





## *ary* • Ablati

**Ablation Area:** The area of a glacier where more glacier mass is lost than gained. **Depressions:** Depressions in the snow surface caused by the sun or warm, gusty wind. **Ablation** or layer of moraine in the ablation zone of a glacier; the rock has been plucked from by the moving glacier and is melting out on the ice surface. **Ablation Season:** Period glaciars lose more mass than they gain; usually coincides with summer. **Ablation Zone:** glacier where snow and ice ablation exceed accumulation. **Abrasions:** rocks within the glacier to smooth and polish the surface below; pulverized rock produced is called rock **talus:** ice at the bottom of a glacier contains large rock fragments, and long scratches clues to direction of travel. **Accommodation Space Equation:** represents a simple volume on the left controlling the amount of space that can be occupied by sediments terms on the right describing how much water or sediment fills the accommodation space. **Glacier Crevasses:** deep, narrow, V-shaped depressions in the surface of the glacier formed by the movement of the glacier over bedrock. **Glacier Flood:** a sudden outburst of the sun on an icy surface causes a glacier to look like it is on fire. **Glacier flood:** a sudden outburst water released by a glacier. **Glacier flour:** a fine powder of silt- and clay-sized particles that a glacier carries as its rock-laden ice scrapes over bedrock; usually flushed out in meltwater streams and cause looks low-powder gray; lakes and oceans that fill with glacier flour may develop a banded appearance called rock flour. **Glacier ice:** well-bonded ice crystals compacted from snow with a bulk density greater than 0.86 kilograms per cubic meter ( $55 \text{ lb/cu\cdot foot}$ ). **Glacier mill:** a nearly vertical chisel of ice that is formed by flowing water; usually found after a relatively flat section of glacier in a series of transverse crevasses. **Glacier Milk:** flour that has been mixed with water to create milky appearance. **Glacier potholes:** potholes formed at the bottom of glaciers through erosion caused by sand and gravel in melt-water; melt-water seeps through crevasses in the glaciers, sometimes forming whirlpools bottom of the glacier, the water is under very high pressure, leading to erosion of underlying rocks. **Glacier reamericana:** a glacier that is reconstructed or reconstituted out of other glacier material; usually formed by the melting of a glacier.

**Area**: Area of a glacier where more mass is gained than lost. **Accumulation Season**: When a glacier gains more mass than it loses usually coincides with winter. **Accumulation**: When a glacier gains more mass than is lost. **Advance**: When a mountain glacier's terminus moves down valley toward sea; glacial advance occurs when a glacier flows down valley.

of ablation at its terminus **Alpine Glacier**. A glacier that is confined by surrounding landforms and also called a mountain glacier **Alpine**. Sharp, narrow ridge formed as result of glacial action on two sides **Band** **Ogives**. Alternate bands of light and dark on a glacier; usually found below the snowline; caused by fast moving snow and glacial meltwater.

ley glacier that has only a single tributary glacier. **Brittle Zone:** The upper 50 meters of ice moves **Budge of Glacier:** as terminus, or bottom of glacier, retreats, zone new balance will be reached eventually between accumulation and wastage, and glacier: a glacier that terminates at or near the top of a cliff. **Hanging Valley:** a valley formed by a glacier that has a valley bottom relatively higher than nearby valleys. Formed by larger glaciers. **Headwall:** the steepest part of a cirque. **Horn:** a peak or pinnacle thinned and eroded by wind or more glacial cirques. **Hornfrost:** a deposit of interlocking ice crystals (hoar frost) formed by

stationary; no matter how margin is moving ice within the glacier continues to flow laterally; but not enough to stop ablation **Bubble Rock**. Name of one of this national park. **Calving**: process by which a block of a glacier breaks off and falls into the sea. **Catchment Glacier**: A semi permanent mass of firm formed by drifted snow behind sublimation on objects, usually those of small diameter freely exposed to the air, such as tree branches, plant stems and leaf edges, wires, poles, etc.; the surfaces of these objects are sufficiently cooled, by nocturnal radiation, to cause the direct sublimation of the water vapor contained in the ambient air.

**Hummock** Small area of raised ground which is formed as a glacier slowly retreats, leaving behind glacial moraine. **Ice apron**: a mass of ice adhering to a mountainside. **Ice cap**: a dome-shaped mass of glacial ice that spreads out in all directions; an ice cap is usually larger than an iceberg but less than 50,000 square kilometers (12 million acres). **Ice Cap Glacier**: Mounds of ice that iceberg peaks and ridges at the base of a glacier.

by a cirque glacier **Cirque Glacier**: Glacier that resides in basins or amphitheaters near a cirque glacier has a characteristic circular shape, with their widths as wide or wider **Col**: the lowest point of a ridge or saddle between two peaks, typically affording a pass mountain range to another. **Cold Glacier**: Glacier in which two peaks of the ice below the entrance of a mountain range **Ice cave**: a cave of ice, usually underneath a glacier and formed by meltwater entering entrances are often enlarged near a glacier terminus by warm winds, most common on stagnant points of a glacier **Ice covered**: land overlaid at present by a glacier is said to be covered, the alternative

point; nonetheless the glacier's surface may be susceptible to melting due to incoming solar radiation at the rock/ice interface may be warmed as a result of the natural (geothermal) heat flow occurring in the ice. **Ice Dome:** ice surface with parabolic surface, located in accumulation zone. **Icequake:** a shaking of ice caused by crevasse formation or jerky motion. **Ice rise:** when ice gets on top of sea ice. **Ice shelf:** a dome-shaped mass of ice.

**Metamorphism**: Snow metamorphism that adds molecules to sharpen the corners of crystal **Continental Glacier**. A glacier that covers much of a continent or large island containing a small glacier that is armchair shaped **Cordilleran Ice Sheet**. The ice cap of the mountains in the northwestern part of North America during the Pleistocene glacier ice that covers surrounding terrain and is greater than 50,000 square kilometers (12 million the Greenland and Antarctic ice sheets) **Ice Shelves**: ice sheet attached to land, extends over sea, flows as **water ice streams**: (1) a current of ice in an ice sheet or ice cap that flows faster than the surrounding

**Tail:** Rocky Hill followed by a tail of till. **Grayacite:** Depression in a glacier formed by surface heat and melts the surrounding snow. **Crevasse:** Open fissure in the ice veneer. A kind of frostface; ice crystals that develop by sublimation in glacial crevasses.

(2) sometimes refers to the confluent sections of a branched-valley glacier (3) obsolete synonym of **ice**. **Ice Tongue:** a long and narrow sheet of ice projecting out from the coastline to the ocean. **cemented glacier:** a rock glacier that has interstitial ice a meter or so below the surface. **Ice-cored glacier:** a rock glacier that has a buried core of ice. **icefall:** part of a glacier with rapid flow and a chaotic crevassed surface.

other cavities with cooled sand and silt, still conditions under which water vapor can deposit ice similar to depth hoar *Cwm*; same conditions as a cirque. **Dead ice:** Any part has ceased to flow; dead ice is usually covered with moraine. **Diamictite:** Diamictite used to describe a non-sorted or poorly sorted, sometimes non-calcareous, terrigenous rocks glaciates that has a base of till, a layer of gravel, a layer of sand, and a thin layer of surface; occurs where the glacier bed steepens or narrows. **field:** a mass of glacier ice, similar to a rock glacier, that has a base of till, a layer of gravel, a layer of sand, and a thin layer of surface; occurs where the glacier bed steepens or narrows. **field:** a mass of glacier ice, similar to a rock glacier, that has a base of till, a layer of gravel, a layer of sand, and a thin layer of surface; occurs where the glacier bed steepens or narrows. **Interglacial:** the period of time between two glaciations. **jokulhlaup:** (i) a large outburst flood that usually occurs

designed to describe a snow sorted by poorly sorted, sometimes fibro-calcareous, terrigenous material containing a wide range of particle sizes derived from a broad provenance. De geer water terrace; parallel ridges like dune marks. Only a few feet apart. **Dirt Cone:** formation of ice that is covered by dirt; a dirt cone is caused by a differential pattern of a glacially dammed lake; dam catastrophically (2) any catastrophic release of water from a glacier; a rapidly ruptured shal<sup>l</sup> or mound composed of sand, gravel and till that accumulates in a depressed area; a retreating glacier, and is then deposited on the land surface with further melting of the glacier. **Hole:** A circular depression in the ground made when a block of ice calves off the edge of a glacier.

**Drift:** Preferred path of meltwater through the dirt-covered surface and bare ice. **Drain Channel:** A circular depression in the ground made by a block of ice or snow off the top of a glacier, buried by drift, and later melted by it. **Kettles:** depressions where large blocks of ice were left behind as the glacier melted; become narrow ridges between widened u-shaped valleys that become narrow until they rise to narrow, arêtes/pyramids. **Lateral moraine:** a small accumulation of drift deposited by a glacier along its side.

ment and glaciogenesis or a snowdrift glacier. **Dropstone:** A rock that was carried elsewhere by glacial and deposited when the ice melts, the rock sinks to the bottom of the body of water of a ridge-shaped moraine deposited at the side of a glacier and composed of material eroded from the walls by the moving glacier. **Laurentide Ice Sheet:** The continental glacier that covered eastern Canada and parts of the northeastern United States during the Pleistocene Epoch. **Leeward Side:** Side of a feature where air descends after it has been rising up the windward side. **Lateral moraine:** A low, elongated, hummocky ridge of till deposited by a lateral glacier. **Lateral till:** Till deposited by a lateral glacier. **Lateral valley:** A V-shaped valley formed by lateral erosion. **Lateral erosion:** Erosion along the sides of a stream channel. **Lateral glaciogenesis:** Glaciogenesis caused by the lateral movement of a glacier. **Lateral moraine:** A low, elongated, hummocky ridge of till deposited by a lateral glacier. **Lateral till:** Till deposited by a lateral glacier. **Lateral valley:** A V-shaped valley formed by lateral erosion. **Lateral glaciogenesis:** Glaciogenesis caused by the lateral movement of a glacier.

A glacier so cold that its base remains frozen to the substrate, also called a polar glacier, where atmospheric temperatures stay so cold all year long that the glacial ice remains. Mars also has polar glaciers. **Dump Moraine:** A mound or layer of moraine formed by meltwater runoff from a glacier. **Agassiz:** proposed that as the glacier moves past stationary valley walls, it usually oriented about 45 degrees upstream of a glacier's margin. **Marginal crevasses:** a crevasse near the side of a glacier.

a glacier by rocks that fall off the ice; sometimes called a ground moraine. **End Moraine:** a ridge of moraine found near the end of a glacier. **Equilibrium Line:** the boundary between accumulation and the zone of ablation. **Equilibrium Zone:** zone of a glacier in which precipitation that falls is equal to the amount that melts the following summer. **Esker:** A

of light and dark on a glacier that were formed by rock avalanching. **Fjord**: a glacial inlet with seawater. **Foliation**: layering in glacier ice that has distinctive crystal sizes and/or is usually caused by stress and deformation that a glacier experiences as it flows over a conductively resistive surface. **ewaterfall feature**: backwash or slumps at the head of a kame.

glacier: very small glacier that occupies gullies and hollows on north-facing slopes (northern hemisphere) may develop into cirque glacier if conditions are favorable **Nunatak**: a rocky crag or small mountain jutting from and surrounded by a glacier or ice sheet **Ogives**: alternate bands of light and dark ice deposited by a glacier **Ridge**: a low, rounded hill of till, talus, or drift **Talus**: a slope of loose rock fragments derived from a cliff or talus slope

**Glaciad**; also called a negative mill. **Glacial advance**: when a mountain glacier's terminus overwhelels you before, occurs a wave of flowers downswallow faster than the tide. **Glacial retreat**: a boulder swept from its place of origin by glacier advance or retreat in a harridan; a swelled up male. **Glacier**: a sheet of ice, a large, slowly moving mass of snow and ice, derived from snowfall, which has been compacted and recrystallized.

other rocks as its glacier type; after glacial melt, the boulder might be stranded in a field somewhere as the glacier type or size exist **Glacial Formation:** 1)Loose snow (<90% air), 2) granular, 3) firm (>25% air), 4) fine-grained ice (>40% air), 5) coarse grained ice (<20% air). **Glacial processes** are defined by moving a glacier **glaciation**: a slowly moving glacier. Granular and firm ice is transported by rolling over the surface. Glaciers move downvalley and across mountain passes. Glaciers are formed when sand is eroded from the bedrock and transported and deposited by meltwater streams from the glaciers melt and nearby till deposits to form in front of the glacier. **Patterned grounds** consists of mostly symmetrical geometries displayed in the ground.

of gouges cut into the bedrock by gravel and rocks carried by glacial ice and meltwater striations. **Glacial Incorporation:** A form of glacial erosion where the ice surrounds its starts to move with the ice. **Glacial Rebound:** The process by which the surface of land bounces back up after an overlying continental ice sheet melts away and the weight of the ice is removed.

**Glacial retreat**: when the position of a mountain glacier's terminus is moving toward its head; occurs when a glacier ablates more material at its terminus than it transports or polygons, circles, stripes, nets, and steps. **Paterno lakes**: a series of tarsis connected by a single ice stream system. **Periglacial**: relating to or denoting an area adjacent to a glacier or otherwise subject to repeated freezing and thawing. **Piedmont glacier**: large ice lobe spreading out over surrounding terrain, associated with the terminus of a large mountain valley glacier. **Pingo**: a low, rounded, ice-covered hill, formed by meltwater percolating through a layer of talus or gravel. **Proglacial**: relating to or denoted by a lake situated behind a glacier. **Subglacial**: beneath a glacier.

**Lateral, also called glacial grooves.** **Glacial Subsidence:** The sinking of the surface of the earth by the weight of an overlying glacial ice sheet. **Glacial till:** accumulations of unsorted, coarse gravel, clay, silt, sand, and boulders; the usual composition of a moraine. **Glacial trough:** a large u-shaped valley formed from a v-shape by a glacier. **Glacial trough:** a large u-shaped valley formed from a v-shape by a glacier.

**Glaciated:** land covered in by any form of glacier is said to be **glaciated**. A polished rock surface created by the glacial abrasion of the underlying **bedrock**.

and glacier now causing this mass being piled and broken on, and carried by the glacial *nest* or *debris* and glacier past or present movement. **Glacier cave:** a cave of ice, usually underneath a glacier by meltwater; cave entrances are often enlarged near a glacier terminus by warm winds; **stairway**: portions of glaciers. **Glacier fire:** a phenomenon in which strong reflections

a glacier nearly below freezing, except possibly for a thin layer of melt near the surface during summer or near the bed; **polar** glaciers are found only in polar regions of the globe or at high altitudes. **Pothole**: a nearly vertical channel in ice that is formed by flowing water; usually found after a relatively flat section of glacier in a region of transverse crevasses; also called a **moulin**. **Push moraine**: moraine built out ahead of an advancing glacier. **Quaternary**: geologic period of the late Cenozoic c. two million years ago to the present. The name refers to the fourth interval of earth time, like to early geologists. **Randkluft**: a fissure that separates a moving glacier from its headwall rock; like a bergschlund. **Reconstructed glacier**: a glacier that is reconstructed or reconstituted out of other glacier material; usually formed by seracs falling from a hanging glacier then re-advancing; also called reconstructed glacier, regenerated glacier, or glacier remnant. **Reconstructed glacier**: a glacier that is reconstructed or reconstituted out of other glacier material; usually formed by seracs falling from a hanging glacier then re-advancing; also called reconstructed glacier, regenerated glacier, or glacier remnant. **Ressional Moraine**: Terminal moraine after it has come back and moved forward again. **Regulation**: motion of an object through ice by melting and freezing that is caused by pressure differences; this process allows a glacier to slide past small obstacles on its bed. **Regenerated glacier**: a glacier that is reconstructed or reconstituted out of other glacier material; usually formed by seracs falling from a hanging glacier then re-advancing; also called reconstructed glacier, regenerated glacier, or glacier remnant. **Retreat**: when a mountain glacier's terminus doesn't extend as far downvalley as it previously did; occurs when ablation surpasses accumulation. **Retreating glacier**: a glacier whose terminus is increasingly retreating upvalley compared to its previous position due to a higher level of ablation compared to accumulation. **Ribbon Lake**: Long, thin lakes that form after a glacier retreats that form in hollows. **Rock flour**: a fine powder of silt- and clay-sized particles that a glacier creates as its rock-laden ice scrapes over bedrock; usually flushed out in meltwater streams, causing water to look powdery gray; lakes and oceans that fill with glacier flour may develop a banded appearance. **Rock glacier**: looks like a mountain glacier and has active flow; usually includes a poorly sorted mix of rocks and fine material; may include: (1) interstitial ice a meter or so below the surface ("ice-cemented"), (2) a buried core of ice ("ice-coated"), and/or (3) rock debris from avalanching snow and rock. **Rock Mountain**: Rock drumlin, **Rogen Moraine**: (also called ribbed moraine) is a subglacially (i.e. under a glacier or ice sheet) formed type of moraine landform, that mainly occurs in Fennoscandia, Scotland, Ireland and Canada. The landforms assemblage of numerous, parallel, closely-spaced ridges consisting of glacial drift, usually TILL. The landforms are formed transverse to ice flow in a subglacial position and are usually found in the central portions of former ice sheets, believed to have been the central areas of the ice sheets. Formation linked closely to Drumlins. **Sastrugi**: parallel wave-like ridges caused by winds on the surface of hard snow, especially in polar regions. **Sedimentary ogives**: alternating bands of light and dark at the firm limit of a glacier; the light bands are usually young and lightest at the highest level up-glacier, becoming increasingly older and darker as they progress down-glacier. **Serac**: an isolated block of ice that is formed where the glacier surface is fractured. **Sichelwannen**: curved grooves formed by water under immense pressure at the base in side valleys. **Kinematic waves**: refer to a wave of moving downglacier propagated by its increased thickness. The wave of ice may move at two to six times the velocity of surrounding thinner ice. **Lahar**: is a mudflow or debris flow originating on a volcano. **Jokulhlaups** (see above) often become lahars when they incorporate the rock debris that lies within their path. **Lateral moraine**: a moraine formed at the side of a glacier. Piles of loose unsorted rocks along the side margins of the glacier. The rocks may be pushed there by the moving ice or dumped from the glacier's rounded surface. **Mass balance**: describes the net gain or loss of snow and ice through a given year. It is usually expressed in terms of water gain or loss. **Neoglaciation**: refers to the advances made by mountain glaciers since the great Pleistocene ice age. In the Cascades the advances have occurred since 6,600 years before present. **Ogives**: are ice-shaped features occasionally found across the glacier surface below icefalls. They may be ridges and swales in the ice or bands of darker or lighter ice. One theory of their formation suggests that the ice is stretched and sometimes thinned when exposed in the icefall during the high velocities of summer; it is compressed during the winter so that bands of different ice thickness form. **Perfectly plastic solid**: is a solid that does not deform until it reaches a critical value of stress, after which it will yield infinitely. Some glaciologists say that ice is a perfectly plastic substance. (That is, brittle and capable of cracking like a solid, yet deformable and capable of flowing at other stresses.) **Pleistocene**: is the period of earth's history, roughly two million years ago to about ten thousand years ago, characterized by the advance and recession of continental ice sheets. **Roche moutonnée**: is a small asymmetrically-shaped hill formed by glacial erosion. The upper sides are rounded and smoothed and the lower sides are rough and broken due to quarrying by the glacier. **Seracs**: are the pinnacles of ice formed where the glacier surface is torn by sets of crevasses. **Striations**: are the scratches etched into the rock at the bed of a glacier. Their presence indicates grinding of sand and rock particles into the bed under considerable pressure. In some places fine-grained debris polished the bedrock to a lustrous surface finish called glacial polish. **Suncup**: is a small depression on a snow or firn surface formed by melting and evaporation resulting from direct exposure to the sun. **Trilobites**: are the sharp vegetative boundaries delimiting the upper margin of a former glaciation. The age differences of the ground surface are often visible because of different ages of the vegetation. **Ice cores**: Ice cores are cylinders of ice drilled out of an ice sheet or glacier. Most ice core records come from Antarctica and Greenland, and the longest ice cores extend to 3 km in depth. The oldest continuous ice core records to date extend 123,000 years in Greenland and 800,000 years in Antarctica. Ice cores contain records to date extend 123,000 years in Greenland and 800,000 years in Antarctica. Ice cores contain formation about past temperature, and about many other aspects of the environment. Crucially, the ice encloses small bubbles of air that contain a sample of the atmosphere – from these it is possible to measure directly the past concentration of gases (including carbon dioxide and methane) in the atmosphere.

