

## AWARDS AND ALLOWANCES

Participants receive all food, lodging and field facilities during the summer session. They cover their own travel expenses between their homes and Juneau, Alaska, and from Whitehorse, Y.T., back home.

## ACADEMIC CREDIT

Qualified participants may be admitted to the Michigan State University summer quarter. From 3 to 15 credits can be arranged, depending on the student's need and academic obligations. A minimum of 3 credits is required. The registration cost per credit is \$23.

## ELIGIBILITY

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

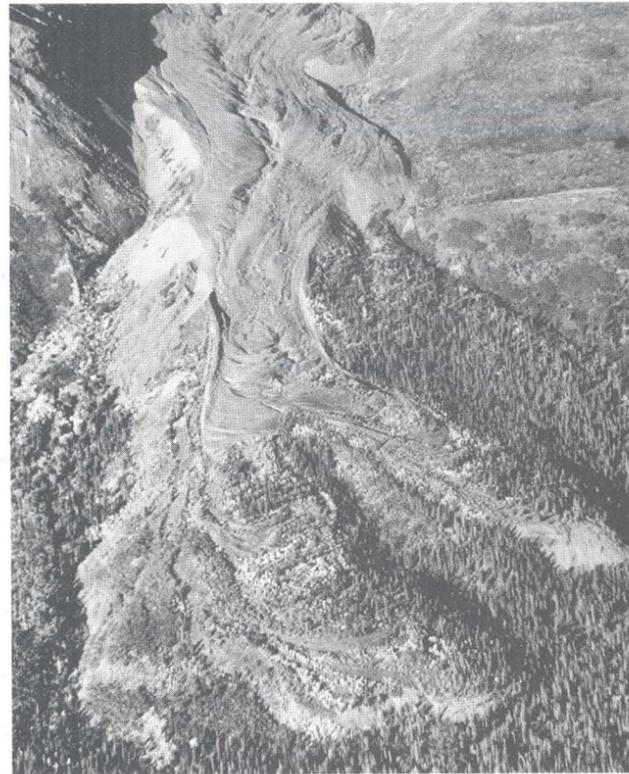
In the operation of this program and in selecting individuals for participation in and for administration of the program, Michigan State University and the Foundation for Glacier and Environmental Research will not discriminate against any person on the ground of race, creed, color, sex, or national 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 15th but earlier inquiry is urged. Applications should include 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.

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

## RESOURCE SCIENTISTS & DISCIPLINES

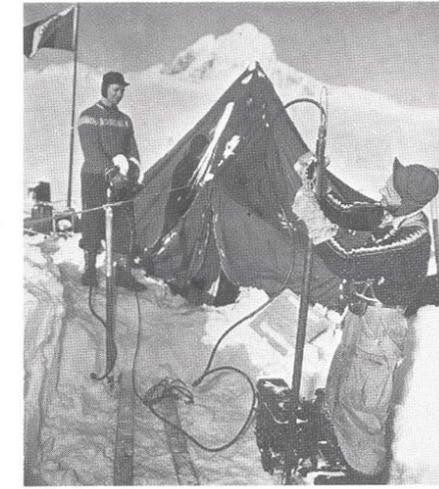
- DR. MAYNARD M. MILLER, Director, Glaciological and Arctic Sciences Institute; Professor, Geology Dept., Michigan State University; Director, Foundation for Glacier and Environmental Research, Seattle, Wn. (glaciology, Pleistocene stratigraphy, geomorphology, field techniques)
- DR. JAMES H. ANDERSON, Institute of Arctic Biology, University of Alaska; Research Associate, Foundation for Glacier and Environmental Research. (arctic ecology, geobotany)
- DR. HUGH BENNETT, Dept. of Geology, Michigan State University (glacier geophysics, seismic research)
- DR. ROBERT F. BLACK, Dept. of Geology, University of Connecticut (glacial and periglacial geology, polar studies, research tactics)
- DR. JAMES BUGH, Dept. of Geology, State University College, Cortland, N.Y. (glacio-hydrology, remote sensing)
- DR. GARY CLOUD, Dept. of Metallurgy, Mechanics and Materials Science, Michigan State University (glacier mechanics, glaciology research)
- DR. WILLIAM J. HINZE, Dept. of Geo-Science, Purdue University (geophysical methods, gravity, magnetics, electrical resistivity)
- DR. DAVID A. LIETZKE, U.S. Soil Conservation Service (arctic and glacial soils)
- DR. ROBERT W. LITTLE, Chairman, Dept. of Mechanical Engineering, Michigan State University (glacier and continuum mechanics)
- CHARLES MERRY, Dept. of Surveying Engineering, University of New Brunswick, Fredericton, N.B., Canada (field surveying, terrestrial photogrammetry)
- DR. ALFRED C. PINCHAK, Dept. of Fluid Mechanics, Case Western Reserve University (glacio-hydrology, analytical techniques, statistical methods)
- ANN M. TALLMAN, Dept. of Geology, Smith College (glacial and periglacial geology)
- DR. AYLMER THOMPSON, Dept. of Meteorology, Texas A & M University (arctic and mountain meteorology, synoptic climatology)
- DR. CHARLES WAAG, Dept. of Geology, Georgia State University (structural glaciology, resource geology, field methods)



Oversnow vehicles on Hades Highway Nève



Dog team on the Taku Nève



Electro-thermic glacier drilling on the Juneau Icefield.

*Medical; Safety and Survival Instruction:* W. M. Smith, M.D. and T. R. Haley, M.D., Foundation for Glacier and Environmental Research (medical coordinators); R. Schutt, M.D., G. A. Drucker, M.D., M. Norris, M.D., O. T. Trott, M.D., F. M. Golomb, M.D., E. Reynolds, A. Rohay, D. Thomas.

*Administration, Liaison and Logistics:* J. W. Miller, K. Schoen, J. and J. Harvey, D. Williams, A. and N. Livingston, K. Loken and H. Rossiter

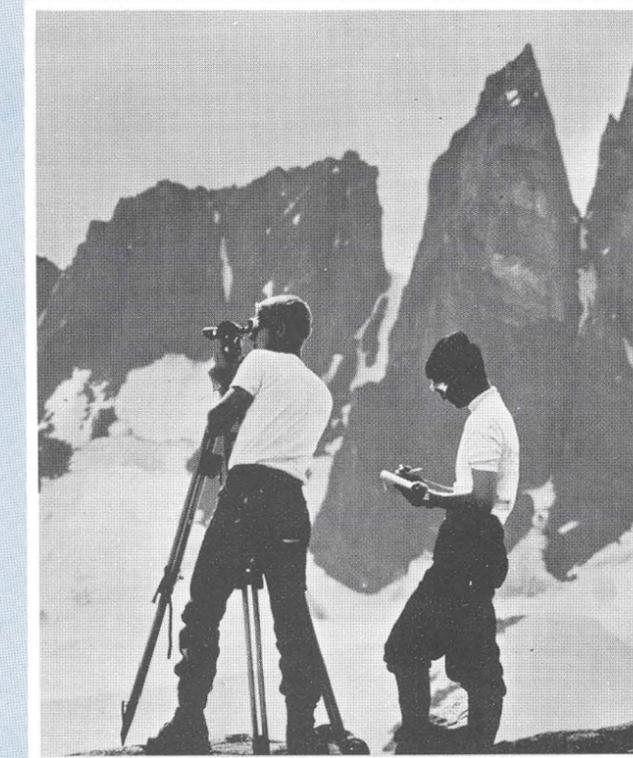
*Camp and Field Operations:* T. Boyce, A. Clough, R. McC. Miller, L. D. Miller, C. Miller, F. Stallwood, J. W. Manthei, and G. Thoma.

*Other visiting Lecturers, Research Affiliates or Scientific Advisers:* Dr. T. Abrams, Abrams Aerial Survey Corp., Lansing, Mich. (aerial surveys); M. Alford, Inland Waters Branch, Government of Canada, Whitehorse, Y.T. (hydrometrics, Yukon-B.C. water resources management); Dr. D. Brew, Dr. A. Ford and V. Berwick, U.S. Geological Survey (regional geology, hydrology); J. Kostoris, Geology Dept., Mich. State Univ. (geomorphology research); V. Jones, Geology Dept., Michigan State University (water resources, glacio-climatology research); B. Winton, U.S. Weather Bureau, Juneau, Alaska (Alaskan meteorology and climatology); B. W. Prather, Found. for Glacier and Environmental Research (glacier seismology, field techniques); R. M. Shaw, Humble Oil Co., Houston (gravity surveys); R. Heffernan, Found. for Glacier and Environmental Research (glacier surveys and geophysical research); H. Langeveld, Dept. of Metallurgy, Mechanics and Materials Science, Mich. State University (glacio-hydrology research); R. Warren, Dept. of Geology, Michigan State University (glacier mechanics research, academic assistant); Dr. Douglas N. Swanson, Forestry Research Lab., U.S. Forest Service, Corvallis, Oregon; Research Associate, Foundation for Glacier and Environmental Research (mass wastage, subarctic environments, glacial geology research); Dr. Gordon Warner, Associate Professor, General Motors Institute, Mich. (materials science, ice deformation research); Walter I. Wittman, Director, Division of Polar Oceanography, U.S. Naval Oceanographic Office, Wn. D.C. (arctic basin research, polar oceanography, sea-ice studies); Dr. Tien H. Wu, Dept. of Engineering, Ohio State University (glacier mechanics, glaciological research).

# ARCTIC AND MOUNTAIN ENVIRONMENTS

14th Summer Institute of Glaciological and Arctic Sciences  
JULY 1 — AUGUST 31, 1973  
JUNEAU ICEFIELD, ALASKA  
and adjacent regions

Supported 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



Surveyors at a control station on the Taku Glacier



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

## PURPOSE

The Juneau Icefield Research Program (JIRP) was organized in 1946 to pursue detailed long-term research on inter-relationships of the many disciplines necessary to understand the total environment of arctic and mountain regions. As an extension of this program, the Summer Institute of Glaciological and Arctic Sciences was organized in 1959 to provide combined academic and field training, both at the graduate and undergraduate level, so essential to the solution of these multi-varied problems. The aim is to insure a total systems competence in potential polar and mountain scientists and to provide practical training with broad significance for geologists, hydrologists, atmospheric scientists and ecologists with environmental interests.

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

As part of their training, participants attend lectures at pertinent 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 a long-range research program of related investigations from high-elevation and continental periglacial areas to low-level temperate and maritime regions. Through this approach, students gain a realistic understanding of glacio-climatological, glacio-geological and glacio-ecological relationships in natural systems. In addition to selected academic offerings, the Institute gives practical field work and extensive experience in a variety of personally challenging environments.

## DATE

The Institute will be held for nine weeks, from July 1 to August 31, 1973. For qualified students interested in participation in the long-term 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

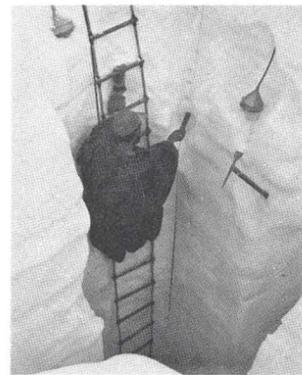
The following courses for credit are offered. These courses are taught by Dr. M. M. Miller of the Department of Geology, Michigan State University. The visiting scientists are not responsible for these offerings, but are available for consultation.

### GRADUATE COURSES

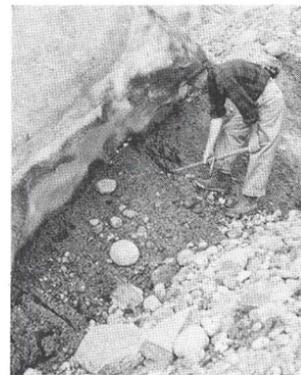
- GLG 814 Field Glaciology (3-6 cr.)
- GLG 800 Field Problems (special topics; variable credit)

### UNDERGRADUATE COURSES

- GLG 445 Field Studies (special topics; variable credit)
- GLG 303 Field Geomorphology: mountain and arctic environments (3 cr.)



*Density and melt-water measurements, Upper Taku Glacier*



*Debris-entrained thrust surface, Mendenhall Glacier*

In addition, the following non-credit special topic seminars are given by visiting scientists: Arctic Environmental Sciences; Terrestrial and Glacial Photogrammetry; Glacier Surveys and Mapping; Glacio-ecology; Glacio-lichenometry; Periglacial Geomorphology and Pleistocene Environments; Glaciology and Ice Physics; Arctic and Mountain Geomorphology; Glacier Mechanics; Glacio-meteorology; Glacio-hydrology; Glacier Geophysics and Arctic Basin Research.

All offerings 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. All offerings are given concurrently during a concentrated four-week session on the Juneau Icefield, emphasizing Neoglacial conditions. Each participant is exposed to all offerings. Those who enroll for course credit are examined only in areas in which registered. An initial week is devoted to indoctrination in field methods, and safety and survival techniques. Another two weeks are used for work on a specific field problem, dependent on the participant's aim, interests and abilities. The last two weeks generally are concentrated in the Atlin area where the deglaciated terrain provides 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.

## PARTICIPANTS

Field participantships are available at the undergraduate, graduate and post-doctoral or senior scientist level. These include six undergraduate research participation awards and eight graduate level awards supported by the Foundation for Glacier and Environmental Research (FGER). 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.

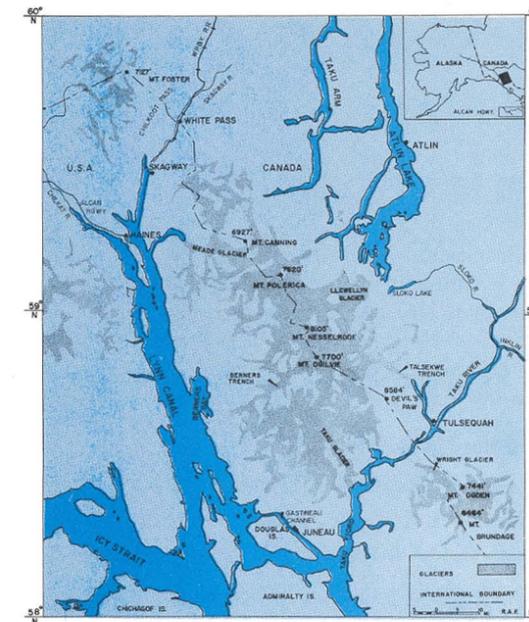
Ten college teacher participantships supported by the National Science Foundation (NSF) will be awarded. Ten NSF-supported participantships are also available to high-ability high school juniors and seniors with environmental

and field science interests. Only high school graduates admitted to a university are eligible for course credits in this program.

Places for a few additional participants in each category are available at the field fee of \$1200 per student for the nine-week session.

## LOCATION

The main glacier area lies 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 and in the Dezadeash Lake and Atlin Lake areas on the continental side of the Boundary Range. Special emphasis this year will be given 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.



*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 3000-volume library containing pertinent research materials, maps, aerial photos and other basic references is maintained at the five 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 Foundation for Glacier and Environmental Research, c/o The Pacific Science Center, Seattle, Washington.