

GLOSSARY OF TERMS

for Test-Pit Stratigraphy

on the Juneau Icefield Research Program*

1. Test-pit:

Hand dug pit from a snow or firn-cover surface to depth, to or below the level of previous year's firn-pack. Pits are usually 6 by 10 feet in dimension, with long walls trending north, and one narrow wall facing north to maintain shadows and minimize melting. All density and stratigraphy measurements made on this latter wall, using tape measure for recording depths in cms below (fiducial) surface at noted date. Density measurements on this wall usually spaced at 10 cm intervals.

2. Névé:

Area of highland firn accumulation above summer transient snow-line or late summer névé-line (see below).

3. Transient Snow-Line:

Margin or outer edge of snow-cover on a glacier during spring and summer melt season. Becomes névé-line at the end of summer -- referred to then as seasonal névé-line.

4. Névé-Line:

Outer or lower margin of firn on a glacier surface at end of summer. Sometimes referred to as the firn line, though because of possible ambiguity in the stratigraphic sense the term névé-line used in JIRP. The latest year position is called the seasonal névé-line or latest firn line. On a temperate glacier this represents the glacier equilibrium line; On polar glaciers the névé-line is not the equilibrium line, as the equilibrium line equates instead to the superimposed ice limit down glacier from the late season transient snow-line or névé-line.

5. Firn and Bubbly Glacier Ice:

The material of glacier surfaces. In late summer above the névé-line firn has become metamorphosed from old snow, and is characterized by sub-rounded grains and a bulk density of 0.45-0.74. At the latter maximum density all intercommunicating intra-crystalline air channels cease to exist - i.e., the air permeability reduces to zero. The term is from the German word "fern", meaning old snow which has outlasted one summer season. Bubbly glacier ice is the material from below the firn-pack, or down-glacier from the transient snow-line or the névé-line. It is comprised of old firn metamorphosed into polycrystalline ice, areated and hence generally whitish in tone and with a density of 0.80 to 0.91 (a mean ρ of 0.90).

6. New Snow and Old Snow:

Either new snow of density of 0.1 to 0.3 or old snow 0.3 to 0.40. The delicate new snow crystals undergo destructive metamorphism -- via pressure breakdown of crystal forms or melt-erosion of dendrites. Old snow is formed by constructive metamorphism via amalgamation of snow crystals and regrowth of the snow flake nuclei into more rounded grains, representing the beginning of transition to firn. In temperate and sub-temperate glaciers this metamorphism is due to compaction and to the regrowth of crystals by regelation, abetted by the accretion of refrozen liquid water on grain surfaces.

7. Snow-cover:

This term has an areal connotation -- it means the area covered by snow. Measurements made in square meters of area (m^2).

8. Snow-pack:

This term has a vertical connotation -- it refers to the depth of snow below a snow-cover. Measurements made in cms.

9. Firn-pack:

This term has a vertical connotation -- i.e., the depth of firn in a stratigraphic column down to the level of transition to firn-ice. Measurements made in cms.

10. Diagenetic structures:

Cross-cutting secondary ice structures formed in the snow-pack or in the firn-pack, from refreezing of percolating melt water during the spring and early summer. Forms and shapes include ice strata, ice layers (thick) and lamellae (thin), ice pods (nondescript), ice lenses (lenticular), block structures, ramose structures, ice dikes, ice columns (vertical trending with two-dimensional surface expression seen as "ice balls"), etc. Diagenetic structures can represent upwards of 25% of a late summer firn-pack and are one manifestation of the process of metamorphism of a firn-pack to firn-ice and eventually to bubbly glacier ice, especially in temperate and sub-temperate glaciers.

11. Density and Specific Gravity:

Weight in grams of snow or firn mass per cubic cm -- therefore designated as $\rho = gm\ cm^{-3}$. Similar in number to specific gravity, which refers to relative density with respect to the density of water which is 1. (ρ of new snow 0.1 - 0.3; old snow 0.3 - 0.40; firn 0.41 - 0.74; firn-ice, 0.74 - 0.80; bubbly glacier i.e. 0.80 - 0.91; dense glacier ice 0.9167). This measurement is used to convert snow and firn densities to water equivalence -- (e.g., firn of 0.50 with a thickness of 1 cm is equivalent to 0.50 cms of water because water with a density of 1 represents 1 cm. of water).

12. Bulk Density:

Mean density of the annual firn-pack or a designated vertical section of snow-pack or firn-pack.

13. Mass-Balance

The measure of retained net accumulation or loss on a glacier at the end of a given summer ablation season -- i.e., the budget year. Recorded as either a positive or negative mass-balance in total cubic meters of water equivalent. Terms used to identify the state of health of a glacier or glacier system.

14. Annual Ablation Surface (A.S.) or Firn Transition Layer:

The buried surface of the previous year's net accumulation firn-pack usually characterized by a dirty (dust) layer, or identifiable relict or sun-cupped layer, or at least by a sharp increase in bulk density () of the firn-pack. Noted as A.S., meaning an annual late summer ablation surface.

15. Relict:

An adjective used in geology to denote a remnant or surviving trace of former presence of a structure or feature after other parts of the feature have been removed, replaced, or disappeared.

*For further reference note the following:

Miller, M.M. (1952) The terms Névé and Firn. Jour. of Glaciology, Vol. 2, No. 12, pp. 150-151.

_____ (1955) A Nomenclature for Certain Englacial Structures
Acta Graphica ; Helsinki, Vol. 14, pp. 291-299.

_____ (1963) Taku Glacier Evaluation Study. Appendix A:
Definitions and Comments on Glaciological Terms. State of Alaska,
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Glaciological and Arctic Sciences Manual (1980) in Vol. I of three,
section on "Criteria for Identifying Annual Firn-Pack Increments."
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