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THE MEASUREMENT OF SIDE-SLIP AT AUSTERDALSBREEN, 1959 *

Summary

Geomorphologists studying glacial erosion need to know the speed at which glaciers slip along their side-walls, but few such measurements have been recorded. J. D. Forbes (1842) observed that the difference in velocity between the centre and sides of the Glacier des Bossons, Chamonix, was least at the higher part and most at the lower part. W. Pillewizer (1950) noted much the same behaviour with the glaciers leading down from Jostedalsbreen, Norway, and Glen confirmed and amplified these findings on Austerdalsbreen in 1956. He measured side-slip of 26 cm/day within 1,15 m of western side-wall immediately down-glacier from an ice-fall. A stake 15,3 metres from the side-wall on the other side of the glacier moved 20,7 cm/day. These movements represented a very appreciable fraction of the movement down the centre line of the glacier. It probably implies also a high value of slip along the bed, which was largely confirmed by W. H. Ward's vertical velocity profile obtained from the displacement of a vertical pipe in the glacier between 1958 and 1959. This may help to account for the scouring of rock basins by glaciers at the foot of rock steps.

In 1959 both the authors measured side-slip lower down Austerdalsbreen. Glen used the method of taking the distances between a vertical stake in the glacier and two fixed points on the side-wall. This gave steady rates of movements varying with the locality between 2 and 4 cm/day, in the plane of glacier movement. Lewis inserted stakes, horizontally or gently inclined, through the up-standing edge of the glacier resting against the side-wall, and measured both horizontal and vertical movement directly on the side-wall. The were taken once or twice a day for three weeks and exhibited more erratic movements than the other method, especially during the earlier part of the period of measurement when only

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this method was used. The vertical movements were particularly erratic. In a few cases heavy down-pours of rain produced a large rapid movement followed by quiescence. The average movement of neighbouring stations was similar by both methods. One stake did not move during more than a week of observation, presumably because it had been inserted immediately up-glacier from a large boulder which was jammed against the side-wall, and was later revealed by melting. This suggests that large boulders cannot slide along and groove the side-wall unless they are many metres below the glacier surface.