SOIL STUDIES AT BARROW, ALASKA

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During the past five years I have been conducting pedologic investigations for the U. S. Army Cold Regions Research and Engineering Laboratory (CRREL), at Barrow (71° 15' N, 156° 40' W), the northernmost land area in Alaska. The objectives of the CRREL sponsored basic research program have been to establish relationships between soils and near-surface frozen sediment and to integrate these findings into fundamental principles of cold regions pedology, hydrology, geology and ecology. Dr. Philip L. Johnson, plant ecologist, is collaborating in these studies.

Previous soil studies in the region were conducted by Dr. J. V. Drew, whose doctoral dissertation (1957) produced under the supervision of Dr. J. C. F. Tedrow (Rutgers University) included a reconnaissance soil map. These earlier studies established the types and distribution of tundra soils and polygonal ground found on this treeless, flat arctic coastal plain. This arctic region is underlain to depths in excess of 300 meters by permafrost or perennially frozen ground (pfg). The short "frost-free" period (90 days) produces an average thaw of 40 cm in the wet, fine grained soil. Below this, the upper 3 to 5 meters of pfg contains massive, vertically oriented ice wedges, buried peats and large quantities of segregated ground ice.

The studies have revealed considerable information on the age of the near-surface pfg. Radiocarbon dating of organic remains in the frozen sediment and buried ice wedges and pollen analyses indicate that a cooler and more severe tundra existed as far back as 14,000 years ago. The ice wedges are useful stratigraphic indicators and form in the following manner: winter cooling causes the ground to contract and crack in a