STATUS REPORT ON JUNEAU ICEFIELD RESEARCH, 1952

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The Juneau Icefield Research Project, 1952. The sixth expedition of the Juneau Icefield Research Project in Southeastern Alaska was in the field during the summer of 1952. Since 1948, there have been annual expeditions each summer in addition to one in the midwinter of 1950-51. As in previous years, the field work was undertaken under the sponsorship of the American Geographical Society and with the support of the Office of Naval Research. Valuable additional support was provided by various agencies in the Departments of the Army and the Air Force and by the U.S. Forest Service. Special assistance was also given by the

U.S. Weather Bureau, the U.S. Geological Survey, the Snow, Ice, and Permafrost Research Establishment, the Houston Technical Laboratory, the General Electric Company, the Department of Geophysics at Columbia University, the Arctic Institute of North America, the Society of Sigma Xi and the University of Minnesota.

Aerial logistic support was provided by the Tenth Rescue Squadron from Elmendorf Air Force Base. A scheduled set of early summer and late summer supply flights with ski-wheeled aircraft thus permitted airlift of needed expeditionary food and equipment in June and evacuation of records, equipment, and personnel at the end of August. For the early summer transfer of equipment to the icefield, a ski-wheeled, C-47 aircraft was employed, with its take-offs assisted by JATO. Two sets of unscheduled flights in midsummer were made to test the Air Force's new medium-sized rescue aircraft, an SA-16 "Albatross." During these operations, approximately sixty landings and take-offs (without JATO) were made on the icefield at elevations ranging from 3,000 to 6,000 feet. A light Piper Cruiser aircraft, piloted by K. Loken of Juneau, was used for air support and mail drops between the periods of Air Force flights.

On May 17, an advance party of three men skied to the central research station, twenty-five airline miles north of Juneau, via the now well-established western approach route through Camp 16 on the Lemon Glacier. This camp lies at 4,300-feet elevation and is a day's climb from Juneau. (With the construction of a proposed U.S. Forest Service trail to the upper Lemon Glacier névé from Salmon Creek Basin, it will be possible to reach the icefield in a half-day of walking from Juneau.) In early July, the main party's leader, A. K. Gilkey, and four other members of the expedition were flown to the central station (Camp 10) by skiplane. A special investigation group of four men arrived in August. Thus, twelve persons were involved in this season's work on the highland ice. Among the icefield personnel was one meteorologist from the Arctic Weather Central of the Air Weather Services in Anchorage and a participating geologist from the staff of the Air Force's Research Studies Institute at Montgomery, Alabama. A member of the U.S. Forest Service aided in liaison work in Juneau. During the summer the expedition was visited by the distinguished Scandinavian scientists, Dr. H. W:son Ahlmann, former Director of the Geographical Institute in Stockholm, and at present Swedish Ambassador to Norway, and Dr. Sverre Petterssen, Director of Scientific Research of the Air Weather Services. The project was also privileged to receive a visit from Dr. Richard U. Light, President of the American Geographical Society.

Under a separate Office of Naval Research contract, a team of five ecologists carried out some related investigations at low elevations on the western side of the icefield.

The field program was considerably aided by the use of two M29C oversnow vehicles ("weasels") which had been para-dropped in the vicinity of the research station in 1951. The first "weasel" was not evacuated from the unexpectedly heavy previous winter's snow cover until June 29. The second one remained buried for another two months, even

defying the use of a mine detector. It ultimately became exposed by ablation on September 1 and was thereafter used to good advantage in the closing weeks of the field season.

The lines of investigation pursued in this year's research program were as follows:

(1) *Glaciology:* A detailed series of standard snow profiles were continued throughout the season to compare with previous years of record and to show progressive changes in the character and firmness of the 1951-52 winter snow cover. These measurements primarily concerned physical characteristics of the firn and its diagenetic ice structures. They were applied periodically on the walls of pits and crevasses at selected locations on several of the main branches of the Taku Glacier system. In conjunction with these, englacial temperature records were obtained at the beginning and end of the summer ablation season to determine the dates of dissipation and repenetration of the spring and autumn cold wave. Samples of the firn were taken at various depths for chloride content determinations and for pollen analysis relating to special investigations of these aspects, which have been underway for several years. In addition, ten lines of movement stakes, established transversely across the Taku Glacier and its several upland tributaries, were surveyed to determine rates and directions of ice flow. From these the relative degree of nourishment of the tributaries may be assessed. Three of these lines coincided with seismic depth profiles obtained in 1949, thus permitting further calculations to be made of the volume of ice transfer down the main branch of the Taku Glacier.

Some emphasis was also placed on the implementation of certain new instrumental techniques. These included the use of a portable 1500-watt electro-thermic ice borer for the three-dimensional study of englacial conditions. This borer reached 171 feet and was only stopped by a shortage of gasoline for the generator. In addition, a Worden-type gravity meter was employed for seven miles of depth profile records across the highest névé of the ice field. The inclination was surveyed in a 245-foot length aluminum pipe which, in 1950, had been inserted in a mechanically-drilled vertical hole in the Taku Glacier. From plotted deformation of this pipe, a significant interpretation of differential englacial ice transfer is now possible on a vertical line through the upper third of the glacier.

(2) *Ecology:* To extend the previous investigations, specimens of nunatak vegetation were collected at a number of locations. Supplemental observations and studies were also conducted concerning the plant successions on recently deglaciated nunatak surfaces. Special reference was given to the type of plant climax to be expected at various elevations on the icefield. At low levels there was a continuation of the previous investigations of the history of recession of several glaciers flowing westward from the icefield. This latter work utilized dendro-chronological techniques. A new aspect of the glacio-ecological program was the study of the development of vegetation (especially fungi) and soils on moraines and deglaciated terrain with special reference to the accumulation of nitrogen.

(3) *Mapping:* A series of new triangulation stations were occupied and pin-pointed on the U.S. Navy vertical aerial photographs (SAE series of 1948). These have refined the previous mapping network which now embraces an area of 500 to 600 square miles. Panorama photographs were also taken from all stations to aid in photogrammetric interpretations.

(4) *Meteorology:* The usual standard synoptic observations on a three-hourly basis were restricted to three camps (10, 10A, and 8, 1952 site) at the 3,600- and 5,850-foot elevations. Two of these stations were on the névé surface and one on the bedrock nunatak at the central base camp. Continued ablation measurements on the icefield surface were made at these as well as other key sites. Also, related albedo and total radiation measurements were obtained at several sites in the névé zone, and a few micro-meteorological observations made to supplement previous studies. Reflected radiation data were obtained with a specially constructed portable solarimeter thermopile.

(5) *Geomorphology:* An aerial study of various morphological features on the icefield was undertaken to supplement previous ground work and to aid in the planning of future geological research. A reconnaissance geomorphological survey was also made of the terminus of the Llewellyn Glacier, along a south to north traverse of the icefield from the Taku Valley in Alaska to Lake Atlin in Northern British Columbia. Further data were obtained on the height and extent of the glacial scour-line, representing a marked ice expansion now known to have occurred on this icefield in the middle of the 18th century. A collection of interstadial tree samples for radio-carbon dating was obtained from under or near the ice on several peripheral glaciers. In the Taku Valley, on the south side of the icefield, further observations were made on the advancing Taku Glacier terminus and on neighboring receding glacier tongues. The bottom sediment sampling program initiated in Twin Glacier Lake in 1951 was also extended by means of a piston-type plunge corer operated manually from a raft.

The main summer party wound up its work on the icefield late in August with members being evacuated by the Camp 16 route and by ski-aircraft, between August 22 and 28. The late season party descended to Twin Glacier Lake on September 17 and continued geomorphological work in the Taku Valley until September 24. On September 25, the last members of the season's field party left Juneau, thus rounding out 131 field days in the area for this year's expedition.

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ALBATROSS LANDING ON UPPER TAKU GLACIER

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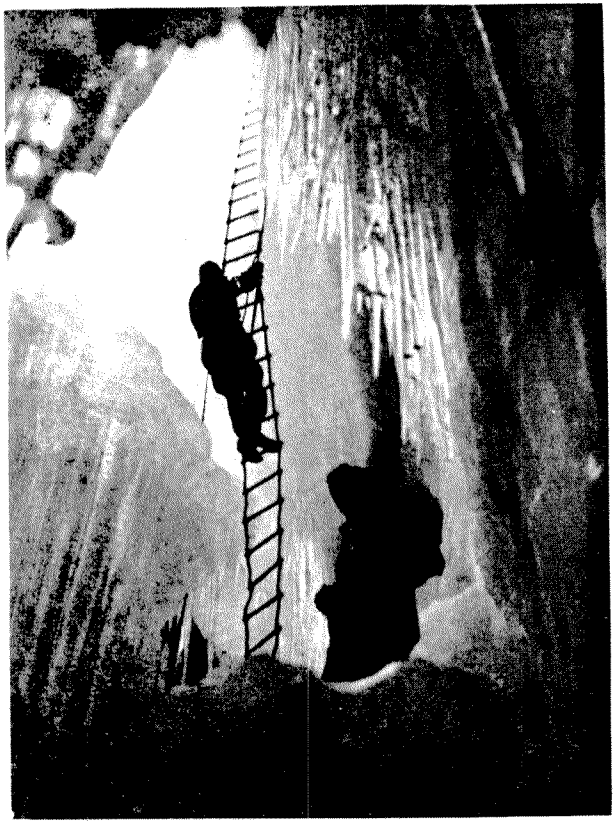
WEASEL OPERATING ON THE UPPER TAKU GLACIER



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CREVASSE EXPLORATION IN TAKU GLACIER, ALASKA