

## AWARDS AND ALLOWANCES

Participants receive all food, lodging and field facilities during the summer session. They are expected to cover their own travel expenses between their homes and Juneau.

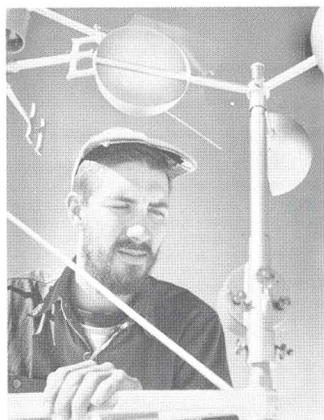
## ACADEMIC CREDIT

Qualified participants may be admitted to the Michigan State University summer quarter. From 3 to 15 credits can then be arranged, depending on the student's need and academic obligations. A minimum of 3 credits is suggested. The registration cost per credit is \$22.

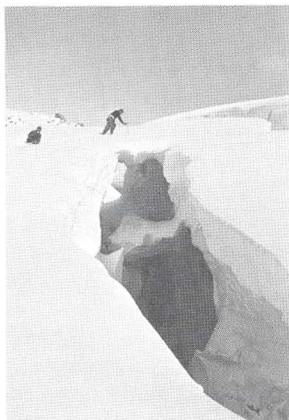
## ELIGIBILITY

Graduate and undergraduate awardees must be enrolled in, or officially admitted for, work as candidates for a degree at their respective institutions. A generally high academic record or potential is expected. Considerable weight, however, is placed on personal character, demonstrated interest and professional motivation. Several post-doctoral or senior scientist awards are also given each year for qualified older scientists. Participantships are also open to qualified high school earth science or environmental science teachers.

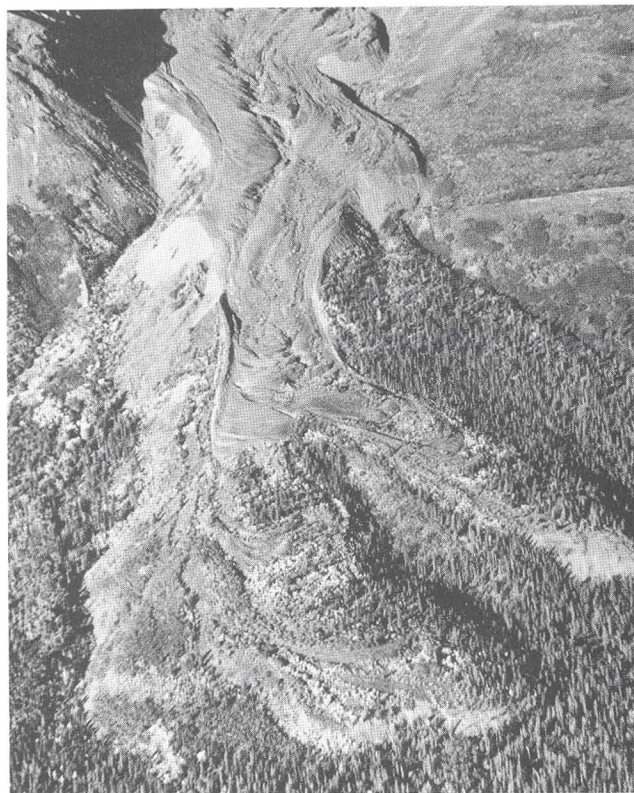
In the operation of this program and in selecting individuals for participation in and for administration of the program, Michigan State University and the Foundation for Glacier and Environmental Research will not discriminate against any person on the ground of race, creed, color, sex, or national origin.



Student meteorologist at Camp 10 station



Field party crossing crevasse on East Twin Glacier



Rock glacier in the Alaska-B.C.-Yukon border region

## APPLICATION

Application can be made as late as June 20th, but earlier inquiry is urged. Applications should contain information on experience and adaptability to rugged field conditions; transcripts; evidence of school or university status; and letters of recommendation from a supervisory head and two other individuals regarding scholarship and character. Two-thirds of the billets are allocated by June 5th. Other participants are notified before June 30th.

Make application to:  
Dr. Maynard M. Miller, Director  
Glaciological and Arctic Sciences Institute  
Michigan State University, East Lansing, Michigan 48823  
Field Addresses: P.O. Box 775, Juneau, Alaska 99801  
P.O. Box 99, Atlin, B.C., Canada

## STAFF

DR. MAYNARD M. MILLER, Director, Glaciological and Arctic Sciences Institute; Professor, Geology Dept., Michigan State University; Director, Foundation for Glacier and Environmental Research, Seattle, Wn. (glaciology, Pleistocene stratigraphy, geomorphology, environmental geology, photogrammetry, research tactics and field techniques)

DR. JAMES H. ANDERSON, Institute of Arctic Biology, University of Alaska; Research Associate, Foundation for Glacier and Environmental Research, Seattle, Wn. (arctic ecology, palynology, tundra ecosystems)

DIRK JANSSEN, Surveying Engineering Dept., University of New Brunswick, Fredericton, N.B., Canada (field surveying and terrestrial photogrammetry)

DR. GOTTFRIED KONECNY, Professor of Photogrammetry, Technical University of Hanover, Germany (photogrammetry, glacier and rock glacier surveys, remote sensing methods)

DR. GARY CLOUD, Metallurgy, Mechanics and Materials Science Dept., Michigan State University (glacier and continuum mechanics)

DR. HERBERT CURL, JR., Oceanography Dept., Oregon State University (snowfield and glacier ecology, mountain climatology)

DR. EDWARD LITTLE, Research Associate, Foundation for Glacier and Environmental Research, Seattle, Wn. (glacier and sea-ice physics, micrometeorology)

DR. ALFRED C. PINCHAK, Fluid Mechanics Dept., Case Western Reserve University, Cleveland, Ohio (glacio-hydrology, fluid mechanics, analytical techniques and statistical methods)

DR. DIRY L. RAY, Director, Pacific Science Center, Seattle, Wn. (North Pacific coastal oceanography, marine biology, environmental sciences)

DR. DOUGLAS N. SWANSTON, Forestry Research Lab., U.S. Forest Service, Corvallis, Oregon; Research Associate, Foundation for Glacier and Environmental Research, Seattle, Wn. (mass wastage, pedology, subarctic environments, glacial geology research)

DR. AYLMER THOMPSON, Meteorology Dept., Texas A & M University (arctic and mountain meteorology, synoptic climatology, satellite meteorology)

DR. CHARLES WAAG, Dept. of Geology, Georgia State University, Atlanta, Ga. (structural glaciology, resources and economic geology, field methods)

WALTER I. WITTMANN, Director, Division of Polar Oceanography, U.S. Naval Oceanographic Office, Washington, D.C. (polar oceanography, arctic basin environmental and sea-ice studies)



Oversnow vehicles on Hades Highway Nêvé.



Dog team on the Taku Nêvé



Electro-thermic glacier drilling on the Juneau Icefield.

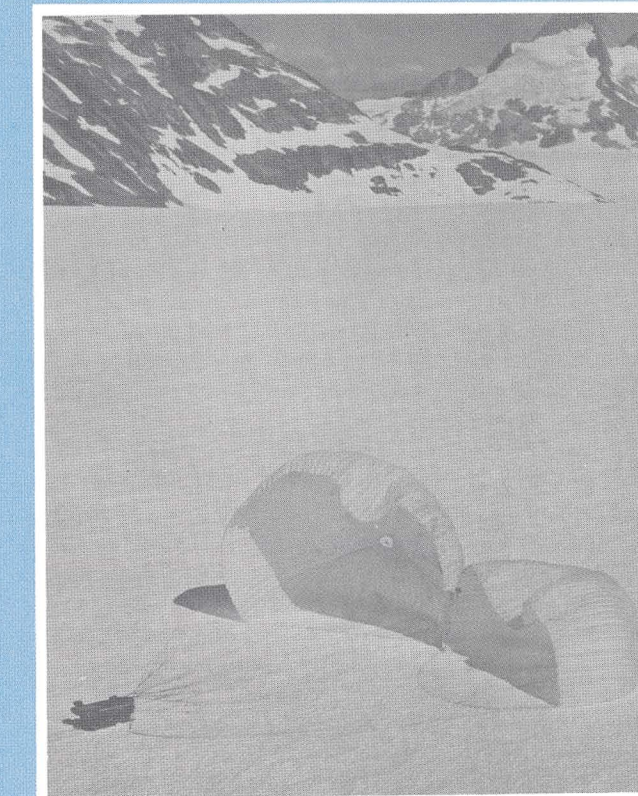
# ARCTIC AND MOUNTAIN ENVIRONMENTS

13th Summer Institute of Glaciological and Arctic Sciences

JULY 7 — AUGUST 31, 1972

JUNEAU ICEFIELD, ALASKA and adjacent regions

Sponsored by the National Science Foundation and Michigan State University in cooperation with the Foundation for Glacier and Environmental Research and the Juneau Icefield Research Program



Parachute delivery of large oversnow vehicle on Juneau Icefield



Icefall and wave-ogives on Vaughan Lewis Glacier near Camp 18

## PROPOSE

The Juneau Icefield Research Program (JIRP) was founded in 1941-42 and was organized in 1946 to pursue long-term research on interrelationship of the various disciplines necessary to interpret and understand the total environment of arctic and mountain regions. As an extension of this basic program, the Summer Institute in Glaciological and Arctic Sciences was organized in 1959 to provide the combined academic and field training, primarily at the graduate level, which is so essential to the solution of these multi-varied problems. The aim is to ensure basic knowledge and a total systems competence for potential polar and mountain scientists, but beyond this to provide practical training with broad significance for geologists, hydrologists, atmospheric scientists, and ecologists who have general as well as scientific environmental interests.

Students not only have the opportunity to observe and study sub-aerial processes in a dynamic region of existing glaciers, but also to gain appreciation of the inter-science integrative approach in studies of the overall environment which are applicable not only to still pristine wilderness regions but to scientific environmental problems in rural and urban areas alike.

As part of their training, participants attend lectures at permanent field sites, participate in demonstrations with instruments and materials in the field, and take and record a variety of different scientific measurements under supervision as part of an actual, on-going, long-range research program and related investigations from high-elevation and high-altitude periglacial areas to low-level temperate and sub-tropical regions. Through this approach, students gain a realistic understanding of glacio-climatological, glaciological and glacio-ecological relationships in natural settings. In addition to academic offerings, the Institute provides practical field work and extensive experience in a variety of personally challenging environments.

## DATE

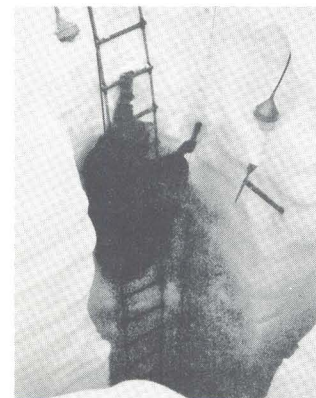
The Institute will be held for eight weeks, from July 7 to August 31, 1972. For qualified students interested in participation in the affiliated Juneau Icefield Research Program and allied regional research projects, or for those who desire field work on thesis problems, up to a month of additional field work can be arranged, beginning as early as June 1 and extending as late as October 1.

## THE CURRICULUM

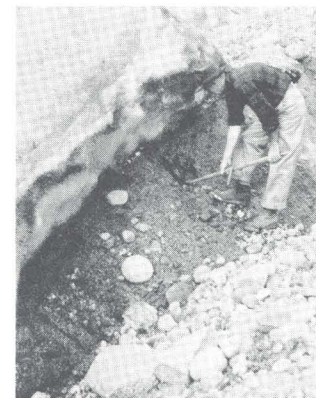
Courses from the 1972 Michigan State University Catalog are offered as follows: (see staff listing)

### GRADUATE COURSES

- GLG 814 Field Glaciology (3-6 cr)
- GLG 800 Sec. 1 Arctic Environmental Sciences (3 cr)
- GLG 800 Sec. 2 Terrestrial and Glacial Photogrammetry (2-6 cr)
- GLG 800 Sec. 3 Glacier Surveys and Mapping (1-3 cr)
- GLG 800 Sec. 4 Glacio-ecology (botanical) (1-3 cr)
- GLG 800 Sec. 5 Glacio-ecology (biological) (1-2 cr)
- GLG 800 Sec. 6 Glacio-lichenometry (1-2 cr)
- GLG 800 Sec. 7 Periglacial Geomorphology and Pleistocene Environments (1-6 cr)
- GLG 800 Sec. 8 Glaciology and Ice Physics (1-6 cr)
- GLG 800 Sec. 9 Arctic and Mountain Geomorphology (1-6 cr)
- GLG 800 Sec. 10 Glacier Mechanics (2-3 cr)
- GLG 800 Sec. 11 Glacio-meteorology (1-3 cr)



Density and melt-water measurements, Upper Taku Glacier



Debris-entrained thrust surface, Mendenhall Glacier

- GLG 800 Sec. 12 Glacio-hydrology and Fluid Mechanics (1-3 cr)
- GLG 800 Sec. 13 Glacier geophysics (1-3 cr)
- GLG 800 Sec. 14 Arctic Oceanography (1-3 cr)
- GLG 800 Sec. 15 Arctic and Wilderness Survival (1-3 cr)
- GLG 899 Thesis field research (Masters) (var. cr)
- GLG 999 Thesis field research (Doctoral) (var. cr)

### UNDERGRADUATE COURSES

- GLG 303 Mountain and Arctic Environments (3 cr)
- GLG 445 Field Studies (Glaciology; Glacial Geomorphology; Terrestrial and Glacial Photogrammetry) (3-6 cr)
- GLG 400H Field Problems (special topics) (1-3 cr)

These courses are designed to take full advantage of a classical glacial, periglacial and mountain and arctic environment in terms of field and "laboratory" instruction.

Additionally, special lectures, field studies and problem sessions are held on adjunct topics such as mapping, surveying, geophysical exploration techniques, snow physics, sea ice physics, radiation budgets, mass wastage and continuum mechanics, lichenometry, glacio-oceanography, permafrost, glacio-fluvial processes, Arctic taxonomy, glacial chronology, mountain geology, and Arctic, mountain, and glacial soils.

All offerings are given concurrently during a concerted work session on the Juneau Icefield, emphasizing Neoglacial conditions. Each participant is exposed to all offerings, but is examined only in those areas in which he is registered. A sixth week is used for work on a specific field problem, dependent on the student's aims, interests, and abilities. The last two weeks generally are concentrated in the Atlin area where deglaciated terrain provides a suitable opportunity for study of Cordilleran Wisconsinan chronology and Holocene periglacial environments. For those wishing to ally the instructional program with a specific thesis project, or equivalent research, including post-doctoral research, field problems may be developed and, where pertinent, variable credit obtained.

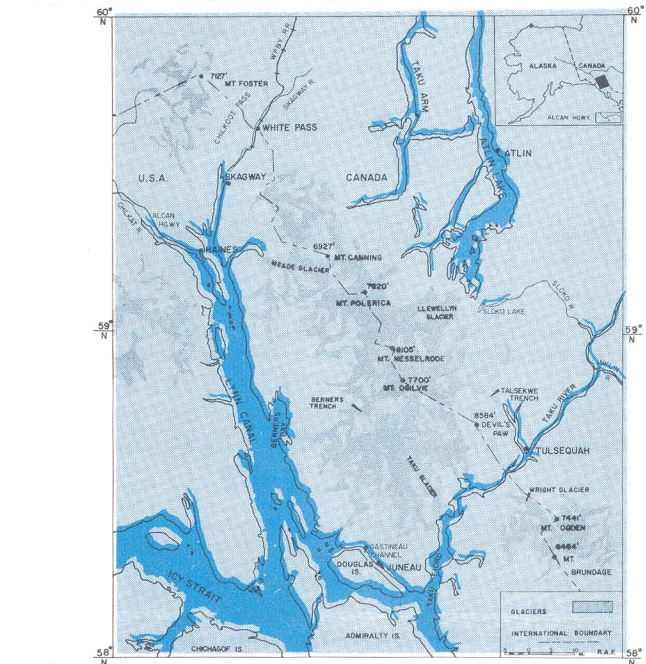
## PARTICIPANTS

Field participantships are available at the undergraduate, graduate and post-doctoral level. These include ten undergraduate research participation (URP) awards supported by the National Science Foundation (NSF) and eight graduate-level awards plus two affiliated science teacher scholarships supported by the Foundation for Glacier and Environmental Research (FGER).

There are ten NSF-supported participantships for high-ability high school juniors and seniors with environmental and field science interests. Only high school seniors pre-admitted to a university are eligible for MSU course credits in this program. Two graduate teaching assistantships and five JIRP research assistantships in connection with on-going research programs are offered to outstanding previous participants or others having equivalent experience. Places for a few additional participants in each category are available at the field fee of \$1080.00 per student.

## LOCATION

The main glacier area sites lie on or near the Juneau Icefield in the Alaska-Canada Coast Range between Juneau, Alaska and Atlin, B. C. In past seasons field trips have been conducted to observe phenomena in the deglaciated coastal environs, such as Glacier Bay, the Chilkat region, the forested fiords of Lynn Canal, the Taku River Valley and in the Dezadeash Lake and Atlin Lake areas on the continental side of the Boundary Range. Special emphasis will be given this year to the Atlin District, lying adjacent to the icefield on the north. Here a remarkable array of Wisconsinan deglaciation features and periglacial phenomena are observed. For this part of the program a permanent headquarters station is maintained at Atlin, B. C., from which field trips are also made to the Southwestern Yukon for geological and ecological observations and field work.



Map of Juneau Icefield and Taku-Atlin region, Alaska-Canada



Helicopter operations on the icefield



Alaska Air National Guard ski-plane at Camp 10

## FACILITIES AND LOGISTICS

Thirteen main stations and 17 lesser camps and research facilities are located on the icefield and its peripheral areas. Permanent aluminum-sheathed and well-insulated buildings exist at field sites. Wooden shelters and tents are used at trail camps. A 2500-volume library containing pertinent research materials, maps, aerial photos and other basic references is maintained at the three main icefield stations, as well as in the environmental sciences research library at the Atlin base station. A wide range of field and laboratory equipment for geophysical, glaciological, surveying, photogrammetric, botanical, meteorological and geological work is available for teaching and research.

Communication between camps and with the Juneau and Atlin bases is handled by radio. Helicopters, charter aircraft, and ski-planes are used for transportation, with ground transport carried out via foot travel, oversnow vehicles, dog team and skis.

Permanent installations are provided by the Juneau Icefield Research Program via its sponsor, the Foundation for Glacier and Environmental Research, c/o The Pacific Science Center, Seattle, Washington.