

ACADEMIC CREDIT

Participants will be registered in the Michigan State University summer quarter. The basic credit requirement is six points, transferrable to other universities. Registration cost is paid by the Institute for NSF participants. Additional credits can be arranged.

ELIGIBILITY

The NSF Awardees must be enrolled in or accepted for graduate work as candidates for a degree at their respective institutions. Indication of intent to go to graduate school is not sufficient. A generally high academic record is expected. Considerable weight is placed on personal character, demonstrated interest and professional motivation. Postdoctoral awards are also given each year for qualified senior scientists and several non-NSF participants can also be made available to qualified high school earth science teachers. *In selecting individuals for project participation and administration, Michigan State University will not discriminate on grounds of race, creed, color, or national origin of any applicant or participant.*

APPLICATION

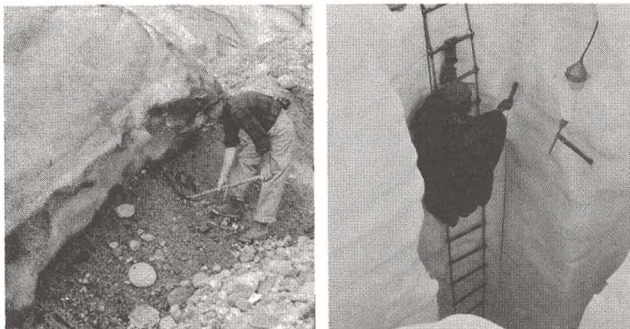
Application can be made, in special cases, as late as June 15th; however, earlier inquiry is urged. Letters of application should contain information on experience and adaptability to rugged field conditions; transcripts; evidence of graduate school status or acceptance; and letters of recommendation from a departmental or supervisory head, and two other individuals regarding scholarship and character. Two-thirds of the billets will be allocated by April 30th. All other participants will be notified before June 30th.

Make application to:

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



(5) Debris-entrained thrust surface, Mendenhall Glacier;
(6) Density and melt-water measurements, Upper Taku Glacier

STAFF

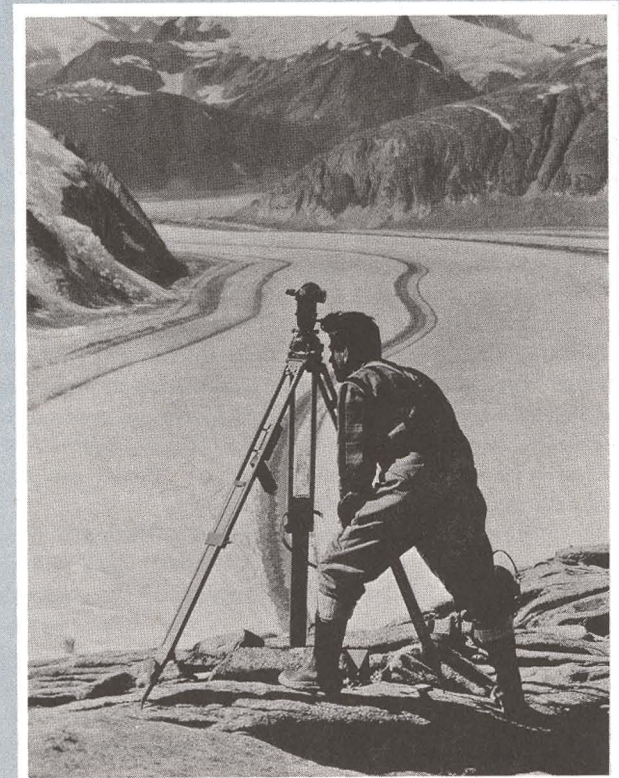
- DR. MAYNARD M. MILLER, Director, Glaciological and Arctic Sciences Institute; Professor, Geology Dept., Michigan State University; Director, Foundation for Glacier and Environmental Research, Seattle, Wn. (glaciology, geomorphology, environmental geology, research, expedition techniques)
- JAMES H. ANDERSON, Institute of Arctic Biology, University of Alaska; Foundation for Glacier and Environmental Research, Seattle, Wn. (Arctic ecology, palynology)
- DR. ROBERT F. BLACK, Professor, Geology Dept., University of Wisconsin. (periglacial studies, permafrost, polar geology)
- DR. ADAM CHRZANOWSKI, Surveying Engineering Dept., University of New Brunswick, Fredericton, Canada. (field surveying, electronic surveys, geodesy)
- AUSTIN E. HELMERS, Institute of Northern Forestry, U. S. Forest Service, Juneau, Ak. (glacio-hydrology, glacio-meteorology)
- DR. HERFRIED HOINKES, Meteorological and Geophysical Institute, University of Innsbruck, Austria. (glacier micro-meteorology, energy balance)
- DR. GOTTFRIED KONECNY, Professor and Head, Surveying Engineering Dept., University of New Brunswick, Canada. (terrestrial photogrammetry, glacier surveys)
- DR. EDWARD LITTLE, Marine Sciences Institute, University of Alaska. (glacier and sea ice physics)
- DR. ROBERT W. LITTLE, Metallurgy, Mechanics and Materials Science Dept., Michigan State University. (continuum and glacier mechanics)
- DR. JACK MAJOR, Dept. of Botany, University of California, Davis. (plant ecology, mountain soils)
- DR. FREDERICK A. MILAN, Dept. of Anthropology, University of Wisconsin. (Arctic anthropology)
- DR. ROBERT L. NICHOLS, Professor, Geology Dept., Eastern Kentucky University. (Pleistocene geology, Antarctic geomorphology, photo geology)
- DR. ALFRED PINCHAK, Fluid Mechanics Dept., Case Western Reserve University. (fluid mechanics, glaciology research)
- DR. DOUGLAS N. SWANSTON, Institute of Northern Forestry, U. S. Forest Service, Juneau, Alaska, Foundation for Glacier and Environmental Research, Seattle, Wn. (mass wastage, pedology)
- DR. AYLMEYER THOMPSON, Professor, Meteorology Dept., Texas A & M University. (mountain meteorology)
- WALTER I. WITTMANN, Head, Polar and Sea Ice Branch, U. S. Naval Oceanographic Office. (polar oceanography, sea ice studies)
- Medical Staff, Safety & Survival Instruction:* W. M. Smith, M.D., Foundation for Glacier and Environmental Research (medical coordinator); D. A. Reid, M.D.; L. S. Fent, M.D.; P. E. Fluvog, M.D.; T. B. Strange, M.D.; Ome Daiber; K. A. Henderson; H. Bressler; D. Thomas; and D. Williams.
- Camp and Field Operations:* R. Asher, C. Cox, C. Fluvog, I. Herrigstad, A. and N. Livingston, K. Loken, A. Miller, J. W. Miller, R. M. Miller, F. Parker, C. Perman, H. and B. Rossiter, V. Sundberg, and S. Waldram.
- Adjunct Lecturers and Research Affiliates:* M. Alford, Inland Waters Branch, Whitehorse, Y. T., Canada (hydrometrics, water management); W. A. Anders, Secretary, National Aeronautics and Space Council (Apollo VIII astronaut, hostile environment exploration); Dr. Hugh Bennett, Michigan State University (glacier geophysics); Dr. Forrest Bird, Bird Corp., Calif. (aerial surveys, expedition medicine); Dr. D. Brew, Dr. A. Ford and V. Berwick, U.S.G.S. (bedrock geology, Alaska hydrology); Dr. Herbert Curl, Jr., Dept. of Oceanography, Oregon State University (Arctic and snowfield ecology); P. Grogger, University of Utah (structural glaciology); H. Janes, D. Smith and Dr. C. Thompson, ESSA Research Labs, Boulder, Colo. (physics and micro-wave surveying); F. Jones, Alaska State Dept. of Game (wildlife ecology); W. R. Latady, Latady Instruments, Inc., Phila., Pa. (glaciological, medical and photogrammetric instrumentation); F. W. Poole, Meteorologist-in-Charge, ESSA Weather Bureau, Juneau, Alaska (climatology); D. Potter, Foundation for Glacier and Environmental Research (glacier surveys); B. Prather, Foundation for Glacier and Environmental Research (glacier seismology); F. A. Small, Ocean Data Systems, Inc., Bethesda, Md. (environmental science program management); A. Tallman, Louis Miller, S. J. Miller, M. Taylor, Michigan State University (glacial geology, conservation); C. Kreitler, University of Texas (environmental hydrology).

ARCTIC AND MOUNTAIN ENVIRONMENTS

11TH SUMMER INSTITUTE OF GLACIOLOGICAL AND ARCTIC SCIENCES

JULY 7 - AUGUST 31, 1970
JUNEAU ICEFIELD, ALASKA
AND ADJACENT REGIONS

Sponsored by the NATIONAL SCIENCE FOUNDATION
and MICHIGAN STATE UNIVERSITY
in cooperation with the FOUNDATION
FOR GLACIER & ENVIRONMENTAL RESEARCH
and the JUNEAU ICEFIELD RESEARCH PROGRAM



Theodolite station in Gilkey Canyon for
National Geographic Society's regional glacier survey

PURPOSE

The Summer Institute of Glaciological and Arctic Sciences, organized in 1960, provides academic and field training, primarily at the graduate level, for potential polar and mountain scientists, and for geologists, hydrologists and ecologists with 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 interdisciplinary investigational approach in studies of the total environment. As part of their training, they attend lectures at pertinent field sites, participate in demonstrations with instruments and materials in the field, and take and record scientific measurements under supervision as part of an actual field research program. Through this approach, students gain a more realistic understanding of glacio-climatological, glacio-geological and glacio-ecological relationships. In addition to academic offerings, the Institute gives practical field work and experience in a variety of environments.

DATE

The Institute will be held for eight weeks, from July 7 to August 31, 1970. For qualified students interested in participation in the affiliated Juneau Icefield Research Program or desiring field work on thesis problems, up to four weeks additional field time can be arranged.

THE CURRICULUM

Catalogued courses are offered in *Field Glaciology*, *Periglacial Geomorphology*, *Glacio-ecology*, *Glacio-meteorology*, *Glacio-hydrology*, *Glacier Geophysics*, *Glacier Mechanics*, *Glacier Surveying*, *Terrestrial and Glacier Photogrammetry* and *Field Problems* in these and related topics. The courses are designed to take full advantage of the glacial, periglacial and mountain environments of the region in terms of field and "laboratory" instruction.

Additionally, special lectures, field studies and problem sessions will be held on adjunct topics such as mapping and surveying, snow physics, glacier physics and continuum mechanics, lichenology, glacio-oceanography, permafrost, glacio-fluvial processes, Arctic geobotany, glacial geology, mountain geology, and Arctic soil science.

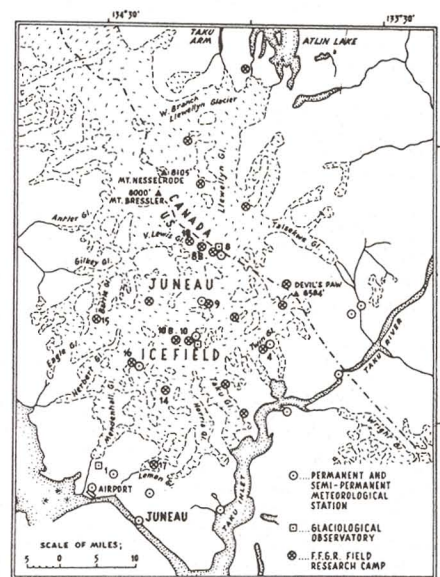
All offerings will be given concurrently during a five-week session on the Juneau Icefield. A sixth week will be used for a specific field problem depending on the student's aims and interests. The seventh and eighth weeks of observation will be conducted in an area of deglaciated terrain. For those wishing to ally the instruction program with a specific thesis program, or equivalent research, including postdoctoral research, field problems may be developed and, where pertinent, variable credit obtained.

PARTICIPANTS

Fourteen National Science Foundation field participantships are available at the graduate and postdoctoral levels, plus four Institute graduate level awards, two affiliated science teacher scholarships, and three FGER participant grants for qualified undergraduates. Places for additional participants without Institute support are available at \$1200 per student. Two graduate teaching assistantships and five JIRP research assistantships in connection with ongoing research programs are also offered to outstanding previous participants or others with equivalent experience.

LOCATION

The main glacier area field sites lie on or near the Juneau Icefield in the Alaska-Canada Coast Range near Juneau, Alaska. Field trips are also 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 or in the Dezadeash and Atlin Lake areas on the continental side of the Coast Range. Special emphasis is given to the Atlin District lying adjacent to the icefield on the north. Here a remarkable array of recent deglaciation features is studied. For this part of the program a headquarters station is maintained at Atlin, B. C. from which field trips are also made to the Southwestern Yukon for geological and ecological observations.



Juneau Icefield and vicinity showing meteorological and glacier research stations. Logistics headquarters at Juneau. Field headquarters at Camp 8 (elev. 7200 ft.), Camp 10 (elev. 4000 ft.), and Camp 17 (elev. 4200 ft.). The Atlin Sub-Arctic Research Station lies north of the map on the eastern shore of Atlin Lake.

FACILITIES AND LOGISTICS

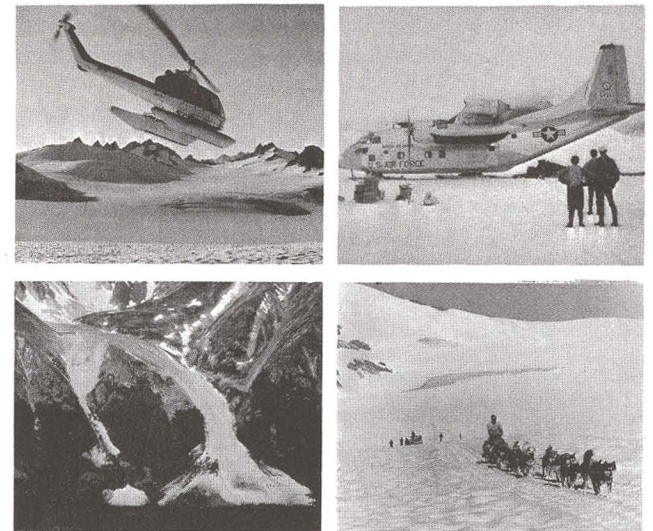
Thirteen main stations and 17 lesser camps and research facilities are located on the icefield and its peripheral areas. Insulated and aluminum-sheathed buildings exist at the field sites. At trail camps, wooden shelters and tents are used. A 1500-volume library containing pertinent research materials, maps, aerial photos and basic references is maintained at the three main icefield stations, with an additional small research library at the Atlin base. 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 Juneau and Atlin is handled by radio. Helicopter and ski-plane transport is used, with ground transport depending on oversnow vehicles 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.

AWARDS AND ALLOWANCES

The NSF participants receive 6 free credits and are furnished a \$200 allowance towards round-trip transportation between their homes and Juneau, Alaska, plus all food, lodging and field facilities during the eight-week session.



(1) Helicopter operations on the icefield; (2) Alaska Air National Guard ski-plane at Camp 10; (3) Rock glacier in the Atlin area; (4) Dog team on the Taku Neve.