

instruments of this type they must be regarded sceptically when insufficient attention is paid to ablation and when the forces exerted on the instrument are not taken into account.

It would be very desirable if Mr. Galloway would say a little more on this aspect of the problem since I find difficulty in understanding how this, after all, rather heavy instrument can move with the glacier ice without prejudicing the accuracy of the measurements.

The carrying out of measurements with this instrument above the glacier end seems to me essential, even though really favourable conditions for its setting up do not always exist. Generally there are only a few places where it can be erected and this applies too to the glacier end. Otherwise there is little prospect of success.

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16 April 1956

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2. — Der tägliche Bewegungsrhythmus von Gletschern. *Die Umschau in Wissenschaft und Technik*, Jahrg. 45, Ht. 33, 1941, p. 520-23.
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(An interesting early investigation of "Hourly glacial motion" by theodolite is described by H. B. Washburn in the *Geographical Journal*, Vol. 87, No. 6, 1936, p. 490. Still earlier records of short-term forward and lateral movement in firn were made by F. Pfaff in a paper entitled Ueber die Bewegung des Firnes und der Gletscher, *Abhandlungen der k. bayer. Akademie der Wissenschaften*, 2 Cl., Bd. 12., Abth. 2, 1876, 23 p. Ed.)

The Editor,

*The Journal of Glaciology*

SIR,

I am most grateful to Professor Evers for pointing out the references to his important papers on this subject which had indeed escaped my notice.

Our measurements in Lyngen were taken over such a short period of time that the problem of ablation scarcely arose, but this could become very serious over longer periods as Professor Evers points out. However, its effects can be minimized by mounting the apparatus on tubes driven deep into the glacier and filled with a freezing mixture of ice and salt. Over a considerable period of time the pull of the wires would undoubtedly cause a movement of the instrument towards the valley side, thus introducing an error, but this can be minimized in the same way as the effect of ablation. On a narrow glacier it should be possible to have two instruments on the same mounting, but with wires running to opposite sides of the valley so that this error would then be entirely eliminated. It is true, however, that in its present form the instrument cannot record lateral movements which may be very important. Indeed periods of apparent reduction in forward speed of the glacier as recorded by the instrument may in fact correspond to periods of intensified lateral or upward motion. Very much remains to be found out about glacier motion and with further testing and development "glacier clocks" may become a source of much interesting information.

R. W. GALLOWAY

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4 October 1956

## GLACIOLOGICAL LITERATURE

THIS selected list of glaciological literature has been prepared by J. W. Glen with the assistance of T. H. Ellison, W. B. Harland, Miss D. M. Johnson, G. T. Warwick and the Staff of the Scott Polar Research Institute. Its field is the scientific study of snow and ice and of their effects on the earth; for the literature on polar expeditions, and also on the "applied" aspects of glaciology, such as snow ploughs, readers should consult the bibliographies in each issue of the *Polar Record*. For Russian material the system of transliteration used is that agreed by the U.S. Board on Geographic Names and the Permanent Committee on Geographical Names for British Official Use in 1947. Readers can greatly assist by sending reprints of their publications to the Society, or by informing Dr. Glen of publications of glaciological interest.

### GENERAL GLACIOLOGY

FINSTERWALDER, R. Geschichte der Alpenen Gletscherkurse. *Zeitschrift für Gletscherkunde und Glazialgeologie*, Bd. 3, Ht. 2, 1956, p. 257-61. [History of the Alpenen Gletscherkurse, now the Kurs für Hochgebirgsforschung.]

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- SHARP, R. P. Objectives of antarctic glaciological research. In Crary, A. P., and others, eds. *Antarctica in the International Geophysical Year*. Washington, American Geophysical Union, 1956, p. 27-35. [Present knowledge; research needs.]
- [UNION GÉODÉSIQUE ET GÉOPHYSIQUE INTERNATIONALE.] *Union Géodésique et Géophysique Internationale, Association Internationale d'Hydrologie Scientifique, Assemblée Générale de Rome 1954. Tom. 4: Comptes-rendus et rapports de la Commission des Neiges et des Glaces*. [Louvain], Association Internationale d'Hydrologie, [1956], 526 p. (Publication No. 39 de l'Association Internationale d'Hydrologie.) [For details of some of papers presented see elsewhere in this list. A full list of papers appears in *Journal of Glaciology*, Vol. 2, No. 17, 1955, p. 451-52.]

## GLACIOLOGICAL INSTRUMENTS AND METHODS

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## FROST ACTION ON ROCKS AND SOIL. FROZEN GROUND. PERMAFROST

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