SIR, *On the regime of the western part of the Ross Ice Shelf drainage system*

Bauer (1967) does not understand our paper (Giovinetto and others, 1966). The only assumption that we make in delineating the ice-drainage divide is that ice flows in the direction of the ice-surface slope.

Bauer is wrong in implying that our estimated error is a claim of "precision" in the estimate of the net mass budget. An estimated error is simply an attempt to quantify the word "approximately", which now and for years to come must precede net-budget estimates of large features such as ice sheets. If no error is stated and there is a conclusion about the net budget, the reader is led to believe that the error in the estimate is not greater than one-third of the net budget. For example, a statement such as "the nett balance of the [Greenland] ice cap is negative and about 100 km³ of water per year" (Bauer, 1955) implies that the error in the estimate is not greater than ± 33 km³ year^{-1}. We doubt if Bauer could substantiate such "precision". We certainly do not claim it for our own figures.

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REFERENCES

Bauer, A. 1955. The balance of the Greenland ice sheet. *Journal of Glaciology*, Vol. 2, No. 17, p. 456–62.
Bauer, A. 1967. The regime of the western part of the Ross Ice Shelf drainage system. *Journal of Glaciology*, Vol. 6, No. 48, p. 959. [Letter.]
Giovinetto, M. B., *and others*. 1966. The regime of the western part of the Ross Ice Shelf drainage system, by M. [B.] Giovinetto, E. S. Robinson and C. W. M. Swithinbank. *Journal of Glaciology*, Vol. 6, No. 43, p. 55–68.

SIR, *Bottom melting of the McMurdo Ice Shelf, Antarctica*

Recent drilling through the McMurdo Ice Shelf near the Williams Field Air Facility resulted in direct thickness measurements from which the rate of bottom melting can be calculated. This information may be of interest to others concerned with Antarctic glaciology and is presented for that reason. The first hole (DH-1) was located at the Williams Field camp (Fig. 1) and indicated an ice-shelf thickness of 44.5 m. The second hole was located due west of the first one and gave a thickness of 27.7 m. The distance between the holes was determined from aerial photographs to be 1 677 m, with an error probably not exceeding 5 m. The westward movement rate of 106 m/year was determined by a series of Electrotape surveys performed by the U.S. Geological Survey and it agrees well with the rates published by Stuart and Bull (1963, p. 405) and furnished by Heine (personal communication). Accumulation in this area is roughly 27 cm of snow per year (Stehle and Sherwood, 1965, p. 2).

The above figures show that as a unit column of the ice shelf moves westward at 106 m/year it loses 16.8 m by bottom melting in the 15.8 years required to travel 1 677 m. The thinning rate is 16.8/15.8, or 1.06 m/year for this part of the ice shelf. If the annual snow accumulation of about 0.27 m/year is assumed to be constant, then the unit column gains 4.05 m during the 15.8 years. The reduction in thickness is then about 12.75 m, or a total loss to the unit column of 0.81 m/year, as the ice shelf moves westward. This is fairly close to the figure of 0.7 m/year given by Macdonald and Hatherton (1961, p. 863). Unfortunately, time limitations did not permit the collection of deep-core specimens which would be of great interest. However, it is hoped that this can be accomplished in the future.

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