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## Standard Terminology Relating to Frozen Soil and Rock<sup>1</sup>

This standard is issued under the fixed designation D7099; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon ( $\epsilon$ ) indicates an editorial change since the last revision or reapproval.

### 1. Scope

1.1 This terminology includes all of those terms which relate to frozen soils and rocks.

1.2 It is based on: a list of definitions drawn up by ASTM Sub-Committee D18.19; ASTM standards; a list of definitions drawn up by the Canadian Geomorphology Research Group (CGRG); the Glossary of Permafrost and Related Ground-Ice Terms developed by the National Snow and Ice Data Center (NSIDC), at the University of Colorado, at Boulder; the Keys to Soil Taxonomy of the United States Department of Agriculture (USDA); and contributions by a number of individuals.

1.3 For all of the terms included, the source is included in parentheses after the definition.

1.4 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*

### 2. Referenced Documents

#### 2.1 ASTM Standards:<sup>2</sup>

D653 Terminology Relating to Soil, Rock, and Contained Fluids

D4083 Practice for Description of Frozen Soils (Visual-Manual Procedure)

#### 2.2 Other References:

Harris, S. A., French, H. M., Heginbottom, J. A., Johnston, G. H., Ladanyi, B., Sego, D. C., and van Everdingen, R. O., 1988, Glossary of Permafrost and Related Ground-Ice Terms, Technical Memorandum, Associate Committee on Geotechnical Research, Ottawa, Canada

Everdingen, Robert van, ed., 1998, revised January, 2002, Multi-Language Glossary of Permafrost and Re-

<sup>1</sup> This terminology is under the jurisdiction of ASTM Committee D18 on Soil and Rock and is the direct responsibility of Subcommittee D18.19 on Frozen Soils and Rock.

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<sup>2</sup> For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

lated Ground-Ice Terms, National Snow and Ice Data Center/World Data Center for Glaciology, Boulder, Colorado

National Snow and Ice Data Center, 2003, English Language Glossary of Permafrost and Related Ground-Ice Terms, Boulder, Colorado, <http://nsdic.org/fgdc/glossary/english.html>

Natural Resources Conservation Service, United States Department of Agriculture, Keys to Soil Taxonomy, Ninth Edition, 2003, 331 pp., [http://soils.usda.gov/technical/classification/tax\\_keys](http://soils.usda.gov/technical/classification/tax_keys)

Permafrost Map of the USSR (1:2,500,000), 1996, Department of Geocryology, Moscow State University, 16 sheets

### 3. Significance and Use

3.1 This terminology can be used to find the definitions of all of those terms which are used in association with frozen materials, including rocks, soils, and water.

### 4. Terminology

#### 4.1 Definitions:

4.1.1 All of the definitions are consistent with those listed in Terminology D653.

**active layer**—the top layer of ground that is subject to annual freezing and thawing. (In the zone of discontinuous permafrost, the active layer is often underlain by unfrozen ground.)

**active layer failure**—any of several possible forms of slope failure in the active layer. **NSIDC**

**active layer thickness**—the thickness of the top layer of ground that is subject to annual freezing and thawing. **NSIDC**

**active rock glacier**—a mass of rock fragments and finer material, on a slope, that contains an ice core or interstitial ice, and which shows evidence of recent movement. **NSIDC**

**adfreeze shear strength**—the shear stress required to separate two objects that are bonded together by ice.

**adfreeze tensile strength**—the tensile stress required to separate two objects that are bonded together by ice. **NSIDC**

**adfreezing**—the process by which objects are bonded together by the ice formed between them. **NSIDC**

- aggradation of permafrost**—see **permafrost aggradation**.
- aggradational ice**—newly formed ice lenses, especially in the lower part of the active layer, which become incorporated into the permafrost due to a raising of the permafrost table or a lowering of the permafrost base.
- air freezing index**—see **freezing index**.
- air thawing index**—see **thawing index**.
- albedo**—the fraction of the total solar radiation incident on a body that is reflected by it.
- alpine permafrost**—permafrost developed in temperate climate mountainous areas.
- altitudinal permafrost limit**—the lowest altitude at which mountain permafrost occurs in a highland area outside of the general permafrost region. **NSIDC**
- altitudinal permafrost zonation**—the vertical subdivision of mountain permafrost into zones based on mean annual temperatures. **NSIDC**
- apparent heat capacity**—the amount of heat required to raise the temperature of a unit mass of frozen ground by one degree. It is expressed in Joules per kg per degree K. **NSIDC**
- approximate freezing index**—the cumulative number of degree-days below 0°C for a given period, calculated from the mean monthly temperatures for a given station without making corrections for positive degree-days in the spring and fall. **NSIDC**
- approximate thawing index**—the cumulative number of degree-days above 0°C for a given period, calculated from the mean monthly temperatures for a given station without making corrections for negative degree-days in the spring and fall. **NSIDC**
- artificial ground freezing**—the process of freezing earth materials by artificial means.
- banded cryogenic fabric**—a distinct soil morphology in which soil particles form subhorizontal layers as the result of freezing and thawing. **NSIDC**
- barrens**—areas of discontinuous vegetation cover in the polar semi-desert of the High Arctic. **NSIDC**
- basal cryopeg**—a layer of unfrozen ground, forming the basal portion of permafrost, in which the temperature is perennially below 0°C (32°F). **NSIDC**
- basal cryostructure**—the structural characteristics of a frozen deposit of boulders that is saturated with ice. **NSIDC**
- basal-layered cryostructure**—the structural characteristics of a frozen layered deposit of gravel and boulders that is saturated with ice. **NSIDC**
- beaded stream**—a characteristic pattern of small streams underlain by ice wedges. “Beads,” or pools, occur at junctions of wedges. The pools are linked by narrow channels. **NSIDC**
- bottom temperature of snow cover**—temperature measured at the base of the snow cover during mid- to late-winter (February/March). The measurements are used in the BTS method to predict the presence or absence of permafrost. **NSIDC**
- BTS method**—a method to predict the presence or absence of permafrost in a mountainous area, using measurements of the bottom temperature of the snow in mid- to late-winter. **NSIDC**
- buried ice**—ice formed on the ground surface and later covered by sediments.
- candled ice**—ice that has rotted or otherwise formed, by melting during the spring, into long columnar crystals which are very loosely bonded together. A distinctive “chiming” sound accompanies movement during “ice-out.”
- cave ice**—ice formed in an open or closed cave. **NSIDC**
- clear ice**—ice that is transparent and contains only a moderate number of air bubbles.
- closed-cavity ice**—ice formed in a closed space, cavity, or cave, in permafrost. **NSIDC**
- closed-system freezing**—freezing that occurs under conditions that preclude the gain or loss of water by the system. **NSIDC**
- closed-system pingo**—a pingo formed by the doming of frozen ground due to the freezing of injected water. The water is provided by the expulsion of pore water during the growth of permafrost. Closed-system pingos are found in poorly-drained terrain in the continuous permafrost zone. **NSIDC**
- closed talik**—a body of unfrozen ground occupying a depression in the permafrost table below a lake or river. **NSIDC**
- cloudy ice**—ice that is translucent or relatively opaque due to the content of air or for other reasons, but which is essentially sound and nonpervious.
- coefficient of compressibility**—the change in volume per unit volume of a substance per unit increase in effective compressive stress, under isothermal conditions. **NSIDC**
- collapse scar**—that part of a peatland where the whole, or part, of a peat plateau has thawed and collapsed to the level of the surrounding land. Collapses scars are not depressions but are marked by vegetation different from the peatland that was not underlain by permafrost. **NSIDC**
- composite wedge**—a wedge, containing both soil and ice, that shows evidence of both primary and secondary filling. **NSIDC**
- compressive strength**—the load per unit area at which an unconfined cylindrical specimen of soil or rock will fail in a simple compression test. Commonly the failure load is the maximum that the specimen can withstand in the test. **D653**
- conglomeric cryogenic fabric**—a distinct soil micromorphology resulting from the effects of freezing and thawing, in

- which coarser soil particles form compound arrangements.  
NSIDC
- construction methods in permafrost**—special procedures of design and construction that are required when engineering works are undertaken in areas of permafrost.
- contemporary permafrost**—(1) newly formed permafrost in an area where surface temperatures have fallen below 0°C (32°F); (2) permafrost that is in thermal equilibrium with the existing mean annual surface or sea-bottom temperature and the geothermal heat flux.
- continuous permafrost**—permafrost occurring everywhere beneath the exposed land surface throughout a geographic region, with the exception of widely scattered sites, such as newly-deposited unconsolidated sediments, where the climate has just begun to impose its influence on the ground thermal regime and will cause the formation of continuous permafrost.
- continuous permafrost zone**—a major subdivision of a permafrost region, in which permafrost occurs everywhere beneath the land surface, with the possible exception of widely scattered sites; both in North American (GPRGIT) and in Russian (Permafrost Map of the USSR) usage: >80 % of area underlain by permafrost.
- convection tube**—a closed single-phase heat transfer device that removes heat from the ground whenever conditions are appropriate to drive the internal convection cell.
- creep of frozen ground**—the slow deformation that results from long-term application of a stress too small to produce failure in the frozen material.
- creep strength**—the failure strength of a material at a given rate of strain or after a given period under deviatoric stress.  
NSIDC
- crust-like cryostructure**—the structural properties of a frozen deposit of angular blocks that are coated with ice, while large spaces between the blocks are not filled with ice.  
NSIDC
- cryofront**—the boundary between frozen and unfrozen ground, as indicated by the position of the 0°C isotherm in the ground.  
NSIDC
- cryogenesis**—the combination of thermophysical, physico-chemical, and physico-mechanical processes that occur in freezing, frozen, and thawing earth materials.  
NSIDC
- cryogenic aquiclude**—a frozen layer of ground with sufficiently low permeability as to act as a confining bed for an aquifer.  
NSIDC
- cryogenic fabric**—the distinct soil micromorphology which results from the effects of freezing and thawing processes.  
NSIDC
- cryogenic temperature**—the term can apply to temperatures below -50°C but is usually used for those temperatures close to absolute zero (-273°C).  
NSIDC
- cryolithology**—the study of the genesis, structure, and lithology of frozen earth materials.  
NSIDC
- cryopedology**—the study of soils at temperatures below 0°C.
- cryopeg**—a layer of unfrozen ground in which the temperature is perennially below 0°C. In general, the freezing of such layers is prevented due to the depression of the freezing point by solids dissolved in the pore water.
- cryoplanation**—the process through which cryoplanation terraces form.  
NSIDC
- cryoplanation terraces**—hillside benches or table-like summit surfaces which are thought to have resulted from intense frost wedging associated with snowbanks. These are usually underlain by permafrost and are considered by some as diagnostic landforms of permafrost terrain.  
NSIDC
- cryosol**—soil within 1 to 2 m of the surface in which the mean annual ground temperature is below 0°C.  
NSIDC
- cryosphere**—that part of the Earth's crust, hydrosphere, and atmosphere subject, for at least a part of each year, to temperatures below 0°C (32°F).  
NSIDC
- cryostructure**—the structural characteristics of frozen earth materials.  
NSIDC
- cryosuction**—a suction which develops in freezing or partially-frozen fine-grained materials due to temperature-dependent differences in unfrozen water content.  
NSIDC
- cryotexture**—the textural characteristics of frozen earth materials cemented together with ice.  
NSIDC
- cryotic ground**—soil or rock in which the temperatures are 0°C, or below.  
NSIDC
- cryoturbate**—a body of earth material moved or disturbed by the action of frost.  
NSIDC
- cryoturbation**—(1) a collective term to describe all soil movements due to frost action; (2) irregular structures formed in earth materials by deep frost penetration and frost action processes.  
NSIDC
- debris flow**—a sudden and destructive form of landslide, in which loose materials on a slope, with at least half of the particles being larger than sand, are mobilized by saturation and flow downwards.  
NSIDC
- deformability**—the ability of a material to change its shape or size under the influence of an external or internal agency.  
NSIDC
- degree-day**—a unit of heat measurement equal to one degree of the variation of the mean temperature for a day from a given reference (or, base) temperature.
- degree of saturation**—(1) the total degree of saturation of frozen soil is the ratio, expressed as a percentage, of the volume of ice and unfrozen water in the soil pores to the volume of the pores; (2) the degree of saturation of frozen soil by ice, expressed as a percentage, is the ratio of the

- volume of ice in the soil pores to the volume of the pores. **NSIDC**
- density of frozen ground**—the ratio of mass per unit of volume of frozen earth materials.
- depth of seasonal frost penetration**—the maximum thickness of the seasonally frozen layer. **NSIDC**
- depth of thaw**—the distance from the ground surface downward to frozen ground at any time during the thaw season.
- depth of zero annual amplitude**—the distance from the ground surface downward to the point beneath which there is virtually no annual fluctuation in the mean ground temperature.
- desiccation crack**—a crack or fissure in fine-grained soil material resulting from shrinkage during drying. **NSIDC**
- desiccation polygon**—a closed, multi-sided, pattern in the ground formed by desiccation cracks in fine-grained soils. **NSIDC**
- design depth of frost penetration**—(1) in North American usage: the mean of the three largest depths of seasonal frost penetration measured during the past thirty years, or, the largest depth of seasonal frost penetration beneath a snow-free soil surface measured during the past ten years; (2) in Russian usage: the mean of the depths of seasonal frost penetration during at least the last ten years with the ground surface free of snow and the groundwater level beneath the depth of seasonal frost penetration. **NSIDC**
- detachment failure**—a slope failure in which the thawed or thawing part of the active layer detaches from the underlying frozen material. **NSIDC**
- dielectric constant**—a measure of the ability of a material to store electrical energy in the presence of an electrostatic field.
- dilation crack**—a tensile fracture in a frozen material caused by surface extension due to doming, slope or embankment movement, or toppling.
- dilation crack ice**—ice that forms in dilation cracks. **NSIDC**
- discontinuous permafrost**—permafrost occurring in some areas beneath the ground surface throughout a geographic region where other areas are free of permafrost.
- discontinuous permafrost zone**—a major subdivision of a permafrost region in which permafrost occurs in some areas beneath the ground surface while other areas are free of permafrost; (1) in North American usage: 30 to 80 % of area underlain by permafrost; (2) in Russian usage: 3 to 80 % of area underlain by permafrost. **GPRGIT; Permafrost Map of the USSR, 1996**
- disequilibrium permafrost**—permafrost that is not in thermal equilibrium with the existing mean annual surface or sea-bottom temperature and the geothermal heat flux. **NSIDC**
- drunken forest**—a group of trees leaning in random directions in a permafrost region; usually associated with thermokarst topography.
- dry density**—the mass of a unit volume of dried material. **NSIDC**
- dry frozen ground**—frozen ground with a very low total water content, consisting almost completely of interfacial water, and not cemented by ice. **NSIDC**
- dry permafrost**—perennially frozen soil or rock without ice, or with an ice content lower than the pore volume, so that it does not yield excess water on thawing.
- dynamic modulus of elasticity**—the ratio of stress to strain for a material under dynamic loading conditions. **NSIDC**
- dynamic Poisson's ratio**—the absolute value of the ratio between the linear strain changes, perpendicular to and in the directions of a given uniaxial stress change, respectively, under dynamic loading conditions. **NSIDC**
- earth hummock**—a hummock having a core of silty and clayey mineral soil which may show evidence of cryoturbation. **NSIDC**
- electrical conductivity**—the property of conducting electricity.
- electrical properties of frozen ground**—these include the: dielectric constant, electrical conductivity, and electrical resistivity.
- electrical resistivity**—the property of a material that determines the electrical current flowing through a centimeter cube of the material when an electrical potential is applied to the opposite faces of the cube. **NSIDC**
- epigenetic ice**—ice in the ground that formed after the deposition of the earth material in which it occurs. **NSIDC**
- epigenetic ice wedge**—an ice wedge that developed after the deposition of the earth material in which it occurs.
- epigenetic permafrost**—(1) permafrost that formed after the deposition of the earth material in which it occurs; (2) permafrost that formed through the lowering of the permafrost base in previously deposited material. **NSIDC**
- equilibrium permafrost**—permafrost that is in equilibrium with the existing mean annual surface or sea-bottom temperature and with the geothermal heat flux. **NSIDC**
- excess ice**—the ice in the ground that exceeds the total volume of the pores that the ground would have under natural unfrozen conditions.
- fabric**—the micromorphology of soil.
- fragmic cryogenic fabric**—a distinct soil micromorphology, resulting from processes of freezing and thawing, in which soil particles form discrete units that are densely packed. **NSIDC**
- fragmoidal cryogenic fabric**—a distinct soil micromorphology, resulting from the processes of freezing and thawing, in which soil particles form discrete units that are coalescing. **NSIDC**

- frazil ice**—crystals of ice that form in turbulent streams in cold weather.
- free water**—that portion of the pore water that is free to move between interconnected pores under the influence of gravity. **NSIDC**
- freeze-thaw cycle**—the freezing of a material followed by thawing.
- freezeback**—refreezing of thawed materials. **NSIDC**
- freezing (of ground)**—the changing of phase from water to ice in soil or rock. **NSIDC**
- freezing front**—the advancing boundary between frozen (or partially frozen) and unfrozen ground. **NSIDC**
- freezing index**—(1) the cumulative number of degree-days below 0°C for a given period; (2) the number of degree-days between 0°C (32°F) and the mean temperature each day. The index is determined from temperatures measured about 1.4 m (4.5 ft) above the ground surface. That determined from temperatures measured at, or immediately below, a surface is known as the **surface freezing index**.
- freezing point**—(1) the temperature at which a pure liquid solidifies under atmospheric pressure; (2) the temperature at which a ground material starts to freeze. **NSIDC**
- freezing-point depression**—the number of degrees by which the freezing point of an earth material is depressed below 0°C (32°F).
- freezing pressure**—the positive pressure developed at ice-water interfaces in a soil as it freezes. **NSIDC**
- friable**—a condition under which the material is easily broken up under light to moderate pressure.
- friable permafrost**—permafrost in which the soil particles are not held together by ice. **NSIDC**
- frost**—the occurrence of air temperatures below 0°C. **NSIDC**
- frost action**—the process of alternate freezing and thawing of moisture in soil, rock, and other materials, and the resulting effects on materials and on structures placed on, or in, the ground.
- frost blister**—a seasonal frost mound produced through doming of seasonally frozen ground through a subsurface accumulation of water under elevated hydraulic potential during progressive freezing of the active layer. The areas affected can be quite large. **NSIDC**
- frost boil**—a small mound of soil material, presumed to have been formed through frost action. **NSIDC**
- frost bulb**—a more-or-less symmetrical zone of frozen ground formed around a buried chilled pipeline, or beneath or around a structure maintained at temperatures below 0°C (32°F).
- frost cracking**—fracturing of the ground by thermal contraction at temperatures below 0°C (32°F).
- frost creep**—the net downslope displacement that occurs when a soil, during a freeze-thaw cycle, expands normal to the ground surface and settles in a nearly vertical direction. **NSIDC**
- frost heave (heaving)**—the upward or outward movement of the ground surface (or objects on, or in the ground), caused by the formation of ice in the soil. **NSIDC**
- frost-heave extent**—the difference between the elevations of the ground surface before and after the occurrence of frost heave. **NSIDC**
- frost jacking**—the cumulative upward or outward displacement of slabs or blocks of rock, or of objects embedded in the ground, due to repetitive freezing and thawing.
- frost mound**—any mound-shaped landform produced by ground freezing combined with accumulation of ground ice due to groundwater movement or the migration of soil moisture. **NSIDC**
- frost penetration**—the movement of the freezing front into the ground during freezing. **NSIDC**
- frost phenomena**—the effects on earth material and structures resulting from frost action. **NSIDC**
- frost shattering**—the mechanical disintegration of rock caused by the pressure of the freezing of water in pores and along grain boundaries. **NSIDC**
- frost sorting**—the differential movement of soil particles of different size ranges as a result of frost action. **NSIDC**
- frost-stable ground**—soil or rock in which little or no segregated ice forms during seasonal freezing. **NSIDC**
- frost-susceptible ground**—soil or rock in which segregated ice will form, causing frost heave, under the required conditions of moisture supply and temperature. **NSIDC**
- frost weathering**—the disintegration and break-up of soil or rock by the combined action of frost shattering, frost wedging, and hydration shattering. **NSIDC**
- frost wedging**—the mechanical disintegration, splitting, or breaking-up of rock caused by the pressure of the freezing of water in cracks, crevices, pores, joint, or bedding planes. **NSIDC**
- frozen fringe**—the zone in a freezing, frost-susceptible soil between the warmest isotherm at which ice exists in pores and the isotherm at which the warmest ice lens is growing.
- frozen ground**—soil or rock in which all or part of the pore water has turned into ice. **NSIDC**
- gas hydrate**—a special form of a solid lattice-like structure in which crystal lattice cages or chambers consisting of host molecules (water) enclose guest molecules (of a variety of gases). **NSIDC**
- gelifluction**—the slow downslope flow of unfrozen earth materials on a frozen substrate. **NSIDC**

- gelisol**—perennially frozen soil that contain permafrost within 2 m of the surface. **USDA**
- geocryology**—the study of earth materials having a temperature below 0°C (32°F). **NSIDC**
- geothermal gradient**—the rate of temperature increase with depth in the earth. **NSIDC**
- geothermal heat flux**—the amount of heat moving steadily outward from the interior of the earth through a unit area in unit time. **NSIDC**
- glacial till (till)**—material left after the retreat of glaciers and ice sheets, usually composed of a wide range of particle sizes, which has not been subjected to the sorting action of water. **D653**
- glaciolacustrine deposits**—glaciofluvial deposits that settled in standing water. **NSIDC**
- granic cryogenic fabric**—a distinct soil micromorphology, resulting from the processes of freezing and thawing, in which soil particles form discrete loosely packed units. **NSIDC**
- granoidic cryogenic fabric**—a distinct soil micromorphology, resulting from the processes of freezing and thawing, in which soil particles form more-or-less discrete loosely packed units. **NSIDC**
- granular ice**—ice that is composed of coarse, more-or-less equi-dimensional, crystals that are weakly bonded together. **NSIDC**
- gravimetric (total) water content**—the ratio, expressed as a percentage, of the mass of the water and ice in a sample to the dry mass of the sample. **NSIDC**
- ground ice**—(1) ice in pores, cavities, voids, or other openings in soil or rock, including massive ice; (2) a general term referring to all types of ice in freezing and frozen ground. **NSIDC**
- ground settlement**—downward movement of the ground causing a lowering of the ground surface resulting from the melting of ground ice in excess of that contained in pore fillings. **NSIDC**
- hard frozen ground**—frozen soil or rock which is firmly cemented by ice. **NSIDC**
- heat capacity**—the amount of heat required to raise the temperature of a unit mass of a substance by one degree. It is commonly expressed in Joules per kg per degree K. **NSIDC**
- heaving pressure**—upward pressure developed during freezing of the ground. **NSIDC**
- high-center polygon**—an ice-wedge polygon in which melting of the surrounding ice wedges has left the center in a relatively elevated position. **NSIDC**
- histel**—a suborder of gelisol that contains large quantities of organic matter. **USDA**
- hydraulic conductivity**—the volume of fluid passing through a unit cross section in unit time under the action of a unit hydraulic potential gradient. It is commonly expressed in cm/second or m/day. **NSIDC**
- hydraulic diffusivity**—the ratio of the hydraulic conductivity and the storage capacity of a groundwater aquifer. **NSIDC**
- hydraulic thawing**—artificial thawing and removal of frozen ground by the use of a stream or jet of water under high pressure. **NSIDC**
- hydrochemical talik**—a layer or body of unfrozen ground, at a temperature of less than 0°C, in a permafrost area, which remains unfrozen due to moving mineralized groundwater. **NSIDC**
- hydrothermal talik**—a layer or body of unfrozen ground, at a temperature above 0°C, in an area of permafrost, which is maintained by moving groundwater. **NSIDC**
- ice**—water in the frozen, solid, state. **NSIDC**
- ice-bearing permafrost**—permafrost that contains ice. **NSIDC**
- ice-bonded permafrost**—ice-bearing permafrost in which the soil particles are cemented together by ice. **NSIDC**
- ice, canded**—see **canded ice**. **NSIDC**
- ice content**—(1) the ratio, expressed as a percentage, of the weight of the ice phase to the weight of dry soil; (2) the ratio, expressed as a fraction, of the volume of ice in a sample to the volume of the whole sample. In the volumetric calculation the ratio cannot exceed unity. In the gravimetric calculation, the percentage can exceed 100 %. **NSIDC**
- ice-cored topography**—topography that is due almost solely to differences in the amount of excess ice underlying the surface. **NSIDC**
- ice crystal**—a very small individual crystal or particle of ice visible in, or on, the face of a mass of soil or rock. Crystals may occur alone, or in combination with other ice formations. **NSIDC**
- ice, epigenetic**—see **epigenetic ice**. **NSIDC**
- ice, excess**—see **excess ice**. **NSIDC**
- ice, frazil**—see **frazil ice**. **NSIDC**
- ice lens**—a lens-shaped body of ice ranging in thickness from hairline to 0.3 m. Ice layers more than 0.3 m in thickness are better termed massive ice beds. **NSIDC**
- ice lenses**—lenticular formations of ice in soil occurring essentially parallel to each other, generally normal to the direction of heat loss, and commonly in repeated layers. **NSIDC**
- ice nucleation temperature**—the temperature at which ice first forms during freezing of a soil/water system that does not initially contain ice. **NSIDC**
- ice-rich permafrost**—perennially frozen ground that contains ice in excess of that required to fill pore spaces. **NSIDC**