniscus. The flow of water in these pores is considered to be laminar (movement of fluid particles in a direction parallel to each other) and dominant in soils.

capillary water: Water that is left in the soil, along with hygroscopic moisture and water vapor, after the gravitational water has drained off. Capillary water is held by surface tension as a film of moisture on the surface of soil particles and peds, and as minute bodies of water filling part of the pore space between particles.

capillary zone: (capillary fringe) The zone immediately above the water table, in which water may be drawn upwards as a consequence of capillary action.

carbon pools: Bodies containing stocks of inorganic or organic forms of carbon.

carbonation: A chemical weathering process in which dilute carbonic acid, derived from the solution in water of free atmospheric and soil-air carbon dioxide, reacts with a mineral.

catena: A sequence of soils of about the same age, derived from similar parent material, and occurring under similar climatic conditions, but having different characteristics because of variation in relief and drainage.

cation: An ion that carries a positive electrical charge (e.g. the metallic element of salt compounds). A cation can combine with certain anions (which have negative charges).

cation exchange: A process in which cations in solution are exchanged with cations held on the exchange sites of mineral and organic matter, particularly on the surfaces of colloids of clay and humus.

cation exchange capacity: The total amount of exchangeable cations that a particular material or soil can adsorb at a given pH. Exchangeable cations are held mainly on the surface of colloids of clay and humus and are measured in centimoles of charge per kilogram (cmol_c/kg) of soil (or of other adsorbing material such as clay).

cc: Cemented (irreversible) pedogenic concretions.

cellulose: A straight-chain, insoluble, polysaccharide that is composed of glucose molecules linked by beta-1,4 glycosidic bonds. It is the principal structural material of plants and one of the most abundant organic compounds in the world.

CFCs: (Chlorofluorocarbons) Gaseous, synthetic substances composed of chlorine, fluorine, and carbon. They have been used as refrigerants, as aerosol propellants, as cleaning solvents, and in the manufacture of plastic foam. The CFCs are suspected of causing ozone depletion in the stratosphere.

chemo-autotroph: A chemotroph that uses carbon dioxide as its main or sole source of carbon. Example: Nitrifying or S oxidizing bacteria.

chemo-heterotroph: A chemotroph that obtains its carbon chiefly or solely from organic compounds. Examples: Most bacteria, fungi, protozoa, and larger fauna.

chemotroph: An organism that obtains its energy from chemical reactions.

chernic horizon: The chernic horizon (from Russian *chern*, black) is a special type of mollic horizon. It is a deep, well structured, blackish surface horizon with a high base saturation, a high content in organic matter and high biological activity (WRB).

chroma: The relative purity, strength, or saturation of a color. It is directly related to the dominance of the determining wavelength of light. It is one of the three variables of color.

chronosequence: A sequence of related soils that differ, one from the other, in certain properties, primarily as a result of differences in time of development.

clay: As a particle-size term: a size fraction less than 0.002 mm in equivalent diameter.

clay (textural class): Soil material that contains 40% or more clay, less than 45% sand, and less than 40% silt.

clay loam: Soil material that contains 27 to 40% clay and 20 to 45% sand.

clay skins: Coatings of oriented clay on the surfaces of peds and mineral grains and lining pores. Clay skins may be up to 100 μm in extent. Clay domains are regions up to 10 μm in extent.

climate: The average weather conditions experienced at a particular place over a long period, usually more than 70 years.

coarse fragments: Rock or mineral particles greater than 2.0 mm in diameter.

cobblestone: Rounded or partially rounded rock or mineral fragments, 75 to 250 mm in diameter.

cohesion: The molecular attraction that holds the surfaces of like substances in contact. For example, the attraction between water molecules is cohesion.

colloid: A substance in a state of fine subdivision, whose particles are 10^{-4} to 10^{-7} cm in diameter.

colluvium: A heterogeneous mixture of material that, as a result of gravitational action, has moved down a slope and settled at its base.

color value: The relative lightness of color, which is approximately a function of the square root of the total amount of light.

community: Any grouping of populations of different organisms found living together in a particular environment.

compaction: To unite firmly; the act or process of becoming compact.

condensation: The conversion of a substance (as water) from the vapor state to a denser liquid or solid state, usually initiated by a reduction in the temperature of the vapor.

conduction: The transfer of heat through matter by the communication of kinetic energy from particle to particle with no net displacement of the particles.

consumer: In the widest sense, a heterotrophic organism that feeds on living or dead material.

convection: A vertical circulation within a fluid that results from density differences caused by temperature variations.

correlation of soil classification: The relationship between soils described by one classification system to another. The classification systems may be national or international.

cryic horizon: The cryic horizon (from Gr. *kryos*, cold, ice) is a perennially frozen soil horizon in mineral or organic soil materials (WRB).

cryic temperature regime: A soil temperature regime that has a mean annual soil temperature lower than 8 °C but do not have permafrost. (Gr. *kryos*, coldness; meaning very cold soils) (Soil Taxonomy).

crystalline: Having the regular internal arrangement of atoms, ions, or molecules in a crystalline substance. Crystalline materials need not necessarily exist as crystals; all metals, for example, are crystalline, although they are not usually seen as regular geometric crystals.

crystallization: The process of forming crystals from liquid or gas.

deciduous: Applies to trees that shed their leaves seasonally.

decomposition: The breakdown of complex organic molecules of dead protoplasm and cell walls into simpler organic and inorganic molecules, which may be used again by other organisms.

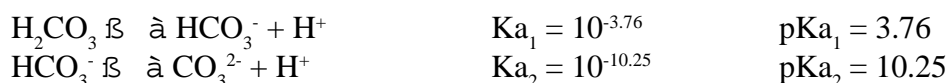
deposition: The addition of materials to the surface.

diagnostic horizons: Combinations of specific soil characteristics that are indicative of certain classes of soils. Those which occur at the soil surface are called epipedons, those below the surface, diagnostic subsurface horizons (Soil Taxonomy).

diffusion: The movement of individual species of gas in response to a concentration gradient.

dipole: A pair of separated opposite electrical charges.

dissociation: The breakdown of a molecule, ion, etc., into smaller molecules, ions, etc. For example, carbonic acid disassociates into bicarbonate and hydrogen ions:



This means that for pH values below pK_{a1} (3.76), H_2CO_3 will have little tendency to dissociate. When $pH = pK_{a1}$, $[H_2CO_3] = [HCO_3^-]$. For pH values between 3.76 and 10.25, H_2CO_3 will dissociate into $HCO_3^- + H^+$. When $pH = pK_{a2}$, $[HCO_3^-] = [CO_3^{2-}]$. As carbonic acid is a weak acid, the solution will contain H_2CO_3 , HCO_3^- , CO_3^{2-} , and H^+ , depending upon the pH of the soil.

drainage: The process of removing gravitational water from soil, using artificial or natural conditions, so that freely moving water can drain, under gravity, through or off soil.

drumlin: An elongated or oval hill of glacial drift, commonly glacial till, deposited by glacier ice and having its long axis parallel to the direction of ice movement.

duric horizon: The duric horizon (from L. *durum*, hard) is a subsurface horizon showing weakly cemented to indurated nodules cemented by silica (SiO_2), presumably in the form of opal and microcrystalline forms of silica (“durinodes”) (WRB).

duripan: A subsurface soil horizon that is cemented by illuvial silica, usually opal or microcrystalline forms of silica, to the degree that less than 50 percent of the volume of air-dry fragments will slake in water or HCl (Soil Taxonomy).

e: A horizon characterized by the removal of clay, iron, aluminum, or organic matter.

ecosphere: The part of the Earth’s environment in which there is an interconnection between living and nonliving components.

ecosystem: A community and its environment treated together as a functional system of complementary relationships, with the transfer and circulation of matter.

ecosystem function: The character of an ecosystem, deriving from the dynamics of processes within the system and strongly influenced by the rates of those processes.

ecosystem structure: The kinds of organisms, their numbers, and the amounts of material (i.e. static descriptive part).

eluvial horizon: A soil horizon that has been formed by the process of eluviation.

eluviation: The transportation of soil material in suspension or in solution within the soil by the downward or lateral movement of water.

end moraine: An ‘end’ or ‘terminal’ moraine is a ridge of glacially deposited material laid down at the leading edge of an active glacier. Its height is in the range of 1-100 m, and it is accumulated by a combination of glacial dumping and pushing.

eolian deposit: Sand, or silt, or both, deposited by the wind.

epipedons: Epipedons are simply the uppermost soil horizons. Epipedon is not synonymous with A horizon and may be thinner than A horizon or include some of the E and/or the B horizon (Soil Taxonomy). (E is equivalent to Ae in the Canadian System of Soil Classification).

equilibrium: A state of balance between opposing forces or actions that is either static (as in a body acted on by forces whose resultant is zero) or dynamic (as in a reversible chemical reaction when the velocities in both directions are equal).

erosion: The wearing away of the land surface by running water, wind, ice, or other geological agents, including such processes as gravitational creep. Erosion can also involve the detachment and movement of soil or rock by water, wind, ice, or gravity.

esker: A winding ridge of irregularly stratified sand, gravel, and cobbles deposited under the ice by a rapidly flowing glacial stream.

evaporation: Water lost as vapor from a soil or open water surface.

evapotranspiration: The combined loss of water from a given area, and during a specified period of time, by evaporation from the soil surface and by transpiration from plants.

exchangeable cation: A positively charged ion held on or near the surface of a solid particle by a negatively charged surface and which may be replaced by other positively charged ions in the soil solution. It is usually expressed in centimoles or millimoles of charge per kilogram. For example, Ca^{2+} , Mg^{2+} , K^{+} and Na^{+} are base-forming exchangeable cations and Al^{3+} and H^{+} are acidic exchangeable cations.

f: A horizon enriched with amorphous material, principally Fe and Al, combined with organic matter. It usually has a chroma of 3 or more. The criteria for an f horizon except for Bgf are: it contains 0.6% or more pyrophosphate-extractable Fe plus Al in textures finer than sand and 0.4% or more in sands; the ratio of pyrophosphate-extractable Fe plus Al to clay (less than 2 Fm) is greater than 0.5; and organic carbon exceeds 0.5%. These horizons are differentiated on the basis of organic carbon content into: Bf, 0.5% to 5% organic carbon and Bhf, more than 5% organic carbon.

feldspars: A group of silicate minerals with a structure in which $(\text{Si,Al})\text{O}_4$ tetrahedra are linked together with potassium, sodium, and calcium.

ferralic horizon: The ferralic horizon (from L. *ferrum*, iron, and *alumen*, alum) is a subsurface horizon resulting from long and intense weathering, in which the clay fraction is dominated by low activity clays, and the silt and sand fractions are dominated by highly resistant minerals, such as iron-, aluminum-, manganese- and titanium oxides (WRB).

ferromagnesians: These are a group of dark colored silicate minerals. Augite has single chain silicon tetrahedra, while hornblende has a double chain silicon tetrahedra.

field capacity: The content of water, on a mass or volume basis, remaining in a soil 2 or 3 days after having been wetted, and after free drainage is negligible.

flow: The movement of mass from one pool to another. Also called flux.

fluvial deposits: All sediments, past and present, deposited by flowing water, including glaciofluvial deposits. Wave-worked deposits and deposits resulting from sheet erosion and mass wasting are not included.

fluvial processes: The set of mechanisms that operates as a result of water flow within (and at times beyond) a stream channel, bringing about the erosion, transfer, and deposition of sediment.

folistic epipedon: A layer (one or more horizons) that is saturated for less than 30 days (cumulative) in normal years and either consists of: organic material that is 20 cm or more thick and either contains 75 percent or more (by volume) *Sphagnum* fibers, or has a bulk density, moist, of less than 0.1; or is 15 cm or more thick (Soil Taxonomy).

food chain: The transfer of energy from the primary producers (green plants) through a series of organisms that eat and are eaten, assuming that each organism feeds on one other type of organism.

food web: A diagram that represents the feeding relationships of organisms within an ecosystem. It consists of a series of interconnecting food chains.

forb: A non-grassy, herbaceous species, e.g., legumes and composites.

forest: A plant formation that is composed of trees, the crowns of which touch to form a continuous canopy.

forest soil: A soil developed under forest vegetation.

fragipan: A natural subsurface horizon with very low organic matter, high bulk density and/or high mechanical strength relative to overlying and underlying horizons; has hard or very hard consistency (seemingly cemented) when dry, but showing a moderate to weak brittleness when moist. The layer typically has redoximorphic features, is slowly or very slowly permeable to water, is considered to be root restricting, and usually has few to many bleached, roughly vertical planes which are faces of coarse or very coarse polyhedrons or prisms (Soil Taxonomy).

frigid temperature regime: A soil temperature regime that has mean annual soil temperatures of $>0^{\circ}\text{C}$ but $<8^{\circ}\text{C}$, $>6^{\circ}\text{C}$ difference between mean summer and mean winter soil temperatures at 50 cm below the surface, and warm summer temperatures (Soil Taxonomy).

g: A horizon characterized by gray colors, or prominent mottling, indicative of permanent or periodic intense reduction, or both; for example, Aeg, Btg, Bg, and Cg.

geosphere: The non-living part of the Earth's environment.

gigaton (Gt): One gigaton is equal to one billion tons (1×10^9 tons or 1×10^{15} g).

glacial drift: All rock material carried by glacier ice and glacial meltwater, or rafted by icebergs. This term includes till, stratified drift, and scattered rock fragments.

glacial till: Unstratified glacial drift deposited directly by the ice and consisting of clay, sand, gravel, and boulders intermingled in any proportion. Also called till.

glacier: A large mass of ice that slowly moves over a land surface.

glaciofluvial deposits: Material moved by glaciers and subsequently sorted and deposited by streams flowing from the melting ice. The deposits are stratified and may occur in the form of outwash plains, deltas, kames, eskers, or kame terraces.

glaciolacustrine deposits: Lacustrine material deposited in contact with glacial ice is called glaciolacustrine. These sediments range in texture from sands to clays.

glaciomarine deposits: Sediments laid down in a sea environment near a glacier.

gley: The product of waterlogged soil conditions, and hence an anaerobic environment; it encourages the reduction of iron compounds by micro-organisms and often causes mottling of the soil into a patchwork of grey and rust colors. The process is known as gleying.

glossic horizon: A layer that develops as a result of the degradation of an argillic, kandic, or natric horizon, from which clay and free iron oxides are removed (Soil Taxonomy).

grassland: Ground covered by vegetation that is dominated by grasses. Grassland constitutes a major world vegetation type and occurs where there is sufficient moisture for grass growth, but where the environmental conditions prevent tree growth. The extensive mid-latitude grassland is known as the steppe or prairie, whereas the corresponding tropical vegetation is called the savannah.

gravel: Rock fragments 2 mm to 75 mm in diameter.

gravitational potential: That portion of the total water potential due to differences in elevation between the reference pool of pure water and the soil water. Since the soil water elevation is usually chosen to be higher than that of the reference pool, the gravitational potential is usually positive.

gravitational water: The water that moves into, through, or out of the soil by gravity.

ground moraine: An unsorted mixture of rocks, boulders, sand, silt, and clay deposited by glacial ice. The predominant material is till, but some stratified drift is present. Ground moraine is usually in the form of undulating plains, having gently sloping swells, sags, and enclosed depressions.

groundwater: Water that is passing through or standing in the soil and the underlying strata. It is free to move by gravity.

gypsic horizon:

1. A mineral soil horizon of secondary CaSO_4 enrichment that is >15 cm thick, has at least 50 g / kg more gypsum than the C horizon, and in which the product of the thickness in centimeters and the amount of CaSO_4 is equal to or greater than 1500g / kg (Soil Taxonomy).
2. The gypsic horizon (from *L. gypsum*) is a non-cemented horizon containing secondary accumulations of gypsum ($\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$) in various forms (WRB).

h: A horizon enriched with organic matter.

heavy clay: Soil material that contains more than 60% clay.

hemicellulose: A polysaccharide found in the cell walls of plants. The branched chains of this molecule bind to cellulose microfibrils, forming a network of cross-linked fibres.

histic epipedon: A thin organic soil horizon that is saturated with water at some period of the year, unless artificially drained, and that is at or near the surface of a mineral soil. The histic epipedon has a maximum thickness, depending on the kind of materials in the horizon, and the lower limit of organic carbon is the upper limit for the mollic epipedon (Soil Taxonomy).

hue: The aspect of color that is determined by the wavelength of light, and changes with the wavelength. Munsell hue notations indicate the visual relationship of a color to red, yellow, green, blue, or purple, or an intermediate of these hues.

humic substances: A series of complex, relatively high molecular weight, brown-to black-colored organic substances that make up 60 to 80% of the soil organic matter and are generally quite resistant to microbial attack.

humification: The development of humus from dead organic material, by the action of saprotrophic organisms, which use this dead material as their food source.

humus:

1. The fraction of the soil organic matter that remains after most of the added plant and animal residues have decomposed. It is usually dark colored.
2. Humus is also used in a broader sense to designate the humus forms referred to as forest humus. They include, principally, mor, moder, and mull.
3. All the dead organic material on and in the soil that undergoes continuous breakdown, change, and synthesis.

hydration: The chemical combination of water with another substance.

hydrogen bonding: A type of electrostatic interaction between molecules occurring in molecules that have hydrogen atoms bound to electronegative atoms (F, N, O). It is a strong dipole-dipole attraction, caused by the electron-withdrawing properties of the electronegative atom. Thus, in the water molecule the oxygen atom attracts the electrons in the O-H bonds. The strength of hydrogen bonds is about one tenth of the strength of covalent bonds.

hydrolysis: The process by which a substrate is split by the intervention of a molecule of water to form two end products.

hydrosphere: The total body of water which exists on or close to the surface of the Earth.

hygroscopic coefficient: The hygroscopic coefficient is the boundary between moist-appearing and dry-appearing soil. This boundary is not sharp. Its arbitrary value is -3100 kPa (-3.1 Mpa) soil matric potential.

hygroscopic water: Water absorbed from the atmosphere and held very tightly by the soil particles, so that it is unavailable to plants in amounts sufficient for them to survive. It is the water lost from an air-dry soil when it is heated to 105°C for 12 hours.

hyperthermic temperature regime: A soil temperature regime that has mean annual soil temperatures of 22 °C or more and >6 °C difference between mean summer and mean winter soil temperatures at 50 cm below the surface (Soil Taxonomy).

ice sheet: A large ice mass, with an area usually greater than about 50,000 km squared, that is made up of ice domes (convex surface forms) and outlet glaciers (a tongue of ice extending radically from an ice dome).

igneous rock: Rock formed by the cooling and solidification of magma. It has not been changed appreciably since its formation.

illuvial horizon: A soil horizon in which material carried from an overlying layer has been precipitated from solution or deposited from suspension as a layer of accumulation.

illuviation: The process of depositing soil material removed from one horizon in the soil to another, usually from an upper to a lower horizon in the soil profile. Illuviated substances include silicate clay, hydrous oxides of iron and aluminum, and organic matter.

immobilization: The conversion of an element from the inorganic to the organic form in microbial tissues so that the element is not readily available to other organisms or plants.

infiltration: The entry of water into soil.

insolation: The amount of incoming solar radiation that is received over a unit area of the Earth's surface. This varies according to the season, latitude, transparency of the atmosphere, and aspect or ground slope. On average, equatorial areas receive approximately 2.4 times as much insolation as polar areas.

interlayer: Materials between structural layers of minerals, including cations, hydrated cations, organic molecules, and hydroxide octahedral groups and sheets.

ion: Atom, group of atoms, or compound that is electrically charged as a result of the loss of electrons (cation) or the gain of electrons (anion).

j: This is used as a modifier of suffixes e, g, n, and t to denote an expression of, but failure to meet, the specified limits of the suffix it modifies; for example, Ae_j is an eluvial horizon that is thin, discontinuous, or faintly discernible.

k: Presence of carbonate.

kame: A conical hill or ridge of sand or gravel deposited in contact with glacial ice.

kandic horizon: A subsoil diagnostic horizon having a clay increase relative to overlying horizons and having low activity clays i.e., <160 cmol_c / kg clay (Soil Taxonomy).

kettle: A depression left after the melting of a detached mass of glacier ice buried in drift.

L-F-H layers: Organic layers developed primarily from leaves, twigs, and woody materials, with a minor component of mosses.

- **L:** The original structures of the organic material are easily recognized.
- **F:** The accumulated organic material is partly decomposed.
- **H:** The original structures of the organic material are unrecognizable.

lacustrine deposits: Materials deposited in lake water and later exposed either by the lowering of the water level or by the uplifting of the land.

landscape: All the natural features such as fields, hills, forests, and water that distinguish one part of the earth's surface from another part. Usually it is the portion of land or territory that the eye can see in a single view, including all its natural characteristics.

latent heat: The heat required to activate a phase change from a solid to a liquid or from a liquid to a gas, i.e., to a higher energy state.

lateral gains: The entry of materials into a pedon from the side.

lateral losses: The loss of materials from a pedon through the side.

lateral moraine: A ridge of debris at the margin of a valley glacier and largely derived from rock fall.

layer: A combination of sheets in a 1:1 or 2:1 assemblage.

leaching: The removal from the soil of materials in solution.

lignin: A complex organic polymer that is deposited within the cellulose or plant cell walls during secondary thickening. Lignification makes the walls woody and therefore rigid.

lithosequence: A group of related soils that differ, one from the other, in certain properties, primarily as a result of parent material as a soil-forming material.

lithosphere: The upper (oceanic and continental) layer of the solid Earth, comprising all crustal rocks and the brittle part of the uppermost mantle.

loam: Soil material that contains 7 to 27% clay, 28 to 50% silt, and less than 52% sand.

loamy sand: 25% or more very coarse, coarse, and medium sand and less than 50% fine or very fine sand.

loess: Material transported and deposited by wind and consisting of predominantly silt-sized particles.

m: A horizon slightly altered by hydrolysis, oxidation, or solution, or all three, to give a change in color, or structure, or both.

macromolecular crystals: A crystalline solid in which all the atoms are all linked together by covalent bonds.

macromolecule: A very large molecule. Natural and synthetic polymers have macromolecules as do natural substances, such as proteins [molecular mass ranging from 5,000 to many million daltons (mass of 1 hydrogen atom)].

macronutrient: A chemical element necessary in large amounts (usually greater than 1 part per million in the plant) for the growth of plants and usually applied artificially in fertilizer or liming materials. “Macro” refers to the quantity and not to the essentiality of the element to the plant.

macropores: (non-capillary pores): Pores of such a sufficient size that capillary menisci are not formed. The shape of the interface between air and water is considered planar (flat), and hence, the capillary forces are nil. The flow of water in such pores can be either in the form of a film moving over all the irregularities of the walls, induced by their roughness or shape, or in some cases, turbulent flow when the pores contain considerably more water.

magma: Composed of molten rock, silicate, carbonate, or sulfide and containing dissolved volatiles and suspended crystals. Magma is generated by the partial melting of the Earth's crust, or mantle, and is the raw material for all igneous processes.

mass flow: The process where the soil atmosphere moves as a unit in response to temperature or pressure differences.

matric potential: That portion of the total water potential due to the attractive forces between water and soil solids, as represented through adsorption and capillarity. It will always be negative.

megagram: = 1,000,000 grams = 1000 kilograms = 1 tonne = 1Mg.

melanic epipedon: A layer that has an upper boundary at, or within 30 cm of, either the mineral soil surface or the upper boundary of an organic layer with andic soil properties (Soil Taxonomy).

mesic temperature regime: A soil temperature regime that has mean annual soil temperatures of 8 °C or more but <15 °C, and >6 °C difference between mean summer and mean winter soil temperatures at 50 cm below the surface (Soil Taxonomy).

mesopause: In the atmosphere, the inversion at about 80 km height, which separates the mesosphere from the thermosphere above.

mesophyte: A plant adapted to environments that are neither extremely wet nor extremely dry.

mesosphere: An upper atmospheric layer above the stratosphere, through which temperature decreases with height up to about 80 km, where temperatures reach a minimum of about -90° C.

metabolism: The total of all the chemical reactions that occur within a living organism.

metamorphic rock: Rock derived from preexisting rocks, but differing from them in physical, chemical, and mineralogical properties, as a result of natural geological processes, principally heat and pressure, originating within the earth. The preexisting rocks may have been igneous, sedimentary, or other forms of metamorphic rock.

metric ton: One metric ton is equal to 1,000 kg (1×10^3 Kg or 1×10^6 g).

mica: A layer-structured aluminosilicate mineral group of the 2:1 type, that is characterized by its non-expandability and high layer charge, which is usually satisfied by potassium. Major types of mica include muscovite and biotite.

micronutrient: A chemical element necessary only in small amounts (usually less than 1 part per million in the plant) for the growth of plants and the health of animals. Examples of these elements are boron, molybdenum, copper, iron, manganese, and zinc. "Micro" refers to the amount, not the essentiality of the element to the organism.

mineral: A usually inorganic substance which occurs naturally, and typically has a crystalline structure, whose characteristics of hardness, lustre, color, cleavage, fracture and relative density can be used to identify it. Each mineral has a characteristic mineral composition. Rocks are composed of minerals.

mineralization: The conversion of an element from an organic form to an inorganic state as a result of microbial decomposition.

molecules: One of the fundamental units forming a chemical compound. In most covalent compounds, molecules consist of groups of atoms held together by covalent or coordinate bonds.

mollic epipedon: A surface horizon of mineral soil that is dark colored and relatively thick, contains at least 5.8 g / kg organic carbon, is not massive and is hard or very hard when dry, has a base saturation of >50% when measured at pH 7, has <110 mg P / kg soluble in 0.05 M citric acid, and is dominantly saturated with divalent cations (Soil Taxonomy).

mollic horizon: The mollic horizon (from *L. mollis*, soft) is a well structured, dark colored surface horizon with a high base saturation and a moderate to high content of organic matter (WRB).

moraine: An accumulation of earth, generally with stones, carried and finally deposited by a glacier. Several kinds of moraines are distinguished, such as a ground moraine and an end moraine.

Munsell color system: A color designation system specifying the relative degrees of the three simple variables of color: hue, value, and chroma. For example: 10YR 6/4 is the color of a soil having a hue of 10YR, value of 6, and chroma of 4. These notations can be translated into several different systems of color names.

n: A horizon in which the ratio of exchangeable Ca to exchangeable Na is 10 or less.

n-compounds: Organic compounds containing N, e.g., proteins.

natric horizon:

1. A mineral soil horizon that satisfies the requirements of an argillic horizon, but that also has prismatic, columnar, or blocky structure and a subhorizon having >15% saturation with exchangeable Na⁺ (Soil Taxonomy).
2. The natric horizon (from Dutch *natrium*, sodium) is a dense subsurface horizon with a higher clay content than the overlying horizon(s). The increase in clay content between the natric horizon and the overlying horizon must meet the same requirements as an argic horizon. Moreover, it has a high content in exchangeable sodium and/or magnesium (WRB).

natural bio-ecosystems: Ecosystems which are maintained by the input of solar energy, natural biotic and abiotic resource materials, and are regulated chiefly by bio-physical information and control.

nitic horizon: The nitic horizon (from L. *nitidus*, shiny) is a clay-rich subsurface horizon with a moderately to strongly developed polyhedral or nutty structure with many shiny ped faces as its main feature. This property cannot or can only partially be attributed to clay illuviation (WRB).

nutrient: An element or compound essential as a raw material for organism growth and development.

nutrient cycle: A biogeochemical cycle in which inorganic nutrients move through the soil, living organisms, air, and water, or through some of these.

nutrient deficiency: A low concentration of an essential element that reduces plant growth and prevents the completion of the normal plant life cycle.

nutrient stress: A condition occurring when the quantity of nutrient available reduces growth. It can be from either a deficient or a toxic concentration.

nutrient toxicity: The quality, state or degree of harmful effect from an essential nutrient in sufficient concentrations in the plant.

nutrient-supplying power of soils: The capacity of the soil to supply nutrients to growing plants from the labile, exchangeable, and the moderately available forms.

ochric epipedon: A surface horizon of mineral soil that is too light in color, too high in chroma, too low in organic carbon, or too thin to be a plaggen, mollic, umbric, anthropic or histic epipedon, or that is both hard and massive when dry (Soil Taxonomy).

octahedral compound: A compound in which six atoms or groups situated at the corners of an octahedron are linked by covalent bonds to an atom at the centre of the tetrahedron. For example, aluminum is covalently linked to six oxygen or hydroxyl ions in octahedral aluminum.

octahedral sheet: A sheet of horizontally linked, octahedral-shaped units that serves as one of the basic structural components of silicate clay minerals. Each unit consists of a central six-coordinated metallic atom (e.g. Al, Mg, or Fe) surrounded by six hydroxyl groups that, in turn, are linked with other nearby metal atoms (e.g. Al, Mg, or Fe), thereby serving as inter-unit linkages to hold the sheet together.

octahedron: A polyhedron with eight triangular faces. In a regular octahedron all eight triangles are congruent equilateral triangles.

Of-Om-Oh horizon: An organic layer developed mainly from mosses, rushes, and woody materials.

- **Of** The least decomposed organic layer, containing large amounts of well-preserved fiber, and called the fibric layer.
- **Om** An intermediately decomposed organic layer, containing less fiber than an Of layer and called the mesic layer.
- **Oh** The most decomposed organic layer, containing only small amounts of raw fiber, and called the humic layer.

ortstein: A spodic horizon that is 50% or more cemented and is 25 mm or more in thickness (Soil Taxonomy).

osmotic potential: That portion of the total water potential due to the presence of solutes in soil water. It will always be negative.

outwash plain: A deposit of coarse-textured materials (e.g., sands, gravels) left by streams of meltwater flowing from receding glaciers.

oven-dry: A soil sample that has been dried at 105 °C until it reaches constant mass.

oxic horizon: A mineral soil horizon that is at least 30 cm thick and is characterized by the virtual absence of weatherable primary minerals or 2:1 layer silicate clays, the presence of 1:1 layer silicate clays and highly insoluble minerals such as quartz sand, the presence of hydrated oxides of iron and aluminum, the absence of water-dispersible clay, and the presence of low cation exchange capacity and small amounts of exchangeable bases (Soil Taxonomy).

oxidation: A reaction in which atoms or molecules gain oxygen or lose hydrogen or electrons.

ozone region: The atmospheric layer at 10-50 km altitude in which ozone (O₃) is concentrated at 1-10 parts per million. The ozone layer limits the amount of ultraviolet radiation reaching the ground surface.

p: A layer disturbed by man's activities, for example, Ap.

parent material: The unconsolidated and more or less chemically weathered mineral or organic matter from which the solum of a soil has developed by pedogenic processes.

particle density: The mass per unit volume of the soil particles (Mg m⁻³ or g cm⁻³).

particle-size analysis: The determination of the various amounts of the different separates in a soil sample, usually by sedimentation, sieving, micrometry, or combinations of these methods.

pedology: The aspects of soil science dealing with the origin, morphology, genesis, distribution, mapping, and taxonomy of soils, and classification in terms of their usage.

pedosphere: The envelope of the Earth where soils occur and where soil-forming processes are active.

petagram: A petagram is equal to 1×10^{15} g and is also equal to a gigaton.

percolation: The downward movement of water through soil, especially through soil that is saturated or close to saturation.

permafrost: The permanently frozen ground which occupies some 26 per cent of the Earth's land surface, under thermal conditions where temperatures below $0\text{ }^{\circ}\text{C}$ have persisted for at least two consecutive winters and the intervening summer.

permanent wilting coefficient: The largest water content of a soil at which indicator plants, growing in that soil, wilt and fail to recover when placed in a humid chamber. Often estimated by the water content at -1500 kPa (-1.5 Mpa) soil matric potential.

petrocalcic horizon:

1. A continuous, indurated calcic horizon that is cemented by calcium carbonate and, in some places, with magnesium carbonate. It cannot be penetrated with a spade or auger when dry, dry fragments do not slake in water, and it is impenetrable to roots (Soil Taxonomy).
2. A petrocalcic horizon (from Gr. *petros*, rock, and L. *calx*, lime) is an indurated calcic horizon, which is cemented by calcium carbonate and, in places, by calcium and some magnesium carbonate. It is either massive or platy in nature, and extremely hard (WRB).

petroduric horizon: The petroduric horizon (from Gr. *petros*, rock, and L. *durum*, hard), also known as duripan, is a subsurface horizon, usually reddish or reddish brown in color, which is cemented mainly by secondary silica (SiO_2 , presumably opal and microcrystalline forms of silica). Air-dry fragments of petroduric horizons do not slake in water, even after prolonged wetting. Calcium carbonate may be present as an accessory cementing agent. It is either massive, or has a platy or laminar structure (WRB).

petrogypsic horizon:

1. A continuous, strongly cemented, massive, gypsic horizon that is cemented by calcium sulfate. It can be chipped with a spade when dry. Dry fragments do not slake in water and it is impenetrable to roots (Soil Taxonomy).
2. The petrogypsic horizon (from Gr. *petros*, rock, and L. *gypsum*) is a cemented horizon containing secondary accumulations of gypsum ($\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$) (WRB).

petroplinthic horizon: The petroplinthic horizon (from Gr. *petros*, rock, and *plinthos*, brick) is a continuous layer of indurated material, in which iron is an important cement and in which organic matter is absent, or present only in traces (WRB).

photo-autotroph: A phototroph that uses carbon dioxide compounds as its main or sole source of carbon. Examples: algae and plants.

photo-heterotroph: A phototroph that uses organic compounds as its main or sole source of carbon. Examples: Green and purple bacteria.

photosynthesis: The series of metabolic reactions occurring in certain autotrophs, whereby the energy of sunlight absorbed by chlorophyll powers the reduction of carbon dioxide and the synthesis of organic compounds.

phototroph: An organism that obtains its energy from sunlight, in most cases by photosynthesis.

phyllosilicates: Phyllosilicate minerals have layer structures composed of shared octahedral and tetrahedral sheets.

placic horizon: A black to dark reddish mineral soil horizon that is usually thin but that may range from 1 mm to 25 mm in thickness. The placic horizon is commonly cemented with iron and is slowly permeable or impenetrable to water and roots (Soil Taxonomy).

plaggen epipedon: A man-made surface horizon more than 50 cm thick that is formed by long-continued manuring and mixing (Soil Taxonomy).

plane (of atoms): A flat (planar) array of atoms of one atomic thickness. Example: plane of basal oxygen atoms within a tetrahedral sheet.

plant nutrient: An element which is absorbed by plants and is necessary for completion of the normal life cycle. These include C, H, O, N, P, K, Ca, Mg, S, Cu, Fe, Zn, Mn, B, Cl, and Mo.

plant residues: Organic compounds in the form of leaf, stem, and root tissues remaining after plants are harvested.

plinthic horizon: The plinthic horizon (from Gr. *plinthos*, brick) is a subsurface horizon which constitutes an iron-rich, humus-poor mixture of kaolinitic clay with quartz and other constituents, and which changes irreversibly to a hardpan or to irregular aggregates on exposure to repeated wetting and drying, with free access to oxygen (WRB).

polar molecule: A molecule that has a dipole moment: i.e., one in which there is some separation of charge in the chemical bonds so that one part of the molecule has a positive charge and the other a negative charge.

pollutant: A by-product of human activities which enters or becomes concentrated in the environment, where it may cause injury to humans or desirable species. In addition to chemical substances, the term also embraces noise, vibration and alterations to the ambient temperature.

pore space: The total space not occupied by soil particles in a bulk volume of soil.

precipitate: A suspension of small solid particles produced in a liquid by chemical reaction.

precipitation: The deposition of hail, mist, rain, sleet, or snow onto the earth.

primary consumers: Mainly bacteria and fungi, which feed by breaking down complex organic compounds in dead protoplasm, absorbing some of the decomposition products, and at the same time releasing inorganic and relatively simple compounds into the environment.

primary mineral: A mineral that has not been altered chemically since deposition and crystallization from molten lava.

primary producers: Organisms that use energy from the sun, water, and carbon from atmospheric carbon dioxide, to make organic molecules and tissues, e.g. higher plants.

producer: In an ecosystem, an organism that is able to manufacture food from simple inorganic substances (i.e., an autotroph, most typically a green plant).

recessional moraine: A 'recessional' moraine is laid down at the terminus of a glacier during a period of standstill that interrupts a sustained period of retreat of the ice margin.

reduction: A reaction in which atoms or molecules either lose oxygen or gain hydrogen or electrons.

regolith: The unconsolidated mantle of weathered rock and soil material overlying solid rock.

reradiation: This means to emit (energy) in the form of radiation after absorbing incident radiation.

residual acidity: Soil acidity that is neutralized by lime or other alkaline material, but which cannot be replaced by an unbuffered salt solution.

residual material: Unconsolidated and partly weathered mineral materials formed by the disintegration of consolidated rock in place.

respiration: The physical and chemical processes by which an organism supplies its cells and tissues with oxygen needed for metabolism and relieves them of carbon dioxide formed in energy-forming reactions.

runoff: The portion of the total precipitation on an area that flows away through stream channels. Surface runoff does not enter the soil. Groundwater runoff or seepage flow from groundwater enters the soil before reaching the stream.

rural techno-ecosystems: Managed ecosystems which are maintained by a greater input of fossil energy than solar energy, and that contain a greater proportion of altered biotic and abiotic resource materials, and man-made artifacts. These systems are regulated by cultural information and control to a greater extent.

s: A horizon containing detectable soluble salts.

sa: A horizon of secondary enrichment of salts more soluble than Ca and Mg carbonates, where the concentration of salts exceeds that present in the unenriched parent material.

salic horizon:

1. A mineral soil horizon of enrichment with secondary salts more soluble in cold water than gypsum. A salic horizon is 15 cm or more in thickness, contains at least 20 g / kg salt, and the product of the thickness in centimeters and the amount of salt by weight is >600 g / kg (Soil Taxonomy).
2. The salic horizon (from L. *sal*, salt) is a surface or shallow subsurface horizon which contains a secondary enrichment of readily soluble salts, i.e. salts more soluble than gypsum ($\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$; $\log K_s = -4.85$ at 25°C) (WRB).

sand: A soil particle between 0.05 and 2.0 mm in diameter.

sand (textural class): Soil material that contains 85% or more sand; the percentage of silt plus 1.5 times the percentage of clay does not exceed 15.

sandy clay: Soil material that contains 35% or more clay and 45% or more sand.

sandy clay loam: Soil material that contains 20 to 35% clay, less than 28% silt, and 45% or more sand.

sandy loam: 30% or more very coarse, coarse, and medium sand, but less than 25% very coarse sand, and less than 30% very fine or fine sand.

saturated flow: The movement of water through a soil that is temporarily saturated. Most of the water moves downwards, and some moves, more slowly, laterally.

saturated soil: Soil that contains the maximum amount of water possible. In such soils, all the pores are filled with water.

secondary consumers: Organisms that wholly or partially ingest other living organisms or organic particulate material, e.g. protozoa which feed on bacteria.

secondary mineral: A mineral resulting from the decomposition of a primary mineral or from the precipitation of the products of decomposition of a primary mineral.

sedimentary rock: A rock formed from materials deposited from suspension or precipitated from solution and usually more or less consolidated. The principal sedimentary rocks are sandstones, shales, limestones, and conglomerates.

sheet (of polyhedra): A flat array of more than one atomic thickness and composed of one level of linked polyhedra. A sheet is thicker than a plane and thinner than a layer. Examples: tetrahedral sheet, octahedral sheet.

silicate minerals: A group of rock-forming minerals that make up the bulk of the earth's outer crust (about 90%) and constitute one-third of all minerals. All silicate minerals are based on a fundamental structural unit – the SiO_4 tetrahedron. They consist of a metal (e.g., calcium, magnesium, aluminum) combined with silicon and oxygen. The silicate minerals are classified into six groups on a structural basis, according to how the tetrahedra are linked together.

silt: A soil separate consisting of particles between 0.05 and 0.002 mm in equivalent diameter.

silt (textural class): Soil material that contains 80% or more silt and less than 12% clay.

silt loam: Soil material that contains 50% or more silt and 12 to 27% clay, or 50 to 80% silt and less than 12% clay.

silty clay: Soil material that contains 40% or more clay and 40% or more silt.

silty clay loam: Soil material that contains 27 to 40% clay and less than 20% sand.

sodic soil: A soil containing sufficient sodium to interfere with the growth of most crop plants having an exchangeable-sodium percentage of 15 or more.

soil: The naturally occurring unconsolidated material on the surface of the earth that has been influenced by parent material, climate (including the effects of moisture and temperature), macro- and micro-organisms, and relief, all acting over a period of time to produce soil that may differ from the material from which it was derived in many physical, chemical, mineralogical, biological, and morphological properties.

soil aeration: The process by which air in the soil is replaced by air from the atmosphere. The rate of aeration depends largely on the volume and continuity of the pores in the soil.

soil aggregate: A group of soil particles cohering in such a way that they behave mechanically as a unit.

soil atmosphere: The gaseous phase of the soil, being that volume not occupied by solids or liquids.

soil buffer compounds: The clay, organic matter, and materials such as carbonates and phosphates, that enable the soil to resist an appreciable change in pH.

soil bulk density: The mass of dry soil per unit bulk volume (Mg m^{-3} or g cm^{-3}). The bulk volume is determined before the soil is dried to constant weight at 105°C .

soil classification: The systematic arrangement of soils into groups or categories on the basis of their characteristics. Broad groupings are made on the basis of general characteristics and subdivisions are made on the basis of more detailed differences in specific properties.

soil colloids: Soil colloids are substances of very small particle size, either mineral (e.g. clay) or organic (e.g. humus), which therefore have a large surface area per unit volume.

soil horizon: A layer of soil or soil material approximately parallel to the land surface; it differs from adjacent genetically related layers in properties such as color, structure, texture, consistence, and chemical, biological, and mineralogical composition.

soil ped: A unit of soil structure, such as a prism, block, or granule, which is formed by natural processes, in contrast with a clod, which is formed artificially.

soil pedon: The smallest volume of what can be called a soil. A pedon has 3 dimensions. Its lower limit is the vague and somewhat arbitrary limit between soil and “not soil”. Its area ranges from 1 to 10 square meters, depending upon the variability of horizons. The shape of the pedon is roughly hexagonal.

soil pH: The pH of a solution in equilibrium with soil. It is determined by means of a glass, quinhydrone, or other suitable electrode or indicator at a specified soil-solution ratio in a specified solution, usually distilled water, 0.01 M CaCl₂, or 1 M KCl.

soil polypedon: A soil volume, in situ, that consists of more than one pedon is termed a polypedon. A soil body in the landscape is a true soil individual and is a concrete example of the polypedon concept. A soil polypedon is also called a soil individual or a soil body.

soil pores: The part of the bulk volume of soil not occupied by soil particles.

soil profile: A vertical section of the soil through all its horizons and extending into the parent material. It has two dimensions.

soil separates: Mineral particles, less than 2.0 mm in equivalent diameter, ranging between specified size limits.

soil solum: The upper horizons of a soil in which the parent material has been modified and in which most plant roots are contained. It usually consists of A and B horizons.

soil structure: The combination or arrangement of primary soil particles into secondary particles, units, or peds. These peds may be, but usually are not, arranged in the profile in such a manner as to give a distinctive characteristic pattern. The peds are characterized and classified on the basis of size, shape, and degree of distinctness into classes, types, and grades.

soil structure class: A grouping of soil structural units or peds on the basis of size.

soil structure grade: A grouping or classification of soil structure on the basis of inter- and intra-aggregate adhesion, cohesion, or stability within the profile.

soil structure type: A classification of soil structure based on the shape of the aggregates or peds and their arrangement in the profile.

soil texture: The relative proportions of the various soil separates in a soil.

soil water: Soil water is understood to be the equilibrium solution in the soil; pure water refers to the chemically pure compound H_2O . Water in soil is subject to several force fields originating from the presence of the soil solid phase, the dissolved salts, the action of external gas pressure, and the gravitational field.

soil water potential: The difference between the energy of water in soil and of pure, free water at the same temperature. The water potential of pure water is zero, so that of a solution will be negative.

soilscape: A pedological portion of the landscape. A soilscape is commonly viewed from a vantage point in the landscape rather than from above it.

solubility: The quantity of solute that dissolves in a given quantity of solvent to form a saturated solution. The solubility of a substance depends on the temperature. Generally, for a solid in a liquid, solubility increases with temperature; for a gas, solubility decreases.

solubility product: (K_s) The product of the concentrations of ions in a saturated solution. For instance, if a compound A_xB_y , is in equilibrium with its solution, then it can be represented as follows:



The solubility product for sparingly soluble salts is written as follows:

$$K_s = [A^+]^x [B^-]^y$$

If the product of ionic concentrations in a solution exceeds the solubility product, then precipitation occurs. If the product of ionic concentrations in a solution is less than the solubility product, then precipitate will dissolve.

soluble component: The portion of plant organic material that is soluble in water.

solute: A dissolved substance.

sombrio horizon: A subsurface mineral horizon that is darker in color than the overlying horizon but that lacks the properties of a spodic horizon. Common in cool, moist soils of high altitude in tropical regions (Soil Taxonomy).

spatial: Relating to, occupying, or having the character of space.

spatio-temporal: Having both spatial and temporal qualities.

spodic horizon:

1. A mineral soil horizon that is characterized by the illuvial accumulation of amorphous materials, composed of aluminum and organic carbon, with or without iron. The spodic horizon has a certain minimum thickness, and a minimum quantity of extractable carbon, plus iron plus aluminum in relation to its content of clay (Soil Taxonomy).
2. The spodic horizon (from Gr. *spodos*, wood ash) is a dark colored subsurface horizon which contains illuvial amorphous substances, composed of organic matter and aluminum, with or without iron. The illuvial materials are characterized by a high pH-dependent charge, a large surface area and high water retention (WRB).

ss: Denotes the presence of several (more than two) slickensides.

stones: Rock fragments 250 to 600 mm in diameter.

stratopause: The level that marks the maximum height of the stratosphere, at around 50 km above the Earth's surface.

stratosphere: The layer of the atmosphere above the troposphere, which extends on average from 10 and 50 km above the Earth's surface, within which temperatures rise with increasing altitude.

strong acids and bases: Those acids and bases that are completely dissociated into their respective cations and anions under conditions found in the soil. For example, at pH values above 1.98, sulfuric acid is disassociated into H^+ and SO_4^{2-} .

sub microscopic pores: These pores are so small that they do not allow clusters of water molecules to form fluid particles or continuous water flow paths. The laws of fluid mechanics are not applicable to these pores so these pores, are often disregarded in problems dealing with water flow in soils.

subsurface flow: The flow of water at a shallow depth beneath the ground surface; it may be influenced by relatively impermeable layers, which enlarge the lateral flow of water.

sulfuric horizon: A horizon composed either of mineral or organic soil material that has both pH <3.5 and jarosite mottles (Soil Taxonomy).

surface area: The area of the exterior or upper boundary of an object or body.

surface tension: The property of a liquid that makes it behave as if its surface is enclosed in an elastic skin.

t: A horizon enriched with silicate clay, as indicated by a higher clay content (by specified amounts) than the overlying eluvial horizon, a thickness of at least 5 cm, oriented clay in some pores, or on ped surfaces, or both, and usually a higher ratio of fine (less than 0.2 μm) to total clay than in the C horizon.

temporal: Relating to time, as distinguished from space.

terminal electron acceptor: A molecule that accepts electrons from an oxidized compound.

tertiary consumers: Organisms that feed on the bodies of secondary consumers e.g. ants, and predatory mites.

tetrahedral compound: A compound in which four atoms or groups situated at the corners of a tetrahedron are linked by covalent bonds to an atom at the centre of the tetrahedron. For example, silicon is covalently linked to four oxygen atoms in a tetrahedral silicon.

tetrahedral sheet: A sheet of horizontally linked, tetrahedral-shaped units that serves as one of the basic structural components of silicate clay minerals. Each unit consists of a central four-coordinated atom (e.g. Si, Al, or Fe), surrounded by four oxygen atoms that, in turn, are linked with other nearby atoms (e.g. Si, Al, or Fe), thereby serving as inter-unit linkages to hold the sheet together.

tetrahedron: A polyhedron with four triangular faces. In a regular tetrahedron, all four triangles are congruent equilateral triangles. It constitutes a regular triangular pyramid.

thermic temperature regime: A soil temperature regime that has mean annual soil temperatures of 15 °C or more but <22 °C, and >6 °C difference between mean summer and mean winter soil temperatures at 50 cm below the surface (Soil Taxonomy).

thermosphere: The upper zone of the atmosphere, above about 80 km, where solar radiation of the shortest radiation is absorbed.

topography: The physical features of a district or region, such as those represented on a map, taken collectively; especially, the relief and contours of the land.

toposequence: A sequence of related soils that differ, one from the other, primarily because of topography as a soil-formation factor.

total acidity: The total acidity is the sum of active and reserve acidity.

transformation: The process of changing the form of a substance.

translocation: The movement of soil materials in solution or suspension from one horizon to another.

transpiration: Water lost from the surface of a plant, mainly via the stomata.

tropopause: The boundary separating a lower layer of the atmosphere (troposphere), in which air temperature generally decreases with height, from the layer above (stratosphere), in which temperature remains constant or increases with height.

troposphere: The layer of the atmosphere between the Earth's surface and the tropopause. The troposphere contains about 80 % of the Earth's air and extends to about 6 to 17 km up from the Earth's surface, depending upon latitude and season.

u: A horizon that is markedly disrupted by physical or faunal processes other than cryoturbation or argillipedoturbation caused by vertisolic processes.

udic moisture regime: A soil moisture regime that is neither dry for as long as 90 cumulative days, nor for as long as 60 consecutive days in the 90 days following the summer solstice, at periods when the soil temperature at 50 cm below the surface is above 5 °C. (L. *udus*, humid) (Soil Taxonomy).

umbric epipedon: A surface layer of mineral soil that has the same requirements as the mollic epipedon with respect to color, thickness, organic carbon content, consistence, structure, and phosphorus content, but that has a base saturation <50% when measured at pH 7 (Soil Taxonomy).

umbric horizon: The umbric horizon (from L. *umbra*, shade) is a thick, dark colored, base-desaturated surface horizon, rich in organic matter (WRB).

unit structure: The total assembly of a layer, plus interlayer material.

unsaturated flow: The movement of water in soil in which the pores are not filled to capacity with water.

urban techno-ecosystem: Ecosystems which are maintained by the input of fossil (or nuclear) energy, that contain man-made artifacts, and that are regulated chiefly by cultural information and control (scientific, political, spiritual or technological).

ustic moisture regime: A soil moisture regime that is intermediate between the aridic and udic regimes and common in temperate subhumid or semiarid regions, or in tropical and subtropical regions with a monsoon climate. A limited amount of water is available for plants, but it occurs at times when the soil temperature is optimum for plant growth. (L. *ustus*, burnt; implying dryness) (Soil Taxonomy).

v: A horizon affected by argillipedoturbation, as manifested by disruption and mixing, caused by shrinking and swelling of soil mass.

vapor flow: The gaseous flow of water vapor in soils from a moist or warm zone of higher potential to a drier or colder zone of lower potential.

vegetation: The plant life or total plant cover of an area.

vertic horizon: The vertic horizon (from L. *vertere*, to turn) is a clayey subsurface horizon which, as a result of shrinking and swelling, has polished and grooved ped surfaces ('slickensides'), or wedge-shaped or parallelepiped structural aggregates (WRB).

vitric horizon: The vitric horizon (from L. *vitrum*, glass) is a surface or subsurface horizon, dominated by volcanic glass and other primary minerals derived from volcanic ejecta (WRB).

water table: The upper surface of groundwater or that level in the ground where the water is at atmospheric pressure.

weak acids and bases: Those acids and bases that are not completely dissociated into their respective cations and anions under conditions found in the soil. For example, a carbonic acid solution will contain H_2CO_3 , HCO_3^- , CO_3^{2-} , and H^+ , depending upon the pH of the soil.

weathering: The breakdown of rocks and minerals at and below the Earth's surface by the action of physical and chemical processes.

x: A horizon of fragipan character.

xeric moisture regime: A soil moisture regime, common to Mediterranean climates, that has moist cool winters and warm dry summers. A limited amount of water is present, but does not occur at optimum periods for plant growth. Irrigation or summer-fallow is commonly necessary for crop production. (Gr. *xeros*, dry) (Soil Taxonomy).

xerophyte: A plant that can grow in very dry conditions and is able to withstand periods of drought.

y: A horizon affected by cryoturbation.

z: A perennially frozen layer.