Recent Glacier Variations on Mt. Hood

By HOWARD HANDEWITH, JR.

FOR THE FIRST TIME since civilized man has been observing them, Coe and Eliot glaciers on Mount Hood have experienced a new surge of life. From the time of Reid's original paper in 1901 there have been many reports of a more or less constant retreat. This retreat started about 1740, and except for several small surges has been virtually continuous for over two hundred years.

In 1940 the Research Committee began making annual cross-profile surveys on Eliot Glacier. This survey provided the committee with accurate measurements of the amount of annual change in ice thickness. The original survey consisted of two fixed lines across Eliot Glacier, the "A" and "B" lines. (see Fig. 4) In 1948 the "C" line and in 1956 the "D" line were established on Coe Glacier, and in 1957 the "B" spur line up Eliot Glacier was added. Over the nineteen year period the terminus of each glacier was measured whenever possible.

The Committee has made little attempt to prognosticate the future of our local glaciers, but has done much work in evaluating their past and present conditions. This report deals with the results of these studies up to 1959.

In the field of glacier studies there have been many reports of world-wide dehydration of existing glaciers, while some ice bodies have shown equilibrium or even an advance. An advancing trend is now apparent in Oregon. Judging by the photos of Eliot Glacier in Fig. 6, taken by the Research Committee in 1947 and 1956, the ice had grown visibly above the 7,100 foot level on the north side of Mount Hood.

Mount Hood, situated some 150 miles east of the Pacific Ocean, on the north-south axis of the Cascade Range, is the breeding ground for the glaciers included in this report. They are nourished by the prevailing southwest "Chinook" winds which bring a probable excess of one hundred inches of water (in rain and snow) to these slopes annually. The largest glaciers exist on the north and east slopes. This could be explained by the fact that the longer and more severe exposure to the hot summer sun occurs on the more gentle south side, whereas on the north side the ice is protected in part at least by the massive north face.

The moraines of Eliot and Coe Glaciers are made of ice-transported debris. The ice at one time must have been higher than the two moraines in order to place the topmost boulders on either side. (see Fig. 1) These two glaciers have been in almost constant retreat since the eighteenth century. With the ice being dissipated, the moraines now are much higher than the surface of the ice and we have the "U" shaped profile shown in Fig. 1. The ice has dropped so low that the lateral moraines are sliding and tumbling back over the surface of the glacier and have become so steep that in the past three years it has become necessary to lower the survey

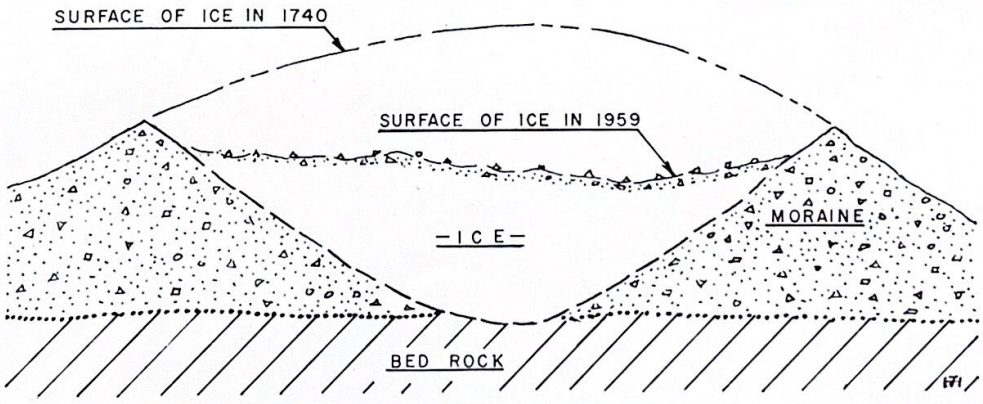


Fig. 1. Idealized section through glacier showing relationship of survey lines in Figures 2 and 4 to the surface of the ice.

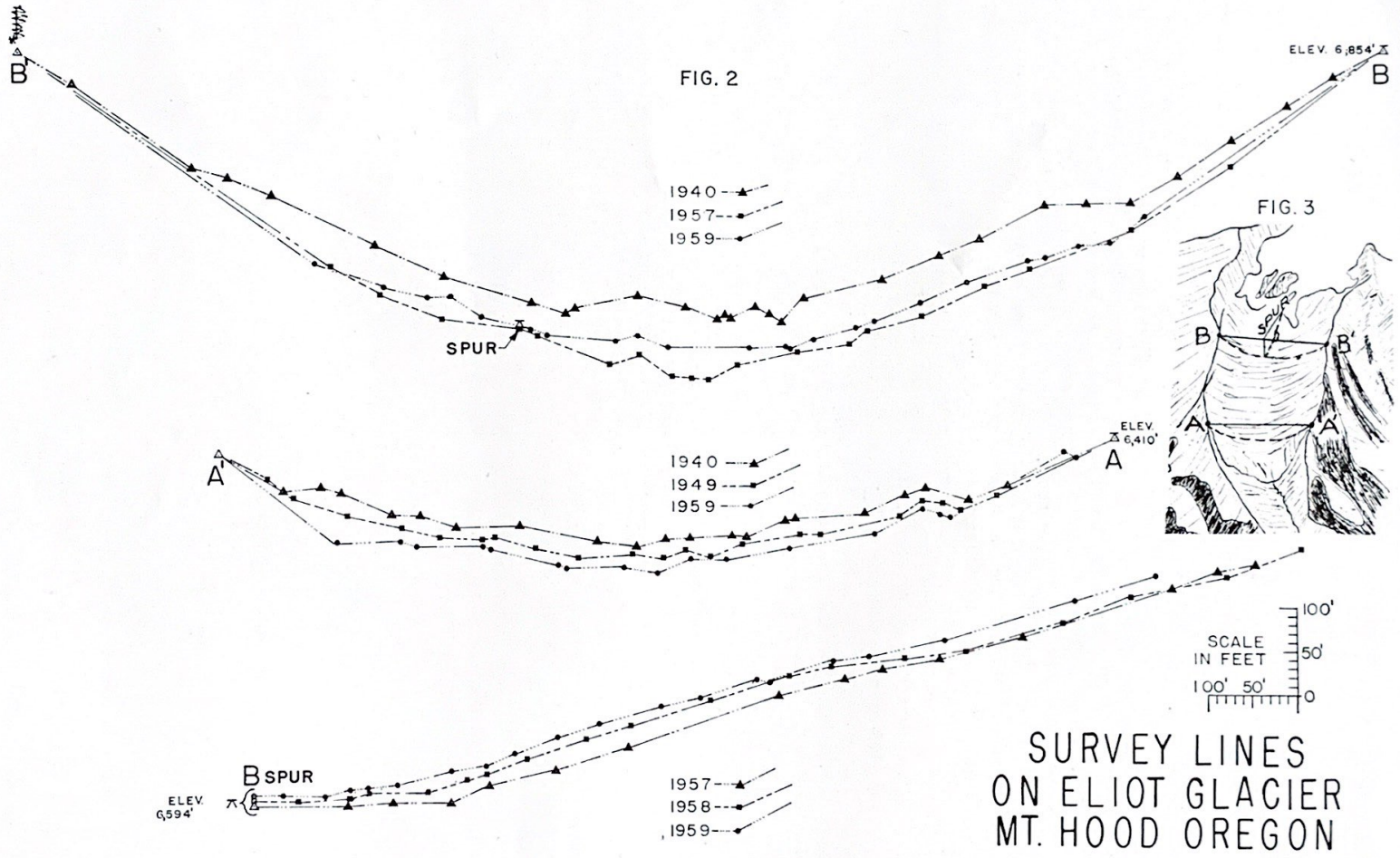


Fig. 2. Survey lines on Eliot Glacier looking down-glacier. Fig. 3. Sketch showing relative positions of survey lines to photo in Figure 6.

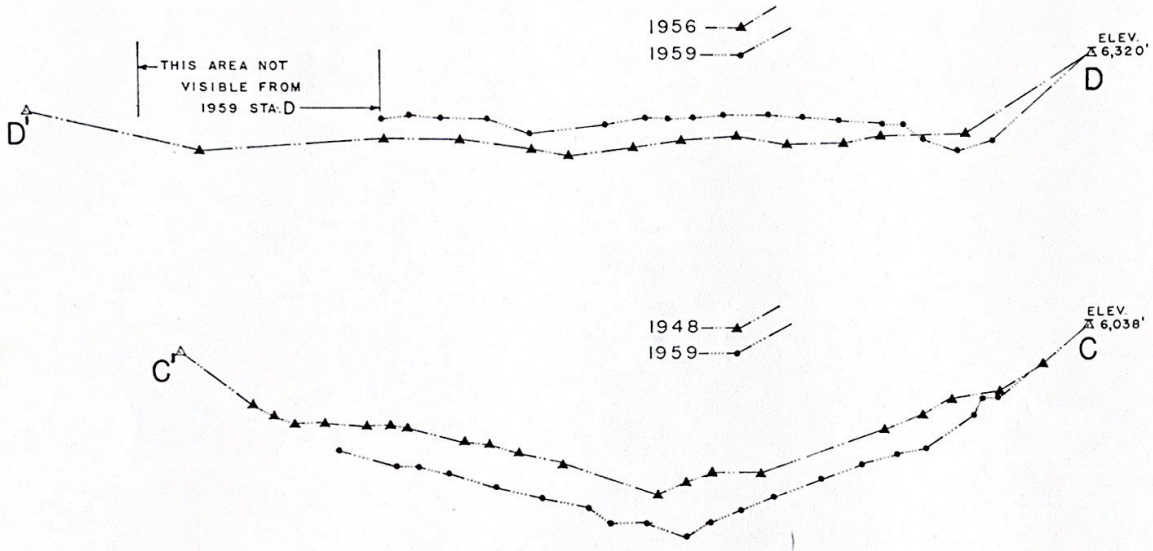


FIG. 4

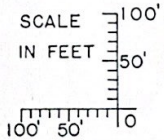
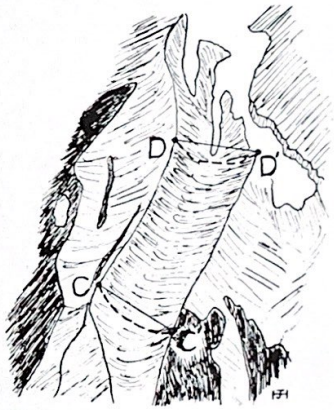


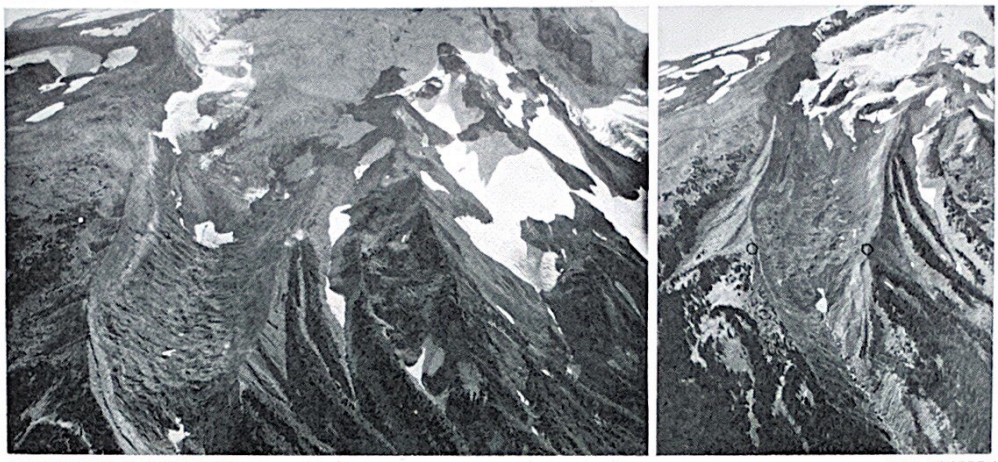
FIG. 5



SURVEY LINES
COE GLACIER
MT. HOOD OREGON

Fig. 4. Survey lines, Coe Glacier looking down-glacier.

Fig. 5. Sketch showing relative positions of survey lines to photo in Figure 7.



ACKROYD PHOTOGRAPHY INC. RAY ATKESON

Fig. 6. Eliot Glacier 1956 and 1947. The terminus in both pictures is covered by the small ice field in the lower center of each picture. The increasing bulge in the ice is very noticeable just below the lower seracs (ice falls).

team over them with the aid of a rope. In the light of the records of past observations, the glaciers of Mount Hood are showing signs of new life.

The lowest part of Eliot Glacier, as it appeared to the survey team in September of 1959, was a slow and almost stagnant mass of ice. The debris-strewn surface had a hummocky surface somewhat resembling an outwash plain running for about three-quarters of a mile up-glacier from the terminus. The vegetation has become more apparent than ever before, and a small pond that existed on the ice, in the center of the glacier in 1957 (See Fig. 6) has completely disappeared in 1959. Survey notes indicated that from 1951 to 1958 the terminus had receded some eighty feet. The surface of the "A" profile, about 1,000 feet up glacier from the terminus, has dropped at the rate of about one foot a year since 1949. (See Fig. 2.) The down-glacier motion, judged from painted boulders* appeared to be slightly less than three feet a year.

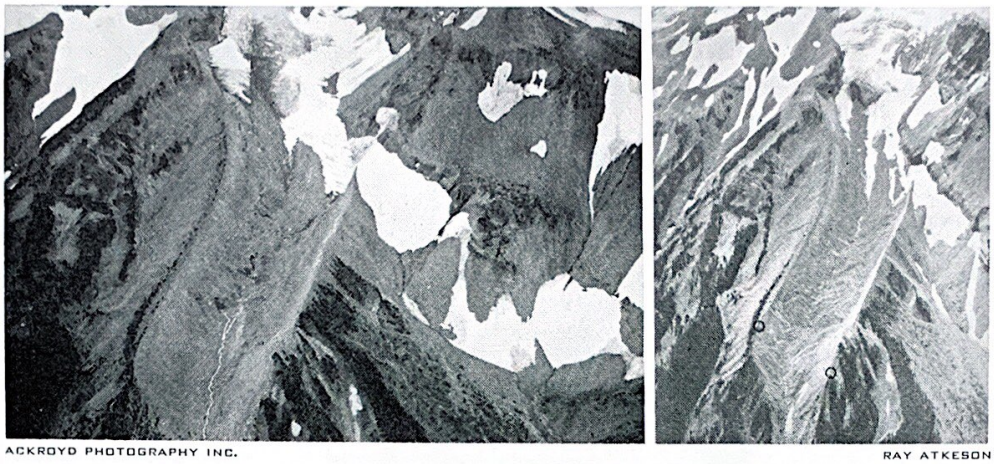
The line crossing the upper part of Eliot Glacier has proved to be of much more interest, however. The "B" profile (See Fig. 2) from 1940 to 1957 had dropped in mid-glacier an average of sixty feet, a loss of about three and one-half feet per year. On the other hand from 1957 to 1959 the same surface rose at the rate of about five feet a year. In midstream there was a swath of bare ice eighty-three feet wide. The down-glacier motion of the painted boulders on "B" line was about ten and one-half feet per year in 1959 in the center of the glacier.

The up-glacier spur off the "B" line was first run in 1957. This line is essentially parallel to the axis of the glacier but about 300 feet to the left in Fig. 4. It was hoped that the line would give an indication as to what would happen to the "B" profile in the future. This line has been run as far up-glacier as is possible with one transit set-up. Because the history of this line has been so brief, not too much can be said about it, except that it has shown a thickening of about ten feet a year for two years. (See Fig. 2.)

Lower Coe Glacier appears much the same as lower Eliot Glacier in that there is much more evidence of superficial stream erosion and almost no bare ice. The "C" line profile (See Fig. 3) has dropped about five feet in the one year from the 1958 to the 1959 surveys. Down-glacier motion appeared to be only slightly in excess of three feet a year. This section of Coe Glacier is practically dead ice.

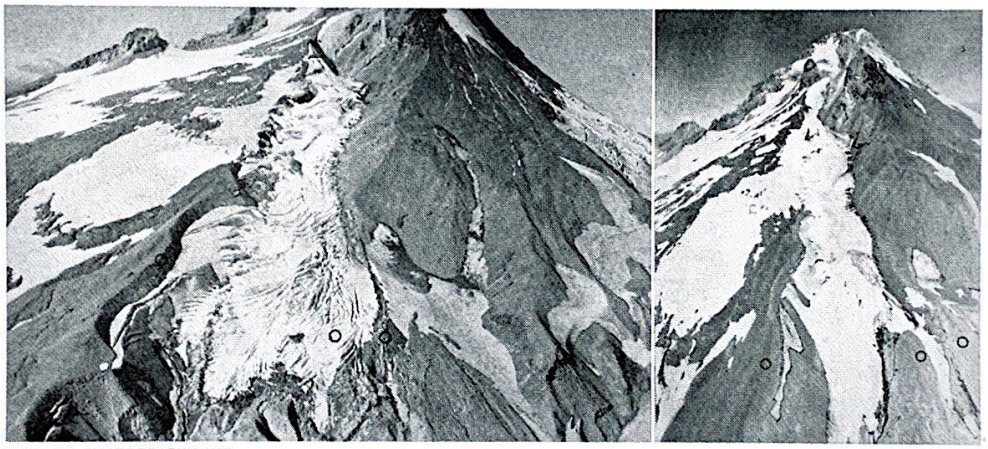
On upper Coe Glacier, just as on upper Eliot, there are many signs of increased glacier activity. The "D" line (See Fig. 3) has been studied for only three years, but in that time an increase in thickness of about eight feet a year has taken place. The new, white, laterally crevassed ice just below the seracs

* Of the painted boulders embedded in the surface of the ice, some are moved by rock and snow slides and tend to leave an unreliable record of down-glacier surface motion.



ACKROYD PHOTOGRAPHY INC. RAY ATKESON

Fig. 7. Coe Glacier 1956 and 1947. In this picture the terminus is completely covered by debris. The increase of ice in the upper center is quite evident. The white ice at the top of the right moraine has almost completely disappeared in 1959, but the bulge of the glacier under the debris was still growing at the time of the 1959 survey.



ACKROYD PHOTOGRAPHY INC. RAY ATKESON

Fig. 8. White River Glacier 1956 and 1957. White River Glacier in center foreground, Palmer Ice Field to the left and Newton Clark Glacier in the extreme upper right. By the appearance of Palmer Ice Field and the ice just to the right of White River Glacier there was less residual snow in 1956 than there was in 1947. The circles indicate the ground survey positions established in 1947. The position in the center was in 1956 covered by the downward moving ice. Palmer Ice Field has made very little change in the ten year period.

(ice fall) and to the right of the axis of Coe Glacier (1957 photo, Fig. 7) had all but disappeared in 1959. Owing to the melting of this ice and the increase in depth of the glacier at that point the area on the far end of the line was not visible from the survey station on the east moraine. (See Fig. 3.)

Just what this new surge of ice means is unknown. Whether the new ice is a temporary surge that may never affect the terminus of glacier, or whether it is truly an indication of a slow, gradual build up, remains to be seen.

Judging from the pictures in Fig. 8 White River Glacier has undergone a marked physical growth in the ten year period between photographs. In 1957 the ice was badly cracked and crevassed, both features of active moving ice. From the glossy appearance of Palmer ice field on the left, and the dirty appearance of the ice just to the right of White River Glacier, there was less residual snow in 1957. White River Glacier increased notably in volume at the points marked by the circles on Fig. 8. Palmer ice field has made no apparent change, but perhaps it has

lost area around the 8,400 foot level. In the older photo the upper forming ground of White River Glacier had a convex appearance; in 1957 the ice had changed to a concave profile, indicating a loss in volume in the ten year period. With a loss in volume above the 8,300 foot level and an increase below, the glacier may have only primed itself for a mometary surge.

In summary, the ice on the north side of Mount Hood has increased in volume about the 7,100 foot level, and the uppermost line on Coe and Eliot glaciers have shown marked gains. The lower lines on the two glaciers have continued their retreat, indicating that an ice wave is now appearing in the higher altitudes. On the gentle and exposed south slopes the ice appears to have accumulated and produced a surge, leaving a void in the area of accumulation, producing a flushing effect. Only time and many more observations will indicate the final outcome of these new movements in the glaciers on Mount Hood.

BIBLIOGRAPHY

Lawrence, Donald B., *"Mount Hood's Latest Eruption and Glacier Advances,"* MAZAMA 1948 p. 22.
Mason, Ralph S., *"Cascade Peak Glaciers Rephotographed,"* MAZAMA 1956 p. 47.
....., *"Recent Survey of Coe and Eliot Glaciers,"* MAZAMA 1954 p. 37.
Matthes, Francois E. & Phillips, Kenneth N., *"Surface Ablation and Movement of the Ice on Eliot Glacier,"* MAZAMA 1943, p. 17.
Phillips, Kenneth N., *"Our Vanishing Glaciers,"* MAZAMA 1938 p. 24.
Reid, Harry Fielding, *"The Glaciers of Mount Hood and Mount Adams,"* MAZAMA 1905 p. 195.

Backpacking in the Three Sisters Area

By RUTH HAUCKE

SATURDAY MORNING, July 25, was clear and sunny. The sidewalk in front of the Pacific Building was buzzing with activity as nineteen Mazamas ran around greeting friends, wrestling with dunnage bags, and scouting positions on the bus waiting to take them to McKenzie Pass, the starting point for our outing. Four more of us got on outside the city on East Burnside.

Aurelia Allen and Mary Mason joined us at Redmond. We all enjoyed the false-fronted stores with the clever advertising signs, which were Redmond's contribution to Oregon's centennial celebration. We proceeded on to Sisters, with spectacular views of every mountain from Hood to Bachelor Butte, and finally zigzagged up the tree-lined McKenzie Highway to the pass, where we met our packers, Bill Kirkpatrick and Shorty Gustafson.

Our first day's hike took us six miles through a variety of terrain — beautiful forest, past two small lakes, and during the hottest part of the day, around two sides of the base of Yapoah Crater. It was an interesting sight, but most of us were more interested in getting to the next shady spot. We camped at Scott Springs, and didn't spend much time with such preliminaries as dinner and campfire before we hit the sack. However most of us managed to walk about one-eighth of a mile to a viewpoint, where we admired all the mountains north of us silhouetted against a beautiful sunset.

We got up early Sunday morning in order to get an early start and cross a big lava field before the hot afternoon sun caught up with us. We passed Collier Glacier and had a very enjoyable day. Nearly everyone went past the Montague and Prouty monuments on the way to Camp Scott, but a few lazy ones took a shortcut up the creek. The last member of our party, Gerry Amort, joined us at Camp Scott. Al Maas located a beautiful campsite at nearby Obsidian Falls. The place was well-named, and many of us tried to figure out whether the food we had eaten weighed as much as prized specimens of obsidian we wanted to put into our dunnage bags.

Our leader, Helen Wirtanen, announced that on Monday we weren't moving camp and that "you can do anything you like!" She, Mary Conzelman, and Mary Mason rested by scouting a trip to Linnton Meadows. Al Nelson led a group of us on a leisurely trip on the rocky slopes above camp where we took dozens of pictures, admired colorful rock gardens, and superb views of the mountains—particularly a close-up of the Husband. Four deer with beautiful antlers