

An Experiment on the Nature of Wind Erosion, Conducted in Peary Land, North Greenland.

By

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When the Danish Peary Land Expedition was spending its first winter in the camp at Brønlunds Fjord (P. C. WINTHER et al., 1950), a radiogram arrived from ARNE NOE-NYGAARD, suggesting that experiments be made to determine the amount of wind erosion in the area. Ventifacts are very abundant on the plains along the coasts of Brønlunds Fjord (J. C. TROELSEN, 1949, pp. 22-23), and as the proposition thus seemed to hold some promise of success, a number of blocks of various shapes and sizes were cut out of bricks and placed on a stretch of open, level ground where large numbers of small ventifacts gave evidence of strong wind erosion. As at Brønlunds Fjord the high winds practically always come from the west, the blocks were placed in a row trending N. 10° E. with a distance of 5-7 centimeters between the individual blocks. The blocks were securely fastened to a piece of board placed flush with the surface of the gravel plain, and all major obstacles were removed from the area around the blocks.

The experiment was started on January 25, 1949, and was terminated on July 1 of the same year. Before and after the experiment, the blocks

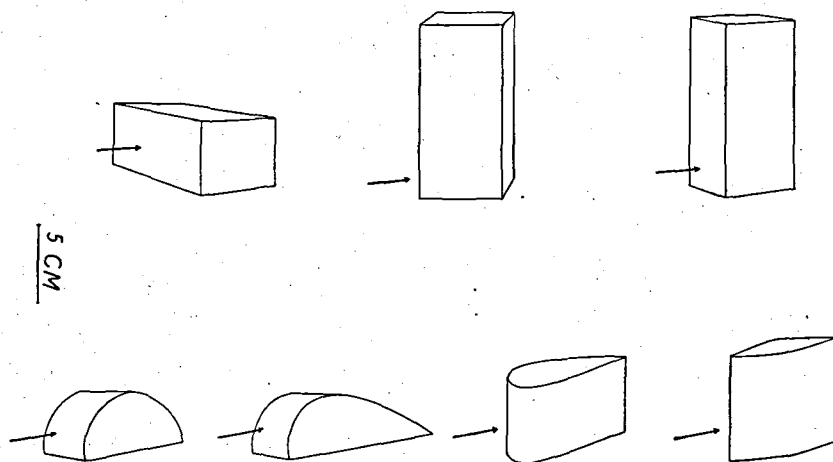


Fig. 1. Sketch illustrating the shapes and sizes of the blocks of silica earth used in the experiment. The arrows indicate the direction of the prevailing wind.

were thoroughly dried in an oven and weighed with an accuracy of 0.1 gram. Violent gales were frequent throughout the period of the experiment, but as even in winter a great deal of sand of varying grain size was carried

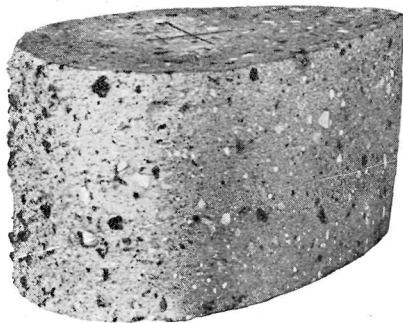


Fig. 2. Photograph of one of the blocks showing its strongly eroded windward side and its untouched upper surface. Height of the block 5 centimeters. CHR. HALKIER phot.

along by the wind, it was not possible to determine how much of the wear on the blocks was due to the effect of blown sand and how much to abrasion by particles of hard snow.

At the end of the experiment it was found that two blocks made of bricks of a hardness of about 3 (not shown in fig. 1) showed no visible or measureable (within 0.1 gram) effect of wind erosion. The balance of the blocks, which were cut out of very soft silica-brick (diatomaceous earth), had been rather strongly eroded on their western sides. No clear correlation could be found between the loss in

weight on the one hand and the vertical cross-sectional area or the area exposed to the west wind or the shape of the blocks on the other hand.

Though the experiment thus is incomplete and of no quantitative significance, some conclusions as to the nature of wind abrasion may be drawn from it. As could be expected, the lowermost part of the blocks showed little abrasion, but already 1 centimeter above the ground the erosive force of the wind seems to have reached its full strength. Some of the blocks had been made streamlined, either in the horizontal or in the vertical section, in order to determine whether sand grains carried by the slip stream along the sides of the blocks had any erosive effect, but not such effect was noted (fig. 2). Another matter is that narrow furrows and ridges extend to the leeward from small pits and knobs on the sides of the blocks. Such furrows and ridges were practically horizontal. While the east (leeward) sides of the blocks had been slightly eroded, a circumstance that may be attributed to the effect of the infrequent east winds, the flat upper surface found on some of the blocks was absolutely untouched by erosion (fig. 2). This lack of erosion may be due to turbulence created where the air is forced upwards along the vertical windward sides of the blocks.

The conclusion seems to be that only the direct impact of sand grains traveling along practically horizontal courses has any erosive effect.

LITERATURE

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