I

ice. Crystallized water formed below the freezing point (H_2O)[16].

ice cave. 1. Any cave in rock that is partly filled with ice. The term should not be applied to glacier caves. The ice may form in massive icicles and flows, when percolation water from unfrozen rock seeps into a cave containing freezing air drawn in from outside. This is a seasonal situation in many alpine caves, and if winter freezing exceeds summer melting the ice may become permanent, as in Austria's Dachstein and Eisriesenwelt caves. Alternately water vapor may crystallize out as hoar frost, commonly forming large hexagonal ice crystals that line the walls of a freezing cave, as in Grotte Valerie, northern Canada[9]. 2. A cave, generally in lava or limestone, in which the average temperature is below 0°C., and which ordinarily contains perennial ice. Ice may have the form of stalactites, stalagmites, or flowstone[10]. (French.) *glacière*; (German.) '*Eishöhle*'; (Greek.) *paghoménon spíleon*; (Italian.) *ghiacciata naturale, grotta ghiacciata*; (Russian.) *ledjanaja pescera;* (Spanish.) *cueva helada, cueva de hielo*; (Turkish.) *buz mağarası*; (Yugoslavian.) *ledena pećina, ledenjača, ledena jama*. See glacier cave.

illite. A clay mineral.

imbibition. 1. The absorption of a fluid, usually water, by a granular rock or other porous material, under the force of capillary attraction, and in the presence of pressure. 2. Fluid displacement in porous media as a result of capillary forces only[16]. 3. Absorption of water by plants. Synonym: capillary percolation.

immiscible. 1. Two or more liquids that are not readily soluble[22]. 2. The chemical property of two or more phases that, at mutual equilibrium, cannot dissolve completely in one another, e.g., oil and water[22]. 3. The quality of liquids exhibiting a clear interface where they are in contact; not miscible[16].

impermeable. A characteristic of some geologic material that limits their ability to transmit significant quantities of water under the pressure differences ordinarily found in the subsurface[22].

impervious. Not permitting the flow of water[16].

impervious lens. An impermeable, lens-shaped body of sediment in an otherwise permeable aquifer[16].

imported water. Water coming from outside the ground-water basin under consideration[16].

impound. The collecting of water by damming[16].

inception. The earliest stage of speleogenesis. The start of the inception phase marks the transition from 'rock with no caves' (in the widest sense) to 'rock with caves', and extends through whatever time interval is required for gravitational laminar flow conditions to be established in a given situation (see gestation and initiation)[9].

inception horizon. A part of a rock succession that is particularly susceptible to the effects of the earliest cave forming processes and hence is critical to the origin of most non-tectonic caves. By virtue of physical, lithological or chemical deviation from the predominant carbonate facies within the sequence, it passively or actively favors the localized inception of dissolutional activity[9]. See also inception.

incision. See entrenchment.

initiation. The early parts of speleogenesis, generally up to the point of breakthrough from laminar to turbulent flow, at an average conduit diameter of 10mm. Initiation includes, but is not the same as, inception[9].

inclinometer. An instrument to measure the inclination of surfaces[16].

incoherent material. Unconsolidated material[16].

incrustation. 1. Deposition of a crust (of calcite, etc.) upon an object by precipitation from water oversaturated with salts (calcium bicarbonate, etc.)[20]. 2. The deposition of mineral matter by water[16]. Synonyms: (French.) *incrustation*; (German.) *Krustenbildung*; (Greek.) *epiphlioma*; (Italian.) *incrostazione*; (Russian.) *obrazovanie natecnih kor*; (Spanish.) *incrustción;* (Turkish.) *kabuk bağlama, kabuklaşma*; (Yugoslavian.) *inkrustacija*.

induced activity. The activity or response of a system that has been subjected to an artificial excitation[16].

induced infiltration. An increase in infiltration from a surface water body by the lowering of the original water table[16].

induced recharge. A method of withdrawing ground water at strategic points to induce natural recharge[16].

indurated rock. A rock that has been hardened and solidified by diagenetic processes[16].

infiltrability. The ease of infiltration[16].

infiltration. The downward entry of water into the soil or rock[22].

infiltration basin. A basin in which water is spread for recharge.

infiltration capacity. The maximum rate at which a soil or rock is capable of absorbing water or limiting infiltration[22].

infiltration gallery. A horizontal conduit for the purpose of intercepting ground water[16].

infiltration index. The average rate of infiltration throughout a given rain storm[16].

infiltration rate. 1. The rate at which a soil or rock under specified conditions absorbs falling rain, melting snow, or surface water expressed in depth of water per unit time[22]. 2. A characteristic describing the maximum rate at which water can enter the soil or rock, under specified conditions, including the presence of an excess of water. It has the dimensions of velocity[22].

infiltrometer. Apparatus for measuring the amount of infiltration[16].

inflow cave, influent cave. Cave into which a stream flows or formerly entered[10].

influent stream. See losing stream.

infrared light. Light not visible to the human eye, with wavelengths longer than those of visible red light and shorter than those of radio waves[23].

initial abstraction. The maximum amount of rainfall absorbed without producing runoff[16].

inject, to. 1. The introduction of pressurized fluids into a porous subsurface formation[16]. 2. The introduction of tracer materials (e.g. fluorescent dyes) into the subsurface.

injection head. A swivel head connector through which drilling fluid is injected into the drill pipe[16].

injection well. Well used for emplacing fluids into the subsurface[22].

injection zone. A geological 'formation,' group of formations, or part of a formation receiving fluids through a well.

injectivity. The capacity of a well or formation to accommodate pumped in liquid[16].

inlet cave. A cave developed beneath a swallow hole where a surface watercourse first passes underground in karst limestone[19].

input point. Points where water enters an underground drainage route or aquifer. An obvious type of input point is a surface sink or swallow hole, where allogenic drainage has direct access to a conduit system within a carbonate aquifer. Less obvious are points where drainage enters a potential carbonate conduit-system from adjacent non-carbonate strata (such as a porous sandstone aquifer) or where water utilizes a fracture system to pass through otherwise relatively impermeable beds and into the carbonate aquifer[9].

insectivore. An animal that feeds on insects. Almost all species of North American bats are insectivores[23]. See also *carnivore; herbivore; omnivore*.

in-situ density. The density of water measured at its actual depth[22]. See also potential density.

insulated stream. A stream neither receiving nor abstracting water from a ground-water body because of an impermeable bed[16].

insurgence. A term proposed to describe a point of inflow for surface water into subsurface conduits. It has not gained wide usage and is not recommended for use. *Diffuse insurgence* may be used to describe the slow percolation of water through overburden and tight pores in the rock. *Confluent insurgence* may be applied to water entering the rock via identifiable streams sinking into the subsurface while a *confluent insurgence complex* would apply to a cluster of insurgences. *Abandoned insurgences* is the term applied to inflow points no

longer used by infiltrating water. An *overflow insurgence* is the term used to describe insurgences utilized only during periods of high flow[12].

intake area, recharge area. The surface area in which water is absorbed into an aquifer eventually to reach the zone of saturation[10].

interaquifer flow. The flow that occurs between aquifers through fracture openings or through the wellbore[16].

interbedded. Pertaining to beds or sedimentary material intercalated in a parallel fashion into a main stratum[16].

interbedding. A bed between layers of different material[16].

interception. The abstraction of direct rainfall on vegetation cover[16].

interception loss. That part of rainfall retained by the aerial portion of vegetative cover[16].

interdigitation. The lateral interlocking of sedimentary series[16].

interface. 1. The contact zone between two materials of different chemical or physical composition[22]. 2. The contact plane of two immiscible liquids[16].

interference. The condition occurring when the area of influence of a water well comes into contact with or overlaps that of a neighboring well, as when two wells are pumping from the same aquifer or are located near each other[6].

interflow. Subsurface runoff[16].

intergranular stress. The stress between grains in a solid matrix[16].

intergranular voids. Generally primary or secondarily enhanced voids within rocks, with average dimensions of 0.00l to 0.lmm. Such voids, or pores, may provide interconnected porosity in many karst rocks and allow early water movement under laminar flow conditions[9].

intermittent spring. See spring, intermittent.

intermittent stream, intermittent river. 1. A stream or river which flows only in direct response to precipitation or to intermittent discharge of a spring; not confined to karst areas, but not uncommon in them[20]. 2. A stream or river that flows at irregular intervals[16]. Synonyms: (French.) *cours d'eau intermittent*; (German.) *intermittierender Fluß, episodischer periodischer Fluß*; (Greek.) *dialípon potamós*; (Italian.) *torrente intermittente*; (Spanish.) *corriente intermitente*; (Turkish.) *kesintili akarsu*; (Yugoslavian.) *susĩca, suvaja*. Contrast with interrupted river.

intermontane basin. A basin lying between two mountain ranges[16].

internal drainage. Drainage in a closed basin and not reaching the sea[16]. It is common in maturely karsted terranes where surface water bodies are relatively nonexistent.

interstice. 1. An opening in a rock or soil that is not occupied by solid matter[22]. 2. An opening or space which may be occupied by air, water, or other gaseous or liquid material[22]. Synonymous with void, pore. See also pore; pore space; porosity; porosity, effective; porosity, primary; porosity, secondary.

interstitial ice. Ice occurring below the surface in soil pores[16].

interstitial medium. Spaces between grains of sand or fine gravel filled with water which contains phreatobia[25].

interstitial water. Water held in small wedge like interstices at grain contact[16].

interstratal karst; interstratal karstification. 1. Features formed by the dissolutional removal of all or part of a buried rock unit. Interstratal-karst features are common within highly soluble evaporite rocks such as gypsum and halite, and may be equally common, but less readily recognized, within the preserved remnants of carbonate successions. Interstratal karst should not be confused with buried karst. The finest interstratal karst in Britain is the extensive cave development in the limestones beneath the Namurian Millstone Grit plateaux of South Wales, where the large collapse dolines in the Millstone Grit are interstratal-karst landforms[9]. 2. The process of karstification of highly soluble rocks (e.g., gypsum, anhydrate, and salt) that are overlain by less soluble rocks (e.g., shales), but are still selectively dissolved by circulating ground water[10].

interstratal karst. Karst topography that is covered by and developed beneath pre-karst rock or sediment and may or may not be part of the contemporary landscape. It is younger than its cover and is formed by the solution of soluble rock in the subsurface, most commonly beneath relatively insoluble rock such as sandstone or chert. The term refers to areal solution rather than to cave development but is also applicable to rejuvenated mantled karst and rejuvenated buried karst. Subsoil karst is transitional to interstratal karst[17]. Synonyms: (French.) *karst sous-jacent*; (German.) *unterirdisches Karstphänomen*; (Greek.) *kalyménon karst*; (Italian.) *carso coperto*; (Spanish.) *karst interstradal*; (Turkish.) *tabakalar arası karst*. See also buried karst; denuded karst; covered karst.

inter-permafrost karst. See permafrost karst; sub-permafrost karst.

interrupted river, interrupted stream. 1. A river which flows for part of its course on the surface, and part underground in caves[20]. 2. A stream interrupted over space[16]. 3. A discontinuous stream[16]. Synonyms: (French.) *rivière interrompue*; (German.) *periodischer Fluß ?, Karstfluß, versickernder Fluß*; (Greek.) *thiakekoménos potamós*; (Russian.) *peresihauchaj reka, syhaja reka*; (Spanish.) *rio sumente*; (Turkish.) *yer yer akan nehir*; (Yugoslavian.) *sušica, suvaja, periodićka rijeka (reka)*. See also lost river; intermittent stream.

intrinsic permeability. See permeability, intrinsic.

inundation. The covering of an area by flood waters[16].

invaded zone. In geophysical well logging, the zone in which an appreciable amount of mud filtrate has penetrated[16].

invasion. In geophysical well logging, the penetration of a fluid into the porous medium[16].

invasion depth. The depth to which drilling mud filtrate penetrates into a formation[16].

invertebrate. An animal, such as a planarian, snail, or crayfish, without a backbone[23]. See also *vertebrate*.

inverted siphon. See water trap.

ion. An element or compound that has gained or lost an electron so that it is no longer neutral electrically and now carries a charge[6].

ion mobility. The ease with which ions move in an electrolytical solution[16].

irreducible saturation. The lowest water saturation obtainable by mechanical reduction methods[16].

irrigation. The artificial watering of fields for crop production[16].

irrigation requirement. The water needed for crop production exclusive of precipitation[16].

irrigation return flow. The part of artificially applied water that is not consumed by evapotranspiration and that migrates to an aquifer or surface water body[22].

irrotation flow. Potential flow or flow with no rotational component[16].

isobath. A line of equal depth[16].

isochrone. A line connecting water levels in observation wells for a given instant in time[16].

isohyet. A line of equal rainfall[16].

isopiestic line. A contour on a piezometric surface connecting points of equal static level[16].

isopleth. A line of equal distance from the point of outflow of a basin[16].

isopotal line. A line of equal infiltration capacity[16].

isotherm. A line of equal temperatures[16].

isotope tracer. Tracer which is an isotope of an element present in the water; it may be artificial (added to water) or natural (present in the water)[20]. Synonyms: (French.) *traceur isotopique*; (German.) *Markierung durch radioaktive Isotopen*; (Greek.) *isotopicos ichnithetis*; (Italian.) *tracciante isotopico*; (Russian.) *izotopnij indikator*; (Spanish.) *trazador isotópico*; (Turkish.) *izotop izleyicisi*; (Yugoslavian.) *izotopni traser*.

isotropic. Equal properties in all directions.

isotropic mass. A mass having the same property or properties in all directions[22].

isotropy. The condition in which the property or properties of interest are the same in all directions[22].

izdan. A general Yugoslavian term for a ground-water reservoir from which ground water may readily be extracted; it is not specifically a karst term[20].

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