The Editor,
The Journal of Glaciology

SIR,

For over twenty years I have used the term "glacierization" in the teaching of geomorphology in the Universities of Edinburgh and Sheffield, and I have every intention of continuing its use in future. Indeed, with all due deference to Professor Flint, I do not see how I can otherwise achieve clarity in my own exposition or foster it in my students' thinking.

The terms "glaciation" and "glacierization" are required since we have to deal with two radically different processes.

Glaciation is the modification of the surface of a land by ice as the result of a glacial episode. The modification may be mainly erosive as in Skye, or mainly depositional as in East Anglia. In either case it is irreversible; as a result of the glacial episode the landscape is significantly changed in ways that are nowadays well understood when the adjective "*glaciated*" is used. By contrast we can speak of *unglaciated* (or as Davis sometimes preferred "*never-glaciated*") areas which have not been so modified.

Glacierization as envisaged by Wright and Priestley is also a process—the investment of a land mass by ice. Since we are dealing with a process it is not enough, as Professor Flint suggests, to make do with adjectival forms such as "glacier-covered"; we need a noun. And since the process, in strong contrast to the irreversible process of glaciation, is a reversible one, the noun must be a different one. Ice masses wax and wane with climatic change; the lands they invest are thus *glacierized* and *de-glacierized*. The final state, glaciologically and climatically, may approximate closely to the first. In the interim glacierization may have been gradual or rapid, heavy or light, widespread or local. A fair example of the utility of such terminology is offered in the discussion on "Unglaciated Areas" by Dr. Farrington and myself on pp. 77 and 78 of *Irish Geography*, Vol. 2, 1950. It is to be noted that the negative form of "glacierized" cannot be "unglacierized" but must be "de-glacierized."

There remains, however, the consideration that even if the need for such a term as "glacierization" be admitted, this may not be the best for the purpose. Few others present themselves. "Glaciered" has been used as an adjective but is very poetic sounding and no useful substantive can be created from it. And this consideration applies even more strongly to adjectives such as "ice-covered" or "glacier-covered" which are already compound. "Glacification" has been used in this sense, but it is used much more frequently and appropriately to denote the change of state from liquid water to ice; it is the analogue in form and sense of "gasification" and should be left for employment by those who have occasion to use it in this way. Nothing else offers but glacierization. Nor is "glacierization" so cacophonous that there should be any difficulty about its acceptance as a technical term by a generation that has already accepted the nationalization of its mines, the rationalization of its industry, the motorization of its cavalry, the totalization of its betting, the sterilization of its Green Belts, the radio-serialization of its great novels, and the Americanization of its leisure. In fact I see much less obstacle arising to the popularization of this term because of its lack of euphony than from lack of vizualization (I mean .of course, failure to visualize) the very real advantages which attend its use.

Glacierization in short seems to me both a necessary term and the best for the job.

The University, DAVID L. LINTON
Sheffield
7 October 1954

PS. The case for spelling such words as "glacierize" with a "z" has of course been conclusively put by Fowler in his dictionary of *Modern English Usage*.

SIR, *A Second Monte Rosa Tunnel*

A new tunnel at an elevation of 4220 m. was started on Monte Rosa at lat. 87·6° N. and long. 632·4° E. on the Swiss Topographical Map, headed due south-east and graded horizontally into the steep ice slope. The tunnel pierced through to bed rock at 92 m.

This year I had a group from the Austrian Alpine Club who occupied a chamber excavated in the snow continuously for two months except for three days during a September blizzard. The

temperature readings are fascinating: starting with 8° F. (−13·3° C.), which obviously is the mean annual temperature of the atmosphere at this altitude, the ice grew progressively warmer as the tunnel advanced, reaching 17° F. (−8·3° C.) at 30 m.; then the ice dropped to 10° F. (−12·2° C.) at 50 m.; the ice warmed up again to 17° F. at 70 m.—then dropped to 8° F. at 90 m.—and the rock itself was at 8° F.

These temperatures varied very little over the whole exposure of the tunnel opening—up to three months. They are not to be interpreted as applying to the old tunnel.

Temperatures of the air outside and inside the tunnel were also recorded during the summer.

25 *West 43rd Street*,
New York 36, *N.Y.*
25 *October* 1954

JOEL E. FISHER

The Editor,
The Journal of Glaciology

SIR,

Finsterwalder's and Ahlmann's Rules

Finsterwalder's and Ahlmann's rules are often used in calculations of the accumulation and ablation balance of glaciers. I doubt whether they are in fact valid for an alpine glacier in equilibrium. They are based on the shape of the curves of precipitation p and ablation a as a function of altitude z (the slight modification introduced by movement of the glacier is here neglected). These curves were obtained by Ahlmann for sub-polar glaciers (Fig. 1, below). The precipitation curve p increases slowly with z, and is concave downwards, reaching a maximum a little after the firn line z_0. However, Mörikofer in the Oberland and Péguy in the eastern Oisans have found that the precipitation increases rapidly with altitude (see, for example, Péguy, C.-P., *La neige*, Paris, Presses Universitaires de France, 1952, p. 51); the curve for p is concave upwards until very near to the maximum which is appreciably higher than the firn line, at about 4000 m. (Fig. 2). In the Andes of central Chile the same seems to be true.

In this case, the curve of $p-a=f(z)$, instead of being a parabola reaching its maximum at the highest altitude of the glacier as Finsterwalder supposes, will be approximately a straight line.

We can write Ahlmann's rule as follows: if S is the surface area of the glacier in horizontal projection and $p_0=a_0$ the precipitation at the firn line, then

$$p_0=a_0=\frac{\int_{z_1}^{z_2}\frac{1}{2}(p+a)dS}{S}$$

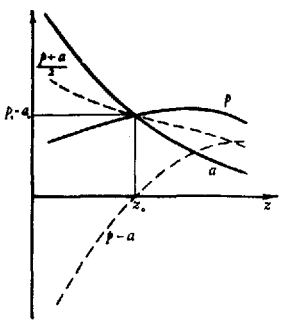

Fig. 1

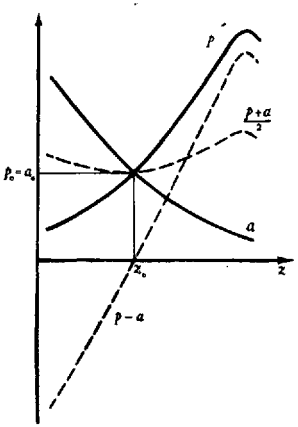

Fig. 2

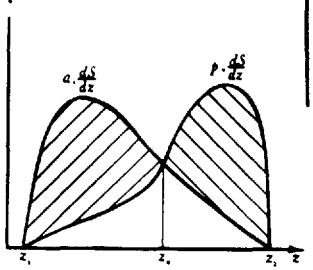

Fig. 3

https://doi.org/10.3189/S0022143000032615 Published online by Cambridge University Press