

UNIVERSITY OF MICHIGAN GLACIOLOGICAL WORK ON THE
ROSS ICE SHELF, 1961-62

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(See Bulletin, Vol. III, No. 1, pp. 17-18;
No. 2, p. 15; No. 4, p. 6; No. 6, pp. 14-17)

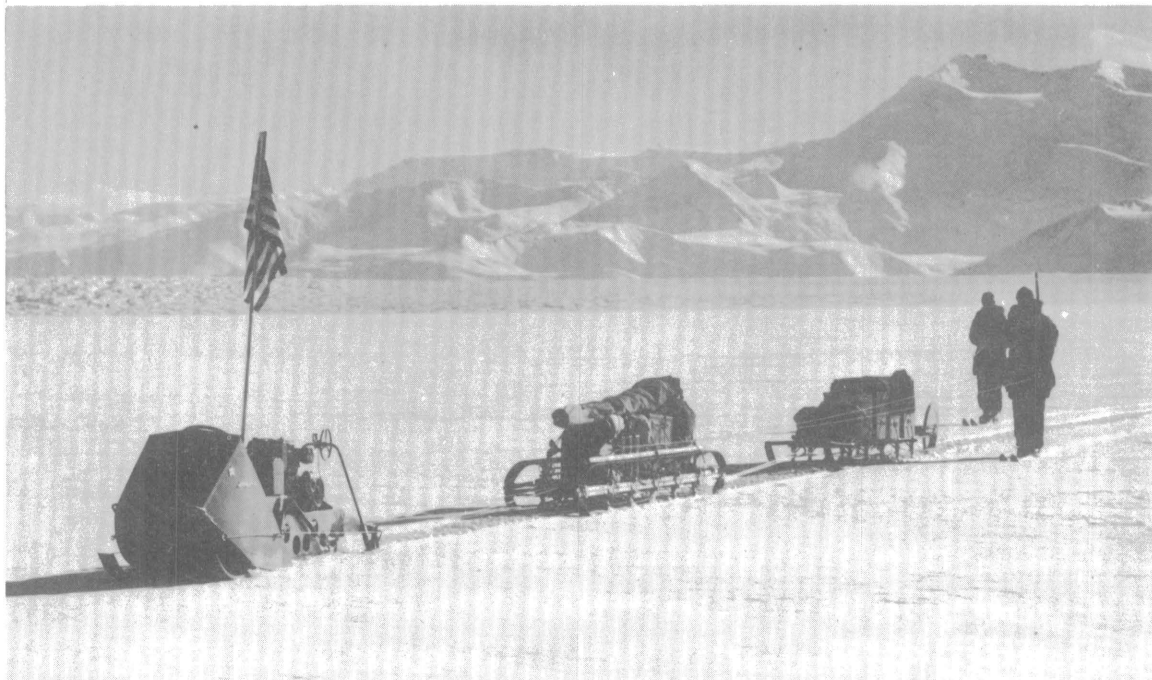
A three-man expedition organized by the Glacial Geology and Polar Research Laboratory, University of Michigan, flew from New Zealand to McMurdo Station on 14 October 1961 in a U.S. Air Force C-124 Globemaster. Members were Charles W. M. Swithinbank and Arthur S. Rundle, glaciologist and assistant glaciologist, respectively, and Thomas E. Taylor, surveyor, of the U.S. Geological Survey. The object of the expedition was to continue measurements begun in 1960-61 of the rate

of movement of the principal valley glaciers flowing into the west side of the Ross Ice Shelf. For part of the season, the party worked together with a geophysical team from the University of Minnesota led by Dr. Edward Thiel. Thiel was killed in a P2V crash at Wilkes Station on 9 November.

Barne Inlet was visited on 23 October, using two U.S. Navy HUS helicopters. A Worden gravity meter was read at four places on a line across the glacier. The Michigan and Minnesota parties were flown to Nimrod Glacier from McMurdo Station in two R4D aircraft on 30 October. Ten gravity readings were made at ice movement stakes planted the year before, and the rate of movement was determined at seven points spaced across the glacier between Cape Lyttelton and Cape Wilson. After making seismic soundings, Thiel was flown out by an R4D on 4 November.

Using two Eliason and one Polaris motor toboggans, the remaining party set out for NAAF Beardmore on 5 November. The 174-mile journey along the foot of the mountains was completed on 13 November. En route, five ice movement markers established the previous year were found and resected. Four days later, the Michigan party, with a single motor toboggan, traversed the 27 miles to the mouth of the Beardmore Glacier. Twelve ice movement stakes were resurveyed and 14 gravity stations were established on a line between Mount Hope and Airdrop Peak. The party returned to NAAF Beardmore on 22 November, where it remained until 7 December.

On 7 December, Swithinbank, Taylor, and Rundle were flown east along the Queen Maud Range in an R4D aircraft piloted by Lieutenant James Weeks, USN. An intended landing at Robert Scott Glacier was prevented by bad weather. After a reconnaissance of the glacier, the party was landed on the ice shelf 30 miles off the mouth of Amundsen Glacier, together with two motor toboggans, food for six weeks, fuel for 320 miles, and camping, glaciological, and survey equipment. The 82 miles to Mount Hamilton on Robert Scott Glacier were covered in four days. This journey was particularly trying for the motor toboggans. Over much of the distance, the surface consisted of rough, hard sastrugi up to three feet high. Despite occasional overturns, the vehicles survived the ordeal without visible damage. Both machines were driven on this journey and throughout the season by remote control. Ropes are led from the toboggan's steering skis to a helmsman following 60 feet behind. All men are on skis, so that the whole sledge train could fall into a crevasse without risking life or limb of its driver or passengers. This method of driving is safer and more comfortable in the crevassed terrain characteristic of the mouths of the great valley glaciers. Moreover, it lessens the wear and tear on the vehicles compared with riding on them.



Polaris motor toboggan under way on Beardmore Glacier,
21 November 1961

At Durham Point, the party found a cairn erected on Thanksgiving Day, 1934, by the Queen Maud geological party of the second Byrd Antarctic Expedition. Inside was a note signed by the three men, and beside the cairn was a stadia rod, plane table tripod, two ice axes, and two pairs of crampons.

Resorting to man-hauling at Mount Hamilton in an attempt to cross the rough, bare ice of the glacier, the Michigan party was forced by severe crevassing to return after only four miles to the safer ice at the foot of the mountain. Without flagged stakes planted across most of the width of the glacier, it was still possible to make ice movement measurements by using moraine boulders and conspicuous crevasses as survey markers. Points were fixed by conventional triangulation, using a theodolite at each end of a baseline established on the mountain. Considering that the camp at the foot of Mount Hamilton was nearly 3,000 feet above sea level and within 300 miles of the South Pole, the air temperatures encountered were remarkably warm for the latitude. Day temperatures were consistently around 20°F. Ice temperatures, which below the level of seasonal fluctuations are known to lie close to the mean annual air temperature, suggested that this kind of weather was probably quite normal for the area. The ice temperature at a depth of

33 feet was -1°F ., whereas an average figure for this latitude would be around -20°F .

Returning once more to the ice shelf on 24 December, the party made a long detour to avoid extensive bare blue ice at the mouth of Robert Scott Glacier, before heading into the coast at O'Brien Peak. The 90 miles to the foot of Amundsen Glacier were covered in $3\frac{1}{2}$ days, in spite of a further detour made necessary by a dangerously crevassed area at the edge of the ice shelf. An attempt was made the following day to cross to the left bank of the glacier to plant survey markers and to make gravity measurements. But, after seven miles, the party was brought to a halt by severe and extensive crevassing, and reluctantly beat a retreat. Movement measurements were made, as they were at Robert Scott Glacier, by using boulders and crevasses as targets for angle measurements.

Owing to a misunderstanding about radio messages, the party's routine position reports were not received at McMurdo Station for a period of 10 days at the end of December. Finally, an R4D search aircraft piloted by Lieutenant Ronald Carlson, USN, located and landed briefly beside the party on 4 January to see that all was well. A continuous period of foggy weather at this time confined the men to their tents for 12 consecutive days, an unpleasant kind of record for them all. Leaving Amundsen Glacier on 15 January, one motor toboggan covered 95 miles in two days. Much of this distance was again accounted for by a wide detour on to the ice shelf to avoid the disturbed area at the mouth of the glacier. A brief stop was made at Mount Betty, where Amundsen's cairn, erected almost exactly 50 years before, was found still intact and still containing a full 5-gallon can of kerosene. Fifty yards away was a cairn erected on 28 December 1929 by the geological party of the first Byrd Antarctic Expedition. Inside was a note by Dr. Laurence M. Gould, leader of the party, together with a large assortment of clothing, some first aid supplies, radio parts, dog harnesses, and Gould's geological hammer. A broken Nansen sledge and a movie camera tripod were lying against the outside of the cairn.

En route to Liv Glacier the following day, 17 January, the Michigan party came upon the old Liv weather station erected during Operation DEEP FREEZE II. The Jamesway hut was almost buried, but the radio masts, though crooked, were still standing. After digging down to the door, the hut was found partly filled with snow but otherwise in good condition. The leftover 5-year-old food was taken outside, where it served as a welcome addition to the party's dwindling supplies.

Nine days were spent at Liv Glacier. A complete traverse was made, in which nine gravity stations and seven ice movement markers were set up.

Returning to Liv weather station, the party was flown out in two R4D loads to NAAF Beardmore and thence to McMurdo Station on 1 February. In addition to the ice movement work, positions were determined by sun observation at each glacier visited. Three baselines were measured and all visible peaks intersected. Taylor completed a reconnaissance triangulation network covering about 150 miles of the mountain range. Ice temperatures were observed in a drill hole at each glacier, and routine weather observations were made throughout the period.

The party was carried in two HUS helicopters to Mulock Inlet on 10 February. Eight ice movement markers established the previous year were resurveyed and eight gravity observations were made in a line across the glacier. The helicopters reappeared on 13 February and returned the party to McMurdo Station. In all, successful movement measurements have now been made on seven of the eight principal valley glaciers in 650 miles of mountain range. The gravity measurements will give a first approximation of the depth of ice on each glacier. Actual movement figures have not yet been computed, but it appears that Barne Inlet is the fastest moving and Liv is the slowest of the glaciers visited. In the course of the season, one motor toboggan covered a total of 723 miles hauling an average load of 1,500 pounds, while two others each covered around 575 miles.

After further ice movement studies in the McMurdo Sound area, the Michigan party returned separately to New Zealand between 18 February and 11 March.