

only an hour, we often spent up to 5 hours searching for the station.

Strain networks covering larger areas near the RISP base camp and sites J-9, H-5, and G-11, were remeasured, and a 40-kilometer two-way level traverse between the base camp and site J-9 was completed (figure).

Accurate positions of 15 stations were obtained by M. Crutcher, M. Voight, and R. Worcester, all of the U.S. Geological Survey. Comparison with 1973-1974 data reveals annual ice shelf velocities of between 200 and 400 meters.

During the second half of the season, 34 new strain rosettes were planted near Roosevelt Island in the grid southwest part of the ice shelf, and accurate geocenter fixes were made at 10 of these stations. An extensive strain network was established near the Roosevelt Island camp to study a 40-kilometer section of the local flow line. J. Nielsen, University of Copenhagen (Denmark), obtained firn cores to 10-meter depths at 14 of the new stations, and these will be analyzed for oxygen isotope concentrations and total beta particle activity in order to identify the 1954-1955 hydrogen bomb layer and eventually to deduce average accumulation rates.

Ten-meter firn temperatures measured in 1973-1974 and 1974-1975 have been compared with those measured by Crary *et al.* (1962). They show an increase of 1°C. between 1958 and 1974. Possible causes for the increase are discussed by Thomas (in press).

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100-meter ice cores from the South Pole and the Ross Ice Shelf

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During its first season in Antarctica, the U.S. Army Cold Regions Research and Engineering Laboratory's (CRREL) shallow drill successfully drilled at the South Pole and at site J-9 on the Ross Ice Shelf. Depths of 100 meters were reached at both sites, with continuous core being obtained.

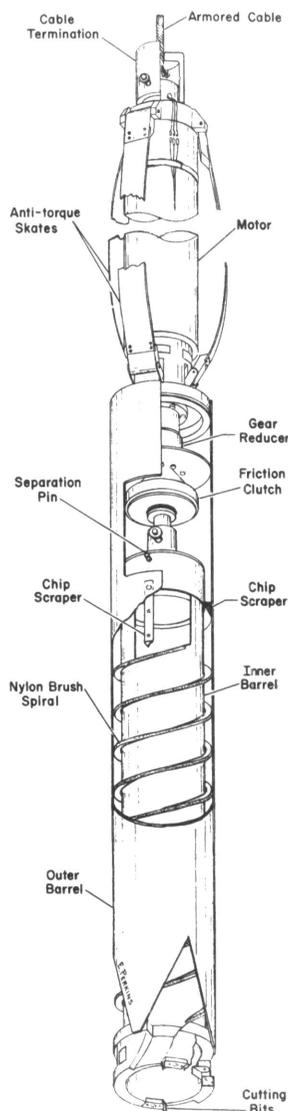


Figure 1. Schematic of the U.S. Army Cold Regions Research and Engineering Laboratory's shallow drill.

Robert Rutherford,* University of Nebraska, Lincoln, and director of the Ross Ice Shelf Project, and I operated the drill, and Chester Langway and Jim Craig, both of CRREL, processed core. Olav Liestøl and Olav Orheim, both of the Norsk Polarinstitut, observed the drilling at the South Pole.

This electromechanical drill weighs 65 kilograms and is designed for continuous core drilling in firn and ice to a depth of 100 meters (figures 1 and 2). The drill bores a 14-centimeter-diameter hole while obtaining a 10-centimeter-diameter core at a penetration rate up to 1 meter per minute in -20°C . ice. The cuttings are transported by a spiral flight to a container above the core storage section. The core and cuttings are removed from the drill after each 1-meter run in a cyclic operation. Additional components include 100 meters of a 7-conductor electromechanical cable, a 6.8-meter tower, ski-mounted hoist, and a 3-phase 220-volt (alternating current) gasoline generator. The equipment was designed to be transported in a ski-equipped Twin Otter airplane and to be assembled and operated by two people.

The first 100-meter hole was started on November 19, 1974, at the South Pole. The -30°C . temperatures experienced during this operation spread the drilling over a 2.5-day period. Actual drilling time was just under 15 hours. A relatively slow start was due to the cutting bits, which had to be reworked in the field. Heaters were added to the winch to keep the motors and gear boxes from freezing. The drill motor was stored each night in a heated shelter. The excellent core obtained from this site had very little surface scoring. The core was retrieved in average sections from 30 to 40 centimeters long. The hole was completed on November 21. The drill was taken apart and crated for transportation to J-9.

Drilling at J-9 started on November 27 after a short wait at the South Pole. Problems with the core retrieval mechanism after reaching the firn-ice transition slowed progress, and 100 meters was reached on November 30. Core from this site was less than perfect and continuous; the problem that caused this condition has been corrected. A temperature profile was taken of the 100-meter hole, and a graph of the temperatures recorded is in figure 3. Upon completion of the temperature measurements, the hole was used for seismic studies by John Clough, University of Wisconsin.

A third 100-meter hole, scheduled for Siple Station, was cancelled due to mechanical problems, bad weather, and a lack of time remaining in the season.

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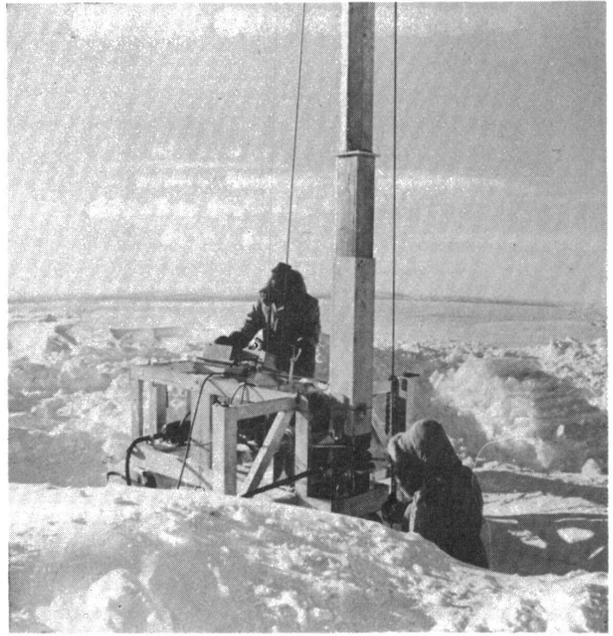


Figure 2. Shallow drill in use during the 1974-1975 austral summer field season.

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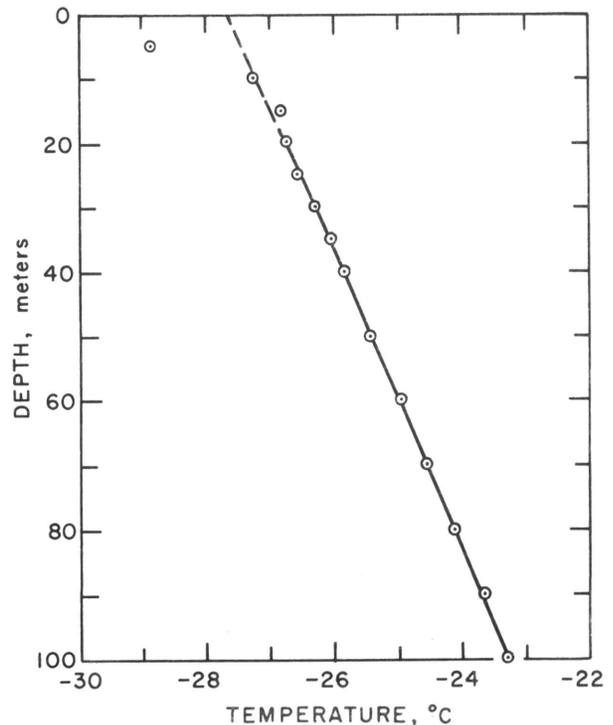


Figure 3. Site J-9 (Ross Ice Shelf) temperature profile, December 1, 1974.