

Geological Agents of Change

Glacier

(movement of ice)

- Glacier may be defined as a large natural accumulation of ice with a downward or outward movement from the snow field under the influence of gravity.
- According to Longwell and Flint (1961) “A glacier is the body of ice, consisting mainly of recrystallized snow, flowing on a land surface.”

Formation of glacier

- Glaciers originate in snowfields. In area, where annual snowfall exceeds the amount of loss of snow due to evaporation and melting, snow starts accumulating, where the accumulation of snow cover becomes thick, it changes into ice due to its own pressure. Due to upward pressure, the lower layers start to flow outward and downward.
- Glacier motion is very slow and its velocity varies from a few centimeters per day to few metres per day. Some mountain glaciers move very rapidly and are called 'surging glacier'.
- The rate of movement of Himalayan glaciers varies from two to four meters per day.

Glaciations

(Geological work of glacier)

- The geological action of glaciers comprises erosion, transportation and deposition which together known as glaciation. Action of glacier is mainly due to its flow. The most significant action is carried out by the valley glacier.


Landforms produced by glaciers are related to its

- Erosion
- Transportation
- Deposition

Erosion: -

The erosive action of the glacier takes place due to

- Plucking
- Rasping
- Avalanching



The most diagnostic feature of glacier erosion occurs in areas of high relief. Some of the major features by glacier erosion are:-

The cirque

This is the french term for bowlshaped basin commonly located at the head of the glacial valley.

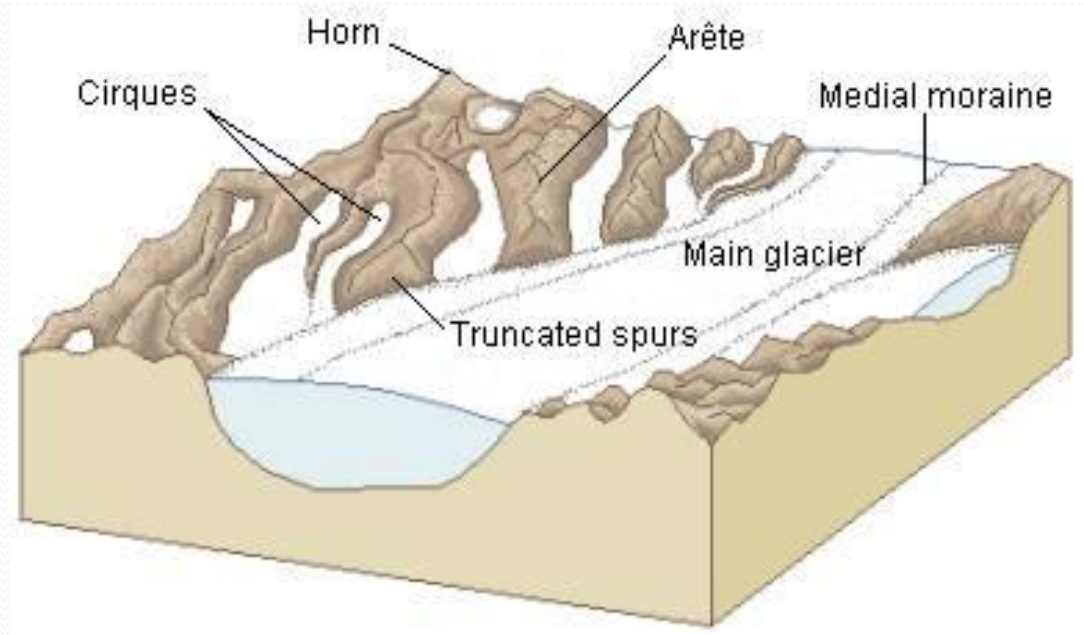
Geometrically, they are steep sided, semi-circular depression.

After the glacier melts, a small lake known as Tann usually occupies the depression.



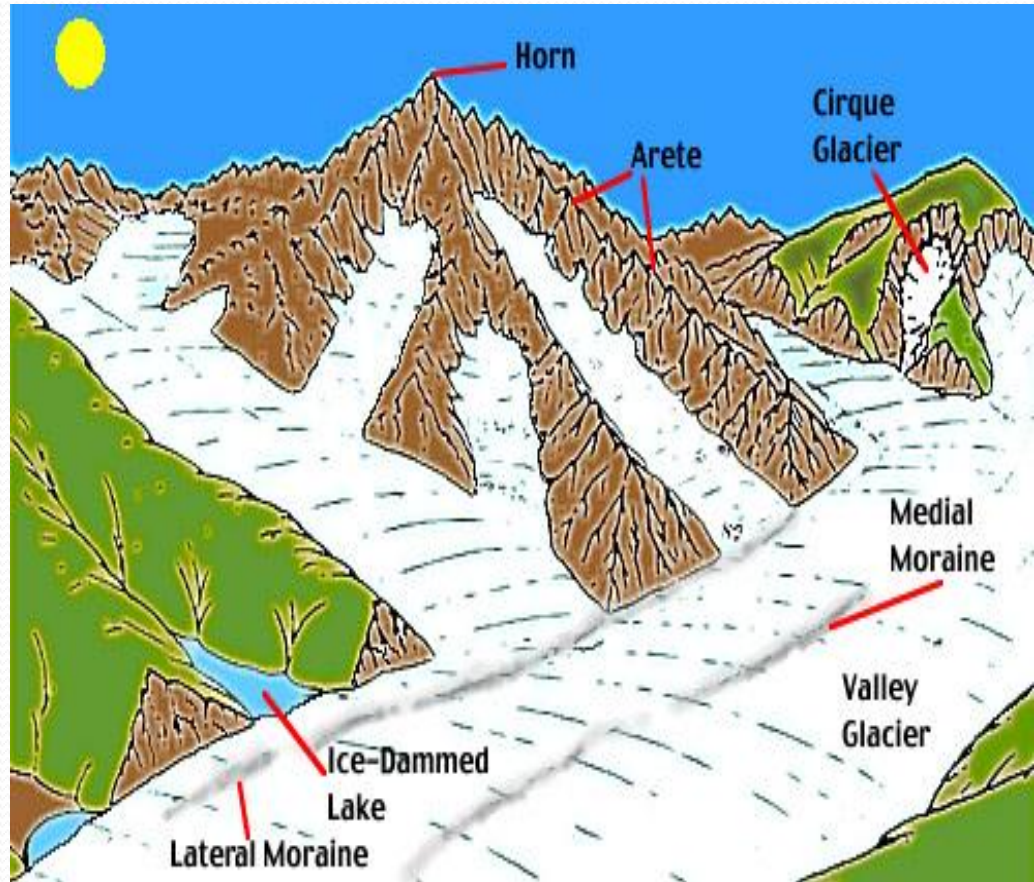
Aretes:

When two adjacent cirques along the opposite slopes of the mountain begin to coalesce, a typical knife like ridge forms. Such ridge is called aretes or comb.



Horn

Pyramidal peak produced due to growth and enlargement of three or more cirques together by heaward erosion. Is called glacier trough.



Hanging valleys: -

Tributaries glaciers generally contain less ice deepened than the floor of tributary glacier. After a period of time, the tributary valley appears to hang above the floor of the main valley. Such tributary valleys are called hanging valley.



Glacial boulders

The rock fragments intrapped in the glacial ice get abraded rounded and their surfaces coalesced during the course of glacier movement such rounded blocks are called glacial boulders.

Boulder Glacier
Glacier National Park, MT



1932



2005

Roaches and Moutonnes

When a little hill of the rock or small elevation is encountered on the way of glacier, it is not usually worn away completely. The side facing the direction of glacier movement becomes gentle and smooth. While the opposite side, remain rough, rugged and steep. The gentle side is called stoss-side and steep side is called lee-side. From a distance a group of such features often looked like sheep lying down. Rocks thus shaped are called roaches moutonnes.



Fiords

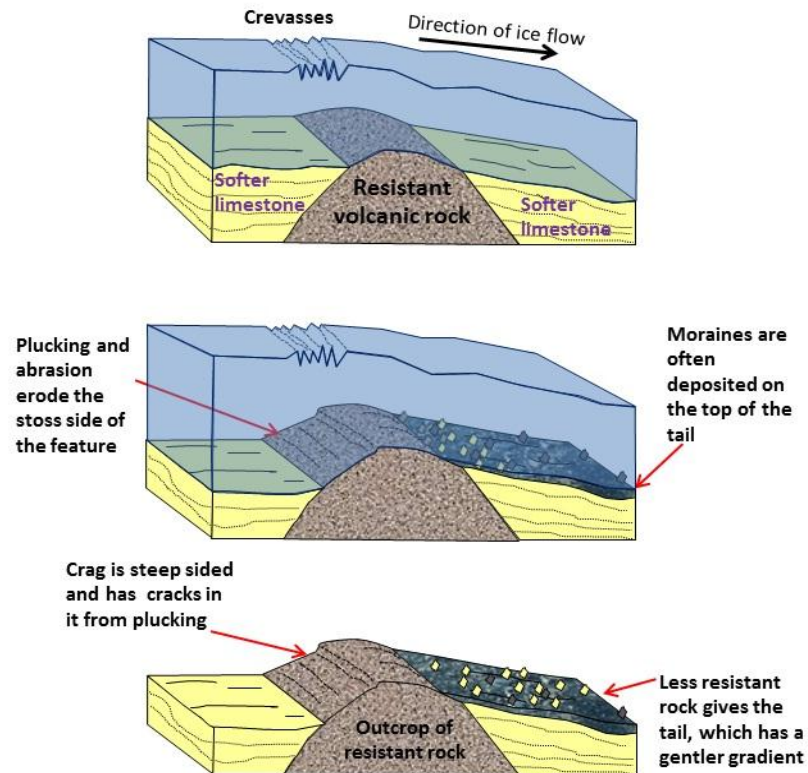
There are deep glacial troughs which have been eroded below sea-level. As a result 'U' shaped valleys are occupied by sea water itself and become arms of sea within the fiords. The glacier comes in contact with sea-water where blocks of the ice break off and float on the sea called icebergs.



Crag and tail

When very hard rocks like igneous bodies or volcanic plugs are encountered on the path of the moving ice and retard its erosive action. This produces features in which the hard block facing the moving ice is known as crag followed by a sloping lee-side made up of softer rocks called tail.

The formation of a Crag and Tail



By Rob Gamesby

<http://www.coolgeography.co.uk>

Depositional features produced by glacier

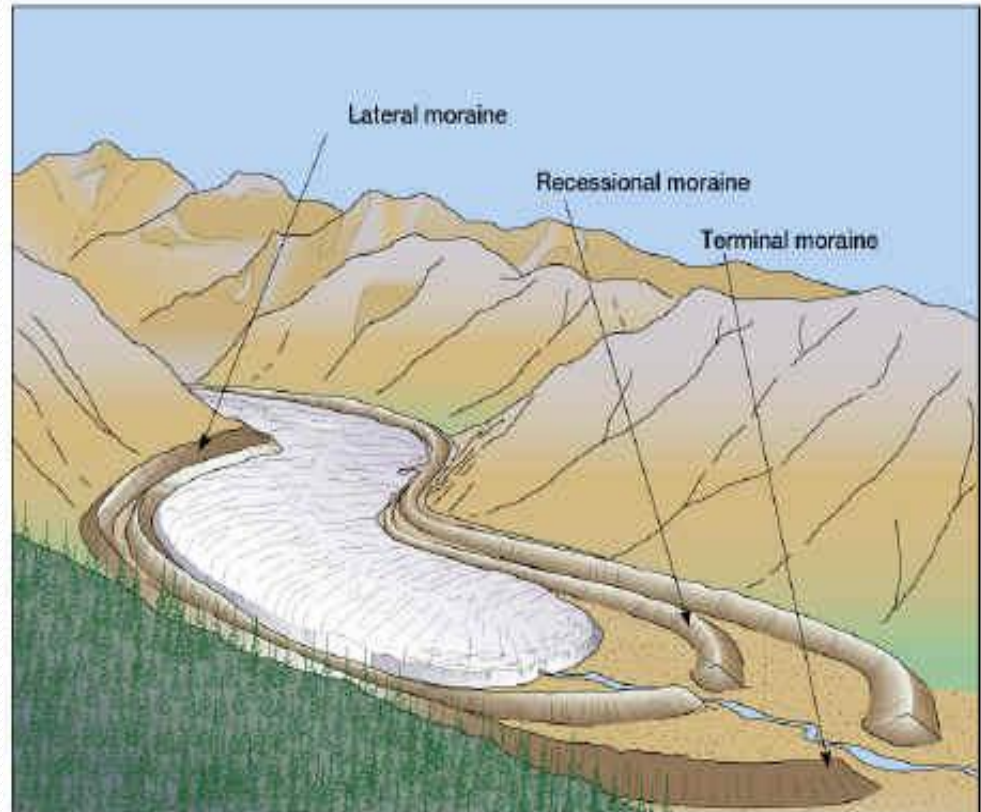
Till

The unstratified, unsorted debris dropped more or less in the random fashion by glacier from deposit known as till.



Moraines

Till makes up a group of topographic features called moraines. These are the glacial deposited soils in the path of the existing glacier or along the valley of an extinct glacier.



Erratic blocks

The large boulders, plucked by the glacier from the bed rocks and carried over a great distance are dropped and come to rest on land surface where the country rocks are of distinctly different types are called erratic blocks. The boulders are quite huge in dimension.



Eskers

An esker is the sinuous ridge extending on the direction of the movement of glacier. Their length ranges from a few 100 meters to several tenth of kilometers and are from 3 to 30 metres or more in height. These are a few tens of metres in width.



Drumlines:

These are streamlined, smooth oval hills.

Geometrically drumlines resembles the inverted bowl of spoon.

