

# WHAT ARE THE GEOLOGICAL ACTION OF GLACIERS?

The geological action of glaciers comprises erosion, transportation and deposition which together constitute what is known as glaciation. The geological action of glacier is mainly due to its flow.

Since the piedmont glaciers are intermediate in nature and characters between the valley glaciers on the one hand and continental ice-sheets on the other, the geological action of glaciers can best be studied separately for valley glaciers and continental ice-sheets.

## **Geological Action of Valley Glaciers**

The most significant action is carried out by valley, glaciers. As it has already been explained, the valley glaciers flow down the pre-existing stream valleys and reshape the valley in specific ways.

### **Erosion**

The erosive action of a glacier takes place due to (i) plucking, (ii) rasping and (iii) avalanching. The erosive action of glacier is more pronounced particularly when the thickness of the ice is great, the pressure on the subglacial floor is high and the glacier ice is heavily charged with rock fragments.

### **Plucking**

This is the process in which the moving ice lifts out blocks of bedrock loosened by the freezing and thawing of water in fractures beneath the ice. Water due to rain or melting often seeps down along the sides of the ice mass filling up the cracks, fissures and porespaces within the country-rocks along the edges and at the head of the glacier.

When the temperature drops, this water freezes within those openings and exerts enormous pressure on the country rocks due to expansion in volume, breaking them up. The broken blocks are frozen in suspension in the ice and are carried away along with the ice.

Thus, plucking involves two processes-quarrying and frost-wedging. While frost-wedging causes a shattering of the country- rocks, the quarrying process lifts out the shattered blocks, of rock. The plucking process particularly affects the downstream side of outcrops of well-jointed rocks.

### **Rasping**

The process is also known as abrasion or corrosion. Glaciers normally carry considerable quantities of rock fragments in their basal sections. These rock fragments are dragged over rock surfaces, and their sharp points and edges cause characteristic scratches, gougings and grooves in the underlying hard bedrocks.

Since the rock fragments are dragged under great pressure over bedrock, they themselves are scratched and worn down into peculiar faceted stones. The sharp points and edges of the rock fragments are gradually blunted by friction.

Thus, some glacial scratches and grooves which may start by being narrow and deep, gradually become broader, and shallower and finally fade out.

This serves as an indication of the direction of ice movement in a given place; the movement of ice is from the deep and narrow end of the groove towards its broader and shallower end.

Bare rock surfaces are scraped and scoured due to abrasion. If the under surface of the glacier is studded with rock particles consisting of silt or sand grains the rock beneath will be polished; if they are gravel or boulders the rock will be scratched, or striated (if it is softer than the fragments).

While the rock-studded bottom of a glacier functions as an effective file or rasp and polishes, scratches and abrades the surfaces over which it moves, the front edge of the glaciers function like a bulldozer pushing and scraping the ground in front of it and is more effective in soft and semi consolidated sediments.

### **Avlanching**

This is a process of mass-wasting. When the valley sides are scraped and the rock debris which are broken off are carried away by the glacier ice, there results a great deal of under-cutting, of the valley side. This leads to mass-wasting, bringing huge amounts of debris onto the top surface of the glacier.

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