

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. Several post-doctoral awards are also given each year for qualified senior scientists. *In selecting individuals for project participation and administration, Michigan State University will not discriminate on the ground of race, creed, color, or national origin of any applicant or participant.*

APPLICATION

Application can be made 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 departmental chairman and two other individuals regarding scholarship and character. Half of the billets will be allocated by May 1st. All other participants will be notified before June 30th.

Make application to:

Director, Glaciological & Arctic Sciences Institute
Michigan State University, East Lansing, Michigan 48823
Field Address: P. O. Box 775 Juneau, Alaska



(5) Debris-entrained thrust surface, Mendenhall Glacier; (6) Plane tabling on Twin Glacier nunatak.

STAFF

- DR. MAYNARD M. MILLER, Director, Glaciological and Arctic Sciences Institute, Professor of Geology, Michigan State University. (glaciology, geomorphology, photo-interpretation, research, expedition techniques)
- DR. PETER ANGUS-LEPPAN, Professor and Head, Dept. of Surveying, University of New South Wales, Sydney, Australia. (geodetic surveying, field mapping, photogrammetry)
- DR. ROBERT F. BLACK, Head, Geology Dept., University of Wisconsin. (periglacial studies, permafrost, polar geology)
- DR. AUREAL T. CROSS, Professor of Geology and Botany, Michigan State University. (arctic-alpine botany, palynology)
- DR. ADAM CHRZANOWSKI, Surveying Engineering Dept., University of New Brunswick, Canada. (field surveying, electronic surveys, geodesy; research)
- DR. HERBERT CURL, JR., Oceanography Dept., Oregon State University. (snowfield ecology, arctic climatology)
- DR. JAMES HARRINGTON, JR., Agricultural Engineering, Michigan State University. (glacio and micro-meteorology)
- DR. GOTTFRIED KONECNY, Head, Surveying Engineering Dept., University of New Brunswick, Canada. (terrestrial photogrammetry, glacier surveying)
- DR. ROBERT W. LITTLE, Metallurgy, Mechanics, & Materials Science Dept., Michigan State University. (glacier mechanics)
- DR. JACK MAJOR, Dept. of Botany, University of California, Davis. (arctic geobotany, mountain soils)
- DR. JOHN D. NAFF, Geology and Geography Dept., Oklahoma State University. (bedrock geology, petrology)
- DR. ROBERT L. NICHOLS, Head, Geology Dept., Tufts University. (pleistocene geology, antarctic geomorphology)
- DR. NED OSTENSO, Office of Naval Research. (geophysics, polar oceanography)
- DR. GUNNAR OSTREM, Glaciology Section, Hydrological Dept., Norwegian Water Resources and Electricity Board, Oslo. (glacio-hydrology, mass balance, glacio-sedimentology)
- DR. ALFRED PINCHAK, Dept. of Fluid Mechanics, Case Western Reserve University. (fluid mechanics, glaciology research)
- BARRY W. PRATHER, Foundation for Glacier Research, Seattle, Washington. (glacier seismic surveys, logistics)
- DR. MARCEL DE QUERVAIN, Director, Swiss Federal Institute for Snow and Avalanche Research, Davos. (atmospheric and snow physics, avalanche research, heat balance)
- DR. DOUGLAS SWANSTON, Institute of Northern Forestry, U. S. Forest Service, Juneau, Alaska. (mass wastage, pedology)
- Medical Staff, Safety & Survival Instruction:* T. R. Haley, M.D. and W. M. Smith, M.D., Foundation for Glacier Research; Otto T. Trott, M.D., D. Loeff and Ome Daiber, Mt. Rescue Council, Seattle; Franz Gabl, Mt. Baker Ski School, Wn.; D. Williams, Juneau, Alaska.
- Camp and Field Operations:* S. Miller & M. Taylor (camp managers and maintenance); I. Herrigstad (communications); L. Miller, D. Larson, T. McMullin, D. Thomas, R. Mack, A. Miller, R. Miller, V. Sundberg, (oversnow vehicles, dog team operations and field assistants); A. Livingston, K. Loken (aerial logistics); J. W. & E. Miller (administration & liaison)
- Adjunct Lecturers & Research Affiliates:* Dr. D. Brew, Dr. A. Ford, V. Berwick, C. Zenone, U.S. Geol. Survey (bedrock geology, Antarctic research, Alaskan hydrology); M. Alford, Canada Water Resources Br. (Yukon & B. C. hydrology); Dr. Gerald Prescott, Michigan State Univ. (cryovegetation, algae research); Dr. D. B. Lawrence, Univ. of Minnesota (glaciobotany, dendro-chronology); A. E. Helmers, Inst. of Northern Forestry, USFS (glacio-hydrology, glacio-meteorology, mass balance); J. Bauer, U. S. Weather Bureau (Alaskan climatology); Dr. R. Ehrlich, C. P. Egan, Michigan State Univ. (glacio-sedimentology, glacial geology); H. Miller, Univ. of Munich, S. Walasek, Michigan State Univ. (glacier geophysics); D. Trabant, Univ. of Alaska (structural glaciology); Dr. H. Lang, Univ. of Zurich (glacio-meteorology); Dr. Talbert Abrams, Abrams Aerial Survey Corp. (aerial exploration, photogrammetry); P. Armstrong, Univ. of Chicago, and J. H. Anderson, Mich. State Univ. (academic assistants).

THE GLACIOLOGICAL INSTITUTE
DEPARTMENT OF GEOLOGY
MICHIGAN STATE UNIVERSITY

9TH SUMMER INSTITUTE OF GLACIOLOGICAL AND ARCTIC SCIENCES

JULY 13 - AUGUST 30, 1968
JUNEAU ICEFIELD REGION, ALASKA

Sponsored by the NATIONAL SCIENCE FOUNDATION
in cooperation with the Foundation For Glacier
Research and the Juneau Icefield Research Program



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PURPOSE

The Summer Institute of Glaciological and Arctic Sciences was organized in 1960 and has been carried through each summer since to provide academic and field training, primarily at the graduate level, for potential polar and mountain scientists. By attendance at lectures held at pertinent field sites, by participation in demonstrations with instruments and materials in the field, and by taking and recording scientific measurements under supervision as part of an actual field research program, the student gains maximum stimulation and appreciation of the significance of the inter-disciplinary investigational approach in glaciology and allied polar disciplines. In this approach, the student obtains a more realistic understanding of glacio-climatological, glacio-geological and glacio-ecological relationships. In addition to the academic offerings, the Institute provides practical training and experience in field work in a variety of sub-Arctic to high-Arctic and mountain expeditionary environments. It is these aspects of the Institute which make its contribution to the learning process especially meaningful.

DATE

The Institute will be held for seven weeks, from July 13 to August 30, 1968. For qualified students interested in participating in the affiliated Juneau Icefield Research Program or desiring field work on thesis problems, up to six 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, lichenology, glacio-oceanography, permafrost, glacio-fluvial processes, mountain geology, and Arctic soil science.

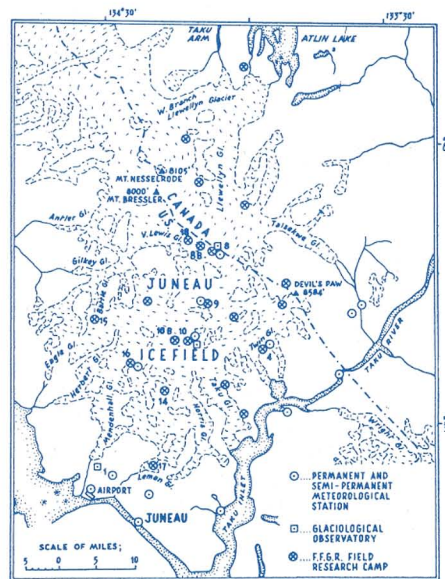
All offerings will be given concurrently during a five-week session on the Juneau Icefield. A sixth week will be used for a specific field problem depending on the student's aims and interests. A seventh week of observation will be conducted in an area of deglaciated terrain. For those wishing to ally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

PARTICIPANTS

Fourteen National Science Foundation field participants are available at the graduate and *post-doctoral* levels, plus three University scholarships, two Institute grants, one affiliated NDEA scholarship, and one NSF undergraduate research participant grant for qualified undergraduates. Places for additional participants without Institute support are available. The fee in such cases is \$1000 per student. Two graduate teaching assistantships and four graduate research assistantships are also offered each year to outstanding previous participants, or others with equivalent field experience.

LOCATION

The main field sites lie on or near Juneau Icefield in the Alaska-B.C., 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 forest fiords of Lynn Canal, the Taku River Valley or in the Dezadeash and Lake Atlin areas on the continental side of the Alaska-Canada Boundary Range. Special emphasis is given to the Atlin District lying adjacent to the icefield on the north. For this part of the program, headquarters will be at Atlin, B.C. Interested students may also be included in a short end-of-season field trip to the Southwestern Yukon for field observations and to participate in the Alaska Science Conference to be held this year at Whitehorse, Yukon Territory.



Juneau Icefield and vicinity showing meteorological and glacier research stations. Main permanent stations are numbered. Summer Institute headquarters at Camp 8 (elev. 7,200 ft.) and Camp 10 (elev. 4,000 ft.).

FACILITIES AND LOGISTICS

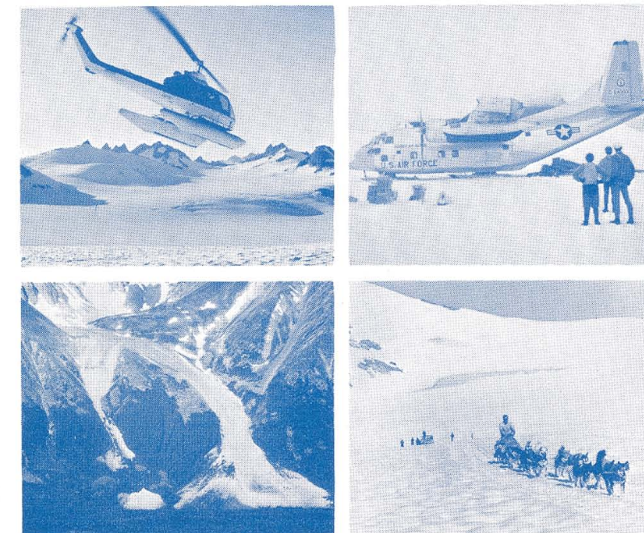
Eight stations and 17 lesser camps and research facilities are located on the icefield. Insulated and aluminum-sheathed buildings exist at the field sites. At trail camps, wooden shelters, metal igloos and tents are used. A 1200-volume library containing pertinent research materials, maps, aerial photos, and basic references is maintained at the three main stations. 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 is handled by radio. Helicopter and ski-plane transport is used, with heavy logistical support provided by the Alaska Air National Guard. For ground transport, oversnow vehicles, a dog team, and skis are used.

Permanent installations are provided by the Juneau Icefield Research Program via its sponsor, the Foundation for Glacier Research, Seattle, Washington.

AWARDS AND ALLOWANCES

The NSF participants receive free tuition and are furnished round-trip air travel expenses, Seattle/Juneau, plus all food, lodging and facilities during the seven-week session. These participants can use the \$150 allowance, in lieu of Seattle/Juneau round trip air fare, for their own arrangements to and from Juneau. The Institute can put participants in touch with each other to facilitate combined travel.



(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 Névé.