HAIL SIMULATED TO STUDY ITS EFFECTS ON CROPS

"There are two ways to establish relationships between hailfall and crop damage," says Allan Murphy, leader of the Environmental and Societal Impacts Group (ESIG) of the Advanced Study Program. "One way is to simulate hailfall on crops and then assess the damage, and the other is to wait for nature to produce damaging hailstorms."

Part of ESIG's efforts in this area are being carried out at Panhandle State University (PSU), Goodwell, Oklahoma. ESIG has a subcontract with PSU to conduct experiments that simulate hail damage to crops and to assess the damage of the artificial hail on wheat plants in various stages of growth.

On 26 August, six NCAR staff members visited PSU; they were Allan Murphy and Richard Katz of ESIG; executive director John Firor; Donald Veal, director of the National Hail Research Experiment (NHRE); Barry Weiss of NHRE; and photographer Anthony Galván III. Their hosts at PSU were Raymond Peck, head of the Agronomy Department and principal investigator for the project, and Jack Alexander, professor of soil science and superintendent of PSU's research station.

Researchers at PSU have been studying simulated hail damage for several years. The current experiments are carried out using a hail-throwing machine--mounted on a tractor-like vehicle--designed and built by J. Earl Elsner of the Department of Agronomy at the University of Georgia. Large quantities of artificial hailstones are produced in two sizes (0.25- and 0.5-in. diameter) from 0.75-in. icecubes that are rounded in a large tumbler similar to the kind used for polishing rocks. Crops are bombarded by driving the vehicle down a row of plots while a mixture of ice and air is ejected from the muzzle of the ice-throwing device. This procedure simulates both the hailfall itself and the accompanying wind.

The PSU researchers were concerned with four variables in the experiments they conducted during May and June 1976: the size, density (number per unit time), and velocity of the artificial hailstones and the stage of growth of the wheat that is being bombarded. Ray Peck dried and weighed the wheat harvested from the plots in order to determine the yields that resulted from the crops treated in the experiment.

The purpose of the visit to PSU was to determine the speed at which the simulated hail leaves the ice-throwing machine. Barry Weiss explains, "We know the speed of the airstream, but we don't think that the ice is moving at the same speed as the air. Specifically, the density of the hailstones seems to influence their speed." Barry is a programmer with NHRE and a former ESIG research assistant. He and Rolando Garcia (formerly of ESIG and now in the Upper Atmosphere Project) were involved in monitoring the research conducted by PSU.

To try to determine the speed of the artificial hail, ESIG decided to use a method involving high-speed multiple-exposure photography. With this...
For the photographing session, the machine was placed in a Quonset hut, which provided a dark background for observing the hailstones. The hailstones—in quantities of one, five, ten, 20, 40, or "a handful"—were ejected at several different speeds, and two strobe lights were set to flash at intervals of 15 or 25 milliseconds. (Before the trip to PSU, Tony experimented with this technique at NCAR, using Teflon ball-bearings.) Over 60 photographs were taken; they are being analyzed by Rick Katz, a statistician with ESIG.

To assess hail damage to crops, ESIG also uses "the real thing"—hail that falls from the sky. For the past two summers ESIG has operated a hail monitoring network in northeastern Colorado and the Nebraska panhandle. In 1976 some 400 hailcubes (cube-shaped frames designed to hold styrofoam pads on all four sides and on the top) were placed adjacent to wheat or corn crops to provide estimates of hailfall size distributions and local wind velocities during hail events. The pads struck by hail were collected by ESIG summer student employees and delivered to NHRE for analysis by a group directed by Neil Holzman. Farmers cooperating with the ESIG effort mailed in crop damage estimates when their fields were struck, and the estimates were checked by crop appraisers.

This photograph, taken by Tony Galván with a high-speed, multiple-exposure method, shows 20 ice pellets being ejected from the ice-throwing device. Flash duration for each of the seven exposures in this photo was 1/12,000 sec, with a flash interval of 15 milliseconds. On the left is a meter stick, used to measure distance between successive images. Note the clump of four pellets moving down the middle of the picture.

method, a hailstone appears several times in one photo, from the time it is shot out of the muzzle of the hailthrower until it reaches the ground. Its speed can then be determined by measuring the distance between successive images and knowing the flash interval. The idea was suggested by David Atlas, who headed NHRE from 1974 through 1975. The photographic equipment was set up by Tony Galván of the NCAR photo lab, with technical assistance from Ted Cannon of NHRE.

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Researchers from NCAR and PSU discuss data on crop damage from simulated hail. Shown here are (left to right) Allan Murphy, Barry Weiss, Raymond Peck and Jack Alexander of PSU, and John Firor. (Photo by Anthony Galván III.)
Crop-hail damage functions—empirical relationships between hail-caused crop damage and one or more hailfall parameters—will be derived from the collected data. Allan Murphy explains, "By simulating hail damage as is being done in the PSU work, we can substantially increase the size of the sample used to establish these relationships. The results of both the PSU study and ESIG's summer field program should eventually provide a reliable means of translating the effects of hail suppression activities into economic benefits and/or losses." • LM

ASP TO SPONSOR SEMINAR SERIES

The Advanced Study Program (ASP) is sponsoring a seminar series for NCAR staff and visitors. The series will begin on Wednesday, 29 September, at 3:30 p.m. in the Damon Room with introductory talks by Francis Bretherton and John Firor. A reception will follow. Staff scientists, other interested staff members, and visitors are encouraged to attend and meet each other.

The seminars are designed primarily to acquaint the visitors—many of whom are just entering the atmospheric sciences—with the broad range of research problems under investigation at NCAR. The first ten lectures will constitute an overview of NCAR research now in progress, and subsequent lectures will describe specific research problems. A few special lectures will be given in the course of the series.

Seminars are planned for each Wednesday at 3:30 p.m. and Friday at 1:30 p.m. in the Walter Orr Roberts Seminar Room at the Fleischmann Building. The seminars will be listed in Calendar Notes the week before they are held. •

ELECTRONIC STORES AND OFFICE SUPPLY TO MOVE TO 30TH STREET

The Electronic Stores and Office Supply operation, now housed in the first basement of the Mesa Laboratory, will move to 30th Street on 1 October. The move was necessitated by the exigencies of space planning. Ed Aden will continue to manage the electronic stores, and Jack Martin will be in charge of office supply.

Staff are encouraged to build up local stocks of office supplies during the next few days to ensure adequate supplies during the move and reduce the numbers of supplies that must be moved.

The electronics stockroom will be located in Room 257 of PSRB-2. Office supplies will be in Room 217 of PSRB-3A; the extension for office supplies will be 77-777. Ed Aden's extension will be announced in Staff Notes as soon as it is known.

If you have any questions concerning this move or the service provided, call Ed Aden at ext. 268 (temporarily) or Jack Martin at ext. 77-777. •
The visiting officials met with NCAR staff for breakfast at the Mesa Lab. Shown here are (left to right) Ivan Ryasanov, Donald Veal, John Firor, Victor Nazarov, and a State Department interpreter. (Photo by Ginger Wadleigh.)

On Friday morning, 15 September, three Soviet civil aviation officials and two officials from the U.S. Federal Aviation Administration (FAA) met with administrators and scientists at NCAR to discuss NCAR's use of aircraft in scientific research.

The Soviet visitors were on a one-week tour of various U.S. aviation facilities as part of a U.S.-USSR program designed to exchange information on the use of aircraft in agriculture, scientific research, construction, and other fields. In this country, the program is sponsored by the Department of Transportation (DOT); DOT's effort is headed by Allan Landolt of the FAA, Assistant Administrator for General Aviation.

The Russian visitors were Victor Nazarov of the Ministry of Civil Aviation, who is Chief of Administration for the Utilization of Aviation in the National Economy; Vasily Pivovarov, also of the Ministry of Civil Aviation, who is executive secretary of the Soviet part of the U.S.-USSR joint working group and a member of the Soviet Foreign Relations Department; and Ivan Ryasanov, Chief of the All-Union Research Institute for Agricultural and Aerial Application of Civil Aviation. Accompanying them from the FAA were Mervin Strickler (Chief) and Oliver Laine (Assistant Chief) of the Aviation Education Programs Division, Office of General Aviation. The visitors met with the following NCAR staff members: Executive Director John Firor, Donald Veal of the National Hail Research Experiment, Donald Lenschow of the Research Aviation Facility (RAF), Bill Zinser of RAF, and Edward Zipser of the GATE Project.

The NCAR visit was arranged by Bill Zinser with the help of Henry Lansford of the Information Office. • JLR

RUSSIAN AVIATION OFFICIALS VISIT NCAR
**COMPUTING FACILITY ANNOUNCES COURSE SCHEDULE**

The Computing Facility is offering several courses to the NCAR staff this fall and winter. Applications for enrollment are available from Linda Besen in ML room 2 and should be returned to her when completed. Each course will be dependent on a minimum enrollment of five. Further details for each class will appear in later issues of Staff Notes.

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<thead>
<tr>
<th>Course</th>
<th>Instructor</th>
<th>Dates</th>
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<tr>
<td>Beginning FORTRAN</td>
<td>Amber McEwen</td>
<td>4 October-12 November</td>
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<tr>
<td>Beginning FORTRAN</td>
<td>Gary Aitken</td>
<td>14 March-29 April</td>
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<tr>
<td>Intermediate FORTRAN</td>
<td>Ben Domenico</td>
<td>3 January-25 February</td>
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<tr>
<td>Intermediate FORTRAN emphasizing numerical methods</td>
<td>Dave Fulker</td>
<td>2 November-14 December</td>
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<tr>
<td>Assembly Language</td>
<td>Marie Working</td>
<td>3 January-25 February</td>
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<tr>
<td>Special Topics:</td>
<td></td>
<td>to be arranged</td>
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<tr>
<td>Editor</td>
<td>Dave Kennison</td>
<td>Systems &amp; ULIS groups</td>
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<tr>
<td>I/O</td>
<td>Russ Rew</td>
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<td>Preprocessors</td>
<td>Tom Wright</td>
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<tr>
<td>NSSL Graphics</td>
<td>Merry Maisel</td>
<td>to be arranged</td>
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<tr>
<td>How To Write It Down</td>
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**DELPHI QUESTION AND ANSWER**

Q. NCAR will reimburse employees for part of the cost of an annual physical examination, presumably to encourage detection of conditions which may adversely affect their ability to perform their jobs. Our health insurance officer has said that no assistance would be provided for the HEARTSCREEN exam. Admittedly HEARTSCREEN is not a full physical exam, but it is probably one of the most important parts of such an exam, and certainly seems to be in the spirit of the assistance policy. Why, then, is the financial assistance being denied?

A. Present NCAR policy does not allow reimbursement for health screening services that do not comprise a complete physical examination. Since HEARTSCREEN falls into that category, charges for HEARTSCREEN cannot be approved. It is recognized that HEARTSCREEN and similar services may be beneficial and seem to have gained wide acceptance in the community; for these reasons the Personnel Office will review relevant policies which will include HEARTSCREEN and other similar services. If the review demonstrates their effectiveness and usefulness in the maintenance of employee health, consideration will be given to modifying existing policy so that payments for such services may be approved in the future.

Questions and suggestions from the staff to management may be submitted in confidence to the Delphi Coordinator, Med Medrud. Questions and answers of general interest to the staff are submitted to Staff Notes by Med unless the questioner says he may not. They may be summarized and edited for readability before publication.
HELP NEEDED IN DOCUMENTING BIG THOMPSON FLOOD

The following letter is from Wallace Hansen, project director of the Front Range Urban Corridor program at the U.S. Geological Survey in Denver. His address is: U.S. Department of the Interior, Geological Survey, Box 25046, Denver Federal Center, Denver, Colorado 80225.

The Front Range Urban Corridor program is cooperating with other groups and agencies in a study of the recent disastrous flood on the Big Thompson River, 31 July-1 August, and we need supportive evidence to help document the hydrologic, geologic, and physiographic effects of the storm.

As you may know, the cloudbursts over the Big Thompson area were accompanied by widespread destructive thunderstorm activity along the Front Range extending all the way from the Wyoming border south to Colorado Springs. We are interested in the regional framework of this storm as well as the critical disaster area itself.

Any information you might have would be appreciated. Do you, for example, have information about rainfall amounts during the storm anywhere in the Front Range Urban Corridor? Information from outlying areas is especially useful. It needn't be precise—even the amount of rain in a bucket, play pool, garbage pail, or tin can is helpful—but we do need good documentation as to how, when, and exactly where the data were obtained.

We also would like to know about local severe scour, sedimentation, or other damage to stream banks, roads, bridges, and so on, and any other unusual effects that you might have observed.

Thank you for your assistance.

ANNOUNCEMENTS

TWO NCAR SCIENTISTS ARE ON EDITORIAL BOARD OF NEW JOURNAL

William Holland of the Oceanography Project and Douglas Lilly of the Small-Scale Analysis and Prediction Project have been appointed to the editorial board of Dynamics of Atmospheres and Oceans. The new journal will deal with the dynamics of planetary atmospheres and their interactions, related systems including planetary fluid interiors and stellar atmospheres, and other basic processes. D. James Baker Jr. of the Department of Oceanography, University of Washington, is manuscript coordinator for the publication.

CORRECTION

In the feature article in last week's Staff Notes, artist Milford Zornes was incorrectly named Milford Fornes.

WANT TO PARTY IN THE AFTERNOON OR EVENING?

The Employee Activities Committee (EAC) has begun making plans for this year's winter holiday party and would like to poll the staff on preferences for the time of day that the party is given (either afternoon or evening). They would also like to get a rough estimate of how many staff members might attend. In the past, the NCAR afternoon holiday parties have been more casual than those held in the evening. In any case, your spouse or a friend is welcome. Please indicate your preference on the form below and send it to Angie Garcia, ML room 220 (ext. 207).

PREFERENCE FOR HOLIDAY PARTY

Check one:

Evening
Afternoon
No preference

Check one:

I would attend either.
I would not

CHUCK LEITH TO GIVE SLIDE SHOW OF KILIMANJARO

The staff is invited to a slide show to be given by staff member Chuck Leith on his climb up Kilimanjaro last summer. The 5895 m mountain is located in Tanzania in East Africa. The slides will be shown on Tuesday, 28 September, at 12:30 p.m. in the Main Seminar Room.

FOUND: LITTLE BLACK BOOK

Staff member John Masterson reports that he found a black, pocket-sized phone/address book last Friday, 17 September, in the Mesa Lab parking lot. If you think that the book is yours, call John at ext. 226.

GOOD DEAL IN THE COLISEUM

The Employee Activities Committee has half-price tickets for the Recreational Vehicles Exhibition in the Denver Coliseum 7-8 October. The bargain prices are $1.00 for adults and 50 cents for children. A bargain parking coupon is also available. See John Donnelly in room 24, Mesa Laboratory, or call him at ext. 527 to obtain your tickets.

YOU'RE INVITED TO WERDIE FENTER'S RETIREMENT PARTY

The Plant Maintenance Department invites the staff to a retirement party for Werdie Fenter on Friday, 24 September, at 3:30 p.m. in the Mesa Laboratory cafeteria. Werdie, presently the assistant security supervisor, has held various positions in the Plant Maintenance Department for the past ten years.
HAI LE RUOTE SGONFIE?
EST-CE QUE VOS PNEUS DE BICYCLETTE SE DEGONFLENT?
ARE YOUR BICYCLE TIRES GOING FLAT?

If so, you will be glad to learn that the Employee Activities Committee has purchased a heavy-duty bicycle tire pump. If you need to pump up your bicycle tires (or your volleyball or football), you should sign for the pump at the reception desk in the Mesa Laboratory and return the pump to the guard or receptionist when you are through with it. John Donnelly, cochairperson of the Employee Activities Committee, notes that the pump will develop over 130 pounds of pressure and that it has a reservoir. "It's intended for use in the immediate vicinity of the Mesa Lab," he says, "and is not to be borrowed for extended periods of time." If you have questions about it, call John at ext. 527.

CHRISTMAS CARDS ARE HALF-PRICE FROM EAC

The Employee Activities Committee has a selection of Christmas cards that may be ordered for half-price. John Donnelly, cochairperson of the committee, has a set of sample cards available for inspection in his office, Room 24, Mesa Laboratory. If you have questions about the cards, call him at ext. 527.

PHONE AND ROOM CHANGES

The following staff members have new phone and room numbers. Please correct your NCAR Directory.

<table>
<thead>
<tr>
<th>Name</th>
<th>Phone</th>
<th>Room</th>
</tr>
</thead>
<tbody>
<tr>
<td>Roger Clark</td>
<td>ext. 77-764</td>
<td>PSRB3 room 206</td>
</tr>
<tr>
<td>Peter Eccles</td>
<td>ext. 647</td>
<td>ML room 017B</td>
</tr>
<tr>
<td>Dean Lauritsen</td>
<td>ext. 77-764</td>
<td>PSRB3 room 206</td>
</tr>
<tr>
<td>Chris Roark</td>
<td>ext. 77-625</td>
<td>PSRB3 room 203</td>
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VISITORS

The Computing Facility advisory panel will meet in the Fleischmann Building on Monday, 27 September, from 9:00 a.m. to 5:00 p.m. The following panel members are expected to attend:

- Harold Orville, South Dakota School of Mines & Technology
- Peter Rhines, Woods Hole Oceanographic Institution
- Robert Carovillano, Boston College
- Eugene Isaacson, Courant Institute of Mathematical Sciences
- Carl Kreitzberg, Drexel University
- Yoshimitsu Ogura, University of Illinois
- Lewis House, NCAR
- Cecil Leith, NCAR

Also attending will be Giorgio Tesi, the NSF representative.

SHORT-TERM VISITORS

- C.S. Chiu, South Dakota School of Mines and Technology. Field of interest: Modeling of summer cumulus clouds and cloud systems in high plains. 17-30 September. Computing carrels, dial "0" for paging service. --Computing Facility

- Dale Haidvogel, Harvard University. Field of interest: Physical oceanography. 20-29 September. Computing carrel 14 or 16, dial "0" for paging service. --William R. Holland

- Joyce Weil, University of Chicago. Field of interest: Development of dropsize spectra. 13 September-5 October. Computing carrels, dial "0" for paging service. --Computing Facility
JOBS OPENINGS

As of September 22, 1976

NCAR is an equal opportunity/affirmative action employer.

Women and minority applicants are encouraged to identify themselves.
A copy of our Affirmative Action Plan is available for review.

John R. Arnold, Director, Equal Opportunity Programs

Staff members and those on lay-off who wish to be considered for a position should contact the Employment Coordinator within two weeks after the job is first posted. If qualified, these persons will be given first consideration; if possible, the position will be filled from this group. After the two-week period, if no current or laid-off employee is selected to fill the position persons from outside NCAR will be considered. For more information, please contact the Personnel Office (ext. 555 or 569).

REGULAR (full-time):

DIRECTOR: For the Cumulonimbus Storms Division. A division of NCAR is being created in order to (a) continue the National Hail Research Experiment; and (b) to investigate the physical processes in and around severe convective storms important for discussion of improved warnings of damaging storms. The director will be responsible for the administrative and scientific direction of the division. In this capacity the director will be responsible for the preparation of plans, budgets and reports, the control of funds, personnel and other resources, as well as planning and reviewing the scientific work of the division, and for recommending senior scientific and engineering appointments. The director is also charged with ensuring proper interaction of the division with related NCAR, university and government research. In addition, the director will participate with directors of other NCAR divisions in advising the Director and Executive Director on NCAR scientific policies, priorities and goals, and on NCAR operations. The Director will remain responsible for achieving affirmative action goals in this division, and contributing to achieving the overall goals of the EEO Program for NCAR.

Candidates must have successful managerial experience including work with large field projects and knowledge and experience in either weather modification, cloud physics or related areas. With respect to managerial experience, candidates must have sufficient knowledge and experience to enable them to discharge the responsibilities of the position wisely and effectively. Salary commensurate with experience. This position may be filled after October 22, 1976.

SCIENTIFIC PROGRAMMER II: For the Administrative Computing Group. The employee works under limited supervision in the analysis, design, implementation and documentation of simple and complex administrative data processing systems. This work involves the total systems process, summarizing problem characteristics and conceptualizing solutions, defining information requirements and programmatically designing data processing systems. The work is normally unstructured, unsupervised with a considerable degree of creativity, imagination, initiative and judgment being required. The Programmer/Analyst must have a thorough knowledge of hardware and software functions and be proficient within most areas of programming in order to perform a variety of complex programming assignments. May be responsible for conducting studies into database and management information system technology and preparing written reports of study results. In addition, the employee may work independently or as a team member in evaluating modifications to existing programs to conform with changes in operating system releases or changes in equipment and/or software. This person analyzes production programs and/or systems to isolate problems or to determine more efficient methods; designs and tests program logic, codes programs, prepares test data and flowcharts, tests and debugs programs, documents all procedures and develops program evaluation criteria. He/she performs maintenance and modification to programs and systems currently in production, modifies or expands program code to accomplish more complex processing; develops and designs major and/or minor components of program and systems as required. He/she consults and confers with professional, technical and administrative personnel to effect the implementation of application systems determined appropriate for automation. Requirements include a bachelor's degree in mathematics, computer science, or related fields, with emphasis in the areas of computer programming, mathematics, operations research, systems analysis, accounting or statistics; 3-5 years applications programming experience in either a production or scientific environment with a minimum of 24 months having been spent programming in ANSI Cobol; plus one to two years experience in systems analysis or design. Complete job description available in the...
Personnel Office. Exempt range 56. Anticipated hire-in salary range: $13,300-16,650 per year. This position may be filled after October 8, 1976.

STAFF RELATIONS & DEVELOPMENT COORDINATOR: For the Personnel Office. Interprets and applies personnel policies and procedures, fairly and without discrimination; maintains official personnel records; assists employee representatives on grievances and appeals; formulates and administers innovative programs providing for the training and development needs of the organization; supervises one professional and one clerical assistant. Requirements include a degree in personnel administration or related fields; minimum of five (5) years experience in employee relations and staff development; two (2) years at management level or an equivalent combination of education and experience; demonstrated knowledge of staff development programs emphasizing management development and affirmative action methodologies related to employee upgrading. Exempt range 58. Anticipated hire-in salary range: $16,800-21,000 per year. This position may be filled at any time.

STAFF SCIENTIST (RESEARCH ECONOMIST): For the Environmental and Societal Impacts Group. Assuming primary responsibility for carrying out in-depth study of the economic effects of hail suppression within the framework of an on-going project concerned with the environmental and societal impacts and implications of operational hail suppression programs. Participating in the design and evaluation of the results of studies of the ecological/environmental, social and legal/political impacts of hail suppression being conducted in conjunction with the National Hail Research Experiment. Also, assisting Group Leader in designing and conducting in-depth study of the value and use of weather forecasts in the electrical/energy industry. Working with atmospheric scientists at NCAR and in the university community on problems related to interactions between the atmosphere and man's activities. Assisting Group Leader in planning and evaluating the Group's research program and in carrying out various administrative tasks. Minimum requirements include three years of professional experience beyond the Ph.D. in resource or environmental economics, systems analysis, geography, or a related area. Experience in applying methodologies such as benefit-cost analysis, input-output analysis, decision analysis and technology assessment is required. Experience should include the use of large computers as a research tool, for example, in building and analyzing simulation models. Experience working with atmospheric scientists or working on atmospheric science problems is also desirable. Ph.D. in resource or environmental economics or in systems analysis, geography, or in a related field with a strong background in economics. Background in agricultural economics, statistics, and/or operations research is also highly desirable. Exempt range 56. Anticipated hire-in salary range: $16,800-21,000/year. This position may be filled at any time.

SUPPORT SCIENTIST II: For the Environmental and Societal Impacts Group. To assist program scientists and other ESIG staff members in (1) the installation, maintenance, and monitoring of ESIG's network of hailcubes and cooperating farmer-reporters. This work involves planning and supervising the activities of ESIG's field crew and part-time damage appraisers and working closely with members of the NHRE staff, and it will require frequent field trips of up to a week's duration in the spring and summer: (2) the collection, processing, and analysis of data related to (a) the development of crop damage functions; (b) the value of weather forecasts in the distribution of electrical power, and (c) other applied meteorological/climatological studies in areas such as weather modification and weather forecasting. Requirements include a master's degree in meteorology or Applied Climatology. Research experience in the area of applied meteorology and/or climatology is needed. This person must have experience in writing FORTRAN programs. Background in statistics and/or economics is desirable. This job requires some physical labor in the installation and dismantling of ESIG's hailcube network. Exempt range 56. Anticipated hire-in salary: $13,900-17,400 per year. This position may be filled by an in-house applicant after October 5, 1976 or after October 22, 1976 by an outside applicant.

REGULAR (part-time):

COMPUTER OPERATOR TRAINEE (2): For the Computing Facility. Working under direct supervision, the trainee will be required to develop the necessary skills to operate the larger large-scale computer systems, a buffer computer used in a remote job entry environment, all peripheral and associated devices according to well-established procedures and policies. These positions are basically for weekend shifts. The hours to be worked are either 8:00 a.m. - 4:00 p.m. or 4:00 - 12:00 midnight Saturday and Sunday, with the remaining four hours arranged during the weekdays for proper staffing of the computer operations. Prefer high school graduate or equivalent educational background. Tabulating equipment or remote job entry terminal experience helpful, but not required. Successful completion of a recognized, non-correspondence, technical course in computer operations preferred. Six months experience at the Computer Operator level or equivalent is required. These people need to be able to lift paper and tab card boxes weighing approximately 45 pounds. Hearing test is required upon employment. Non-exempt range 17. Anticipated hire-in salary range: $650-750 per month. These positions may be filled after October 5, 1976.

SECRETARY: For the Administration Division Office. This person will work 20 hours per week. This person is responsible for secretarial support to the Assistant Director for Administration and Deputy. Is responsible for seeing that Manual changes are made on a timely basis and for maintaining master UCAR Manual file, list of manual holders, and for distribution of changes. Is responsible for planning and coordinating the seven managers in the Administration Manager Meetings, keeping calendars and setting meetings for Assistant Director and Deputy and making all travel arrangements. Is responsible for additional review and typing of correspondence for Administrative Computing Manager. Requirements include shorthand and at least four years of professional secretarial experience. Non-exempt range 17. Anticipated hire-in salary range: $750-900 per month. This position may be filled after October 5, 1976.
SPECIAL PROJECT (full-time):

RADAR DATA COORDINATOR: For the National Hail Research Experiment (NHRE). Acts as coordinator of routine reduction of meteorological radar data. Maintains files on computer program and tape library. Maintains quality control and acts as interface with data users. Will be responsible for maintaining complete and up-to-date history of each day of processed radar data and helping with calibration and housekeeping data implementation. Will coordinate the work of one programmer and several students. Familiarity with data handling, data processing, cataloguing and distribution techniques is highly desirable. Basic knowledge of meteorological data and principles is required. Demonstrated experience in computer programming is needed. Previous experience with meteorological data systems, particularly radar, will be weighed heavily. Exempt range 54. Anticipated hire-in salary range: $11,400-14,300 per year. This position may be filled at any time. The NHRE project is expected to continue through June 30, 1979.

SYNOPTIC/MESOSCALE METEOROLOGIST: For the National Hail Research Experiment (NHRE) to work on the connections between mesoscale meteorology and those features of severe storms that are thought to influence the production of hail. The scientist will be expected to study problems related to the possibilities of using synoptic and mesoscale meteorological data, as an aid to seeding operations for hail suppression, and as a possible covariate in the statistical analysis of the randomized seeding experiment. The scientist will be expected to work in close cooperation with radar meteorologists and cloud physicists on these problems, but to bring as his particular specialty a demonstrated knowledge and judgment in mesoscale and storm scale meteorology. The selected candidate will supervise one full-time scientist at the M.S. level. Requirements include a Ph.D. or equivalent in synoptic or mesoscale meteorology with severe storm research experience. Academic training or research experience in the application of statistical techniques is also required. Exempt range 58-60. Anticipated hire-in salary range: $16,800-25,400. This position may be filled at any time. The NHRE project is expected to continue through June 30, 1979.

TEMPORARY (part-time):

LABORER: For the Field Observing Facility. To assist with making repairs to damaged parts of fiberglass radome sections. Will do general maintenance, light carpentry and painting. There are no particular educational requirements. Requirements do include experience with hand tools and good physical condition. This person will work 20 hours per week for two (2) months. Anticipated hire-in rate: $3.18 per hour. This position may be filled after October 5, 1976.

STUDENT ASSISTANT-CASUAL:

STUDENT ASSISTANT: (3) For the ATM Project. Operate microdensitometer for digitization of photographic film, operate keypunch, operate editor/printer for production of solar movies, perform data manipulation with small calculators, transform tabulated data to curves and charts and mount 2 X 2 slides in glass mounts. Experience with keypunch and desk calculators desirable. Salary is based on the Student Schedule. These positions may be filled at any time.

STUDENT ASSISTANT: For the Field Observing Facility. To provide technical and clerical assistance with the computer processing of radar data. Will be required to learn operation of radar data processing programs, to set up input to codes, to submit data runs, to monitor computer output, to detect errors in processing codes. Will also be responsible for bookkeeping functions such as labelling tapes, keeping records of data processed and delivering processed data to scientists. Requirements include a strong interest in science, two (2) years of college and the ability to organize work with meticulous attention to detail. Prefer candidate with some programming experience. Salary is based on the Student Schedule. This position may be filled at any time.

STUDENT ASSISTANT: (2) For the National Hail Research Experiment to provide technical and clerical assistance with the computer processing of radar data. Will be required to submit computer programs, monitor outputs and punch input data cards. Requirements include some experience in the areas of computer science and a knowledge of basic programming skills (FORTRAN). Some experience with radar data is desirable but not necessary. One to two years of college is preferred. Demonstrated experience in radar data processing and FORTRAN programming skills may be substituted for education. These people will work approximately 20 hours per week. Salary is based on the Student Schedule. These positions may be filled after September 28, 1976.

STUDENT ASSISTANTS (5): For the National Hail Research Experiment to perform precipitation data reduction. Work will involve measuring and providing tallies of hailstone dents on hailpads from the field precipitation network. Periodically the data reduction supervisor may obtain assistance from the precipitation data reduction crew member in maintaining records, summarizing data reports and in miscellaneous handling of the hailpads. This data reduction is very tedious, but requires accuracy and attention to the task throughout its performance. No experience is necessary, but these persons must be meticulous and able to pay attention to detail. Anticipated hire-in salary range: $3.18/hour. These positions may be filled after September 28, 1976.
STUDENT ASSISTANT: For the National Hail Research Experiment to assist in data reduction of NHRE field project. This will include transcribing sailplane pilot voice tapes, reviewing cloud photographs and analyzing preflight information. Some knowledge of aircraft operations and meteorology is desirable. One year of college is preferred. Salary is based on the Student Schedule. This position may be filled after October 5, 1976.

STUDENT CASUAL: For the AAP. This job involves operation of T.V. - microscope scanner, preparation of slides for aerosol sampling and other laboratory work. This person will operate an existing set of computer programs for data reduction. The person must learn the needed techniques quickly, work efficiently and be able to interact with other staff members. Requirements include meticulous handling of equipment and operation in a clean room environment. One year's experience in chemistry or biology laboratory is needed. Anticipated hire-in salary range: $3.18/hour. This position may be filled after September 28, 1976.

STUDENT CASUAL REPRINT STOCK CLERK: For the Publications Office up to 20 hours per week. Assists in the warehousing, inventorying, filing, record-keeping, distribution and mailing of NCAR reprints and publications. Receives new reprints and publications, records and numbers them, provides record copies to the Publications Office Secretary, files and shelves new publications in stockrooms, keeping stocks up to date and in order. Gathers and mails publications in response to requests. Maintains and inventories publications warehouse (30th St.). Writes and types notices in response to requests. Notifies scientist when reprint stocks are low. Does in-house distribution of new reprints and publications. Types author and title cards on new reprints and technical notes and does other record-keeping as necessary. Also does some work for Public Information Office cleaning and maintaining loan/rental films. Requirements include warehouse experience and ability to type. This person is required to lift 50 pound boxes of books while standing on a ladder. Must be able to get down ladder with books in hand. Salary is based on Student Schedule. Anticipated hire-in salary: $3.05/hour. This position may be filled after September 28, 1976.
**CALENDAR NOTES**

September 27 through October 4, 1976

**MONDAY, September 27**
- Meeting -- Computing Facility Advisory Panel
  - 8:30 a.m. to 5:00 p.m.
  - Fleischmann Building
  - Walter Orr Roberts Seminar Room

**TUESDAY, September 28**
- Slide Show -- Climb of Mt. Kilimanjaro, Chuck Leith, AAP
  - 12:30 p.m.
  - NCAR Mesa Laboratory, Main Seminar Room
- ASP Special Seminar -- The Use of Empirical Orthogonal Functions for Forecasting Water Level in the Baltic, Ingemar Holmström, Swedish Meteorological and Hydrological Institute
  - 3:30 p.m.
  - Fleischmann Building
  - Walter Orr Roberts Seminar Room

**WEDNESDAY, September 29**
- ASP Visitors' Educational Seminar Series -- Overview of NCAR Research, Francis Bretherton, UCAR; and John Firor, NCAR (followed by reception with refreshments)
  - 3:30 p.m.
  - NCAR Mesa Laboratory, Damon Room

**THURSDAY, September 30**
- Turbulence Club Meeting -- Some Aspects of Barotropic Stability and Instability, Ingemar Holmström, Swedish Meteorological and Hydrological Institute
  - 10:00 a.m.
  - Fleischmann Building
  - Walter Orr Roberts Seminar Room
- HAO Colloquium -- Ozone and Water Vapor on Mars, Charles Barth, LASP, Astro-Geophysics, University of Colorado
  - 11:00 a.m.
  - HAO Classroom 138

**FRIDAY, October 1**
- ASP Visitors' Educational Seminar Series -- Climate Project Research, Robert Dickinson, AAP
  - 1:30 p.m.
  - Fleischmann Building
  - Walter Orr Roberts Seminar Room

**MONDAY, October 4**
- Open

Calendar Notes announcements may be mailed to Vonda Giesey, ML 141. Wednesday at 12:00 noon is the deadline for items to be included in the Calendar Notes.