

Sørfonna is circular in plan, and of approximately 14 miles radius on a flat base 300 m. above sea level, all of which is reasonable as a first approximation, then the maximum height attained comes out at 740 m. above sea level approximately. The height was found by Professor Ahlmann in 1931 to be 764 m.

Dr. NYE: I am grateful to Mr. Hartog for pointing out this satisfying agreement. The fact that the formula for a horizontal bed and with  $2h_0=23$  m. fits the observed height shows that the average shear stress on a horizontal plane passing through the edge of the ice cap is close to 1 bar.

## THE COLD ICE TUNNEL ON THE SILBERSATTEL, MONTE ROSA

1953 PROGRESS

DURING the summer of 1953 progress on the tunnel was advanced from a length of about 60 m. to close to 100 m., notwithstanding considerable set-backs caused by bad weather.

On reopening the tunnel in June 1953, it was found that the axis of the tunnel had been twisted horizontally and warped vertically as much as three or four meters from its original line; the cross-section of the innermost part of the tunnel, formerly 2 m. high and 1 m. wide, had been compressed to approximately 1.20 m. high and 0.75 m. wide.

Notwithstanding the exposure of the inner walls of the tunnel to air for nearly twelve months, no substantial change in the temperatures of the ice walls was noted on reopening the tunnel (see *Journal of Glaciology*, Vol. 2, No. 13, April 1953, p. 194-96, for temperature measurements in 1952).

After re-excavating the 1952 structure to full size, progress was advanced during 1953 to a total length of close to 100 m., and it is estimated that there is over 70 m. of *névé* overlying the tunnel at its heading, which would represent a pressure of approximately 100 lb./sq. in. (7.03 kg./cm.<sup>2</sup>). It was therefore with much surprise that quite a few voids were opened up in this far-in position of the tunnel, voids up to one cubic foot in volume. There was, of course, no unbalanced air pressure in the voids as the bubbly nature of the *névé* would not permit air under pressure. Occasional small stones of the size of a man's fist were often found; presumably they were dislodged by the wind during the former lower horizons of the glacier, and were not scoured out from the bed. The temperature of the ice walls throughout this entire advance of the tunnel in 1953 was uniformly between 7° and 8° F. (-13.9° to -13.3° C.).

It is expected to continue the tunnel, with the benefits of these two years of experience, during the summer of 1954, and it is hoped to reach bed-rock before the end of this coming summer.

Parallax in photographs of the location of the portal of the tunnel in 1953, compared with identical photographs in 1952, indicates movement of about 35 m. per annum for this high-altitude glacier. The location of the portal (see photograph on p. 194 of the reference cited above) has since been triangulated from the Gornergrat Stockhorn, so that accurate data on this movement will be available in 1954.

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JOEL E. FISHER