

Part 629 - GLOSSARY OF LANDFORM AND GEOLOGIC TERMS

CONTENTS

PART	TITLE	PAGE
629.00	Definition and Purpose.....	629-1
629.01	Policy and Responsibilities.....	629-1
629.02	Definitions.....	629-1
	(a) Codes for references.....	629-1
	(b) Clarifying comments attached to glossary terms.....	629-2
	(c) Glossary terms.....	629-2
629.03	References.....	629-42
	(a) Current references.....	629-42
	(b) Classic references.....	629-44
Exhibit 629-1	List of Landscape, Landform, and Microfeature Terms Contained in the Glossary.....	629-47
Exhibit 629-2	Subsets of Landform Terms (Grouped by "Process" or Common Setting).....	629-51
Exhibit 629-3	List of Materials or Material-Related, Structure, or Morphological- Feature Terms Contained in the Glossary.....	629-57
Exhibit 629-4	List of Other Terms, Including Genesis-Process Terms and Geologic Time Terms Contained in the Glossary.....	629-59
Exhibit 629-5	North American Glacial Episodes and General Geologic Time Scale.....	629-61

Part 629 - GLOSSARY OF LANDFORM AND GEOLOGIC TERMS

629.00 Definition and Purpose.

The purpose of this glossary is to provide soil scientists and other specialists with a list of standard landform and geologic terms and their definitions to help:

- improve predictions of soil occurrence by ensuring that soil scientists accurately identify the landforms that they encounter;
- improve the clarity and accuracy of map units;
- ensure consistent word usage in soil surveys nationwide;
- provide preferred or appropriate definitions for terms that have several definitions in general use;
- train soil scientists and other professionals in useful aspects of soils and where they occur.

629.01 Policy and Responsibilities.

This glossary is the official reference for soil survey applications of landform, geologic, and related terms. The National Soil Survey Center is responsible for maintaining and updating this glossary. MLRA office soil scientists and National Cooperative Soil Survey participants are responsible for submitting proposals for additions for use within soil survey descriptions and publications. Permission was granted (letters dated September 11, 1985 and September 22, 1993) by the American Geological Institute (AGI), to use various definitions. Modifications to original AGI definitions are indicated by the reference notation (explained below).

629.02 Definitions.

(a) **Codes for references.** The source from which definitions were taken, whole or in part, are identified by a code (e.g. GG) at the end of each definition. Underlined codes (e.g. GG) signify a modification of the original source definition. The reference codes are:

BHM Buol, S.W., Hole, F.D., and McCracken, R.J. 1989. Soil genesis and

classification, 3rd Ed. Iowa State University Press, Ames, IA; 446p.

CF Clayton, L. and Freers, T.F. (eds.) 1967. Glacial geology of the Missouri Coteau and adjacent areas. Guidebook 18th annual field conference Midwest Friends of the Pleistocene. North Dakota Geological Survey Miscellaneous Series #30, 170 p.

FC Freeze, A.L. and Cherry, J.A. 1979. Groundwater. Prentice-Hall, Inc., Englewood Cliffs, NJ. 604 p.

FFP Peterson, F.F. 1981. Landforms of the Basin and Range Province defined for soil survey. Nevada Agricultural Experiment Station Technical Bulletin No. 28, Reno, NV. 52p.

GG Bates, R.L., and Jackson, J.A. (eds) 1987. Glossary of geology, 3rd Ed. American Geological Institute, Alexandria, VA. 788p

GM Goldthwaite, R.P. and Matsch, C.L. (eds.) 1988. Genetic classification of glacial deposits: final report of the commission on genesis and lithology of glacial Quaternary deposits of the International Union for Quaternary Research (INQUA). A.A. Balkema, Rotterdam; 294 p.

GSST Soil Science Society of America. 1987. Glossary of Soil Science terms. Soil Science Society of America, Madison, WI. 44p.

HP Hawley, J.W., and Parsons, R.B. 1980. Glossary of selected geomorphic and geologic terms. Mimeo. USDA Soil Conservation Service, West National Technical Center, Portland, OR. 30 p.

KST Soil Management Support Services. 1992. Keys to Soil Taxonomy, 5th Ed. SMSS Technical Monograph No. 19,

- Virginia Polytechnical Institute and State University. 541p.
- MA MacDonald, G.A. and A.T. Abbott. 1970. Volcanoes in the sea, the geology of Hawaii. University of Hawaii Press, 441p.
- NRC National Research Council of Canada. 1988. Glossary of permafrost and related ground ice terms. Associate Committee Geotechnical Research, Technical Memorandum 142; 156 p
- RD Raymond B. Daniels, (personal communication).
- RR Robert V. Ruhe. 1975. Geomorphology: Geomorphic processes and surficial geology. Houghton-Mifflin, Boston, MA, 246p.
- SJ Sugden, D.E. and John, B.S. 1976. Glaciers and landscape, a geomorphological approach. Halsted Press, John Wiley and Sons, Inc., New York, NY, 376 p.
- SSM Soil Survey Staff. 1993. Soil Survey Manual. USDA - Soil Conservation Service, Agricultural Handbook No. 18, U.S. Government Printing Office, Washington, DC.
- ST Soil Survey Staff. 1975. Soil Taxonomy. A basic system of soil classification for making and interpreting soil surveys. USDA - Soil Conservation Service Agricultural Handbook #436, U.S. Government Printing Office, Washington, DC, 754 p.
- SW Schoeneberger, P.J. and Wysocki, D.A. (personal communication)

(b) Clarifying comments attached to glossary terms.

(not recommended) - indicates terms that are unacceptable (erroneous, obsolete, ill-defined, chronically misapplied, or otherwise inappropriate for use in a soils context). If available, a preferred term is indicated.

refer to... - follows terms that may be technically correct (theoretically acceptable) but are not preferred and should not be used, if at all

possible, due to unnecessary redundancy and confusion. Preferred alternatives are indicated.

(colloquial:) - identifies a term, and the area where it is used, whose local definition or usage is either not widely accepted or not known outside the specified area. A colloquial term should not be used if a more widely recognized alternative is available.

Compare -... - indicates other glossary terms that are related to, yet different from, the term they follow.

(c) Glossary terms.

a'a lava - A type of lava flow having a rough, jagged, clinkery surface. Compare - pahoehoe lava. GG & MA

ablation till - A general term for loose, relatively permeable material deposited during the downwasting of nearly static glacial ice, either contained within or accumulated on the surface of the glacier. Compare - till, ground moraine. GG

accretion [sedimentology] - The gradual increase or extension of land by natural forces acting over a long period of time, as on a beach by the washing up of sand from the sea or on a flood plain by the accumulation of sediment deposited by a stream. Synonym: aggradation. GG

active layer - The top layer of ground subject to annual thawing and freezing in areas underlain by permafrost. NRC

active slope - (not recommended)

aeolian - (not recommended) use eolian.

aggradation - The building-up of the Earth's surface by deposition; specifically, the accumulation of material by any process in order to establish or maintain uniformity of grade or slope. Compare - accretion. GG

alas - A type of thermokarst depression with steep sides and a flat, grass-covered floor, found in thermokarst terrain, produced by thawing of extensive areas of very thick and exceedingly ice-rich permafrost. Compare - thermokarst depression. NRC and GG

alluvial - Pertaining to material or processes associated with transportation and/or subaerial

no land or islands or non-coral origin; the reef is surrounded by open sea. **GG**

avalanche - a large mass of snow, ice, soil, or rock, or mixtures of these materials, falling, sliding, or flowing very rapidly under the force of gravity. Velocities may sometimes exceed 500 km/hr. **GG**

avalanche chute - [preferred term] The central, channel-like corridor, scar, or depression along which an avalanche has moved. An eroded surface marked by pits, scratches, and grooves. **GG**

avalanche track - (not recommended as a landform term - use avalanche chute) The path formed by an avalanche. It may take the form of an open path in a forest, with bent and broken trees, or an eroded surface marked by pits, scratches, and grooves. Compare - avalanche chute **GG**

avulsion - A sudden cutting off or separation of land by a flood or by abrupt change in the course of a stream, as by a stream breaking through a meander or by a sudden change in current whereby the stream deserts its old channel for a new one. Compare - crevasse, flood-plain splay. **GG**

axial stream - a) the main stream of an intermontane valley, flowing in the deepest part of the valley and parallel to its longest dimension. b) a stream that follows the axis of a syncline or anticline. **GG**

backshore - The upper or inner, usually dry, zone of the shore or beach, lying between the high-water line of mean spring tides and the upper limit of shore-zone processes; it is acted upon by waves or covered by water only during exceptionally severe storms or unusually high tides. It is essentially horizontal or slopes gently landward, and is divided from the foreshore by the crest of the most seaward berm. Compare - washover fan. **GG**

backshore terrace - refer to berm.

backslope - The hillslope profile position that forms the steepest and generally linear, middle portion of the slope. In profile, backslopes are commonly bounded by a convex shoulder above and a concave footslope below. They may or may not include cliff segments (i.e. free faces). Backslopes are commonly erosional forms

produced by mass movement, colluvial action, and running water. Compare - summit, shoulder, footslope, toeslope. **GSST & HP**

backswamp - A flood-plain landform. Extensive, marshy, or swampy, depressed areas of flood plains between natural levees and valley sides or terraces. Compare - valley flat. **HP**

badlands - A landscape which is intricately dissected and characterized by a very fine drainage network with high drainage densities and short, steep slopes with narrow interfluvies. Badlands develop on surfaces with little or no vegetative cover, overlying unconsolidated or poorly cemented materials (clays, silts, or in some cases sandstones) sometimes with soluble minerals such as gypsum or halite. **GG**

bajada - (colloquial: southwestern U.S.A.) A broad, gently inclined piedmont slope formed by lateral coalescence of a series of alluvial fans, and having a broadly undulating transverse profile, parallel to the mountain front, resulting from the convexities of component fans. The term is generally restricted to constructional slopes of intermontane basins. Synonym - coalescent fan piedmont. **HP**

ballena - (colloquial: western U.S.A.) A fan remnant having a distinctively-rounded surface of fan alluvium. The ballena's broadly-rounded shoulders meet from either side to form a narrow summit and merge smoothly with concave sideslopes and then concave, short pediments which form smoothly-rounded drainageways between adjacent ballenas. A partial ballena is a fan remnant large enough to retain some relict fan surface on a remnant summit. Compare - fan remnant. Modified from FFP.

ballon - (colloquial: western U.S.A.) A rounded, dome-shaped hill, formed either by erosion or uplift. **GG**

bar - [streams] A general term for a ridge-like accumulation of sand, gravel, or other alluvial material formed in the channel, along the banks, or at the mouth of a stream where a decrease in velocity induces deposition; e.g. a channel bar or a meander bar. [coast] - A generic term for any of various elongate offshore ridges, banks, or mounds of sand, gravel, or other unconsolidated material submerged at least at high tide, and built up by the action of waves or currents, especially at the mouth of a river or estuary, or at a slight

distance offshore from the beach. Compare - longshore bar. GG & GSST

bar and channel - The microrelief common to flood plains and relatively young alluvial terraces. With time, the microrelief becomes subdued as the higher lying bars erode into the channels, or the channels fill from other sources. The ridge-like bars often consist of accumulations of coarse sediment; the channels are finer textured. The relief between bar and channel is largely related to the competence of the stream. Compare - meander scroll, meander belt. HP

barchan dune - A crescent-shaped dune with tips extending leeward (downwind), making this side concave and the windward (upwind) side convex. Barchan dunes tend to be arranged in chains extending in the dominant wind direction. Compare - parabolic dune. HP

barrier bar - (not recommended) use longshore bar

barrier beach - (a) a narrow, elongate, coarse-textured ridge rising slightly above high-tide level and generally parallel with the shore, but separated from it by a lagoon or marsh; it is rarely more than several kilometers long. (b) [relict] (colloquial: western U.S.A.) a wide, gently-sloping portion of a bolson floor comprising numerous, parallel, closely-spaced, relict longshore-bars and lagoons built by a receding pluvial lake. Synonym, offshore barrier, offshore beach, bar beach. Compare - bar [coast], barrier island. GG and FFP

barrier flat - A relatively flat area, often occupied by pools of water, separating the exposed or seaward edge of a barrier from the lagoon behind it. GG

barrier island - A long, narrow, sandy island, representing a broadened barrier beach that is above high tide and parallel to the shore, and that commonly has dunes, vegetated zones, and swampy terrains extending lagoonward from the beach. Also a long series of barrier beaches. GG

basal till - a) Unconsolidated material of mixed composition deposited at the base (bottom) of a glacier [The term emphasizes the e.g. subglacial till. Types of basal till include lodgement, melt-out, and flow till. b) [obsolete- use or refer to lodgement till] - a firm, dense, clay-rich till containing many abraded stones (coarse

fragments) dragged along beneath a moving glacier and deposited upon bedrock or other glacial deposits. GG

base level - The theoretical limit or lowest level toward which erosion of the Earth's surface constantly progresses but seldom, if ever, reaches; especially the level below which a stream cannot erode its bed. The general or ultimate base level for the land surface is sea level, but temporary base levels may exist locally. GG

basin - a) Drainage basin; b) A low area in the Earth's crust, of tectonic origin, in which sediments have accumulated. GG '87 c) (colloquial: western U.S.A.) A general term for the nearly level to gently sloping, bottom surface of an intermontane basin (bolson). Landforms include playas, broad alluvial flats containing ephemeral drainageways, and relict alluvial and lacustrine surfaces that rarely, if ever, are subject to flooding. Where through-drainage systems are well developed, flood plains are dominant and lake plains are absent or of limited extent. Basin floors grade mountainward to distal parts of piedmont slopes. FFP

basin floor - A general term for the nearly level, lower-most part of intermontane basins (i.e. bolsons, semi-bolsons). The floor includes all of the alluvial, eolian, and erosional landforms below the piedmont slope. Compare - basin, piedmont slope. FFP

basin-floor remnant - (colloquial: western U.S.A.) A relatively flat, erosional remnant of any former landform of a basin floor that has been dissected following the incision of an axial stream. FFP

bay - (a) Any terrestrial formation resembling a bay of the sea, as a recess or extension of lowland along a river valley or within a curve in a range of hills, or an arm of a prairie extending into, or partly surrounded by, a forest. (b) A Carolina Bay. GG & GSST.

bayou - A term applied to many local water features in the lower Mississippi River basin and in the Gulf Coast region of the U.S.. Its general meaning is a creek or secondary watercourse that is tributary to another body of water; especially a sluggish and stagnant stream that follows a winding course through alluvial lowlands, coastal swamps or river deltas. Compare - oxbow, slough. GG

beach - a) A gently sloping zone, typically with a concave profile, of unconsolidated material extending landward from the low-water line to the place where there is a definite change in material or physiographic form (such as a cliff) or to the line of permanent vegetation (usually the effective limit of the highest storm waves); a shore of a body of water, formed and washed by waves or tides, usually covered by sand or gravel; b) the relatively thick and temporary accumulation of loose water-borne material (usually well-sorted sand and pebbles) accompanied by mud, cobbles, boulders, and smoothed rock and shell fragments, that is in active transit along, or deposited on, the shore zone between the limits of low water and high water. GG

beach plain - A continuous and level or undulating area formed by closely spaced successive embankments of wave-deposited beach material added more or less uniformly to a prograding shoreline, such as to a growing compound spit or to a cusped foreland. Compare - wave-built terrace, chenier plain. GG

beach ridge - A low, essentially continuous mound of beach or beach-and-dune material heaped up by the action of waves and currents on the backshore of a beach, beyond the present limit of storm waves or the reach of ordinary tides, and occurring singly or as one of a series of approximately parallel deposits. The ridges are roughly parallel to the shoreline and represent successive positions of an advancing shoreline. GG

beach terrace - a) A landform that consists of a wave-cut scarp and wave-built terrace of well-sorted sand and gravel of marine and lacustrine origin. b) (colloquial: western U.S.A.) relict shorelines from pluvial lakes, generally restricted to valley sides. Compare - strandline, shoreline. FFP

beaded drainage pattern - (not recommended; use beaded stream pattern.)

beaded stream pattern - A characteristic pattern of small streams in areas underlain by ice wedges. The course of the stream channel is controlled by the pattern of the wedges, with beads (pools) occurring at the junctions of the wedges. NRC

bed [stratigraphy] - The smallest, formal lithostratigraphic unit of sedimentary rocks. The designation of a bed or a unit of beds as a formally named lithostratigraphic unit generally should be limited to certain distinctive beds whose recognition is particularly useful. Coal beds, oil sands, and other layers of economic importance commonly are named, but such units and their names usually are not a part of formal stratigraphic nomenclature. Compare - formation. GG

bedded - Formed, arranged, or deposited in layers or beds, or made up of or occurring in the form of beds; especially said of a layered sedimentary rock, deposit, or formation. GG

bedrock - A general term for the solid rock that underlies the soil and other unconsolidated material or that is exposed at the surface. Compare - regolith, residuum. GG

bench - refer to structural bench.

berm - A low, impermanent, nearly horizontal or landward-sloping shelf, ledge, or narrow terrace on the backshore of a beach, formed of material thrown up and deposited by storm waves; it is generally bounded on one side or the other by a beach ridge or beach scarp. Some beaches have no berms, others have one or several. GG

blind valley - A valley, commonly in karst, that ends abruptly downstream at the point at which its stream disappears underground. GG

block [volcanic] - A pyroclast that was ejected in a solid state; it has a diameter greater than 64 mm. Compare - cinder, lapilli, tephra. GG

block field - A thin accumulation of stone blocks, typically angular, with only coarse fragments in the upper part, over solid or weathered bedrock, colluvium, or alluvium, without a cliff or ledge above as an apparent source. Block fields occur on high mountain slopes above tree-line, or in polar or paleo-periglacial regions; they are most extensive along slopes parallel to the contour; and they generally occur on slopes of less than 5%. Synonym - felsenmeer. Compare - block stream, talus, scree. GG

block stream - an accumulation of boulders or angular blocks, with no fine sizes in the upper part, overlying solid or weathered bedrock, colluvium, or alluvium, and lying below a cliff or ledge from which coarse fragments originate.

Block streams usually occur at the heads of ravines as narrow bodies that are more extensive downslope than along the slope. They may exist on any slope angle, but ordinarily not steeper than 90 percent slope. Compare - block field.

GG

blowout - A general term for a saucer-, cup-, or trough-shaped hollow or depression formed by wind erosion, on a pre-existing dune or other sand deposit, especially in an area of shifting sand, loose soil, or where protective vegetation is disturbed or destroyed; the adjoining accumulation of sand derived from the depression, where recognizable, is commonly included. Some blowouts may be many kilometers in diameter. Compare - deflation basin. GG

bluff - (a) A high bank or bold headland, with a broad, precipitous, sometimes rounded cliff face overlooking a plain or body of water, especially on the outside of a stream meander; ex. a river bluff. (b) Any cliff with a steep, broad face. GG

bog - Waterlogged, spongy ground, consisting primarily of mosses, containing acidic, decaying vegetation such as sphagnum, sedges, and heaths, that may develop into peat. Compare - fen, marsh, swamp. GG

bolson - (colloquial: western U.S.A.) A landscape term for an internally drained (closed) intermontane basin into which drainages from surrounding mountains converge inward toward a central depression. Bolsos are often tectonically depressed areas and, according to Peterson, include alluvial flat, alluvial plain, beach plain, barrier beach, lake plain, sand sheets, dunes, and playa. The piedmont slope includes slopes of erosional origin adjoining the mountain front (pediments) and complex construction surfaces (fans). A semi-bolson is an externally drained (open) bolson. Synonym - intermontane basin. GG and FFP.

bottomland - (not recommended) use flood plain.

boulder field - (not recommended) use block stream. Compare - block field.

braided channel - (not recommended) use braided stream.

braided stream - A channel or stream with multiple channels that interweave as a result of repeated bifurcation and convergence of flow

around interchannel bars, resembling (in plan view) the strands of a complex braid. Braiding is generally confined to broad, shallow streams of low sinuosity, high bedload, non-cohesive bank material, and a steep gradient. At a given bank-full discharge, braided streams have steeper slopes and shallower, broader, and less stable channel cross sections than meandering streams. Compare - meandering channel, flood-plain landforms. HP

break - (slopes) An abrupt change or inflection in a slope or profile. Compare - knickpoint, shoulder, escarpment. (geomorphology) A marked variation of topography, or a tract of land distinct from adjacent land, or an irregular or rough piece of ground. Compare - breaks. GG

breaks - (colloquial: western U.S.A.) (a) a tract of rough or broken land dissected by ravines and gullies, as in a badlands region. (b) A sudden change in topography as from a plain to hilly country or a line of irregular cliffs at the edge of a mesa or a river. GG

breccia - A coarse-grained, clastic rock composed of angular rock fragments (larger than 2mm) commonly bonded by a mineral cement in a finer-grained matrix of varying composition and origin. The consolidated equivalent of rubble. Compare - conglomerate. GSST

buried - (adjective) Landforms, geomorphic surfaces, or paleosols covered by younger sediments (e.g. eolian, glacial, and alluvial). Compare - exhumed, relict. HP

buried soil - soil covered by an alluvial, loessal, or other surface, earthy mantle of more recent material, typically to depths exceeding 50 cm. GSST & ST

butte - An isolated, generally flat-topped hill or mountain with relatively steep slopes and talus or precipitous cliffs and characterized by summit width that is less than the height of bounding escarpments, commonly topped by a caprock of resistant material and representing an erosion remnant carved from flat-lying rocks. Compare - mesa, plateau, cuesta. HP & GG

caldera - A large, more or less circular depression, formed by explosion and/or collapse, which surrounds a volcanic vent or vents, and whose diameter is many times greater than that of the included vent, or vents. Compare - crater. GG

caliche - A general term for a prominent zone of secondary carbonate accumulation in surficial materials of warm, subhumid to arid areas. Caliche is formed by both geologic and pedologic processes. Finely crystalline calcium carbonate forms a nearly continuous surface-coating and void-filling medium in geologic (parent) materials. Cementation ranges from weak in non-indurated forms to very strong in types that are indurated. Other minerals (carbonates, silicate, sulfate) may be present as accessory cements. Most petrocalcic and some calcic horizons are caliche. **HP**

canyon - A long, deep, narrow, very steep-sided valley with high and precipitous walls in an area of high local relief e.g., mountain or high plateau terrain. **HP**

captured stream - A stream whose course has been diverted into the channel of another stream by natural processes. **GG**

Carolina Bay - Any of various shallow, often oval or elliptical, generally marshy, closed depressions in the Atlantic coastal plain (from southern New Jersey to northeastern Florida, especially developed in the Carolinas). They range from about 100 meters to many kilometers in length, are rich in humus, and under native conditions contain trees and shrubs different from those of the surrounding areas. Also called Grady ponds (colloquial: Georgia and Alabama). Compare - pocosin. **GG**

cat clay - [obsolete] wet, clay dominated soils containing ferrous sulfide which become highly acidic when drained. **GSST**

catena - [as used in USA] A sequence of soils across a landscape, of about the same age, derived from similar parent material, and occurring under similar climatic conditions, but having different characteristics due to variations in relief and in drainage. **GSST**

catsteps - (refer to terracettes). A terracette; especially one produced by slumping of loess deposits as in western Iowa. **GG**

channel - a) (stream) the hollow bed where a natural body of surface water flows or may flow. The deepest or central part of the bed of a stream, containing the main current and occupied more or less continuously by water. b) (colloquial: western U.S.A.) the bed of a single

or braided watercourse that commonly is barren of vegetation and is formed of modern alluvium. Channels may be enclosed by banks or splayed across and slightly mounded above a fan surface and include bars and mounds of cobbles and stones. **GG** and **FFP**

chenier - A long, narrow, vegetated marine beach ridge or sandy hummock, 1 to 6 m high, forming roughly parallel to a prograding shoreline, seaward of marsh and mud-flat deposits, enclosed on the seaward side by fine-grained sediments, and resting on foreshore or mud-flat deposits. It is well drained, often supporting trees on higher areas. **GG**

chenier plain A mud-rich strand plain, occupied by cheniers and intervening mud-flats with marsh and swamp vegetation. Compare - chenier, strand plain. **GG**

chert - A hard, extremely dense or compact, dull to semivitreous, cryptocrystalline sedimentary rock, consisting dominantly of interlocking crystals of quartz less than about 30 mm in diameter; it may contain amorphous silica (opal). It sometimes contains impurities such as calcite, iron oxide, or the remains of silicious and other organisms. It has a tough, splintery to conchoidal fracture and may be white or variously colored gray, green, blue, pink, red, yellow, brown, and black. Chert occurs principally as nodular or concretionary segregations in limestones and dolomites. **GG**

cinder cone - a conical hill formed by the accumulation of cinders and other pyroclastics, normally basaltic or andesitic composition. Slope steepness generally exceeds 20 percent. **GG**

cinders - Uncemented vitric, vesicular, pyroclastic material, more than 2.0 mm in at least one dimension, with an apparent specific gravity (including vesicles) of more than 1.0 and less than 2.0. Compare - ash [volcanic], block [volcanic], lapilli, tephra. **KST**

circle - A form of patterned ground whose horizontal mesh is dominantly circular. Compare - Nonsorted circle, patterned ground. **GG**

cirque - Semicircular, concave, bowl-like area with steep face primarily resulting from erosive activity of a mountain glacier. **HP**

clast - An individual constituent, grain, or fragment of sediment or rock, produced by the

mechanical weathering (disintegration) of a larger rock mass. **HP**

clastic - (adjective) Pertaining to rock or sediment composed mainly of fragments derived from preexisting rocks or minerals and moved from their place of origin. The term indicates sediment sources that are both within and outside the depositional basin. Compare - detritus, epiclastic, pyroclastic, volcanoclastic. **GG**

claypan - A dense, compact layer in the subsoil

cliff - Any high, very steep to perpendicular or overhanging face of rock or earth; a precipice. **GG**

coalescent fan piedmont - refer to fan piedmont. **HP**

coastal plain - A low, generally broad plain that has as its margin an oceanic shore and its strata horizontal or gently sloping toward the water, and generally represents a strip of recently prograded or emerged sea floor; e.g. the coastal plain of the southeastern U.S. which extends for 3000 km from New Jersey to Texas. **GG**

col - A high, narrow, sharp-edged pass or saddle through a divide or between two adjacent peaks in a mountain range; especially a deep pass formed by the headward erosion and intersection of two cirques. Compare - gap, pass, saddle. **GG**

collapsed lake plain - (provisional definition) A lake plain formed on, and bounded by, glacial ice and subsequently "let down" or collapsed by the melting of underlying ice. Compare - lake plain. Modified substantially from **CF**

collapsed ice-floored lakebed - (provisional definition) A lakebed formed in a lake on glacial ice and subsequently "let down" or collapsed by the melting of underlying ice, resulting in contortion or folding or the lacustrine sediment and sedimentary structures. These modified or distorted lacustrine sediments cap present-day topographic highs and generally lie at elevations higher than the surrounding disintegration moraine. Compare - collapsed lake plain, collapsed ice-walled lakebed. Modified substantially from **CF**

collapsed ice-walled lakebed - (provisional definition) A lakebed that formed in a lake bounded by stagnant ice, but floored by solid

ground, usually till. Collapse features are limited to the lakebed margins. Presently, these materials and sedimentary structures generally occur as roughly circular-shaped hills of till capped by lacustrine sediments, generally at elevations higher than surrounding disintegration moraine. Compare - collapsed ice-floored lakebed, collapsed lake plain. Modified substantially from **CF**

collapsed outwash plain - (provisional definition) An outwash plain which forms on glacial ice, and is subsequently let down or collapsed when the underlying ice melts, resulting in contortion or folding of the sediments and sedimentary structures. Outwash sediments now cap present topography. Compare - collapsed lake plain. Modified substantially from **CF**

colluvial - (adjective) Pertaining to material or processes associated with transportation and/or deposition by mass movement (direct gravitational action) and local, unconcentrated runoff on sideslopes and/or at the base of slopes. Compare - alluvial. **HP**

colluvium - Unconsolidated, unsorted earth material being transported or deposited on sideslopes and/or at the base of slopes by mass movement (e.g. direct gravitational action) and by local, unconcentrated runoff. Compare - alluvium, slope alluvium, scree, talus, mass movement. **HP**

competence - The ability of a current of water or wind to transport sediment, in terms of particle size rather than amount, measured as the diameter of the largest particle transported. It depends upon velocity: a small but swift current for example, may have greater competence than a larger but slower moving current. **GG**

conformity - The mutual and undisturbed relationship between adjacent sedimentary strata that have been deposited in orderly sequence with little or no evidence of time lapses; true stratigraphic continuity in the sequence of beds without evidence that the lower beds were folded, tilted, or eroded before the higher beds were deposited. **GG**

congelifraction - refer to frost shattering.

congeliturbation - (not recommended) use cryoturbation.

conglomerate - A coarse-grained, clastic sedimentary rock composed of rounded to subangular rock fragments larger than 2 mm, commonly with a matrix of sand and finer material; cements include silica, calcium carbonate, and iron oxides. The consolidated equivalent of gravel. Compare - breccia. HP

constructional [geomorphology] - (adjective) Owing its origin, form, position, or general character to depositional (aggradational) processes, such as accumulation of sediment to form an alluvial fan or terrace. Compare - erosional. HP

continuous permafrost - Permafrost occurring everywhere beneath the exposed land surface throughout a geographic region. Compare - discontinuous permafrost, sporadic permafrost. NRC

coppice mound (dune) - (not recommended; obsolete) use shrub-coppice dune.

corrosion [geomorphology] - a process of erosion whereby rocks and soil are removed or worn away by natural chemical processes, especially by the solvent action of running water, but also by other reactions, such as hydrolysis, hydration, carbonation, and oxidation. GG

coulee - (colloquial: northwest U.S.A.) A dry or intermittent stream valley or wash, especially a long, steep-walled gorge representing a Pleistocene overflow channel that carried meltwater from an ice sheet, as the Grand Coulee in Washington State. HP

country rock - a general, imprecise term for: a) the rock enclosing or traversed by a mineral deposit. b) the rock intruded by and surrounding an igneous intrusion. GG

cove - A walled and rounded or cirque-like opening at the head of a small steep valley. Also a term used in the southern Appalachians for a smooth-floored, somewhat oval-shaped "valley" sheltered by hills or mountains; e.g., Cades Cove in eastern Tennessee. GG

crater [volcanic] - A basin-like, rimmed structure, usually at the summit of a volcanic cone. It may be formed by collapse, by an explosive eruption or by the gradual accumulation of pyroclastic material into a surrounding rim. Compare - caldera. GG

craton - a part of the earth's crust that has attained stability, and has been minimally deformed for a prolonged period. The term is now restricted to continental areas. GG

creep - Slow mass movement of earth material down slopes, caused by gravity but facilitated by saturation with water and alternate freezing and thawing. Compare - solifluction. HP

crest - (not recommended - use summit) The commonly linear, narrow summit of a ridge, hill, or mountain. It is appropriately applied to elevated areas where retreating backslopes are converging such that these high areas are almost exclusively composed of convex shoulders. Compare - summit -part b), saddle. Substantially modified from FFP

crevasse [geomorphology] - a) A wide breach or crack in the bank of a river or canal; especially one in a natural levee or an artificial bank of the lower Mississippi River. Compare - flood-plain splay, avulsion. b) A wide, deep break or fissure in the Earth after an earthquake. [glaciology] A deep, nearly vertical fissure, crack, or rift in a glacier or other mass of land ice. GG

crevasse filling - A short, straight ridge of stratified sand and gravel believed to have been deposited in a crevasse of a wasting glacier and left standing after the ice melted; a variety of kame. May also occur as long, sinuous ridges and linear complexes of till or drift. GG

crevasse splay - (not recommended) use flood-plain splay. Compare - crevasse.

cross-bedding - (a) Cross-stratification in which the cross-beds are more than 1 cm in thickness. (b) A cross-bedded structure; a cross-bed. GG

cross-lamination - (a) Cross-stratification characterized by cross-beds that are less than 1 cm in thickness. (b) A cross-laminated structure; a cross-lamina. GG

cross-stratification - Arrangement of strata inclined at an angle to the main stratification. This is a general term having two subdivisions; cross-bedding, in which the cross-strata are thicker than 1 cm, and cross-lamination, in which they are thinner than 1 cm. A single group of related cross-strata is a set and a group of similar, related sets is a coset. GG

cryoplanation - The reduction and modification of a land surface by processes associated with intensive frost action, such as solifluction, supplemented by the erosive and transport actions of running water, moving ice, and other agents. GG

cryoturbation - A collective term used to describe all soil movements due to frost action, characterized by folded, broken and dislocated beds and lenses of unconsolidated deposits. Compare - pedoturbation. NRC

cueta - An asymmetric, homoclinal ridge capped by resistant rock layers of slight to moderate dip (less than 10 degrees or 16 percent); produced by differential erosion of interbedded resistant and weak rocks. A long, gently sloping to sloping face (dip slope), roughly paralleling the inclined beds; opposes a relatively short and steep (scarp) face cut across the tilted rocks. Compare - hogback, mesa, dip slope, scarp slope. HP

cutoff [streams] - The new and relatively short channel formed when a stream cuts through a narrow strip of land and thereby shortens the length of its channel. GG

cyclothem - A series of beds deposited during a single sedimentary cycle of the type that prevailed during the Pennsylvanian Period. It is an informal, lithostratigraphic unit equivalent to "formation". Cyclothems are typically associated with unstable shelf or interior basin conditions in which alternate marine transgression and regressions occur. The term has also been applied to rocks of different ages and of different lithologies from the Pennsylvanian cyclothems. Compare - rhythmite. GG

dead-ice - (not recommended) use stagnant ice.

dead-ice moraine - (not recommended) use disintegration moraine.

debris - Any surficial accumulation of loose material detached from rock masses by chemical and mechanical means, as by decay and disintegration. It consists of rock clastic material of any size and sometimes organic matter. GG

debris avalanche - The very rapid and usually sudden sliding and flow of incoherent, unsorted mixtures of soil and weathered bedrock. GG

debris flow - A mass movement of rock fragments, soil, mud, more than half of the

particles being larger than sand size. Compare - mudflow. GG

deflation - The sorting out, lifting and removal of loose, dry, fine-grained soil particles (clays, silts, and fine sands) by the turbulent eddy action of the wind; a form of wind erosion. GG & GSST

deflation basin - A topographic basin excavated and maintained by wind erosion which removes unconsolidated material and commonly leaves a rim of resistant material surrounding the depression. Unlike a blowout, a deflation basin does not include adjacent deposits derived from the basin. Compare - blowout. GG

delta - A body of alluvium, nearly flat and fan-shaped, deposited at or near the mouth of a river or stream where it enters a body of relatively quiet water, usually a sea or lake. HP

delta plain - The level or nearly level surface composing the land-ward part of a large delta; strictly, a flood plain characterized by repeated channel bifurcation and divergence, multiple distributary channels, and interdistributary flood basins. GG

dendritic drainage pattern - A drainage pattern in which the streams branch randomly in all direction and at almost any angle, resembling in plan the branching habit of certain trees. GG

deposit - Earth material of any type, either consolidated or unconsolidated, that has accumulated by natural processes. GG

deposition - The laying down of any material by any agent such as wind, water, ice or by other natural processes. HP

depression - Any relatively sunken part of the Earth's surface; especially a low-lying area surrounded by higher ground. A closed depression has no natural outlet for surface drainage (e.g. a sinkhole). An open depression has a natural outlet for surface drainage. GG

desert pavement - A natural, residual concentration of wind-polished, closely packed pebbles, boulders, and other rock fragments, mantling a desert surface where wind action and sheetwash have removed all smaller particles. It usually protects the underlying, finer-grained material from further deflation. The coarse

fragments commonly are cemented by mineral matter. Compare - stone line. GG & GSST

desert varnish - a thin, dark, shiny film or coating, composed of iron oxide accompanied by traces of manganese oxide and silica, formed on the surfaces of pebbles, boulders, and other rock fragments, in and on rock outcrops in arid regions. It is believed to be caused by exudation of mineralized solutions from within and deposition by evaporation on the surface. GG

detritus [geology] - A collective term for rock and mineral coarse fragments occurring in sediments, that are detached or removed by mechanical means (e.g. disintegration, abrasion) and derived from pre-existing rocks and moved from their place of origin. Compare - clastic, epiclastic, pyroclastic. GG

diamicton - A nonlithified, nonsorted or poorly sorted sediment that contains a wide range of particle sizes, such as coarse fragments contained within a fine earth matrix (e.g. till, pebbly mudstone) and used when the genetic context of the sediment is uncertain. GG

diapir - a dome or anticlinal fold in which the overlying rocks or sediments have been ruptured by the squeezing-out of plastic core material. Diapirs in sedimentary strata usually contain cores of salt or shale; igneous intrusions may also show diapiric structure. GG

dike [intrusive rocks] - A tabular igneous intrusion that cuts across the bedding or foliation of the country rock. Compare - sill. GG

dip - The angle that a structural surface, e.g. a bedding or fault plane, makes with the horizontal, measured perpendicular to the strike of the structure and in the vertical plane. GG

dip slope - A slope of land surface, roughly determined by and approximately conforming with the dip of underlying bedded rocks; for example, the long, gently inclined surface of a cuesta. Compare - scarp slope. HP

discontinuity - [stratigraphy] Any interruption in sedimentation, whatever its cause or length, usually a manifestation of nondeposition and accompanying erosion; an unconformity. GG

discontinuous permafrost - Permafrost occurring in some areas beneath the exposed land surface throughout a geographic region where

other areas are free of permafrost. Compare - continuous permafrost, sporadic permafrost. NRC

disintegration moraine - A drift topography characterized by chaotic mounds and pits, generally randomly oriented, developed in supraglacial drift by collapse and flow as the underlying stagnant ice melted. Slopes may be steep and unstable and there will be used and unused stream courses and lake depressions interspersed with the morainic ridges. Consequently, there will be rapid or abrupt changes between materials of differing lithology. SJ

distal [sedimentology] - (adjective) Said of a sedimentary deposit consisting of fine clastics and deposited farthest from the source area. Compare - proximal. GG

distributary [streams] - (a) A divergent stream flowing away from the main stream and not returning to it, as in a delta or on a flood plain. It may be produced by stream deposition choking the original channel. (b) One of the channels of a braided stream; a channel carrying the water of a stream distributary. GG

divide - a) The line of separation, or b) the summit area, or narrow tract of higher ground that constitutes the watershed between two adjacent drainage basins; it is the surface waters that flow naturally in one direction from those that flow in the opposite direction. Compare - interfluvium. GG

doline - refer to sinkhole

dolomite [mineral] - A common rock-forming rhombohedral carbonate mineral: $\text{CaMg}(\text{CO}_3)_2$. GG

dolomite [rock] - (obsolete) A carbonate sedimentary rock consisting chiefly (more than 50 percent by weight or by areal percentages under the microscope) of the mineral dolomite. NP Compare - dolostone. GG

dolostone - a term proposed for the sedimentary rock formerly called dolomite, in order to avoid confusion with the mineral of the same name. Compare - dolomite. GG

dome - [fold] an uplift or anticlinal structure, either circular or elliptical in outline, in which the rocks dip gently away in all directions. A

dome may be small (e.g. a salt dome) or many kilometers in diameter. [geomorphology] A smoothly rounded landform of rock mass such as a rock-capped mountain summit, that roughly resembles the dome of a building. (e.g. the rounded granite peaks of Yosemite, CA). GG

drainage basin - A general term for a region or area bounded by a drainage divide and occupied by a drainage system. GG

drainage pattern - The configuration of arrangement in plan view of the natural stream courses in an area. It is related to local geologic and geomorphologic features and history. GG

drainageway - a) A general term for a course or channel along which water moves in draining an area. b) [soil survey] a term restricted to relatively small, linear depressions that, at some time, move concentrated water and either lack a defined channel (e.g. head slope, swale) or have a small, defined channel (e.g. low order streams). Modified substantially from GG.

draw - A small stream channel, generally more open and with broader floor than a ravine or gulch. HP

drift [glacial geology] - A general term applied to all mineral material (clay, silt, sand, gravel, boulders) transported by a glacier and deposited directly by or from the ice, or by running water emanating from a glacier. Drift includes unstratified material (till) that forms moraines, and stratified deposits that form outwash plains, eskers, kames, varves, and glaciofluvial sediments. The term is generally applied to Pleistocene glacial deposits in areas that no longer contain glaciers. GG

drumlin - A low, smooth, elongated oval hill, mound, or ridge of compact till that may or may not have a core of bedrock or stratified drift. The longer axis is parallel to the general direction of glacier flow. Drumlins are products of streamline (laminar) flow of glaciers, which molded the subglacial floor through a combination of erosion and deposition. HP

drumlin field - Groups or clusters of closely spaced drumlins, distributed more or less en echelon, and commonly separated by small, marshy tracts. GG

dry wash - refer to wash.

dune - A low mound, ridge, bank or hill of loose, windblown, granular material (generally sand), either bare or covered with vegetation, capable of movement from place to place but always retaining its characteristic shape. (See barchan dune, parabolic dune, parna dune, shrub-coppice dune, seif dune, transverse dune). GG

dune field - A group or aggregate of moving and fixed sand dunes in a given area, together with the sand plains and the ponds, lakes, or swamps produced by the blocking of streams by sand. GG

earth dike - refer to levee (stream).

earthflow - A mass-movement landform and process characterized by downslope translation of soil and weathered rock over a discrete basal shear surface (landslide) within well defined lateral boundaries. The basal shear surface is more or less parallel with the ground surface in the downslope portion of the flow, which terminates in lobe-like forms. Overall, little or no rotation of the slide mass occurs during displacement, although, in the vicinity of the crown scarp, minor initial rotation is usually observed in a series of slump blocks. Earthflows grade into mudflows through a continuous range in morphology associated with increasing fluidity. GG

earth hummock - A type of hummock consisting predominantly of a core of silty and clayey mineral soil and showing evidence of cryoturbation. Earth hummocks are a type of nonsorted circle. Compare - turf hummock, hummock [patterned ground], non-sorted circle, patterned ground. NRC

earth pillar - a tall, conical column of unconsolidated to semi-consolidated earth materials (e.g. clay till, or landslide debris) produced by differential erosion and usually capped by a flat, hard rock fragment that shields the underlying, softer material from erosion. It can measure up to 6-9 m in height, and its diameter is a function of the width of the protective boulder. GG

elevation [survey] - The vertical distance from a datum (usually mean sea level) to a point or object on the earth's surface; especially the height of a ground point above the level of the sea. Compare - relief. GG

elevated lake plain - refer to collapsed lake plain, collapsed ice-floored lakebed.

end moraine - A ridge-like accumulation that is being or was produced at the outer margin of an actively flowing glacier at any given time; a moraine that has been deposited at the outer or lower end of a valley glacier. Compare - terminal moraine, recessional moraine, ground moraine. **GG**

eolian - Pertaining to material transported and deposited by the wind. Includes earth materials such as dune sands, sand sheets, loess deposits, and clay (e.g. parna). **HP**

ephemeral stream - A stream, or reach of a stream, that flows only in direct response to precipitation. It receives no protracted supply from melting snow or other source, and its channel is, at all times, above the water table. Compare - arroyo, intermittent stream. **HP**

epiclastic - Pertaining to any clastic rock or sediment other than pyroclastic. Constituent fragments are derived by weathering and erosion rather than by direct volcanic processes. Compare - pyroclastic, volcanoclastic, clastic, detritus. **HP**

erosion - The wearing away of the land surface by running water, waves, or moving ice and wind, or by such processes as mass wasting and corrosion (solution and other chemical processes). The term "geologic erosion" refers to natural erosion processes occurring over long (geologic) time spans. "Accelerated erosion" generically refers to erosion in excess of what is presumed or estimated to be naturally occurring levels, and which is a direct result of human activities (e.g. cultivation and logging.). Substantially modified from **HP**

erosion remnant - A topographic feature that remains or is left standing above the general land surface after erosion has reduced the surrounding area; e.g., a monadnock, a butte, or a stack. **GG**

erosion surface - A land surface shaped by the action of erosion, especially by running water. **GG**

erosional [geomorphology] - (adjective) Owing its origin, form, position or general character to degradational processes by water, wind, ice or gravity. Compare - constructional. **HP**

erosional outlier - refer to erosion remnant.

erosional pavement - A concentration of gravel or coarser fragments that remains on the soil surface as a lag after finer particles have been removed by running water or wind. Compare - stone line, desert pavement. **HP**

erratic - A rock fragment carried by glacial ice, or by floating ice (ice-rafting), and subsequently deposited at some distance from the outcrop from which it was derived, and generally, though not necessarily resting on bedrock or sediments of different lithology. Coarse fragments range in size from a pebble to a house-size block. **GG**

escarpment - A relatively continuous cliff or relatively steep slope, produced by erosion or faulting, breaking the general continuity of more gently sloping land surfaces. The term is most commonly applied to cliffs produced by differential erosion and it is commonly used synonymously with "scarp." **HP**

esker - A long, narrow, sinuous, steep-sided ridge composed of irregularly stratified sand and gravel that was deposited by a subglacial or supraglacial stream flowing between ice walls, or in an ice tunnel of a retreating glacier, and was left behind when the ice melted. Eskers range in length from less than a kilometer to more than 160 kilometers, and in height from 3 to 30 meters. Compare - glaciofluvial deposits, kame, crevasse filling, outwash. **HP**

estuary - (a) A seaward end or the widened funnel-shaped tidal mouth of a river valley where fresh water comes into contact with seawater and where tidal effects are evident; e.g., a tidal river, or a partially enclosed coastal body of water where the tide meets the current of a stream. (b) A portion of an ocean or an arm of the sea affected by fresh water; e.g., the Baltic Sea. (c) A drowned river mouth formed by the subsidence of land near the coast or by the drowning of the lower portion of a nonglacial valley due to the rise of sea level. **GG**

exfoliation - The process by which concentric scales, plates, or shells of rock, from less than a centimeter to several meters in thickness, are successively spalled or stripped from the bare surface of a large rock mass. It often results in a rounded rock mass or dome-shaped hill. **GG**

exhumed - (adjective) Formerly buried landforms, geomorphic surfaces, or paleosols that

have been re-exposed by erosion of the covering mantle. Compare - relict, buried. HP

extramoranian - refer to extramoranial

extramoranial - (adjective) said of deposits and phenomena occurring outside the area occupied by a glacier and its lateral and end moraines. Compare - intramoranial. GG

extrusive - (adjective) said of igneous rocks and sediments derived from deep-seated molten matter (magmas), deposited and cooled on the earth's surface (e.g. including lava flows and tephra deposits). Compare - intrusive, volcanic. HP

faceted spur - The inverted V-shaped end of a ridge that has been truncated or steeply beveled by stream erosion, glaciation, or faulting. Compare - spur. HP

facies [stratigraphy] - The sum of all primary lithologic and paleontologic characteristics of sediments or sedimentary rock that are used to infer its origin and environment; the general nature of appearance of sediments or sedimentary rock produced under a given set of conditions; a distinctive group of characteristics that distinguish one group from another within a stratigraphic unit; e.g.: contrasting river-channel facies and overbank-flood-plain facies in alluvial valley fills. HP

fall [mass movement] - (a) A very rapid movement of a mass of rock or earth that travels mostly through the air by free fall, leaping, bounding, or rolling, with little or no interaction between one moving unit and another; e.g.: rockfall, debris fall. (b) The mass of material moved by a fall. GG

fall line - (not recommended; obsolete) An imaginary line or narrow zone connecting the water falls on several adjacent or near-parallel rivers, marking the points where these rivers make a sudden descent from an upland to a lowland, as at the edge of a plateau; specifically, the Fall Line marking the boundaries between the ancient, resistant crystalline rocks of the Piedmont Plateau and the younger, softer sediments of the Atlantic Coastal Plain of the Eastern United States. It also marks the limit of navigability of the rivers. Now considered an archaic term because Coastal Plain materials occur several miles west or inland of the Fall

Line and current research is showing it to be a broad zone of high-angle reverse faults. GG

fan [geomorphology] - (a) A gently sloping, fan-shaped mass of detritus forming a section of a low-angle cone commonly at a place where there is a notable decrease in gradient; specifically an alluvial fan. (b) A fan-shaped mass of congealed lava that formed on a steep slope by the continually changing direction of flow. GG

fan apron - A sheet-like mantle of relatively young alluvium covering part of an older fan piedmont (and occasionally alluvial fan) surface. It somewhere buries a soil that can be traced to the edge of the fan apron where the soil emerges as the land surface, or relict soil. No buried soils should occur within a fan-apron mantle. FFP

fanglomerate - A sedimentary rock consisting of slightly waterworn, heterogeneous fragments of all sizes, deposited in an alluvial fan and later cemented into a firm rock. GG

fanhead trench - A linear depression formed by a drainageway that is incised considerably below the surface of an alluvial fan. GG

fan piedmont - The most extensive landform on piedmont slopes, formed by a) the lateral, downslope, coalescence of mountain-front alluvial fans into one generally smooth slope with or without the transverse undulations of the semi-conical alluvial fans and (b) accretions of fan aprons. FFP

fan remnant - A general term for landforms that are the remaining parts of older fan-landforms, such as alluvial fans, fan aprons, inset fans, and fan skirts, that either have been dissected (erosional fan-remnants) or partially buried (nonburied fan-remnants). An erosional fan remnant must have a relatively flat summit that is a relict fan-surface. A nonburied fan-remnant is a relict surface in its entirety. Compare - ballena. FFP.

fan skirt - (a) The zone of smooth, laterally-coalescing, small alluvial fans that issue from gullies cut into the fan piedmont of a basin or that are coalescing extensions of the inset fans of the fan piedmont, and that merge with the basin floor at their toeslopes. These are generally younger fans which overlap older fan surfaces. FFP

fan terrace - refer to fan remnant

fault - A fracture or fracture zone of the earth with displacement along one side in respect to the other. GG

fault line - the trace of a fault plane on the ground surface or on a reference plane.
Compare - fault-line scarp. GG

fault-line scarp - a) a steep slope or cliff formed by differential erosion along a fault line, as by the more rapid erosion of soft rock on the side of a fault as compared to that of more resistant rock on the other side; e.g. the east face of the Sierra Nevada in California. b) A fault scarp that has been modified by erosion. This usage is not recommended because the scarp is usually not located on the fault line. GG

felsenmeer - refer to block field. GG

felsic rock - a general term for igneous rock having abundant, light-colored minerals (granite, etc); also applied to those minerals (quartz, feldspars, feldspathoids, muscovite) as a group.
Compare - mafic rock. GG

fen - Waterlogged, spongy ground containing alkaline decaying vegetation, characterized by reeds, that develops into peat. It sometimes occurs in sinkholes of karst regions. Compare - bog, marsh, swamp. GG

first bottom - (not recommended; colloquial: midwest US) refer to flood-plain step.

fjord - A long, narrow, winding, U-shaped and steep-walled, generally deep inlet or arm of the sea between high rocky cliffs of slopes along a mountainous coast. Typically it has a shallow sill or threshold of solid rock or earth material submerged near its mouth and becomes deeper far inland. A fjord usually represents the seaward end of a deep, glacially excavated valley that is partially submerged by drowning after melting of the ice. GG

flat - [lake] a) the low-lying, exposed, flat land of a lake delta or of a lake bottom. b) the flat bottom of a desiccated lake in the arid parts of western U.S.A. Compare - playa, pluvial lake.
[geomorphology] - (adjective) Having, or marked by a continuous surface or stretch of land that is smooth, even, or horizontal, or nearly so, and that lacks any significant curvature, slope, elevations, or depressions. (noun) A general term for a level or nearly level surface or small area of land marked by little or no relief; refer to

mud flat. Also, a nearly level region that visibly displays less relief than its surroundings (not recommended). GG.

flood plain - The nearly level plain that borders a stream and is subject to inundation under flood-stage conditions unless protected artificially. It is usually a constructional landform built of sediment deposited during overflow and lateral migration of the streams. HP

flood-plain landforms - A variety of constructional and erosional features produced by stream channel migration and flooding, e.g., backswamp, braided stream, flood-plain splay, meander, meander belt, meander scroll, oxbow lake, and natural levee. HP

flood-plain playa - A landform consisting of very low gradient, broad, barren, axial-stream channel segments in an intermontane basin. It floods broadly and shallowly and is veneered with barren fine-textured sediment that crusts. Commonly, a flood-plain playa is segmented by transverse, narrow bands of vegetation, and it may alternate with ordinary narrow or braided channel segments. FFP

flood-plain splay - A fan-shaped deposit or other outspread deposit formed where an overloaded stream breaks through a levee (natural or artificial) and deposits its material (often coarse-grained) on the flood plain. Compare - crevasse. GG

flood-plain step - an essentially flat, alluvial surface within a valley that is frequently covered by flood water from the present stream; any approximately horizontal surface frequently modified by scour and/or deposition. May occur individually or as a series of steps. RR

floodwall - (not recommended) use levee.

floor [geomorphology] - a) A general term for the nearly level, lower part of a basin or valley; (not preferred) refer to basin floor, valley floor, b) The bed of any body of water; e.g., the nearly level surface beneath the water of a stream, lake, or ocean. GG

flow [mass movement] - (a) A mass movement of unconsolidated material that exhibits a continuity of motion and a plastic or semifluid behavior resembling that of a viscous fluid; e.g., creep; solifluction; earthflow; mudflow; debris flow. Water is required for most types of flow

movement. (b) The mass of material moved by a flow. **GG**

flowtill - A supraglacial till that is modified and transported by mass flow. Compare - ablation till, basal till, lodgement till, mass-movement till, slump-till, supraglacial melt-out till. **GG**

flute [glacial geology] - lineations or streamline grooves and ridges parallel to the direction of ice movement, formed in newly deposited till or older drift. They range in height from a few centimeters to 25 m, and in length from a few meters to 20 km. **GG**

fluve - (refer to drainage way) A linear depression (topographic low) of any size, along which water flows, at some time. Compare - interfluve. Modified from FFP.

fluvial - Of or pertaining to rivers; produced by river action. **HP**

fold - A curve or bend of a planar structure such as rock strata, bedding planes, foliation, or cleavage. **GG**

foothills - A steeply sloping upland with hill relief (up to 300 meters) that fringes a mountain range or high-plateau escarpment. Compare - hill, mountain, plateau. **HP**

footslope - The hillslope position that forms the inner, gently inclined surface at the base of a hillslope. In profile, footslopes are commonly concave. It is a transition zone between upslope sites of erosion and transport (shoulder, backslope) and downslope sites of deposition (toeslope). Compare - summit, shoulder, backslope, and toeslope. **HP**

foredune - A coastal dune or dune ridge oriented parallel to the shoreline, occurring at the landward margin of the beach, along the shoreward face of a beach ridge, or at the landward limit of the highest tide, and more or less stabilized by vegetation. **GG**

formation [stratigraphy] - The basic lithostratigraphic unit in the local classification of rocks. A body of rock (commonly a sedimentary stratum or strata, but also igneous and metamorphic rocks) generally characterized by some degree of internal lithologic homogeneity or distinctive lithologic features (such as chemical composition, structures, textures, or general kind of fossils), by a prevailing (but not necessarily

tabular) shape, and is mappable at the earth's surface (at scales of the order of 1:25,000) or traceable in the subsurface. Formation may be combined into Groups or subdivided into members. Compare - bed. **HP**

fosse [glacial geology] - A long, narrow depression or troughlike hollow between the edge of a retreating glacier and the wall of its valley, or between the front of a moraine and its outwash plain. **GG**

free face - The part of a hillside consisting of an outcrop of bare rock (scarp or cliff) that stands more steeply than the angle of repose of the talus slope immediately below. **GG**

frost boil - A small mound of fresh soil material formed by frost action. A type of nonsorted circle commonly found in fine-grained sediment underlain by permafrost, or formed in areas affected by seasonal frost. Compare - patterned ground. **NRC**

frost bursting - (not recommended) use frost shattering.

frost churning - (not recommended) use cryoturbation.

frost polygons - (not recommended) use patterned ground.

frost riving - (not recommended) use frost shattering.

frost shattering - The mechanical disintegration, splitting, or breakup of a rock or soil caused by the pressure exerted by freezing water in cracks or pores, or along bedding planes. Sometimes referred to as congelifraction. **GG**

frost splitting - (not recommended) use frost shattering.

frost stirring - (not recommended) use cryoturbation.

frost weathering - (not recommended) use frost shattering.

frost wedging - (not recommended) use frost shattering.

gap - A sharp break or opening in a mountain ridge, or a short pass through a mountain range; e.g., a wind gap. **GG**

gelifraction - (not recommended) use frost shattering.

gelivation - (not recommended) use frost shattering.

geomorphic surface - A mappable area of the earth's surface that has a common history; the area is of similar age and is formed by a set of processes during an episode of landscape evolution. A geomorphic surface can be erosional, constructional or both. The surface shape can be planar, concave, convex, or any combination of these. Compare constructional, erosional. RR'75

geomorphology - The science that treats the general configuration of the earth's surface; specifically the study of the classification, description, nature, origin, and development of landforms and their relationships to underlying structures, and of the history of geologic changes as recorded by these surface features. The term is especially applied to the genetic interpretation of landforms. GG

giant ripple - A ripple that is more than 30 m in length; e.g., the jokulhlaup derived giant ripples in Camas Prairie, MT.; it usually exhibits superimposed megaripples. Compare - ripple mark. GG

gilgai - The microrelief of soils produced by expansion and contraction with changes in moisture. Found in soils containing large amounts of smectitic clay, that swell and shrink considerably with wetting and drying. Usually a succession of microbasins and microknolls in nearly level areas or of microvalleys and microridges parallel to the direction of the slope. Also referred to, in part or in total, as crabhole, Bay of Biscay, or hushabye in older literature. GSST

glacial - (adjective) (a) Of or relating to the presence and activities of ice and glaciers, as in glacial erosion. (b) Pertaining to distinctive features and materials produced by or derived from glaciers and ice sheets, as in glacial lakes. (c) Pertaining to an ice age or region of glaciation. GG

glacial drainage channel - A channel formed by an ice-marginal, englacial, or subglacial stream during glaciation. GG

glacial drift - (not recommended) use drift.

glacial lake - a) A lake that derives much or all of its water from the melting of glacier ice, fed by meltwater, and lying outside the glacier margins (e.g. proglacial lake) or lying on a glacier (e.g. ice-walled lake, ice-floored lake) and due to differential melting. b) A lake occupying a basin produced by glacial deposition, such as one held in by a morainal dam. c) A lake occupying a basin produced in bedrock by glacial erosion (scouring, quarrying); e.g., cirque lake, fjord. d) A lake occupying a basin produced by collapse of outwash material surrounding masses of stagnant ice. e) [relict] An area formerly occupied by a glacial lake. GG

glacial-marine sedimentation - The accumulation of glacially eroded, terrestrially derived sediment in the marine environment. Sediment may be introduced by fluvial transport, by ice rafting, as an ice-contact deposit, or by eolian transport. Compare - glaciomarine deposits. GG

glacial outwash - (not recommended) use outwash.

glacial till - (not recommended) use till. Till should only be used for describing glacial sediments, therefore "glacial till" is redundant. GM

glaciation - The formation, movement and recession of glaciers or ice sheets. A collective term for the geologic processes of glacial activity, including erosion and deposition, and the resulting effects of such action on the earth's surface. GG

glacier - A large mass of ice formed, at least in part, on land by the compaction and recrystallization of snow, moving slowly by creep downslope or outward in all directions due to the stress of its own weight, and surviving from year to year. Included are small mountain glaciers as well as ice sheets continental in size, and ice shelves which float on the ocean but are fed in part by ice formed on land. GG

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, valley trains, deltas, kames, eskers, and kame terraces. Compare - drift and outwash. HP

glaciolacustrine deposits - Material ranging from fine clay to sand derived from glaciers and deposited in glacial lakes by water originating mainly from the melting of glacial ice. Many are bedded or laminated with varves or rhythmites. HP

glaciomarine deposits - glacially eroded, terrestrially derived sediments (clay, silt, sand, and gravel) that accumulated on the ocean floor. Sediments may be accumulated as an ice-contact deposit, by fluvial transport, ice-rafting, or eolian transport. Compare - glacial-marine sedimentation. GG & GM

gorge - (a) A narrow, deep valley with nearly vertical, rocky walls, smaller than a canyon, and more steep-sided than a ravine; especially a restricted, steep-walled part of a canyon. (b) A narrow defile or passage between hills or mountains. GG

graben - An elongate, relatively depressed crustal unit or block that is bounded by faults on its long sides. It is a structural form that may or may not be geomorphologically expressed as a rift valley. Compare - horst. GG

ground moraine - An extensive, fairly even layer of till, having an uneven or undulating surface; a deposit of rock and mineral debris dragged along, in, on, or beneath a glacier and emplaced by processes including basal lodgement and release from downwasting stagnant ice by ablation. HP

grus - The fragmental products of in situ granular disintegration of granite and granitic rocks, dominated by inter-crystal disintegration. Compare - saprolite. Modified substantially from GG

gulch - (colloquial: western U.S.A.) A small stream channel, narrow and steep-sided in cross section, and larger than a gully. General synonym - ravine. Compare - arroyo, draw, gully, wash. HP

gully - A small channel with steep sides cut by running water and through which water ordinarily runs only after a rain or ice or snow melt. The distinction between a gully and a rill is one of depth. A gully generally is an obstacle to wheeled vehicles and is too deep to be obliterated by ordinary tillage; a rill is of lesser depth and

can be smoothed over by ordinary tillage. Compare - gulch, arroyo, wash, draw. HP

gut - (a) (colloquial: U.S. Virgin Islands, Caribbean Basin) A gully, ravine, small valley, or narrow passage on land. (b) [stream] A tidal stream connecting two larger waterways. GG

hanging valley - A tributary valley whose floor at the lower end is notably higher than the floor of the main valley in the area of junction. GG

head [geomorphology] - (a) The source, beginning, or upper part of a stream. (b) The upper part or end of a slope or valley. GG

headland [coast] - (a) An irregularity of land, especially of considerable height with a steep cliff face, jutting out from the coast into a large body of water (usually the sea or a lake); a bold promontory or a high cape. (b) The high ground flanking a body of water, such as a cove. (c) The steep crag or cliff face of a promontory. GG

head slope - The concave surface at the head of a drainageway where the flow of water converges downward toward the center and contour lines form concave curves. Compare - nose slope, side slope. RR

headwall - A steep slope at the head of a valley; e.g. the rock cliff at the back of a cirque. GG

herbaceous peat [Soil Taxonomy] - An accumulation of organic material, decomposed to some degree, that is predominantly the remains of sedges, reeds, cattails and other herbaceous plants. Compare - moss peat, sedimentary peat, woody peat, peat, muck, and mucky peat. SSM

high-center polygon - A polygon whose center is raised relative to its boundary. Compare - low center polygon. NRC

highmoor bog - a bog, often on the uplands, whose surface is covered by sphagnum mosses which, because of their high degree of water retention, make the bog more dependent upon precipitation than on the water table. The bog often occurs as a raised peat bog or blanket bog. Compare - lowmoor bog, raised bog. GG

hill - A generic term for an area of the land surface, rising as much as 300 meters above surrounding lowlands, usually of restricted summit area relative to surrounding surfaces and having a well-defined outline; hill slopes

generally exceed 15 percent. The distinction between a hill and a mountain is often dependent on local usage. Compare - mountain, foothills, plateau. **HP**

hillside - (not recommended) use hillslope.

hillslope - A generic term for the steeper part of a hill between its summit and the drainage line, valley flat, or depression floor at the base of the hill. **HP**

hillslope-profile position - Discrete slope segments found along a transect line that runs perpendicular to the contour, beginning at a divide and descending to a lower, bounding stream channel or valley floor. In descending order, the hillslope-profile positions of a simple hillslope include summit, shoulder, backslope, footslope, and toeslope. However, not all of these components are necessarily present along a particular hillslope. Complex hillslopes may include two or more shoulder-to-toeslope sequences, or portions thereof. **HP & RR & SW**

hill top (not recommended) use summit.

hogback - A sharp-crested, symmetric (homoclinal) ridge formed by highly tilted resistant rock layers; produced by differential erosion of interlayered resistant and weak rocks with dips greater than about 25° (45 percent). Compare - cuesta. **HP**

Holocene - The epoch of the Quaternary Period of geologic time, extending from the end of the Pleistocene Epoch (about 10 to 12 thousand years ago) to the present. **HP**

homoclinal [structural geomorphology] - (adjective) Pertaining to strata that dip in one direction with a uniform angle. Compare - cuesta, hogback. **HP**

horn - [glacial geology] A high, rocky, sharp pointed, steep-sided, mountain peak with prominent faces and ridges, bounded by the intersecting walls of three or more cirques that have been cut back into the mountain by headward erosion of glaciers. **GG**

horst - An elongate, relatively uplifted crustal unit or block that is bounded by faults on its long sides. It is a structural form and may or may not be expressed geomorphically. **GG**

hummock - [geography] An imprecise, general term for a rounded or conical mound or other small elevation. Also, a slight rise of ground above a level surface (not preferred). **GG**. [patterned ground] A small, irregular knob of earth (earth hummock) or turf (turf hummock). Neither type of hummock is diagnostic of permafrost, but both are most common in subpolar or alpine regions. Both require vegetative cover. **GG**

ice age - (not recommended) use Pleistocene

ice-rafting - The transportation of rock fragments of all sizes on or within icebergs, icefloes, or other forms of floating ice. Compare - erratic. **GG**

ice segregation - The formation of ice by the migration of pore water to the frozen fringe where it forms into discrete layers or lenses. It commonly ranges in thickness from hairline to more than 10 m and often occurs in alternating layers of ice and soil. **NRC**

ice wedge - A massive, generally wedge-shaped body with its apex pointing downward, composed of foliated or vertically banded, commonly white, ice. **NRC**

ice wedge cast - A filling of sediment in the space formerly occupied by an ice wedge. **NRC**

ice wedge polygon - Patterned ground in areas of ice wedges. These polygons are commonly in poorly-drained areas and may be high-centered or low-centered. **NRC**

igneous rock - Rock formed by solidification from a molten or partially molten state; major varieties include plutonic and volcanic rocks. Examples: andesite, basalt, granite. Compare - intrusive, extrusive. **HP**

inselberg - A prominent, isolated, residual knob, hill, or small mountain, usually smoothed and rounded, rising abruptly from an extensive lowland erosion surface in a hot dry region; generally bare and rocky although the lower slopes are commonly buried by colluvium. Compare - monadnock, nunatak. **GG**

inset fan - A special name for the flood plain of an ephemeral stream that is confined between the fan remnants, ballenas, basin-floor remnants, or closely-opposed fan toeslopes of a basin. Modified from **EEP**.

integrated drainage - a general term for a drainage pattern in which stream systems have developed to the point where all parts of the landscape drain into some part of a stream system, the initial or original surfaces have essentially disappeared and the region drains to a common base level. Few or no closed drainage systems are present.

interbedded - Said of beds lying between or alternating with others of different character; especially said of rock material or sediments laid down in sequence between other beds, such as "interbedded" sands and gravels. GG

interdune - The relatively flat surface, whether sand-free or sand-covered, between dunes; GG

interfluvial - A landform composed of the relatively undissected upland or ridge between two adjacent valleys containing streams flowing in the same general direction. An elevated area between two drainageways that sheds water to those drainageways. Compare - divide. GG & FFP

intermittent stream - A stream, or reach of a stream, that does not flow year-round and that flows only when a) it receives baseflow solely during wet periods, or b) it receives ground-water discharge or protracted contributions from melting snow or other erratic surface and shallow subsurface sources. Compare - ephemeral stream. HP

intermontane basin - A generic term for wide structural depressions between mountain ranges that are partly filled with alluvium and called "valleys" in the vernacular. Intermontane basins may be drained internally (bolsons) or externally (semi-bolson). FFP

interstream divide - (refer to divide). Compare - interfluvial.

intramorphous - said of deposits and phenomena occurring within a lobate curve of a moraine (e.g. within the area occupied by a glacier). Compare - extramorphous. GG

intrusive - Denoting igneous rocks derived from molten matter (magmas) that invaded pre-existing rocks and cooled below the surface of the earth. Compare - extrusive. HP

island - a) An area of land surrounded by water. b) inappropriately applied to areas surrounded by water on three sides (use peninsula) or to submerged areas (use shoal, longshore bar). b) An elevated area of land surrounded by swamp, or marsh, or isolated at high water or during floods. Compare - barrier island. GG

joint [geology] - A surface of actual or potential fracture or parting in a rock, without displacement; the surface is usually planar and often occurs with parallel joints to form part of a joint set. HP

jökulhlaup - An Icelandic term for a glacial outburst flood, especially when an ice dam impounding a glacial lake breaks. Such breaks drained glacial Lake Missoula and created the Channeled Scablands in the Pacific Northwest. (Pronounced: yo-kool-loup, the last syllable as in "out".) GG

kame - A low mound, knob, hummock, or short irregular ridge, composed of stratified sand and gravel deposited by a subglacial stream as a fan or delta at the margin of a melting glacier; by a supraglacial stream in a low place or hole on the surface of the glacier; or as a ponded deposit on the surface or at the margin of stagnant ice. Compare - crevasse filling, kame moraine, kame terrace, esker, outwash. GG

kame moraine - (a) An end moraine that contains numerous kames. (b) A group of kames along the front of a stagnant glacier, commonly comprising the slumped remnants of a formerly continuous outwash plain built up over the foot of rapidly wasting or stagnant ice. GG

kame terrace - A terrace-like ridge consisting of stratified sand and gravel (a) deposited by a meltwater stream flowing between a melting glacier and a higher valley wall or lateral moraine, and (b) left standing after the disappearance of the ice. It is commonly pitted with "kettles" and has an irregular ice-contact slope. HP

karst - Topography with sinkholes, caves, and underground drainage that is formed in limestone, gypsum, or other rocks by dissolution, and that is characterized by sinkholes, caves, and underground drainage. GG

kettle - A steep-sided, bowl-shaped depression commonly without surface drainage (closed depression) in drift deposits, often containing a

lake or swamp, and formed by the melting of a large, detached block of stagnant ice that had been wholly or partly buried in the drift. Kettles range in depth from 1 to tens of meters, and with diameters up to 13 km. Compare - pothole. GG

kipuka - A low "island" of land surrounded by a younger lava flow. Compare - steptoe. MA

knickpoint - (a) Any interruption or break in slope; (b) a point of abrupt inflection in the longitudinal profile of a stream or of its valley. HP

knob - (a) A rounded eminence, a small hill or mountain; especially a prominent or isolated hill with steep sides, commonly found in the Southern United States. (b) A peak or other projection from the top of a hill or mountain. Also, a boulder or group of boulders or an area of resistant rocks protruding from the side of a hill or mountain. GG

knoll - A small, low, rounded hill rising above adjacent landforms. HP

lacustrine deposit - Clastic sediments and chemical precipitates deposited in lakes. HP

lagoon - (a) [coast] a shallow stretch of salt or brackish water, partly or completely separated from a sea or lake by an offshore reef, barrier island, sand or spit. GG (b) [relict landform] a nearly level, filled trough or depression behind the longshore bar on a barrier beach and built by a receding pluvial or glacial lake. FFP

lahar - A term for a mass movement landform and a process characterized by a mudflow composed chiefly of volcanoclastic materials on or near the flank of a volcano. The debris carried in the flow includes pyroclastic material, blocks from primary lava flows, and epiclastic material. Compare - mudflow. GG

lakebed - (a) [relict] The flat to gently undulating ground underlain or composed of fine-grained sediments deposited in a former lake. (b) The bottom of a lake; a lake basin. GG

lake plain - A nearly level surface marking the floor of an extinct lake filled by well-sorted, generally fine-textured, stratified deposits, commonly containing varves. GG

lakeshore - The narrow strip of land in contact with or bordering a lake; especially the beach of a lake. GG

lake terrace - A narrow shelf, partly cut and partly built, produced along a lake shore in front of a scarp line of low cliffs and later exposed when the water level falls. GG

lamination (lamina) - (noun) The thinnest recognizable layer, (commonly less than 1 centimeter thick), of original deposition in a sediment or sedimentary rock, differing from other layers in color, composition, or particle size. Several laminae constitute a bed. Compare - lamella. GG

lamella - a) [soil] a thin (commonly less than 1 cm thick), discontinuous or continuous, generally horizontal layer of fine material (especially clay and iron oxides) that have been pedogenically concentrated (illuviated) within a coarser (e.g. sandy), eluviated layers (several centimeters to several decimeters thick). Compare - lamina. Substantially modified from ST b) a thin scale, leaf, lamina, or layer, e.g. one of the units of a polysynthetically twinned mineral, such as plagioclase. GG

landform - Any physical, recognizable form or feature on the earth's surface, having a characteristic shape and range in composition, and produced by natural causes; it includes a wide range in size such as a shrub-coppice dune than can be several meters across vs. a seif dune which can be up to 100 kilometers long. Landforms provide an empirical description of similar portions of the earth's surface. HP & GG

landscape [soils] - a collection of related, natural landforms; usually the land surface which the eye can comprehend in a single view. GSST

landslide - A general term for a mass movement landform and a process characterized by moderately rapid to rapid (greater than 30 centimeters per year) downslope transport, by means of gravitational stresses, of a mass of rock and regolith that may or may not be water saturated. Compare - creep, mass movement, solifluction. HP

land-surface form - The description of a given terrain unit based on empirical analysis of the land surface rather than interpretation of genetic factors. Surface form may be expressed quantitatively in terms of vertical and planimetric

slope-class distribution, local and absolute relief, and patterns of terrain features such as interfluvial crests, drainage lines, or escarpments. HP

lapilli - Non or slightly vesicular pyroclastics, 2.0 to 76 mm in at least one dimension, with an apparent specific gravity of 2.0 or more. Compare - ash [volcanic], block [volcanic], cinders, tephra. KST

lateral moraine - A ridge-like moraine carried on and deposited at the side margin of a valley glacier. It is composed chiefly of rock fragments derived from valley walls by glacial abrasion and plucking, or colluvial accumulation from adjacent slopes. GG

lava flow - a solidified body of rock formed from the lateral, surficial outpouring of molten lava from a vent or fissure, often lobate in form. GG

lava plain - A broad stretch of level or nearly level land, usually hundreds of square kilometers in extent, underlain by a relatively thin succession of basaltic lava flows resulting from fissure eruptions. GG

lava plateau - A broad elevated tableland or flat-topped highland, many hundreds or thousands of square kilometers in extent, underlain by a thick succession of basaltic lava flows resulting from fissure eruptions. GG

lava tube - A natural, hollow tunnel beneath the surface of a solidified lava flow through which the lava flow was fed; the tunnel was left empty when the molten lava drained out. MA & GG

ledge - (a) A narrow shelf or projection of rock, much longer than wide, formed on a rock wall or cliff face, as along a coast by differential wave action on softer rocks. (b) A rocky outcrop; solid rock. (c) An underwater ridge of rocks, especially near the shore; also a near shore reef. (d) A quarry exposure or natural outcrop of a mineral deposit. Compare - structural bench. GG

levee [streams] - An artificial or natural embankment built along the margin of a watercourse or an arm of the sea, to protect land from inundation or to confine streamflow to its channel. Compare - natural levee. GG

limestone - A sedimentary rock consisting chiefly (more than 50 percent) of calcium carbonate, primarily in the form of calcite. Limestones are

usually formed by a combination of organic and inorganic processes and include chemical and clastic (soluble and insoluble) constituents; many contain fossils. HP

lithification - The conversion of unconsolidated sediment into a coherent and solid rock, involving processes such as cementation, compaction, desiccation, crystallization, recrystallization, and compression. It may occur concurrently with, shortly after, or long after deposition. HP

lithologic - (adjective) Pertaining to the physical character of a rock. HP

lodgement till - A basal till commonly characterized by compact, fissile ("platy") structure and containing coarse fragments oriented with their long axes generally parallel to the direction of ice movement. Compare - till, flow-till, melt-out till. GG

loess - Material transported and deposited by wind and consisting predominantly of silt size. GSST

loess bluff - A bluff composed of a thick deposit of coarse loess, formed immediately adjacent to the edges of flood plains, as along the Mississippi River valley or China. Sometimes referred to as a bluff formation (not preferred). Modified substantially from GG.

loess hill - A hill composed of thick deposits of loess. SW

longshore bar [relict] - a narrow, elongate, coarse-textured ridge that once rose near to, or barely above, a pluvial or glacial lake and extended generally parallel to the shore but was separated from it by an intervening trough or lagoon; both the bar and lagoon are now relict features. GG

louderback - A remnant of a lava flow appearing in a tilted fault block and bounded by a dip slope. Used as evidence of block faulting in basin-and-range topography. GG

low-center polygon - A polygon whose center is depressed relative to its boundary. Compare - high-center polygon. NRC

lowland - a general, imprecise term (not preferred) for low-lying land or an extensive region of low land, especially near a coast and

including the extended plains or country lying not far above tide level. Also, the low, relatively level ground of a region or local area, in contrast with the adjacent higher country. Compare - upland. **GG**

low marsh - (refer to mud flat). The flat, usually bare ground situated seaward of a salt marsh and regularly covered and uncovered by the tide; e.g., a mud flat. **GG**

lowmoor bog - a bog that is at or only slightly above the water table, on which it depends for accumulation and preservation of peat (chiefly the remains of sedges, reeds, shrubs, and various mosses). Compare - highmoor bog, raised bog. **GG**

mafic rock - a general term for igneous rock composed chiefly of one or more ferromagnesian, dark-colored minerals; also said of those minerals. Compare - felsic rock. **GG**

marine terrace - A constructional coastal strip, sloping gently seaward, veneered by marine deposits (typically silt, sand, fine gravel). Compare - terrace, wave-built terrace. **GG**

marl - An earthy, unconsolidated deposit consisting chiefly of calcium carbonate mixed with clay in approximately equal proportions (35 to 65 percent of each); formed primarily under freshwater lacustrine conditions, but varieties associated with more saline environments also occur. **HP**

marsh - Periodically wet or continually flooded areas with the surface not deeply submerged. Covered dominantly with sedges, cattails, rushes, or other hydrophytic plants. Compare - salt marsh, swamp, bog, fen. **GSST**

mass movement - Dislodgement and downslope transport of soil and rock material as a unit under direct gravitational stress. The process includes slow displacements such as creep and solifluction, and rapid movements such as landslides, rock slides, and falls, earthflows, debris flows, and avalanches. Agents of fluid transport (water, ice, air) may play an important, if subordinate role in the process. **HP**

mass-movement till - see "till"

mass wasting - use mass movement.

mawae - (colloquial: Hawaii) A natural, surface channel commonly found near the middle of an a'ala lava flow, formed by the evacuation of molten lava. Compare - lava tube.

meander [streams] - One of a series of regular freely developing sinuous curves, bends, loops, turns, or windings in the course of a stream. **GG**

meander belt - The zone within which migration of a meandering channel occurs; the flood-plain area included between two imaginary lines drawn tangentially to the outer bends of active channel loops. Landform components of the meander-belt surface are produced by a combination of gradual (lateral and down-valley) migration of meander loops and avulsive channel shifts causing abrupt cut-offs of loop segments. Landforms flanking the sinuous stream channel include: point bars, abandoned meanders, meander scrolls, oxbow lakes, natural levees, and flood-plain splays. Meander belts may not exhibit prominent natural levee or splay forms. Flood plains of broad valleys may contain one or more abandoned meander belts in addition to the zone flanking the active stream channel. **HP**

meandering channel - The term "meandering" should be restricted to loops with channel length more than 1.5 to 2 times the meander wave length. Meandering stream channels commonly have cross sections with low width-to-depth ratios, cohesive (fine-grained) bank materials, and low gradient. At a given bank-full discharge, meandering streams have gentler slopes, and deeper narrower, and more stable channel cross sections than braided streams. Compare - meander, braided stream, flood-plain landforms. **HP & RR**

meander scar - (a) A crescent-shaped, concave or linear mark on the face of a bluff or valley wall, produced by the lateral planation of a meandering stream which impinged upon and undercut the bluff; it indicates the abandoned route of the stream. (b) (not recommended) An abandoned meander, often filled in by deposition and vegetation, but still discernible [refer to oxbow]. **GG**

meander scroll - (a) One of a series of long, parallel, close fitting, crescent-shaped ridges and troughs formed along the inner bank of a stream meander as the channel migrated laterally down-valley and toward the outer bank. Compare - meander belt, point bar. (b) (not recommended;

refer to oxbow lake) - A small, elongate lake on a floodplain in a well-defined part of an abandoned stream channel. GG

medial moraine - a) an elongate moraine carried in or upon the middle of a glacier and parallel to its sides, usually formed by the merging of adjacent and inner lateral moraines below the junction of two coalescing valley glaciers. b) A moraine formed by glacial abrasion of a rocky protuberance near the middle of a glacier and whose debris appears at the glacier surface in the ablation area. c) the irregular ridge left behind in the middle of a glacial valley, when the glacier on which it was formed has disappeared. GG

melt-out till - Till derived from slow melting of debris-rich stagnant ice buried beneath sufficient overburden to inhibit deformation under gravity, thus preserving structures derived from the parent ice. Compare - flow-till, lodgement till. GG

mesa - A broad, nearly flat-topped, and usually isolated landmass bounded by steep slopes or precipitous cliff and capped by layers of resistant, nearly horizontal, rocky summit width greater than the height of bounding escarpments. (Colloquial: western U.S.A.; not preferred usage) Also used to designate broad structural benches and alluvial terraces that occupy intermediate levels in stepped sequences of platforms bordering canyons and valleys. Compare - butte, plateau, cuesta. HP & GG

metamorphic rock - Rock of any origin altered in mineralogical composition, chemical composition, or structure by heat, pressure, and movement at depth in the earth's crust. Nearly all such rocks are crystalline. Examples: schist, gneiss, quartzite, slate, marble. HP

metasediment - A sediment or sedimentary rock that shows evidence of having been subjected to metamorphism. GG

meta-stable slope - (not recommended)

microfeature [soil survey] - small, local, natural forms (features) on the land surface that are too small to delineate on a topographic or soils map at commonly used map scales (e.g. 1:24,000, and 1:15,840). Examples include earth pillars, patterned ground, frost boils. Compare - microrelief. SW

micro-high - a generic microrelief term applied to slightly elevated areas relative to the adjacent

ground surface; changes in relief range from several centimeters to several meters; crosssectional profiles can be simple or complex and generally consist of gently rounded, convex tops with gently sloping sides. SW.

micro-depression - refer to micro-low.

micro-knoll - refer to micro-high.

micro-low - a generic microrelief term applied to slightly lower areas relative to the adjacent ground surface; changes in relief range from several centimeters to several meters; ; crosssectional profiles can be simple or complex and generally consist of subdued, concave, open or closed depressions with gently sloping sides. SW.

microrelief - (a) [soil survey] Slight variations in the height of a land surface that are too small to delineate on a topographic or soils map at commonly used map scales (e.g. 1:24,000 and 1:15,840). Examples include micro-high, micro-low. Compare - microfeature. SW (b) (not preferred - refer to microfeature) Generically refers to local, slight irregularities in form and height of a land surface that are superimposed upon a larger landform, including such features as low mounds, swales, and shallow pits. GG '87

midden - A mound or stratum of refuse (broken pots, ashes, food remains, etc.) normally found on the site of an ancient settlement. GG

mima mound - A term used for one of numerous low circular or oval domes composed of loose, unstratified, gravelly, silty, or sandy material. The basal diameter varies from 3 meters to more than 30 meters, and the height from 30 centimeters to about 2 meters. Compare - pimple mound, patterned ground, shrub-coppice dune. GG

Miocene - The epoch of the Tertiary Period of geologic time, immediately preceding the Pliocene Epoch (from approximately 5 million to 24 million years ago); also corresponding (time-stratigraphic) "series" of earth materials.

monadnock - An isolated hill or mountain of resistant rock rising conspicuously above the general level of a lower erosion surface in a temperate climate representing an isolated remnant of a former erosion cycle in an area that

has largely been beveled to its base level.
Compare - inselberg, nunatak. GG

monocline - A unit of folded strata that flexes from the horizontal in one direction only, and is not part of an anticline or syncline. This structure is typically present in plateau areas where nearly flat strata locally assume steep dips caused by differential vertical movements without faulting. HP

moraine [glacial geology] - An accumulation of drift, with an initial topographic expression of its own, built chiefly by the direct action of glacial ice. Types of moraines include: disintegration, end, ground, lateral, recessional, and terminal moraines. Compare - till. HP

moss peat [Soil Taxonomy] - An accumulation of organic material that is predominantly the remains of mosses (e.g. sphagnum moss). Compare - Herbaceous peat, sedimentary peat, woody peat, peat, muck, and mucky peat. SSM

mound - a) A low, rounded hill, natural or artificial; constructed of earthy material; b) A small, human-made hill, composed either of debris accumulated during successive occupations of the site (e.g. tell) or of earth heaped up to mark a burial site (e.g. burial mound). c) A structure built by colonial organisms (e.g. termite mound). GG

mountain - A natural elevation of the land surface, rising more than 300 meters above surrounding lowlands, usually of restricted summit area relative to surrounding surfaces and generally having steep sides (greater than 25 percent slope) with or without considerable bare-rock surface. A mountain can occur as a single, isolated mass or in a group forming a chain or range. Mountains are primarily formed by tectonic activity and/or volcanic action and secondarily by differential erosion. Compare - hill, plateau, foothill. HP

mountainside - (not recommended) use mountain slope.

mountain slope - A part of a mountain between the summit and the foot. GG

mountain valley - a) Any small, externally-drained depression sufficiently elevated above the surrounding land surface to be considered separately with a distinctive name. b) (colloquial: western U.S.A.) A relatively small,

structural depression within a mountain range that is partly filled with alluvium and commonly drains externally to an intermontane basin, bolson, or semi-bolson. Modified from FFP

muck - unconsolidated soil material consisting primarily of highly decomposed organic material in which the original plant parts are not recognizable (i.e. "sapric" in Soil Taxonomy). It generally contains more mineral matter and is usually darker in color, than peat. Compare - peat, mucky peat, herbaceous peat. GSST

mucky peat - unconsolidated soil material consisting primarily of organic matter that is in an intermediate stage of decomposition such that a significant part of the original material can be recognized and a significant part of the material can not be recognized (i.e. "hemic" in Soil Taxonomy). Compare - peat, muck, herbaceous peat. SSM

mud flat - A relatively level area of fine grained material (e.g. silt) along a shore (as in a sheltered estuary) or around an island, alternately covered and uncovered by the tide or covered by shallow water, and barren of vegetation. Compare - lowmarsh. GG

mudflow [mass movement] - A general term for a mass movement landform and a process characterized by a flowing mass of predominantly fine-grained earth material (particles less than 2 mm comprising more than 50 percent of the solid material) possessing a high degree of fluidity during movement. If more than half of the solid fraction consists of material larger than sand size, debris flow is preferred. GG

mudstone - a) a blocky or massive, fine-grained sedimentary rock in which the proportions of clay and silt are approximately equal b) A general term that includes clay, silt, claystone, siltstone, shale, and argillite, and that should be used only when the amounts of clay and silt are not known or cannot be precisely identified. GG

muskeg - A bog, usually a sphagnum bog, frequently with grassy tussocks (hummocks), growing in wet, poorly drained boreal regions, with deep accumulations of organic material, often in areas of permafrost; a moss-covered muck or peat bog of boreal regions. GG and HP

natural levee - A long, broad low ridge or embankment of sand and coarse silt, built by a stream on its flood plain and along both sides of

its channel, especially in time of flood when water overflowing the normal banks is forced to deposit the coarsest part of its load. It has a gentle slope away from the river and toward the surrounding floodplain, and its highest elevation is closest to the river bank. Compare - levee, meander belt. GG

net (nonsorted) - refer to patterned ground.

net (sorted) - refer to patterned ground.

nivation - (a) The process of excavation of a shallow depression or nivation hollow on a mountain side by removal of fine material around the edge of a shrinking snow patch or snow bank, chiefly through sheetwash, rivulet flow, and solution in melt water. Freeze-thaw action is apparently insignificant. (b) (not preferred) More generally, the work of snow and ice beyond the limits of glacial action. GG

nonsorted circle - A type of patterned ground whose mesh (shape) is dominantly circular and has a nonsorted appearance due to the absence of a border of coarse fragments. Vegetation characteristically outlines the pattern by forming a bordering ridge. Diameters commonly range from 0.5 to 3 m. Nonsorted circles include mud boils, earth hummocks, turf hummocks, and frost boils. Nonsorted circles have various origins. Some, such as mud and earth hummocks and frost boils, involve cryoturbation activity and differential heave of frost-susceptible materials. Others, such as mud boils, involve hydraulic pressures and diapir-like displacement of water-saturated sediments. Compare - sorted circle, frost boil, patterned ground. NRC and GG

nonsorted polygon - refer to patterned ground.

nose slope - The projecting end of an interfluvium, where contour lines connecting the opposing side slopes form convex curves around the projecting end and lines perpendicular to the contours diverge downward. Overland flow of water is divergent. Compare - head slope, side slope. RR

notch - a) (colloquial - northeast U.S.A.) a narrow passageway, or short defile between mountains; a deep, close pass. Compare - gap. b) a breached opening in the rim of a volcanic crater. GG

nuée ardente - A swiftly flowing, turbulent gaseous cloud, sometimes incandescent, erupted

from a volcano and containing ash and other pyroclastics in its lower part; a density current of pyroclastic flow. The lower part of the nuée ardente is comparable to an ash flow. Compare - lahar. GG

nunatak - An isolated hill, knob, ridge, or peak of bedrock that projects prominently above the surface of a glacier and is completely surrounded by glacier ice. Compare - inselberg, monadnock. GG

offshore bar - (not recommended) use barrier beach.

outcrop - a) That part of a geologic formation or structure that appears at the surface of the earth. b) [soil survey] An actual exposure of bedrock at or above the ground surface. Compare - cliff. Modified substantially from GG

outwash [glacial geology] - (a) Stratified detritus (chiefly sand and gravel) removed or "washed out" from a glacier by melt-water streams and deposited in front of or beyond the end moraine or the margin of an active glacier. The coarser material is deposited nearer to the ice. (b) The meltwater of a glacier. Compare - pitted outwash, drift, esker, kame, till. GG

outwash fan - A fan-shaped accumulation of outwash deposited by meltwater streams in front of the end moraine of a glacier. Coalescing outwash fans form an outwash plain. GG

outwash plain - An extensive lowland area of coarse textured, glaciofluvial material. An outwash plain is commonly smooth; where pitted, due to melt-out of incorporated ice masses, it is generally low in relief. Compare - outwash, pitted outwash plain, kettles. HP

outwash terrace - A valley train deposit extending along a valley downstream from an outwash plain or terminal moraine; a flat-topped bank of outwash with an abrupt outer face. Compare - kame terrace, valley train. GG

overthrust - A low angle thrust fault of large scale, with displacement generally measured in kilometers. GG

oxbow - A closely looping stream meander having an extreme curvature such that only a neck of land is left between the two parts of the stream. (colloquial: northeastern U.S.A.) the land enclosed, or partly enclosed, within an

- oxbow.** Compare - meander belt, oxbow lake, bayou. **GG**
- oxbow lake** - The crescent-shaped, often ephemeral body of standing water situated by the side of a stream in the abandoned channel (oxbow) of a meander after the stream formed a neck cutoff and the ends of the original bend were silted up. Compare - meander belt, oxbow. **GG**
- paha** - (colloquial: midwestern U.S.A.) commonly an erosional remnant modified by depositional processes consisting of a low, elongated, rounded ridge or hill consisting mainly of drift, rock, or windblown sand, silt, or clay capped with a thick cover of loess; found especially in northeast Iowa. Height varies between 10 and 30 m. **GG**
- pahoehoe lava** - A type of basaltic lava flow having a smooth, billowy or rope-like surface. Compare - a'a lava. **GG & MA**
- paleosol** - A soil that formed on a landscape in the past with distinctive morphological features resulting from a soil-forming environment that no longer exists at the site. The former pedogenic process was either altered because of external environmental change or interrupted by burial. A paleosol (or component horizon) may be classed as relict if it has persisted in a land-surface position without major alteration of morphology by processes of the prevailing pedogenic environment. An exhumed paleosol is one that formerly was buried and has been re-exposed by erosion of the covering mantle. Most paleosols have been affected by some subsequent modification of diagnostic horizon morphologies and profile truncation. **HP**
- palsa** - An elliptical dome-like permafrost mound containing alternating layers of ice lenses and peat or mineral soil, commonly 3-10 m high and 2-25 m long, occurring in subarctic bogs of the tundra and often surrounded by water; pl. palsen. **NRC**
- parabolic dune** - A sand dune with a long, scoop-shaped form, convex in the downwind direction so that its horns point upwind, whose ground plan, when perfectly developed, approximates the form of a parabola. **GG**
- parallel drainage pattern** - A drainage pattern in which the streams and their tributaries are regularly spaced and flow parallel or subparallel to one another over a considerable area. **GG**
- parent material** - The unconsolidated and more or less chemically weathered mineral or organic matter from which the solum is developed by pedogenic processes. **GSST**
- parna** - a term used, especially in southeast Australia, for silt and sand-sized aggregates of eolian clay occurring in sheets. **GG**
- parna dune** - A dune largely composed of sand-sized aggregates of clay. Compare - parna. **HP**
- partial ballena** - refer to ballena
- patina** - A general term for a colored film or thin outer layer produced on the surface of a rock or other material by weathering after long exposure. Compare - desert varnish. **GG**
- patterned ground** - A general term for any ground surface exhibiting a discernibly ordered, more-or-less symmetrical, morphological pattern of ground and, where present, vegetation. Patterned ground is characteristic of, but not confined to, permafrost regions or areas subjected to intense frost action; it also occurs in tropical, subtropical, and temperate areas. Patterned ground is classified by type of pattern and presence or absence of sorting and includes nonsorted and sorted circles, net, polygons, steps and stripes, garlands, and solifluction features. In permafrost regions, the most common macroform is the ice-wedge polygon and a common microform is the nonsorted circle. Stone polygons generally form on slopes of less than 8 percent, while garlands and stripes occur on slopes of 8 to 15 percent and more than 15 percent, respectively. **NRC and HP**
- peak** - Sharp or rugged upward extension of a ridge chain, usually at the junction of two or more ridges; the prominent highest point of a summit area. **HP**
- peat** - Unconsolidated soil material consisting largely of undecomposed, or slightly decomposed, organic matter (i.e. "fibric" in Soil Taxonomy) accumulated under conditions of excessive moisture. Compare - muck, mucky peat, herbaceous peat. **GSST**
- peat plateau** - A generally flat-topped expanse of peat, elevated above the general surface of a peatland, and containing segregated ice that may

or may not extend downward into the underlying mineral soil. Controversy exists as to whether peat plateaus and palsens are morphological variations of the same feature. NRC

pediment - A gently sloping erosional surface developed at the foot of a receding hill or mountain slope. The surface may be essentially bare, exposing earth material that extends beneath adjacent uplands; or it may be thinly mantled with alluvium and colluvium, ultimately in transit from upland front to basin or valley lowland. In hill-foot slope terrain the mantle is designated "pedisediment." The term has been used in several geomorphic contexts: Pediments may be classed with respect to (a) landscape positions, for example, intermontane-basin piedmont or valley-border foot slope surfaces (respectively, apron and terrace pediments (Cooke and Warren, 1973)); (b) type of material eroded, bedrock or regolith; or (c) combinations of the above. Compare - Piedmont slope. HP

pedisediment - A layer of sediment, eroded from the shoulder and back slope of an erosional slope, that lies on and is, or was, being transported across a pediment. FFP

pedoturbation - the mixing of soil materials by natural processes. Compare - cryoturbation.

peneplain - (Obsolete) A low nearly featureless, gently undulating land surface of considerable area, which presumably has been produced by the processes of long-continued subaerial erosion. GG

perennial stream - A stream or reach of a stream that flows continuously throughout the year and whose surface is generally lower than the water table adjacent to the region adjoining the stream. Compare - Ephemeral stream, Intermittent stream. GG

periglacial - (adjective) Pertaining to processes, conditions, areas, climates, and topographic features occurring at the immediate margins of glaciers and ice sheets, and influenced by cold temperature of the ice. The term was originally introduced to designate the climate and related geologic features peripheral to ice sheets of the Pleistocene. HP

permafrost - Ground, soil, or rock that remains at or below 0° C for at least two years. It is defined on the basis of temperature and is not necessarily frozen. Compare - continuous

permafrost, discontinuous permafrost, sporadic permafrost, thaw-stable permafrost, thaw sensitive permafrost. NRC

physiographic province - A region of which all parts are similar in geologic structure and climate and which has consequently had a unified geomorphic history; a region whose pattern of relief features or landforms differ significantly from that of adjacent regions. Examples: the Valley and Ridge, Blue Ridge, and Piedmont provinces in the eastern U.S.A., and the Basin and Range, Rocky Mountains, and Great Plains provinces in the western U.S.A. GG

piedmont - (adjective) Lying or formed at the base of a mountain or mountain range; e.g., a piedmont terrace or a piedmont pediment. (noun) An area, plain, slope, glacier, or other feature at the base of a mountain; e.g., a foothill or a bajada. In the United States, the Piedmont (noun) is a low plateau extending from New Jersey to Alabama and lying east of the Appalachian Mountains. GG

piedmont slope - The dominant gentle slope at the foot of a mountain; generally used in terms of intermontane-basin terrain in arid to subhumid regions. Main components include (a) an erosional surface on bedrock adjacent to the receding mountain front (pediment); (b) a constructional surface comprising individual alluvial fans and interfan valleys, also near the mountain front; and (c) a distal complex of coalescent fans (bajada), and alluvial slopes without fan form. Piedmont slopes grade to basin-floor depressions with alluvial and temporary lake plains or to surfaces of through drainage. Compare - bolson. HP

pimple mound - (colloquial: Gulf Coast U.S.A.) Low, flattened, approximately circular or elliptical features composed of sandy loam that is coarser than, and distinct from, the surrounding soil; the basal diameter ranges from 3 m to more than 30 m, and the height from 30 cm to more than 2 m. Compare - mima mound, patterned ground, shrub-coppice dune. GG

pingo - A large frost mound; especially a relatively large conical mound of soil-covered ice (commonly 30 to 50 meters high and up to 400 meters in diameter) raised in part by hydrostatic pressure within and below the permafrost of Arctic regions, and of more than 1 year's duration. GG

pitted outwash - Outwash with pits or kettles, produced by the partial or complete burial of glacial ice by outwash and the subsequent thaw of the ice and collapse of the surficial materials. Compare - pitted outwash plain. GG

pitted outwash plain - an outwash plain marked by many irregular depressions such as kettles, shallow pits, and potholes which formed by melting of incorporated ice masses; many are found in Wisconsin and Minnesota. Compare - outwash, pitted outwash. GG

plain - A general term referring to any flat, lowland area, large or small, at a low elevation. Specifically, any extensive region of comparatively smooth and level gently undulating land. A plain has few or no prominent hills or valleys but sometimes has considerable slope, and usually occurs at low elevation relative to surrounding areas. Where dissected, remnants of a plain can form the local uplands. A plain may be forested or bare of trees and may be formed by deposition or erosion. Compare - lowland, plateau. GG

plateau - [geomorphology] A comparatively flat area of great extent and elevation; specifically an extensive land region considerably elevated (more than 100 meters) above adjacent lower-lying terrain, and is commonly limited on at least one side by an abrupt descent, has a flat or nearly level surface. A comparatively large part of a plateau surface is near summit level. Compare - hill, foothill, mountain, mesa, plain. GG

playa - The usually dry and nearly level lake plain that occupies the lowest parts of closed depressions, such as those occurring on intermontane basin floors. Temporary flooding occurs primarily in response to precipitation-runoff events. Playa deposits are fine grained and may or may not have high water table and saline conditions. HP

playa lake - A shallow, intermittent lake in a arid or semi-arid region, covering or occupying a playa in the wet season but drying up in summer; an ephemeral lake that upon evaporation leaves or forms a playa. GG

Pleistocene - The epoch of the Quaternary Period of geologic time, following the Pliocene Epoch and preceding the Holocene (from approximately 2 million to 10 thousand years ago); also the corresponding (time-stratigraphic) "series" of earth materials. HP

Pliocene - The last epoch of the Tertiary Period of geologic time, following the Miocene Epoch and preceding the Pleistocene Epoch (approximately 5 to 2 million years ago); also, the corresponding (time-stratigraphic) "series" of earth materials. HP

plug dome - A volcanic dome characterized by an upheaved, consolidated conduit filling. GG

pluton - a) an igneous intrusion. b) a body of rock formed by metasomatic replacement. The term originally signified only deep-seated or plutonic bodies of granitoid texture. GG

plutonic - Pertaining to igneous rocks formed at great depth, but also including associated metamorphic rocks. GG

pluvial lake - A lake formed in a period of exceptionally heavy rainfall; a lake formed in the Pleistocene Epoch during a time of glacial advance, and now either extinct (relict) or existing as a remnant (lake); e.g., Lake Bonneville. Compare - glacial lake, proglacial lake. GG

pocosin - (colloquial: southeastern U.S.A.) A large wet area on broad, commonly a swamp, which occurs on nearly level interfluvies in the Atlantic coastal plain with distinctive, native vegetation relative to adjacent areas. Soils may be either mineral or organic. A Native American term for "swamp on a hill." Compare - raised bog. RD

point bar - One of a series of low, arcuate ridges of sand and gravel developed on the inside of a growing meander by the slow addition of individual accretions accompanying migration of the channel toward the outer bank. Compare - meander scroll. GG

polygon - A type of patterned ground consisting of a closed, roughly equidimensional figure bounded by more or less straight sides; some sides may be irregular. Refer to patterned ground. Compare - High center polygon, low center polygon, ice wedge polygon, nonsorted polygon. NRC

pond - a) A natural body of standing fresh water occupying a small surface depression, usually smaller than a lake and larger than a pool. b) A small artificial body of water, used as a source of water. Compare - salt pond. GG

pool - A small, natural body of standing water, usually fresh; e.g. a stagnant body of water in a marsh, or a transient puddle in a depression following a rain. GG

porcellanite - an indurated or baked clay or shale with a dull, light-colored, cherty appearance, often found in the roof or floor of a burned-out coal seam. GG

postglacial - refer to Holocene.

pothole [geomorphology] - A generic, imprecise term for any pot-shaped pit or hole. GG;
[glacial geology] - A term applied to a small pit depression (1 to 15 meters deep), generally circular or elliptical, occurring in an outwash plain, a recessional moraine, or a till plain.
[lake] - A shallow depression, generally less than 10 hectares in area, occurring on disintegration moraines and commonly containing an intermittent or seasonal pond or marsh. GG

pressure ridge - a) ice-pushed ridge. b) A ridge of glacier ice, produced by horizontal pressure associated with glacier flow. c) [volcanic] an elongate uplift of the congealing crust of a lava flow, probably due to the pressure of the underlying, still-flowing lava. GG

proglacial lake - a type of glacial lake which formed just beyond the margin of an advancing or retreating glacier; generally in direct contact with the ice. Compare - glacial lake, pluvial lake. GG

proximal [sedimentology] - (adjective) Said of a sedimentary deposit consisting of coarse clastics and deposited nearest the source area. Compare - distal. GG

pumice - A light-colored, vesicular, glassy rock commonly having the composition of rhyolite. It commonly has a specific gravity of < 1.0 and is thereby sufficiently buoyant to float on water. Compare - scoria, tephra. GG

pyroclastic - Pertaining to fragmental materials produced by usually explosive, aerial ejection of clastic particles from a volcanic vent. Such materials may accumulate on land or under water. Compare - epiclastic, volcanoclastic, clastic. HP

Quaternary - The period of the Cenozoic Era of geologic time, extending from the end of the

Tertiary Period (about 2 million years ago) to the present and comprising two epochs, the Pleistocene (Ice Age) and Holocene (Recent); also, the corresponding (time-stratigraphic) 'system' of earth materials. GG

radial drainage pattern - A drainage pattern in which streams radiate or diverge outward, like the spokes of a wheel from a high central area. GG

raised beach - an ancient beach occurring above the present shoreline and separated from the present beach, having been elevated above the high-water mark either by local crustal movements (uplift) or by lowering of sea level, and often bounded by inland cliffs. GG

raised bog - An area of acid, peaty soil, especially that developed from moss, in which the center is higher than the margins. Compare - pocosin, Carolina Bay, moss peat. [Note: raised peat bog (not preferred) - refer to highmoor bog]. GG

ravine - A small stream channel; narrow, steep-sided, and commonly V-shaped in cross section; and larger than a gully. General synonym - gulch. Compare - draw. HP

recessional moraine - An end or lateral moraine, built during a temporary but significant halt in the final retreat of a glacier. Also, a moraine built during a minor readvance of the ice front during a period of general recession. Compare - end moraine, ground moraine, terminal moraine. GG

reef - (a) A ridge-like or mound-like structure, layered or massive, built by sedentary calcareous organisms, especially corals, and consisting mostly of their remains; it is wave-resistant and stands above the surrounding contemporaneously deposited sediment. Also, such a structure built in the geologic past and now enclosed in rock, commonly of differing lithology. (b) A mass or ridge of rocks, especially coral and sometimes sand, gravel, or shells, rising above the surrounding sea or lake bottom to or nearly to the surface, and dangerous to navigation; specifically such a feature at 10 fathoms (18.3 m) or less, formerly 6 fathoms (11 m). GG

regolith - All unconsolidated earth materials above the solid bedrock. It includes material weathered in place from all kinds of bedrock and alluvial, glacial, eolian, lacustrine, and pyroclastic deposits. Soil scientists regard as soil

only that part of the regolith that is modified by organisms and soil-forming processes. Most engineers describe the whole regolith, even to a great depth, as "soil." Compare - residuum, bedrock. HP

relict - (adjective) Pertaining to surface landscape features e.g., landforms, geomorphic surfaces, and paleosols that have never been buried and yet are predominantly products of past environments. Compare - exhumed. HP

relief - The relative difference in elevation between the upland summits and the lowlands or valleys of a given region. GG

remnant - refer to erosion remnant.

residuum - (residual soil material) Unconsolidated, weathered, or partly weathered mineral material that accumulates by disintegration of bedrock in place. Compare - saprolite, regolith, colluvium. HP

rhythmite - An individual unit of a succession of beds developed by rhythmic sedimentation; e.g. a cyclothem. The term implies no limit as to thickness or complexity of bedding and it carries no time or seasonal connotation. Compare - varves, cyclothem. GG

ribbed fen - nutrient-rich wetland with a surface pattern of ridges and depressions.

ridge - A long, narrow elevation of the land surface, usually sharp crested with steep sides and forming an extended upland between valleys. The term is used in areas of both hill and mountain relief. HP

rim - The border, margin, edge, or face of a landform, such as the curved brim surrounding the top part of a crater or caldera; specifically the rimrock of a plateau or canyon. GG

ripple mark - an undulating surface of alternating, subparallel, small-scale ridges and depressions, commonly composed of loose sand. It is produced on land by wind and under water by the agitation of water by currents or wave action, and generally tends at right angles or obliquely to the direction of flow of the moving fluid. Compare - giant ripple mark. GG

rise - (refer to lake plain) A imprecise term for a slight increase in slope and elevation of the land surface, usually with a broad summit and gently

sloping sides. [soil survey] Use of this term is restricted to areas of very low relief such as lake plains or coastal plains. GG & SW

riser - a) The vertical or steeply sloping surface, commonly one of a series, of natural step-like landforms, as those of a glacial stairway or of successive stream terraces. Compare - tread, escarpment. GG

river valley - an elongate depression of the Earth's surface; carved by a river during the course of its development. Compare - valley side, valley floor. GG

roche moutonnée - A small elongate protruding knob or hillock of bedrock, so sculptured by a large glacier as to have its long axis oriented in the direction of ice movement, an upstream (stoss or scour) side that is gently inclined, smoothly rounded, and striated, and a downstream (lee or pluck) side that is steep and rough. It is usually a few meters in height, length, and breadth. GG

rock glacier - A mass of poorly sorted angular boulders and fine material, with interstitial ice a meter or so below the surface (ice-cemented) or containing a buried ice glacier (ice-cored). It occurs in a permafrost area, and is derived from a cirque wall or other steep cliff. Rock glaciers have the general appearance and slow movement of small valley glaciers, ranging from a few hundred meters to several kilometers in length, and having a distal area marked by a series of transverse, arcuate ridges. GG

rotational landslide - A general term for a mass movement landform and a process characterized by a slide in which shearing takes place on a well defined, curved shear surface, concave upward, producing a backward rotation in the displaced mass. The landform may be single, successive (repeated up- and down-slope), or multiple (as the number of slide components increases). GG

rotational slump - (not recommended) use rotational landslide.

rubble - An accumulation of loose angular rock fragments, commonly overlying outcropping rock; the unconsolidated equivalent of a breccia. Compare - scree, talus. GG

saddle - A low point on a ridge or interfluvium, generally a divide (pass, col) between the heads of streams flowing in opposite directions. Compare - summit, crest. HP

salt marsh - Flat, poorly drained area that is subject to periodic or occasional overflow by salt water, containing water that is brackish to strongly saline, and usually covered with a thick mat of grassy halophytic plants; e.g., a coastal marsh periodically flooded by the sea, or an inland marsh, (or salina) in an arid region and subject to intermittent overflow by salty water. Compare - tidal marsh, mud flat. **GG**

salt pond - A large or small body of salt water in a marsh or swamp along the seacoast. **GG**

sand boil - An accumulation of sand commonly in the form of a low mound, produced by the expulsion of liquified sand to the ground surface; sometimes called sand volcanoes (not preferred). Examples are found on top of slump sheets or on the upper surface of highly contorted layers of laminated sediments. Modified from **GG**

sand flow [mass movement] - A flow of wet sand, as along banks of noncohesive clean sand that is subject to scour and to repeated fluctuations in pore-water pressure due to rise and fall of the tide. **GG**

sandhills - a region of sand dunes or sand hills, either covered with vegetation or bare, as in north-central Nebraska. **GG**

sand ridge - a) (not preferred) an imprecise, generic name for any low ridge of sand, formed at some distance from shore, e.g. submerged (longshore bar) or emergent (barrier beach). b) One of a series of long, wide, extremely low, parallel ridges believed to represent the eroded stumps of former longitudinal sand dunes, as in western Zimbabwe. **GG**

sand sheet - A large, irregularly shaped, commonly thin, surficial mantle of eolian sand, lacking the discernible slip faces that are common on dunes. **GG**

sand wedge - refer to ice wedge cast

sandstone - Sedimentary rock containing dominantly sand-size clastic particles. **HP**

saprolite - (Provisional definition) Soft, friable, isovolumetrically weathered bedrock that retains the fabric and structure of the parent rock (Colman and Dethier, 1986) exhibiting extensive inter-crystal and intra-crystal weathering. In pedology, saprolite was formerly applied to any

unconsolidated residual material underlying the soil and grading to hard bedrock below. Compare - grus, residuum. **HP**

scabland - An elevated, flat-lying, basalt-floored area, with little if any soil cover, sparse vegetation, and usually deep, dry channels scoured into the surface, especially by glacial meltwaters such as the channeled scablands of eastern Washington. Compare - coulee. **GG**

scarp - An escarpment, cliff, or steep slope of some extent along the margin of a plateau, mesa, terrace, or structural bench. A scarp may be of any height. Compare - escarpment. **GG**

scarp slope - The relatively steeper face of a cuesta, facing in a direction opposite to the dip of the strata. Compare - dip slope. **GG**

scoria - Vesicular, cindery crust or bomb-sized fragments of such material on the surface of andesitic or basaltic lava, the vesicular nature of which is due to the escape of volcanic gases before solidification; it is usually heavier, darker, and more crystalline than pumice. Synonym - cinder. Compare - pumice, tephra. **GG**

scour [geomorphology] - (a) The powerful and concentrated clearing and digging action of flowing air, water, or ice, especially the downward erosion by stream water in sweeping away mud and silt on the outside curve of a bend, or during the time of a flood. (b) A place in a stream bed swept (scoured) by running water, generally leaving a gravel bottom. **GG**

scree - A collective term for an accumulation of coarse rock debris or a sheet of coarse debris mantling a slope. Scree is not a synonym of talus, as scree includes loose, coarse fragment material on slopes without cliffs. Compare - talus, colluvium, mass movement. **HP**

scroll - refer to meander scroll.

sea cliff [coastal] - A cliff or slope produced by wave erosion, situated at the seaward edge of the coast or the landward side of the wave-cut platform. It may vary from an inconspicuous slope to a high, steep escarpment. **GG**

sediment - Material, both mineral and organic, that is in suspension, is being transported, or has been moved from its site of origin by water, wind, ice or mass-wasting and has come to rest on the earth's surface either above or below sea

level. Sediment in a broad sense also includes materials precipitated from solution or emplaced by explosive volcanism, as well as organic remains; e.g., peat that has not been subject to appreciable transport. HP

sedimentary peat [Soil Taxonomy] - an accumulation of organic material that is predominantly the remains of floating aquatic plants (e.g. algae) and the remains and fecal material of aquatic animals, including corprogenous earth. Compare - herbaceous peat, moss peat, woody peat, peat, muck, and mucky peat. SSM

sedimentary rock - A consolidated deposit of clastic particles, chemical precipitates, and organic remains accumulated at or near the surface of the earth under "normal" low temperature and pressure conditions. Sedimentary rocks include consolidated equivalents of alluvium, colluvium, drift, and eolian, lacustrine, marine deposits; e.g., sandstone, siltstone, mudstone, clay-stone, shale, conglomerate, limestone, dolomite, coal, etc. Compare - sediment. HP

seep - (noun) A generally small area, where water or oil percolates slowly to the land surface. For water, it may be considered as a seepage spring, but it is used by some for flows too small to be considered as springs. GG

seif dune - A large, sharp-crested, elongated, longitudinal (linear) dune or chain of sand dunes, oriented parallel, rather than transverse (perpendicular), to the prevailing wind. If unmodified, the crest, in profile, commonly consists of a succession of curved slip faces produced by strong, but infrequent cross winds. A seif dune may be as much as 200 m high and from 400 m to more than 100 km long. GG and HP

semi-bolson - (colloquial: western U.S.A.) A wide desert basin or valley that is drained by an intermittent stream, an externally drained (open) intermontane basin. Compare - bolson GG

shale - Sedimentary rock formed by induration of a clay, silty clay, or silty clay loam deposit and having the tendency to split into thin layers, i.e., fissility. HP

sheep tracks - (not recommended) use terracettes.

shield volcano - A volcano having the shape of a very broad, gently sloping dome, built by flows of very fluid basaltic lava or rhyolitic ash flows. Compare - stratovolcano. GG & MA

shoal - (noun) (a) A relatively shallow place in a stream, lake, sea, or other body of water; a shallows. (b) A submerged ridge, bank, or bar consisting of, or covered by, sand or other unconsolidated material, rising from the bed of a body of water to near the surface so as to constitute a danger to navigation. It may be exposed at low water. Compare - reef. GG

shoreline - The intersection of a specified plane of water with the beach; it migrates with changes of the tide or of the water level. Compare - strand line. GG

shoulder - The hillslope position that forms the uppermost inclined surface near the top of a hillslope. If present, it comprises the transition zone from backslope to summit. The surface is dominantly convex in profile and erosional in origin. Compare - summit, backslope, footslope, and toeslope. HP

shrub-coppice dune - A small, streamlined dune that forms around brush and clump vegetation. GG

side slope - The slope bounding a drainageway and lying between the drainageway and the adjacent interfluvium. It is generally linear along the slope width and overland flow is parallel down the slope. Compare - head slope, nose slope. RR

sill [intrusive rocks] - a tabular, igneous intrusion that parallels the planar structure of the surrounding rock. Compare - dike. GG

siltstone - Sedimentary rock containing dominantly silt-size clastic particles.

sinkhole - A closed depression formed either by solution of the surficial bedrock e.g., limestone, gypsum, salt or by collapse of underlying caves. Complexes of sinkholes in carbonate-rock terrain are the main components of karst topography. Synonym (not preferred) - doline. HP

slackwater - A quiet part of, or a still body of water in a stream. Compare - backswamp. GG

slide [mass movement] - (a) A mass movement process or descent resulting from failure of earth,

snow, or rock under shear stress along one or several surfaces that are either visible or may reasonably be inferred; e.g., landslide; snowslide; rockslide. The moving mass may or may not be greatly deformed, and movement may be rotational or planar. A slide can result from lateral erosion, lateral pressure, weight of overlying material, accumulation of moisture, earthquakes, expansion owing to freeze-thaw of water in cracks, regional tilting, undermining, fire, and human agencies. (b) The track of bare rock or furrowed earth left by a slide. (c) The landform or mass of material moved in or deposited by a slide. Compare - avalanche, debris avalanche, avalanche chute. GG

slip face - The steeply sloping surface on the lee side of a dune, standing at or near the angle of repose of loose sand, and advancing downwind by a succession of slides wherever that angle is exceeded. GG

slope - the inclination of the land surface from the horizontal. Percent slope is the vertical distance divided by the horizontal distance, then multiplied by 100.

slope alluvium - Sediment gradually transported on mountain or hill slopes primarily by alluvial processes and characterized by particle sorting. In a profile sequence, sediments may be distinguished by differences in size and/or specific gravity of coarse fragments and may be separated by stone lines. Sorting of rounded or subrounded pebbles or cobbles and burnished peds distinguish these materials from unsorted colluvial deposits. Compare - colluvium. HP

slough - (a) A small marsh, especially a marshy area lying in a local, shallow, closed depression on a piece of dry land, as on the prairie of the midwestern U.S.A. (b) A term used, especially in the Mississippi Valley, for a creek or sluggish body of water in a tidal flat, flood plain, or coastal marshland. Compare - bayou, oxbow. (c) A sluggish channel of water, such as a side channel of a river, in which water flows slowly through low, swampy ground, as along the Columbia River, or a section of an abandoned river channel which may contain stagnant water and occurs in a flood plain or delta. (d) An area of soft, miry, muddy or waterlogged ground, a place of deep mud. GG

sloughed till - (not recommended) use flow till.

slump - a) A mass movement process characterized by a landslide involving a shearing and rotary movement of a generally independent mass of rock or earth along a curved slip surface (concave upward) and about an axis parallel to the slope from which it descends, and by backward tilting of the mass with respect to that slope so that the slump surface often exhibits a reversed slope facing uphill. b) The landform or mass of material slipped down during, or produced by a slump. Compare - rotational landslide. GG

slump block - The mass of material torn away as a coherent unit during slumping. GG

slump till - see "till"

soil creep - refer to creep.

soil ripples - (not recommended) use terracettes.

solifluction - Slow, viscous downslope flow of water-saturated regolith. Rates of flow vary widely. The presence of frozen substrate or even freezing and thawing is not implied in the original definition. However, one component of solifluction can be creep of frozen ground. The term is commonly applied to processes operating in both seasonal frost and permafrost areas. Compare - creep. NRC

solifluction lobe - An isolated tongue-shaped feature up to 25 m wide and 150 m or more long, formed by rapid solifluction on certain sections of a slope showing variations in gradient. This feature commonly has a steep (15° - 60°) front and a relatively smooth upper surface. NRC

solifluction sheet - A broad deposit of nonsorted, water-saturated, locally derived material that is moving or has moved downslope. Stripes are commonly associated with solifluction sheets. NRC

solifluction terrace - A low step with a straight or lobate front, the latter reflecting local differences in rate of flow. A solifluction terrace may have bare mineral soil on the upslope part and 'folded under' organic matter in both the seasonally thawed and the frozen soil. NRC

sorted circle - A type of patterned ground whose mesh (shape) is largely circular and has a sorted appearance commonly due to a border of coarse fragments surrounding finer material, occurring either singly or in groups. Diameters range from

a few centimeters to more than 10 meters. The coarse fragment border may be 35 cm high and 8 to 12 cm wide. Compare - patterned ground. GG and NRC

sorted polygon - refer to patterned ground.

spit - (a) A small point or low tongue or narrow embankment of land, commonly consisting of sand or gravel deposited by longshore drifting and having one end attached to the mainland and the other terminating in open water, usually the sea; a finger-like extension of the beach. (b) A relatively long, narrow shoal or reef extending from the shore into a body of water. GG

splay - refer to flood-plain splay.

spoil bank - Rock debris, banks, and earthy dump deposits resulting from the excavation of ditches and strip mines. GSST

sporadic permafrost - The area near the southern boundary of discontinuous permafrost where permafrost occurs in isolated patches or islands. Compare - continuous permafrost, discontinuous permafrost. NRC

spur [geomorphology] - A subordinate ridge or lesser elevation that projects sharply from the crest or side of a hill, mountain, or other prominent range of hills or mountains. GG

spur ridge - (not recommended) use spur.

stack - A steep-sided mass of rock rising above its surroundings on all sides from a slope or hill. GG

stagnant ice - a) glacial ice that is not flowing forward and is not receiving material from an accumulation area; b) detached blocks of ice left behind by a retreating glacier, usually buried in a moraine and melting very slowly. GG

steptoe - An island-like area in a lava flow. HP

stone line - A sheet-like lag concentration of coarse fragments in surficial sediments. In cross section, the line may be marked only by scattered fragments or it may be a discrete layer of fragments. The fragments are more often pebbles or cobbles than stones. A stone line generally overlies material that was subject to weathering, soil formation, and erosion before deposition of the overlying material. Many stone lines seem to be buried erosion pavements,

originally formed by running water on the land surface and concurrently covered by surficial sediment. Compare - desert pavement. HP & RR

stone net - refer to patterned ground. Synonym - sorted polygon, stone polygon.

storm surge - An abnormal, sudden rise of sea level along an open coast during a storm, caused primarily by onshore-wind stresses, or less frequently by atmospheric pressure reduction, resulting in water piled up against the coast. It is most severe when accompanied by a high tide. GG

strandline - a) the shoreline, especially a former shoreline now elevated above the present water level. b) a beach, especially one raised above the present sea or lake level. GG

strand plain - A prograded shore built seaward by waves and currents, and continuous for some distance along the coast. It is characterized by subparallel beach ridges and swales, in places with associated dunes. GG

strath terrace - a type of stream terrace, formed as an erosional surface cut on bedrock and thinly mantled with stream deposits (alluvium).

stratified - (adjective) Formed, arranged, or laid down in layers. The term refers to geologic deposits. Layers in soils that result from the processes of soil formation are called horizons; those inherited from the parent material are called strata. HP

stratigraphy - The branch of geology that deals with the definition and interpretation of layered earth materials; the conditions of their formation; their character, arrangement, sequence, age, and distribution; and especially their correlation by the use of fossils and other means. The term is applied both to the sum of the characteristics listed and a study of these characteristics. HP

stratovolcano - A volcano that is constructed of alternating layers of lava and pyroclastic deposits, along with abundant dikes and sills. Viscous, acidic lava may flow from fissures radiating from a central vent, from which pyroclastics are ejected. GG

stream - (a) Any body of running water that moves under gravity to progressively lower levels, in a relatively narrow but clearly defined

channel on the ground surface, in a subterranean cavern, or beneath or in a glacier. It is a mixture of water and dissolved, suspended, or entrained matter. (b) A term used in quantitative geomorphology interchangeably with channel. **GG**

stream channel - refer to channel.

stream order - An integer system applied to tributaries (stream segments) that documents their relative position within a drainage basin network as determined by the pattern of its confluences. The order of the drainage basin is determined by the highest integer. Several systems exist. In the Strahler system, the smallest unbranched tributaries are designated order 1; the confluence of two first-order streams produces a stream segment of order 2; the junction of two second-order streams produces a stream segment of order 3, etc. **GG**

stream terrace - One of a series of platforms in a stream valley, flanking and more or less parallel to the stream channel, originally formed near the level of the stream, and representing the dissected remnants of an abandoned flood plain, stream bed, or valley floor produced during a former state of erosion or deposition. Erosional surfaces cut into bedrock and thinly mantled with stream deposits (alluvium) are designated "strath terraces." Remnants of constructional valley floors thickly mantled with alluvium are termed alluvial terraces. Compare - flood-plain step, terrace. **HP**

string bog - A peatland with rough parallel narrow ridges of peat dominated by peat vegetation interspersed with slight depressions, many of which contain shallow pools. The ridges are at right angles to low < 2° slopes. They are typically 1 to 3 m wide, up to 1 m high and may be over 1 km long. The ridges are slightly elevated and are better drained allowing shrubs and trees to grow. They are best developed in areas of discontinuous permafrost. **NRC**

stripe - a type of patterned ground; one of the alternating bands of fine and coarse surface material, or of rock or soil and vegetation-covered ground, commonly found on steeper slopes. It is usually straight, but may be sinuous or branching. Compare - patterned ground. **GG**

structural back slope - (not recommended) use dip slope.

structural bench - A platform-like, nearly level to gently inclined erosional surface developed on resistant strata in areas where valleys are cut in alternating strong and weak layers with an essentially horizontal attitude. Structural benches are bedrock controlled, and in contrast to stream terraces, have no geomorphic implication of former, partial erosion cycles and base-level controls, nor do they represent a stage of flood-plain development following an episode of valley trenching. Compare - ledge.; see scarp. **HP**

subaerial - (adjective) Said of conditions and processes, such as erosion, that exist or operate in the open air on or immediately adjacent to the land surface; or of features and materials, such as eolian deposits, that are formed or situated on the land surface. **GG**

subglacial - (a) Formed or accumulated in or by the bottom parts of a glacier or ice sheet; said of meltwater streams, till, moraine, etc. (b) Pertaining to the area immediately beneath a glacier, as subglacial eruption or subglacial drainage. **GG**

subglacial melt-out till - refer to till

summit - (a) The topographically highest hillslope position of a hillslope profile and exhibiting a nearly level (planar or only slightly convex) surface. Compare - shoulder, backslope, footslope, and toeslope, crest. (b) A general term for the top, or highest area of a landform such as a hill, mountain, or tableland. It usually refers to a high interfluvial area of relatively gentle slope that is flanked by steeper hillslopes, e.g., mountain fronts or tableland escarpments. **HP**

superglacial - (not recommended) refer to supraglacial. **GG**

supraglacial - Carried upon, deposited from, or pertaining to the top surface of a glacier or ice sheet; said of meltwater streams, till, drift, etc. **GG**

supraglacial debris-flow sediment - refer to "till"

supraglacial melt-out till - refer to "till"

supraglacial till - refer to ablation till.

swale - (a) A slight, open depression which lacks a defined channel that can funnel overland or subsurface flow into a drainageway. Soils in

swales tend to be more moist and thicker (cummulic) compared to surrounding soils. (not preferred; refer to depression). SW (b) A shallow depression in an undulating ground moraine due to uneven glacial deposition; Compare - swell-and-swale topography. (c) A long, narrow, generally shallow, trough-like depression between two beach ridges, and aligned roughly parallel to the coastline. (not preferred; refer to interdune) GG

swamp - An area of low, saturated ground, intermittently or permanently covered with water, and predominantly vegetated by shrubs and trees, with or without the accumulation of peat. Compare - marsh, bog, fen. GG

swash zone - The sloping part of the beach that is alternately covered and uncovered by the uprush of waves, and where longshore movement of water occurs in a zigzag (upslope-downslope) manner. GG

swell - (not recommended) refer to swell-and-swale topography.

swell-and-swale topography - Topography of ground moraine having low relief, gentle slopes, and well-rounded hills or hummocks interspersed with shallow depressions. HP

syncline - A unit of folded strata that is concave upward. In a simple syncline, beds forming the opposing limbs of the fold dip toward its axial plane. Compare - anticline, monocline. HP

tableland - A general term for a broad upland mass with nearly level or undulating summit area of large extent and steep side slopes descending to surrounding lowlands. Compare - plateau, mesa. HP

talus - Rock fragments of any size or shape (usually coarse and angular) derived from and lying at the base of a cliff or very steep rock slope. The accumulated mass of such loose broken rock formed chiefly by falling, rolling, or sliding. Compare - colluvium, mass movement, scree. GG

tank - (colloquial: southwestern USA) A natural depression or cavity in impervious rocks in which water collects and remains for the greater part of the year. GG

tephra - A collective term for all clastic volcanic materials that are ejected from a vent during an

eruption and transported through the air, including ash [volcanic], blocks [volcanic], cinders, lapilli, scoria, and pumice. Tephra is a general term which, unlike many volcanoclastic terms, does not denote properties of composition, viscosity, or grain size. HP

terminal moraine - An end moraine that marks the farthest advance of a glacier and usually has the form of a massive arcuate or concentric ridge, or complex of ridges, underlain by till and other drift types. Compare - end moraine, recessional moraine, ground moraine. HP and GG

terrace [geomorphology] - A step-like surface, bordering a valley floor or shoreline, that represents the former position of a flood plain, or lake or sea shore. The term is usually applied to both the relatively flat summit surface (tread), cut or built by stream or wave action, and the steeper descending slope (scarp, riser), graded to a lower base level of erosion. Compare - stream terrace, flood-plain step. HP

terrace slope - not recommended, use riser

terraces - Small, irregular step-like forms on steep hillslopes, especially in pasture, formed by creep or erosion of surficial materials that may or may not be induced by trampling of livestock such as sheep or cattle. Synonyms (not preferred) - catstep, sheep or cattle track. HP

terrain - A tract or region of the Earth's surface considered as a physical feature, an ecological environment, or a site of some planned human activity. GG

Tertiary - The period of the Cenozoic Era of geologic time (approximately from 65 to 2 million years ago). Epoch/series subdivisions comprise, in order of increasing age, Pliocene, Miocene, Oligocene, Eocene, and Paleocene. HP

thaw-sensitive permafrost - Perennially frozen ground which, upon thawing, will experience significant thaw settlement and suffer loss of strength to a value significantly lower than that for similar material in an unfrozen condition. Compare - thaw-stable permafrost. NRC

thaw-stable permafrost - Perennially frozen ground which, upon thawing, will not experience either significant thaw settlement or loss of

strength. Compare - thaw-sensitive permafrost. NRC

thermokarst - Karst-like topographic features produced in a permafrost region by local melting of ground ice and subsequent settling of the ground. GG

thermokarst depression - A hollow in the ground resulting from subsidence following the local melting of ground ice in a permafrost region. GG

thermokarst lake - Lake or pond produced in a permafrost region by melting of ground ice. HP

tidal flat - An extensive, nearly horizontal, marshy or barren tract of land that is alternately covered and uncovered by the tide, and consists of unconsolidated sediment mostly clays, silts and/or sand). It may form the top surface of a deltaic deposit. GG

till [glacial] - Dominantly unsorted and unstratified drift, generally unconsolidated deposited directly by and underneath a glacier without subsequent reworking by meltwater, and consisting of a heterogeneous mixture of clay, silt, sand, gravel, stones, and boulders. Compare - ablation till, basal till, lodgement till, drift, moraine. GG

till plain - An extensive flat to undulating surface underlain by till. Compare - till, ground moraine. HP

toeslope - The hillslope position that forms the gently inclined surface at the base of a hillslope. Toeslopes in profile are commonly gentle and linear, and are constructional surfaces forming the lower part of a hill-slope continuum that grades to valley or closed-depression floors. Compare - summit, shoulder, backslope, footslope, valley floor. HP

tombolo - A sand or gravel bar or barrier that connects an island with the mainland or with another island. GG

topography - The relative position and elevations of the natural or manmade features of an area that describe the configuration of its surface. HP

tor - A high, isolated pinnacle, or rocky peak; or a pile of rocks, much-jointed and usually granitic, exposed to intense weathering, and often assuming peculiar or fantastic shapes. GG

translational slide - A mass movement landform and a processes and a type of landslide, involving the downslope displacement of soil-rock material on a surface that is roughly parallel to the general ground surface, in contrast to rockfalls and rotational landslides. The term includes such diverse landslide types as rock slide, block glides, slab or flake slides, and debris slides. Compare - fall, rotational landslide, slide. GG

transverse dune - A very asymmetric sand dune elongated perpendicular to the prevailing wind direction, having a gentle windward slope and a steep leeward slope standing at or near the angle of repose of sand; it generally forms in areas of sparse vegetation. GG

tread - The flat or gently sloping surface of natural step-like landforms, commonly one of a series, such as successive stream terraces. Compare - riser GG

tree-tip mound - the small mound of debris sloughed from the root plate (ball) of a tipped-over tree. Sometimes called a cradle knoll (not preferred). Local soil horizons are commonly obliterated and result in heterogeneous strata. Compare - tree-tip pit. Modified substantially from BHM.

tree-tip pit - the small pit or depression resulting from an area vacated by the root plate (ball) resulting from tree-tip ("tree-throw"). Such pits are commonly adjacent to small mounds composed of the displaced material. Subsequent infilling commonly results in a heterogeneous soil matrix, that may or may not include a stone line that lines the depression. Compare - tree-tip mound. Modified substantially from BHM.

trough [geomorphology] - (a) Any long, narrow depression in the earth's surface, such as one between hills or with no surface outlet for drainage; especially a broad, elongate U-shaped valley, such as a glacial trough or a trench. (b) The channel in which a stream flows. Compare - U-shaped valley. GG

trough end - (not recommended - refer to cove, cirque). The steep, semicircular rock wall forming the abrupt head or end of a U-shaped valley. Compare - headwall. GG

trough valley - refer to U-shaped valley.

trough wall - refer to valley side.

tuff - A compacted deposit that is 50 percent or more volcanic ash and dust.

tunnel valley - a relatively shallow trench or depression cut into drift and other loose material, or in bedrock, by a subglacial stream not loaded with coarse sediment that may or may not be part of the present day drainage pattern. **GG**

turf hummock - A hummock consisting of vegetation and organic matter with or without a core of mineral soil or stones. Compare - earth hummock, non-sorted circle, patterned ground. **NRC**

unconformity - A substantial break or gap in the geologic record where a unit is overlain by another that is not in stratigraphic succession. Compare - discontinuity. **GG**

underfit stream - A stream that appears to be too small to have eroded the valley in which it flows; a stream whose volume is greatly reduced or whose meanders show a pronounced shrinkage in radius. It is a common result of drainage changes effected by capture, glaciers, or climatic variations. **GG**

upland [geomorphology] - a general term for a) the higher ground of a region, in contrast with a valley, plain, or other low-lying, adjacent land. b) Land at a higher elevation than the flood plain or low stream terrace; land above the footslope zone of the hillslope continuum. Compare - lowland. **HP & GG**

uplift [tectonic] - A structurally high area in the earth's crust, produced by positive movements that raise or upthrust the rocks, as in a dome or arch. **GG**

upthrust - (a) An upheaval of rock; said preferably of a violent upheaval. (b) A high angle gravity or thrust fault in which the relatively upthrown side was the active (moving) element. **HP**

U-shaped valley - a valley having a pronounced parabolic cross profile suggesting the form of a broad letter "U", with steep walls and a broad, nearly flat floor; specifically a valley carved by glacial erosion. Compare - V-shaped valley. **GG**

valley - An elongate, relatively large, externally drained depression of the Earth's surface that is

primarily developed by stream erosion or glacial activity. Compare - basin. **HP**

valley-border surfaces - A general grouping of valley-side geomorphic surfaces that occur in a stepped sequence graded to successively lower stream base levels, produced by episodic valley entrenchment. **HP**

valley fill - The unconsolidated sediment deposited by any agent (water, wind, ice, mass wasting) so as to fill or partly fill a valley. **HP**

valley flat - A flood-plain landform. A general term for broad, nearly level flood-plain surfaces that are not subject to frequent inundation. Compare - backswamp, meander belt. **HP**

valley floor - A general term for the nearly level to gently sloping, lowest surface of a valley. Landforms include axial stream channels, the flood plain, and, in some areas, low terrace surfaces. Compare - flood-plain landforms, meander, braided channel, valley side. **HP**

valley side - The sloping to very steep surfaces between the valley floor and summits of adjacent uplands. Well-defined, steep valley sides have been termed valley walls (not recommended). Note: Scale, relief, and perspective may require use of closely related terms such as hill slope or mountain slope. **HP**

valley side alluvium - A concave "slopewash" deposit at the base of a hill slope, mountain slope, terrace escarpment, etc., that may or may not include the alluvial toe slope. **HP**

valley train - A long narrow body of outwash confined within a valley beyond a glacier; it may, or may not, emerge from the valley and join an outwash plain. **GG**

valley wall - (not recommended) use valley side

varve - A sedimentary layer, lamina, or sequence of laminae, deposited in a body of still water within 1 year; specifically, a thin pair of graded glaciolacustrine layers seasonally deposited, usually by meltwater streams, in a glacial lake or other body of still water in front of a glacier. Compare - rhythmite. **GG**

ventifact - A stone or pebble that has been shaped, worn, faceted, cut, or polished by the abrasive action of windblown sand, usually under arid conditions. When the pebble is at the

ground surface, as in a desert pavement, the upper part is polished while the lower or below ground part is angular or subangular. **GG & HP**

vitric - Pyroclastic material that is more than 75% glass. **GG**

volcanic - (adjective) Pertaining to (a) the deep seated (igneous) processes by which magma and associated gases rise through the crust and are extruded onto the earth's surface and into the atmosphere, and (b) the structures, rocks, and landforms produced. Compare - extrusive, volcanoclastic. **HP**

volcanic cone - A conical hill of lava and/or pyroclastics that is built up around a volcanic vent. **GG**

volcanic dome - A steep-sided, rounded extrusion of highly viscous lava squeezed out from a volcano, and forming a dome-shaped or bulbous mass of congealed lava above and around the volcanic vent. **GG**

volcanoclastic - Pertaining to the entire spectrum of fragmental materials with a preponderance of clasts of volcanic origin. The term includes not only pyroclastic materials but also epiclastic deposits derived from volcanic source areas by normal processes of mass movement and stream erosion. Examples: welded tuff, volcanic breccia. **HP**

volcanic plug - (not recommended) use plug.

volcano - a) a vent in the surface of the Earth through which magma and associated gases and ash erupt; also, the form or structure, usually conical, that is produced by the ejected material. b) Any eruption of material, e.g. mud, that resembles a magmatic volcano. **GG '87**

V-shaped valley - a valley having a pronounced cross profile suggesting the form of the letter "V", characterized by steep sides and short tributaries; specifically a narrow valley resulting from downcutting by a stream. The "V" becomes broader as the downcutting progresses. Compare - U-shaped valley. **GG**

wash (dry wash) - (colloquial: western U.S.A.) The broad, flat-flooded channel of an ephemeral stream, commonly with very steep to vertical banks cut in alluvium. Note: When channels reach intersect zones of ground-water discharge they are more properly classed as "intermittent

stream" channels. Synonym - arroyo. Compare - gully. **HP**

washover fan - A fan-like deposit of sand washed over a barrier island during a storm. **GG**

waterway - a) A general term for a way or channel, either natural (as a river) or artificial (as a canal), for conducting the flow of water. b) A navigable body or stretch of water available for passage; a watercourse. Compare - drainage way. **GG**

wave-built terrace - A gently sloping coastal feature at the seaward or lakeward edge of a wave-cut platform, constructed by sediment brought by rivers or drifted along the shore or across the platform and deposited in the deeper water beyond. Compare - beach plain, strand plain. **GG**

wave-cut platform - A gently sloping surface produced by wave erosion, extending into the sea or lake from the base of the wave-cut cliff. It represents both the wave-cut bench and the abrasion platform. **GG**

wave-cut terrace - (not recommended) use wave-built terrace.

weathering - All physical disintegration, chemical decomposition, and biologically induced changes in rocks or other deposits at or near the earth's surface by atmospheric or biologic agents or circulating surface waters with essentially no transport of the altered material. These changes result in disintegration and decomposition of the material. Compare - regolith, residuum, saprolite. **HP**

wind gap - A former water gap now abandoned by the stream that formed it, suggesting stream piracy or stream diversion. **HP**

welding - a) consolidation of sediments (especially of clays) by pressure resulting from the weight of superincumbent material or from earth movement, characterized by cohering particles brought within the limits of mutual molecular attraction as water is squeezed out of the sediments. b) the diagenetic process whereby discrete crystals and/or grains become attached to each other during compaction, often involving pressure solution and pressure transfer. **GG**

welded tuff - a glass-rich rock that has been indurated by the welding together of its glass

shards under the combined action of the heat retained by particles, the weight of overlying material, and hot gasses. It is generally composed of silica pyroclasts and appears banded or streaky. GG

woody peat [Soil Taxonomy] - An accumulation of organic material that is predominantly composed of trees, shrubs, and other woody plants. Compare herbaceous peat, moss peat, sedimentary peat, peat, muck, and mucky peat. SSM

629.03 References.

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Exhibit 629-1 List of Landscape, Landform, and Microfeature Terms Contained in the Glossary.

Note: NR - indicates terms that are NOT RECOMMENDED; NP - indicates terms that are NOT PREFERRED; LF - Landform; LS - Landscape; micro - Microfeature.

A) LANDSCAPE TERMS
(LF = Landform)

badlands	meander belt
bajada (also LF)	mountains (singular = LF)
basin	peneplain - NR
bolson	piedmont
breaks	plains (also LF)
coastal plain (also LF)	plateau (also LF)
dune field	river valley
drumlin field	sandhills
fan piedmont (also LF)	scabland
foothills	semi-bolson
hills	tableland
intermontane basin (also LF)	thermokarst
karst	till plain (also LF)
lava plateau (also LF)	upland - NP
lowland - NP	valley (also LF)

B) LANDFORM TERMS
(LS = Landscape; micro = microfeature; w = water body)

a'a	bayou (w)
alas	beach
alluvial cone - NP	beach plain
alluvial fan	beach ridge
alluvial flat	beach terrace
alluvial plain - NR	bench - NP
alluvial terrace - NP	berm
anticline	blind valley
arete	block field (also material)
arroyo	block stream (also material)
ash flow (also material)	blowout
atoll	bluff
avalanche chute	bog
avalanche track - NR	bottomland - NR
backshore	boulder field - NR
backshore terrace - NP	braided channel - NR
backswamp	braided stream
bajada (also LS)	butte
ballena	caldera
ballon	canyon
bar	Carolina Bay
barchan dune	channel
barrier bar - NR	chenier
barrier beach	chenier plain
barrier flat	cinder cone
barrier island	cirque
basin floor	cliff
basin-floor remnant	coalescent fan - NR
bay (w)	coalescent fan piedmont - NP

coastal plain (also LS)	fluve - NP
col	fold
collapsed ice-floored lakebed	foredune
collapsed ice-walled lakebed	fosse
collapsed lake plain	free face
collapsed outwash plain	gap
coppice-mound - NR	giant ripple
coulee	glacial drainage channel
cove	glacial lake (relict)
crater (volcanic)	glacial lake (w)
crest - NR	gorge
crevasse filling	graben
cutoff	ground moraine
dead -ice moraine - NR	gulch
debris avalanche (also material)	gut (channel); (w)
debris flow (also material)	gut (valley)
deflation basin	hanging valley
delta	headland
delta plain	headwall
depression	highmoor bog
diapir	hill
dike	hillside - NR
dipslope	hill top - NR
disintegration moraine	hogback
divide	horn
doline - NP	horst
dome	inselberg
drainageway	inset fan
draw	interdune
drumlin	interfluve
dry wash - NP	intermontane basin (also LS)
dune	interstream divide - NP
earth dike - NP	kame
earth flow (also material)	kame moraine
elevated lake plain - NP	kame terrace
end moraine	kettle
erosional outlier - NP	kipuka
erosion remnant	knob
escarpment	knoll
esker	lagoon (w)
estuary (w)	lahar (also material)
faceted spur	lake (w)
fall (also material)	lakebed
fan	lake plain
fan apron	lakeshore
fanhead trench	lake terrace
fan piedmont (also LS)	landslide (also material)
fan remnant	lateral moraine
fan skirt	lava flow
fan terrace - NP	lava plain
fault-line scarp	lava plateau (also LS)
fen	lava tube
fjord (w)	ledge
flat	levee (stream)
flood plain	loess bluff
flood-plain playa	loess hill
flood-plain splay	longshore bar [relict]
flood-plain step	louderback (also structure)
floodwall - NR	low marsh - NR
flute	lowmoor bog

- marine terrace
 marsh
 mawae
 meander
 meandering channel
 meander scar
 meander scroll
 medial moraine
 mesa
 monadnock
 monocline (also structure)
 moraine
 mountain (also LS)
 mountainside - NR
 mountain slope
 mountain valley
 mud flat
 mudflow (also material)
 muskeg
 natural levee
 notch
 nunatak
 offshore bar - NR
 outwash fan
 outwash plain
 outwash terrace
 oxbow
 oxbow lake (ephemeral)
 oxbow lake (w)
 paha
 parabolic dune
 parna dune
 partial ballena
 patterned ground
 peak
 peat plateau
 pediment
 pingo
 pitted outwash plain
 plain (also LS)
 plateau (also LS)
 playa
 playa lake (w)
 plug dome
 pluvial lake (relict)
 pluvial lake (w)
 pocosin
 point bar
 pothole (also micro)
 pothole lake (w)
 pressure ridge (volcanic)
 proglacial lake (w)
 raised beach
 raised bog
 ravine
 recessional moraine
 reef
 remnant - NP
 ribbed fen
 transverse dune
 trough
 ridge
 rim
 rise - NP
 roche moutonnée
 rock glacier
 rotational landslide (also material)
 rotational slump - NR
 saddle
 salt marsh
 salt pond (w)
 sand flow (also material)
 sand ridge - NP
 sand sheet
 scarp
 scarp slope
 scroll - NP
 sea cliff
 seif dune
 shield volcano
 shoal (relict)
 shoal (w)
 shoreline
 shrub-coppice dune
 sill (also structure)
 sinkhole
 slackwater (w)
 slide (also material)
 slough (also water)
 slough (permanent water)
 slump
 slump block
 spit
 splay - NP
 spur
 spur ridge - NR
 stack
 steptoe
 strand plain
 strath terrace
 stratovolcano
 stream channel - NP
 stream terrace
 string bog
 structural back slope -NR
 structural bench
 swale (also micro)
 swallow hole
 swamp
 syncline (also structure)
 terminal moraine
 terrace
 terrace slope - NR
 thermokarst depression
 thermokarst lake (w)
 tidal flat
 till plain (also LS)
 tombolo
 tor
 translational slide
 valley wall - NR
 volcanic cone

trough end - NR
trough valley - NR
trough wall - NR
tunnel valley
U-shaped valley
valley
valley flat
valley floor
valley side
valley train

volcanic dome
volcano
V-shaped valley
wash
washover fan
wave-built terrace
wave-cut platform
wave-cut terrace - NR
wind gap

C) MICROFEATURE TERMS

catsteps - NP
earth pillar
frost boil
gullies
mound

patterned ground microfeatures:

a) periglacial patterned ground microfeatures:

circle
earth hummocks
frost polygons - NR
high-center polygons
ice wedge polygons
low-center polygons
nets (nonsorted) - NP
nets (sorted) - NP
non-sorted circles
nonsorted polygons - NP
palsa, palsen (peat hummocks)
polygons
sorted circles
sorted polygon - NP
stone nets - NP
stripes
turf hummocks

b) other patterned ground microfeatures:

bar and channel
gilgai
hummocks
mima mounds
pimple mounds

pinnacle
pond (also water list)
pool (also water list)
pothole (also LF)
ripple mark
sand boil
scour (mark)
sheep tracks - NR
soil ripples - NR
solifluction lobe
solifluction sheet
solifluction terrace
swale (also LF)
swell - NR
tank (also water list)
terraces
tree-tip mound
tree-tip pit

Exhibit 629-2 Subsets of Landform Terms (Grouped by "Process" or Common Setting).

1. Beach, Coastal, Marine, and Lacustrine Landforms
2. Depressional Landforms
3. Eolian Landforms
4. Erosional Landforms
5. Fluvial Landforms
6. Glacial Landforms
7. Mass Movement Landforms
8. Periglacial Landforms
9. Solution Landforms
10. Slope Landforms
11. Tectonic, Structural, and Volcanic Landforms
12. Wetland Terms and Landforms
13. Water "Landforms" & Related Terms

1. BEACH, COASTAL, MARINE, AND LACUSTRINE LANDFORMS

atoll	lakebed (relict)
backshore	lake plain
bar	lake terrace
barrier beach	longshore bar [relict]
barrier flat	marine terrace
barrier island	mud flat
beach	playa
beach plain	pluvial lake
beach ridge	raised beach
beach terrace	reef
berm	salt marsh
bluff	sea cliff
chenier	shoal (relict)
chenier plain	shoreline
coastal plain	spit
delta	stack
delta plain	strand plain
flat	tidal flat
foredune	tombolo
headland	washover fan
island	wave-built terrace
lagoon	wave-cut platform

2. DEPRESSIONAL LANDFORMS

alluvial flat	intermontane basin
basin floor	kettle
basin floor remnant	mountain valley
canyon	playa
Carolina Bay	pothole
col	ravine
coulee	saddle
cove	swale
depression	trough
drainageway	U-shaped valley
gap	valley
gorge	valley floor
gulch	V-shaped valley
gut (valley)	

3. EOLIAN LANDFORMS

barchan dune	loess hill
blowout	paha
deflation basin	parabolic dune
dune	parna dune
foredune	sand sheet
interdune	seif dune
loess bluff	transverse dune

4. EROSIONAL LANDFORMS - water erosion (overland flow) related and excluding fluvial, glaciofluvial, and eolian erosion.

arete	monadnock
ballena	notch
ballon	paha
basin floor remnant	partial ballena
col	peak
cuesta	pediment
erosion remnant	saddle
free face	scarp slope
gap	strath terrace
hogback	structural bench
horn	tor
inselberg	
meander scar	

5. FLUVIAL LANDFORMS - dominantly related to concentrated water (channel flow), both erosional and depositional processes, and excluding glaciofluvial landforms.

alluvial fan	coulee
alluvial flat	cutoff
arroyo	delta
backswamp	delta plain
bajada	drainageway
bar	draw
basin-floor remnant	fan skirt
block stream	fanhead trench
braided stream	flood plain
canyon	flood-plain playa
channel	flood-plain splay

flood-plain step
 giant ripple
 gorge
 gulch
 gut (valley)
 inset fan
 levee
 meander scar
 meander scroll
 natural levee

oxbow
 oxbow lake (ephemeral)
 pediment
 point bar
 ravine
 strath terrace
 stream terrace
 wash
 wind gap

6. GLACIAL LANDFORMS - including glaciofluvial forms.

arete
 cirque
 col
 collapsed ice-floored lakebed
 collapsed ice-walled lakebed
 collapsed lake plain
 collapsed outwash plain
 crevasse filling
 disintegration moraine
 drumlin
 end moraine
 esker
 flute
 fosse
 glacial drainage channel
 glacial lake (relict)
 ground moraine
 hanging valley
 kame
 kame moraine

kame terrace
 kettle
 lateral moraine
 medial moraine
 moraine
 nunatak
 outwash fan
 outwash plain
 outwash terrace
 pitted outwash plain
 pressure ridge (ice)
 proglacial lake (relict)
 recessional moraine
 roche moutonnée
 rock glacier
 terminal moraine
 till plain
 tunnel valley
 U - shaped valley

7. MASS MOVEMENT LANDFORMS - including creep forms.

ash flow
 avalanche chute
 debris flow
 earth flow
 fall
 lahar
 landslide
 mudflow

rock glacier
 rotational landslide
 sand flow
 slide
 slump
 slump block
 talus
 translational slide

8. PERIGLACIAL LANDFORMS - (modern or relict) including patterned ground (note: consider "patterned ground" as a landform, but treat specific types of patterned ground, singular or plural, as microfeatures).

alas
 block field
 muskeg
 patterned ground
 peat plateau

pingo
 rock glacier
 string bog
 thermokarst depression

9. SOLUTION LANDFORMS

blind valley	swallow hole
sinkhole	thermokarst depression

10. SLOPE LANDFORMS - terms that tend to be generic and that emphasize their form rather than any particular genesis or process.

bluff	mesa
butte	monadnock
cliff	mountain
cuesta	mountain valley
dome	mountain slope
escarpment	notch
faceted spur	paha
fault-line scarp	peak
free face	plain (also LS)
gap	plateau (also LS)
headwall	ridge
hill	rim
hogback	scarp
horn	spur
inselberg	structural bench
interfluve	tor
knob	U - shaped valley
knoll	V - shaped valley
lahar	wind gap
ledge	

11. TECTONIC, STRUCTURAL, AND VOLCANIC LANDFORMS

anticline	lava plain
caldera	lava plateau (also LS)
cinder cone	lava tube
crater (volcanic)	louderback
cuesta	mawac
diapir	monocline
dike	plug dome
dipslope	pressure ridge (volcanic)
dome	scarp slope
fault-line scarp	shield volcano
graben	steptoe
hogback	stratovolcano
horst	structural bench
kipuka	syncline
lahar	volcanic cone
lava flow	volcanic dome

12. WETLAND TERMS AND LANDFORMS - [Provisional list: conventional, geologic definitions; not legalistic or regulatory usage].

alas	oxbow lake (ephemeral)
backswamp	peat plateau
bog	playa (intermittent water)
Carolina Bay	pocosin
estuary	pothole (intermittent water)
fen	raised bog
highmoor bog	ribbed fen
lowmoor bog	salt marsh
marsh	slough
moor	string bog
mud flat	swamp
muskeg	tidal flat

13. WATER "LANDFORMS" & RELATED TERMS - legitimate landform terms but generally treated generically as "water" in soil survey.

bay	pond (micro)
bayou	pool (micro)
estuary	pothole (lake)
fjord	proglacial lake
glacial lake	salt pond
gut (channel)	shoal
lagoon	slackwater
lake	slough (permanent water)
oxbow lake	tank (micro)
playa lake	thermokarst lake
pluvial lake	

Exhibit 629-3 List of Materials or Material-Related, Structure, or Morphological-Feature Terms Contained in the Glossary.

(NR - indicates terms that are NOT recommended; NP - indicates terms that are not preferred)

ablation till	fanglomerate
alluvium	felsenmeer - NP
aquiclude	felsic rock
aquifer	flowtill
aquitard	formation (stratigraphy)
ash	glacial drift - NR
ash flow	glacial outwash - NR
basal till	glacial till - NR
bed	glaciofluvial deposits
bedded	glaciolacustrine deposits
bedrock	glaciomarine deposits
block	herbaceous peat
block field	ice wedge
block stream	ice wedge cast
boulder field - NR	igneous rock
breccia	interbedded
caliche	intrusive
chert	lacustrine deposit
cinders	lahar
clast	lamination (lamina)
clastic	lamella
colluvium	lapilli
conglomerate	lava flow
continuous permafrost	limestone
country rock	lithologic
craton	lodgement till
cross-bedding	loess
cross-lamination	louderback
cross-stratification	mafic rock
cyclothem	marl
dead-ice - NR	melt-out till
debris	metamorphic rock
deposit	metasediment
desert pavement	moss peat
desert varnish	muck
detritus (geology)	mucky peat
diamicton	mudstone
dike	nueé ardente
dip	outcrop
discontinuity	outwash
discontinuous permafrost	paleosol
dolomite (mineral)	parna
dolomite (rock)	peat
drift (glacial geology)	pedisediment
epiclastic	permafrost
erosional pavement	pitted outwash
erratic	pluton
facies (stratigraphy)	plutonic

porcellanite
pumice
pyroclastic
regolith
residuum
rhythmite
rubble
sand sheet
sandstone
saprolite
scoria
scree
sediment
sedimentary peat
sedimentary rock
shale
siltstone
sill
slope alluvium
sloughed till - NR
slump block
slump till
solifluction sheet
sporadic permafrost
stagnant ice

stone line
strandline
subglacial melt-out till
supraglacial till
supraglacial debris-flow
sediment - NP
supraglacial melt-out
till - NP
supraglacial till - NP
talus
tephra
thaw-sensitive permafrost
thaw-stable permafrost
till (glacial)
tombolo
tor
tuff
valley fill
valley side alluvium
varve
ventifact
vitric
volcaniclastic
welded tuff
woody peat

Exhibit 629-4 List of Other Terms, Including Genesis-Process Terms and Geologic Time Terms Contained in the Glossary.

(NR - indicates terms that are NOT recommended; NP - indicates terms that are not preferred)

aeolian - NR	geomorphology
accretion	gelifraction - NR
active layer	gelivation - NR
active slope - NR	glacial
aggradation	glacial epoch
alluvial	glacial marine
angle of repose	sedimentation
avalanche	glaciation
avulsion	Holocene
buried	ice age - NR
bypassed	ice-rafting
colluvial	ice segregation
competence	intramorainal
conformity	landslide
congelifraction - NP	lithification
congeliturbation - NR	mass movement
constructional	metastable slope - NR
(geomorphology)	Miocene
corrosion	mudflow
creep	nivation
cryoplanation	pedoturbation
cryoturbation	periglacial
debris avalanche	Pleistocene
debris flow (mudflow)	Pliocene
deflation	postglacial - NP
deposition	proximal
distal	Quaternary
earthflow	recent
eolian	relict
erosion	rotational landslide
erosional (geomorphology)	sand flow
exfoliation	scour
exhumed	slide
extramorainic - NP	slump
extramorainal	soil creep - NP
extrusive	solifluction
fall	storm surge
flow	stratified
fluvial	stratigraphy
frost bursting - NR	stream order
frost churning - NR	subaerial
frost riving - NR	subglacial
frost shattering	superglacial - NP
frost splitting - NR	Tertiary
frost stirring - NR	translation slide
frost weathering - NR	volcanic
frost wedging - NR	weathering
	welding

Exhibit 629-5 North American Glacial Episodes and General Geologic Time Scale. (After Morrison; In: Sibrava, et al., 1986; and Harland, et al., 1990)

<u>Geologic Period</u>	<u>Geologic Epoch</u>	<u>Subdivision</u>	<u>(Oxygen isotope stage)</u>	<u>Years BP</u>	
Quaternary	<u>Holocene</u>		(1)	0 to 10-12 ka*	
	Late Pleistocene	<u>Late Wisconsin</u>		(2)	10-12 to 28 ka
		<u>Middle Wisconsin</u>		(3, 4)	28 to 71 ka
		<u>Early Wisconsin (Late Sangamon)</u>		(5a - 5d)	71 to 115 ka
		<u>Sangamon</u>		(5e)	115 to 128 ka
		<u>Late-Mid Pleistocene (Illinoian)</u>		(6-8)	128 to 300 ka
		Middle Pleistocene	<u>Middle-Mid Pleistocene</u>		(9-15)
	<u>Early-Mid Pleistocene</u>			(16-19)	620 to 770 ka
		<u>Early Pleistocene</u>			770 ka to 1.64 Ma**
	Tertiary	<u>Pliocene</u>			1.64 to 5.2 Ma
<u>Miocene</u>				5.2 to 23.3 Ma	
<u>Oligocene</u>				23.3 to 35.4 Ma	
<u>Eocene</u>				35.4 to 56.5 Ma	
<u>Paleocene</u>				56.5 to 65.0 Ma	
Cretaceous	<u>Late Cretaceous</u>			65.0 to 97.0 Ma	
	<u>Early Cretaceous</u>			97.0 to 145.6 Ma	
Jurassic				145.6 to 208.8 Ma	
Triassic				208.8 to approx. 243.0 Ma	
Permian				approx. 243.0 Ma to 290.0 Ma	
Pennsylvanian				290.0 to 322.8 Ma	
Mississippian				322.8 to 362.5 Ma	
Devonian				362.5 to 408.5 Ma	
Silurian				408.5 to 439.0 Ma	
Ordovician				439.0 to 510.0 Ma	
Cambrian				510.0 to approx. 570 Ma	

* ka = x 1,000

** Ma = x 1,000,000 Note: all ages are subject to change.