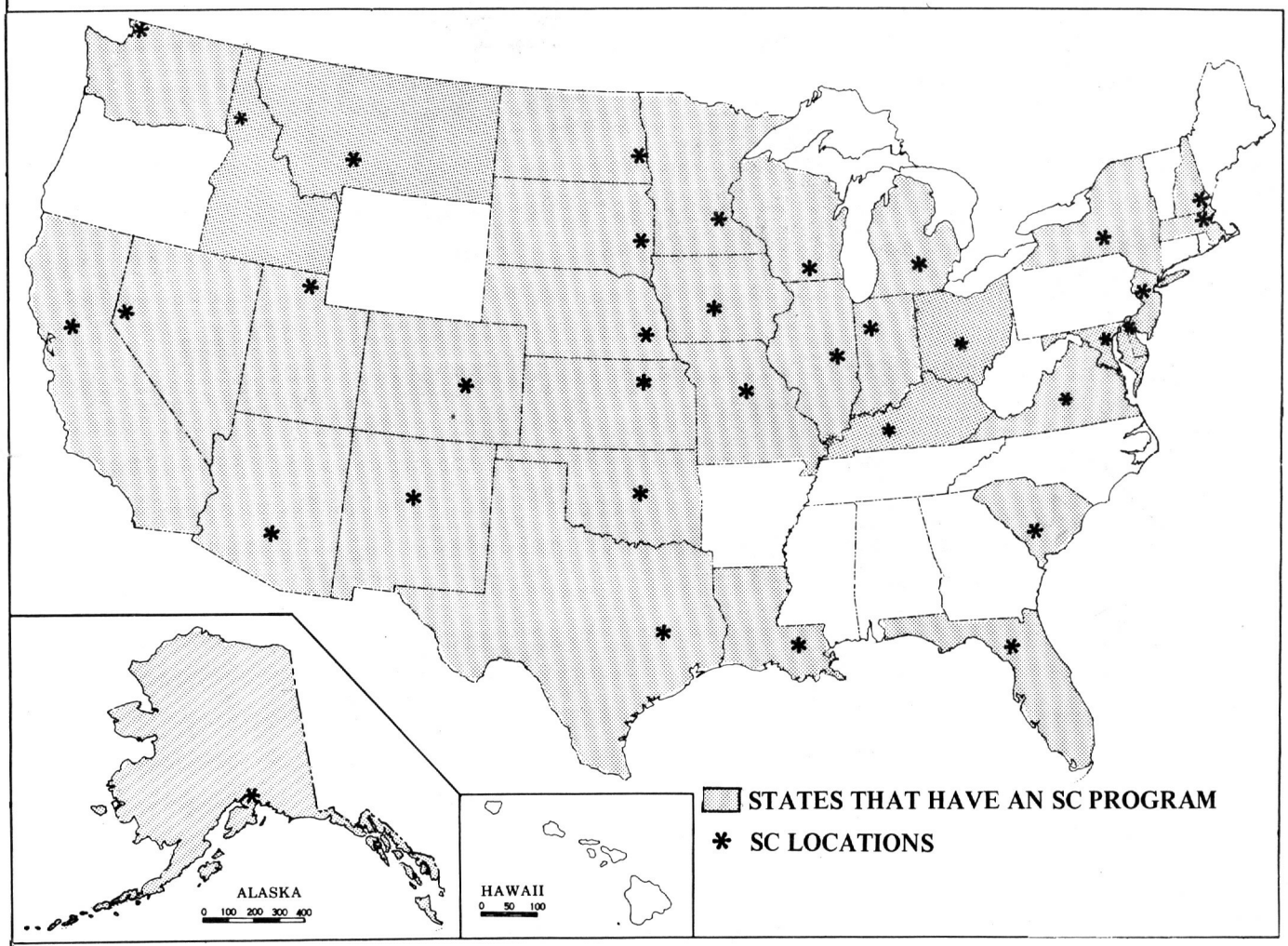
National Oceanic and Atmospheric Administration
Environmental Data Service
National Climatic Center

NEWS LETTER

IN COOPERATION WITH
THE AMERICAN ASSOCIATION OF STATE CLIMATOLOGISTS



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NCC BRIEFS

NCC is pleased to announce that three more States - Idaho, Kentucky, and Ohio - have recently established SC positions. Also, there is a new SC for the State of North Dakota, replacing Dr. J. M. Ramirez. The new SC's are as follows:

DR. MYRON MOLNAU
College of Agriculture
University of Idaho
Moscow, ID 83843

MR. GLEN CONNER
Dept. of Geography & Geology
Western Kentucky University
Bowling Green, KY 42101

DR. JOHN W. ENZ
Department of Soils
Walster Hall
North Dakota State University
Fargo, ND 58102

PROFESSOR JOHN N. RAYNER
Department of Geography
Ohio State University
1775 S. College Road
Columbus, OH 43210

Negotiations are underway with representatives of three other States - Mississippi, Oregon, and Pennsylvania; hopefully, they will establish SC programs in the near future.

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NCC was happy to host the first scheduled meeting of the AASC, which was held at this Center on October 26 & 27, 1977. NCC has actively pursued the development of a State funded SC program in each State to replace the former NOAA SC program. As of March 1978, there are 35 States with an active program. These SC's are professionals and many are associated with universities. The group has a formal organization, American Association of State Climatologists; NCC is an ex-officio member of the Association which could be used as a vehicle to expand the already existing Coastal Zone Management Program activities of some members. EDS-NCC has obligated a portion of its base funds for use in supporting the data/information needs of these professionals. NCC is investigating ways of getting data to the SC's in order to serve the greatest part of the public possible. These plans include automation to increase the amount of services without significant cost increases and installation of interface systems so that SC offices can have direct access to the NCC data base.

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USSR ANTARCTIC AND EURASIAN UPPER AIR DATA - As a part of the continuing data exchange through the World Data Center system, the USSR recently sent nearly 100 35mm microfilm reels of checked upper air data for their stations. The data may be borrowed from World Data Center A for Meteorology, NCC, telephone 704 258-2850, Ext. 754, or FTS 672-0754.

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NEW CLIMATE AND HEALTH BROCHURE - A brochure "Climate and Weather Data for Physicians and Health Researchers" has been printed and a copy will be sent to each SC. The purpose is to acquaint the medical community with the EDS data sources. Comments about it and requests for additional copies should be addressed to Bill Hodge, Climate and Health Project, NCC.

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COUNTY DATA - Several SC's sent comments concerning the need or lack of need for data by county (see Newsletter Volume 1, Number 3). All were useful and will be considered in our planning. The importance of county data varies from one part of the country to another. In some States the county system is almost obsolete; in others, it is used extensively.

Our interest is prompted by a need to correlate mortality and health data with meteorological data. Most national medical data bases group data by counties or clusters of counties, except in metropolitan areas. We are developing a tape which will identify the county and census area each station is in. Its purpose is to simplify computer programs making use of data from both disciplines. An announcement in a future Newsletter will tell when it can be ordered.

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NCC's HISTORICAL DATA BASE PROJECT - NCC is assembling a historical data base for climate analysis and research. A three-pronged effort has been underway to: (1) assemble a data inventory of long-term series of meteorological data containing all the available information as to its quality (homogeneity) by State; (2) compile specialized data sets of the longest term instrumental records for use in climate diagnostics, verification of proxy data and other applications; and (3) to digitize back to the late 1800's the network of climatological stations whose present form make up our national cooperative network. Data is currently digitized only to about 1931.

Some of the data sets that we have compiled under item 2 above include:

1. State-wide averages of monthly temperature and total precipitation. The longest series belongs to Iowa which begins in 1873, the shortest to California which starts in 1897. Regional (corresponding to the nine U. S. Census regions) and national time series (also areally weighted) have also been compiled from the State data. Time series corresponding to seasonal combinations of various months have also been completed by State, region, and national groupings.

2. Population-weighted heating degree days by State, region, and national groups for the same period of record as is available for the State-wide average temperature data.

3. A station network of about 55 stations comprising the longest available periods of record. Regional sub-networks for use as a quick index of large scale temperature anomalies is also available.

The assistance of SC's to ensure that the old series are complete, correct, and well documented would constitute a significant contribution to our national climate program.

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RECORDS DISPOSITION - Several SC's have been asking about the status and long range plans of this program. To bring you up to date, film containing the following records have been determined to meet our archival specifications for microforms:

Form Number	Type of Record	Period of Record
WBAN 20	Winds Aloft Computation Sheet	1967-1976
WBAN 22	Winds Aloft Summary Form	1919-1964
WBAN 33	Summary of Constant Pressure Data	1936-1973

Disposition actions have already begun on the WBAN 20's and some of you may already have received them. Those of you who haven't should soon be receiving a notice that they will be mailed to you. All boxes will be sent by ordinary mail, so you will be getting just a few at a time.

The WBAN 33's will be sent next, followed by the WBAN 22's. Please recognize that to pack and ship these records takes time and that they will be sent as fast as possible within our available resources.

Looking further ahead, we are currently filming the most recent 30 years of records for NWS first order stations and military stations. The exact period covered is 1948 through 1977. When this phase is completed, we plan to film records in the following order of priority for the same 30-year period: (1) FAA and NWS second order, (2) Cooperative Observer's, and (3) selected autographic. After this 30-year micrographics data base has been established, records for periods prior to 1948 will be filmed in the same order of priority as given above.

The entire filming project could take anywhere from 5 to 15 years depending on the resources allocated for the work. Throughout the filming process, records that have been satisfactorily placed on film will be sent to the SC's when they are no longer needed by NCC. Since it is difficult to predict a reliable timetable for disposal actions, SC's should expect to receive records in varying time intervals and volumes throughout the next five or more years.

Of course, any of the above plans are subject to change. If you have any questions about the program or need some special assistance, feel free to phone Tom Prizio (Ext. 785) or Bill Bartlett (Ext. 275). They will be glad to help you if they can.

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MICROGRAPHICS AIDS IN WEATHER RECORDS MANAGEMENT

By Thomas A. Prizio
Chief, Archival Services Branch, NCC
(Reprint from IRM Magazine, December 1977)

The National Climatic Center (NCC), located in the Federal Building, Asheville, N.C., is the central climatological data facility of the Environmental Data Service (EDS). EDS is one of the major line components of the National Oceanic and Atmospheric Administration (NOAA), which is a part of the Department of Commerce.

This article describes aspects of NCC's operations pertaining to the management and use of weather records. NCC collects weather records and processes selected information from these records for publication in serial data bulletins and in response to user specifications. The discussions which follow center on the micrographics program being implemented at NCC to improve the management and security of weather records.

Archives. NCC is the official repository for the nation's meteorological records, selected environmental data, and climatological publications/tabulations produced by NCC's computer system. The collection consists of about 160 million pages of original weather records and approximately 99,000 reels of magnetic tape containing weather data. New records are added at the rate of about three and one-half million sheets per year. The volume of these records is nearly 100,000 cubic feet, and the projected expansion rate is about 2,000 cubic feet per year. These records occupy about 25 miles of steel shelf length and about 50,000 square feet of floor space. Included in the collection are official records collected from the late 1800s onward, and unofficial reports (diaries, letters, documents, charts, etc.) generated in the 18th and 19th centuries. NCC's primary goal is to maintain an active collection and make all records readily available to users. Since there is no way of predicting which of the 160 million records will be requested, it is incumbent upon NCC to maintain a storage and retrieval system which is highly responsive to user needs.

Records Generation. The records in NCC's repository are created by various civilian and federal agencies, and thousands of private citizens. Primary contributors are the National Weather Service, Federal Aviation Administration, U. S. military weather services, volunteer weather observers, foreign countries, merchant marine vessels, and international experiments conducted in collaboration with foreign nations. The collection is worldwide and contains observations taken at locations on land, sea, and in the atmosphere. Also included are the official weather maps prepared by the National Weather Service.

Data Applications. NCC's records document the recent history of the climate of this nation and other parts of the world. These data are a vital national resource which can serve many purposes. The list of users includes individuals and agencies from all walks of life, i.e., private citizens, industry, universities, federal agencies, courts of law, foreign countries, etc. The data are used for such purposes as meteorological research (improving weather forecasts, etc.), solar energy research, agricultural research (increasing food production, etc.), assessment of the impact of climate on human activities, engineering design, medical research, wind energy research, control of air pollution, national security considerations, recreation planning, design of transportation systems, development of nationwide emergency preparedness programs, flood control, space exploration, national distribution of petroleum products, lawsuits, distribution of consumer products, development of programs to minimize property damage and/or human injuries caused by severe weather (tornadoes, lightning, hail, hurricanes, etc.), and documentation of weather conditions which existed during various events. In brief, climatic influences project themselves on man in countless ways and these records document many of these interactions.

Acquisitions. Incoming records are received by the Archival Services Branch where they are logged, indexed, boxed and labeled, and archived for efficient retrieval. Prior to being archived, however, selected data from many of these records are entered on magnetic tape for computer processing.

Micrographics/Computer System

Threats to Records Preservation. The NCC repository contains original weather records only. These records are under constant threat of being destroyed by fire, vandalism, sabotage or natural disasters (earthquakes, tornadoes, etc.). Should the records be destroyed, they could not be reconstructed and the integrity of the historical documentation of the nation's weather events would be forever lost. Therefore, safeguards to preserve this national resource for posterity are essential.

Solution. For economy, accuracy, legality, compactness, and preservation of records, the best answer to the non-digital information handling problem at NCC is microforms. Of the 160 million records on hand, about 60 million selected ones are being filmed. Most of this work is being done on a Terminal Data Corporation Documate II camera which is operated 24 hours per day, seven days per week. Key information related to all generated microforms is being entered into NCC's computer data base and utilized for efficient retrieval of selected data.

Microfilm Media. NCC's primary micrographics data base is microfiche. The widely varying sizes of documents made it necessary to adopt 49 (double frame); 60; and 98-frame formats with medium reduction (18X-29X). The predominant format in this data base is COSATI 98-frame. The microfiche medium was adopted because selected imagery can be quickly retrieved and reproduced; it is highly adaptable to automated storage and retrieval systems; and, it provides great flexibility in selecting and organizing materials to

user specifications at lowest possible costs. Exceptionally large documents are placed on 35mm roll film.

Records Preparation. Various functions are accomplished in preparing records for filming. These include: arranging records in proper formats, reviewing records indexes and meteorological station histories to assure that collections are assembled correctly, determining methods of enhancing records where needed, and preparing target sheets to be filmed with the records and inserting them in the proper filming sequence.

Film Quality. After the records have been filmed, the processed microforms undergo independent Quality Control and Quality Assurance tests. Quality control personnel concentrate on determining whether the microforms were prepared to the standards established by industry and the Federal government. Their area of concern centers on evaluating the adequacy of the physical aspects of microforms, i.e., density, resolution, damage, film processing, etc. Quality assurance personnel ensure that the integrity of technical information on records is permanently preserved on microforms, that microforms are adequate replacements for original records, and that microforms serve the purposes for which original records were created. Records contained on the microforms rejected by either test are refilmed to acceptable standards. All records must be on archival quality film which adheres to the processing and storage requirements of the latest American National Standards Institute (ANSI) specifications. When these requirements are met, Quality Assurance personnel index each image of each microform. These indexes are entered into the computer data base for use in the efficient retrieval of needed microforms.

Film Copies. Two second-generation silver negative copies are made from the original rolls after the film has been determined to be of archival quality. The two duplicate sets of 105mm film are cut into 6 x 4" microfiche, and the original roll is left intact. Each of the cut duplicate sets is then maintained in widely separated locations in NCC to serve different purposes in responding to user needs.

Permanent Film Storage. The original rolls of film are wound on cores that do not give off reactive fumes or exudations. They are packed in acid-free boxes designed by NCC to minimize deterioration of film during its long-term storage. The fully loaded boxes are deposited in climate-controlled space in a Federal Archives and Records Center (FARC) which is quite distant from NCC. The microfilm capacity of one storage box, which has a volume of one cubic foot, is about 0.6 million records. At approximately two-year intervals, a one per cent sample of randomly selected rolls will be inspected for signs of deterioration or damage. If damage is found, an attempt will be made to determine the cause; corrective action will be taken, if feasable, and bad film will be replaced with good copy. The three duplicate sets of microforms, i.e., the original at the FARC and the two sets at NCC, serve as back-up to each other. Damaged or misplaced film in any set will be replaced by copies made from either of the other two sets. The original film is kept in roll form to expedite reproduction in an emergency.

Microfiche Production. The NCC micrographics data base presently consists of 150,000 master microfiche. Filming of the 60 million records is expected to yield nearly one million additional microfiche. If the programmed resources are provided, about five years will be required to complete this task.

Records Disposal. The National Archives and Records Service has authorized NCC to dispose of records after they have been satisfactorily placed on archival quality film, and the original film is stored in a FARC for security purposes. As a result of agreements with most State Archivists, records will not be destroyed. Instead, they will be shipped to various State archives to be used as unofficial collections in serving intrastate needs.

User Services

Thousands of users throughout the world contact NCC each month for assistance. The list of users is steadily increasing and this upward trend is expected to continue. In the past year, NCC provided users nearly one million paper copies of climatological data and distributed about one million issues of current serial climatological publications. About one-fourth million out-of-print back issues were reproduced from the master file copies to satisfy user needs. Approximately 40,000 microfiche and 10,000 35mm and/or 16mm rolls of film were furnished to users. More and more users are willing to accept microforms instead of paper copies because of their space saving feature, low cost, and the potential they offer for improving records management programs.

Microfiche Service Center

Ongoing Plan. The existing microfiche are stored in two Sperry-Remington Kardveyer 300 power files, each having a capacity of 110,000 microfiche. When the 60 million records are filmed, eight such power files will be needed. They will be arranged in the form of a compact Service Center which will occupy just under 2,000 square feet of floor space. Included in the Service Center will be two video-display terminals for querying NCC's computer data base to quickly determine the availability and location of needed data. The Service Center will also contain several types of film reader-printers and at least one high-speed, high-volume printer that will provide hard copy prints from microfiche.

Benefits. NCC will realize the following *major* benefits from its micrographics program:

- The security of the nation's vital records will be insured against loss from natural or man-made disasters. Surveillance over tens of millions of records will be easily maintained.
- The manpower required to retrieve data and service requests will be significantly reduced. User services will be more efficient and less costly. Requests will be filled more quickly. Records will be better controlled and they will be virtually loss-proof.
- Records management activities will be greatly improved. It will be much less costly and more efficient to administer a microfiche file than a voluminous collection of paper records. Tremendous storage space savings will be achieved.
- The ability to locate and retrieve combinations or packages of various types of records to satisfy particular needs will be greatly enhanced through use of Automated Data Processing (ADP) techniques.
- Mailing costs will be reduced. It will cost much less to mail microforms then the equivalent information in paper form.

Summary. Management and utilization of the 150,000 microfiche already produced and filed in the Service Center, unquestionably verify that the benefits mentioned above are valid. NCC is accelerating its production of microfiche so that these same benefits can be derived from a much greater data base. No longer will it be necessary to retrieve paper records from miles of shelves to satisfy user's needs. Requests can be filled at least ten times faster from a microfiche Service Center than from paper records located in files scattered over 50,000 square feet of floor space.

Additional Insights Into NCC Operations

Since this article concentrated on major activities related to the management and utilization of weather records, many aspects of NCC's operations were not discussed. NCC welcomes visitors desiring assistance or a firsthand look at its operations. Upon request, NCC will provide brochures which describe its functions and capabilities.

NCC is a unique center and the sole source for considerable past weather information. Simply put, as the nation's weather data bank, NCC's operations are somewhat analogous to commercial banks — weather data are deposited when created, and withdrawn (at actual cost of reproduction to users) when needed. □

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COOLING DEGREE DAYS

By R. E. Lautzenheiser
SC, Massachusetts

Rising cost of energy has increased interest in the cooling degree day statistic. SC's may be asked for monthly values for stations other than the NWS First Order stations for which data appear handily in LCD bulletins. These data are almost as readily available in the CD bulletins, for all cooperative stations whose mean temperature and heating degree days are published. The cooling data fall from the simple relation:

$$CDD = HDD + (T-65.0)N + 7$$

where HDD = Published heating degree days
T = Mean temperature for month
N = Days in month

The resulting estimate will be mostly either exactly the same as calculated from daily mean temperatures or one unit off in either direction. The error may be two or more but too infrequently to be of importance. Boston, Massachusetts, data for 1977 show errors of one in May, two in June, none in July, and one in August.

One may ask why the constant 7 appears. This compensates for the presently used rule of rounding. Daily means go up $.5^{0}$ half the days, averaging a 0.25^{0} daily bias. The monthly mean goes up $.05^{0}$ one half the months, averaging $.025^{0}$ per day. The net bias from the rounding rule is $.225^{0}$ per day. Multiplied by a 30 day average month, this gives 6.75, which appears as 7 in the formula.

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Descriptions of the SC programs for the States of Illinois, Indiana, Minnesota, and Washington follow. Descriptions for other States will be in subsequent issues as they are received from the SC's. Those that have not sent in their description should do so within the next few months.

CLIMATIC ACTIVITIES IN ILLINOIS

By Stanley A. Changnon, Jr.
SC, Illinois

Many of the functions of the Illinois State Climatologist have been continued under the auspices of the Illinois State Water Survey since the demise of the federal program. The Water Survey had served as the home institution for the Illinois SC since 1954 and the transfer of activities was not difficult.

The Illinois State Water Survey is a division of State government located on the University of Illinois Campus. The goal of the Water Survey is to perform research and services related to the water resources of Illinois. Within the Water Survey, there is an Atmospheric Sciences Section which comprises 40 professional scientists and engineers, 25 sub-professional staff, and some 35 student employees. We attempt to provide certain of the service activities formerly provided by the Federal SC.

The Illinois State Water Survey has had an active program in climatology since the early 1950's when we joined with the Weather Bureau in performing the Cooperative Punch Card Program for Illinois. We process the historical weather records on tape for some 70 Illinois stations in a variety of formats. These data are available for our own research as well as loan to others.

Our focus in climatology is in three areas: services, data acquisition, and research. We answer any and all requests and have a considerable service interaction with the staff of the University of Illinois because of our campus locations. These services typically run the gamut from telephone calls to long letters, to publications. To help provide better information, the Water Survey scientists began 20 years ago a program of preparing climatologically focused publications. We have some 40 such publications. These were recently summarized in a publication with the title Illinois Weather and Climate Information.

Where to Find It. In the area of data collection, it should be noted that the Illinois State Water Survey has long had great interests in meteorology. To this end, we have acquired extensive amounts of meteorological equipment and operated a variety of mesoscale networks over the past 30 years. Currently, we operate the Urbana Weather Station Service (one of the climatic benchmark stations), and we are operating a dense raingage network of 320 recording raingages in northeastern Illinois,

northwestern Indiana, and southwestern Michigan. This raingage network is located for the studies of several phenomena including the temporal and spatial variations of heavy rainfall, urban effects on precipitation, lake effects on precipitation, and severe storms. Data from this network include 5-minute rainfall amounts which have been collected since June 1976. Data collection is projected to continue for at least three years. In this sense, the Water Survey has considerable "climatic data" beyond that of the National Weather Service. Any one interested in these types of data should contact the Survey.

Current research projects with a strong climatological orientation include one that concerns the climatic fluctuations of hail loss within the 20 major hail States of the Nation. This project seeks to describe the statistical aspects of these fluctuations and how they relate between States. The second project is a two-pronged study of (1) the crop yield-weather relationships (on a crop reporting district basis) for the Corn Belt, and (2) the seasonal and annual fluctuations of key weather conditions and their possible prediction. Like many organizations, we are also involved in a study of the long-term fluctuations in State's climate.

Our various studies of inadvertent weather and climate modification are still being pursued. We are studying the effects of a large cooling lake in southern Illinois on the local weather, the effects of St. Louis and Chicago on weather and climate, and we have just completed a study on the effect of the widespread irrigation in the Great Plains on the precipitation climate of that area.

In summary, we have done and are doing a considerable amount of climatic research and service activities. However, we see the need and the opportunities to do much more.

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ACTIVITY REPORT

By Professor Lawrence A. Schaal
SC, Indiana

After NOAA, NWS, closed State climatology offices in 1973, the personnel ceiling was reduced from 1 3/5 to 1/2. Sponsorship was taken up by the Agronomy Department where a joint appointment had existed since 1956. Services are limited to agricultural applications. Non-agricultural services are taken care of in a consultant capacity or referred to NWS offices.

The one-half time of the SC is divided between extension activities and research. The main extension activity is the Monday work of writing and assembling the Indiana Weekly Weather and Crop Report which has a mailing list of 3,300. The publication consists of four parts. A narrative of

crops status by the agricultural statistician, a narrative by the SC, an article by an extension specialist with the subject related to current weather anomaly, and lastly, a comprehensive summary of weather variables on the back page.

The 7-day summary is mainly accomplished using data and a computer jointly operated by the National Weather Service and Purdue University. Elements reported are: air and soil temperature, precipitation, evaporation, solar radiation, growing degree days, division averages of one week and four weeks of precipitation, and growing degree days. Available normals are stored in the computer so that departures are processed as quickly as the extremes and means. Rainfall stations no longer report weekly by postcard, but rainfall reports from river stations are lifted from the NOAA Indiana Weather Wire to enhance the quality of precipitation data. Pickup is via computer which summarizes in tabular form station values and division averages. Editing can easily be accomplished. Daily temperature reporting stations number 25 during the growing season by virtue of the Environmental Studies Services Center being located here and Purdue Research Farms over the State.

On Monday afternoon the Purdue Agricultural Information Service prints, folds, and mails the report. About the same time the articles are filed on the NOAA Weather Wire. Often the evening papers carry the release.

On Wednesday and Thursday, the SC handles requests and proceeds with some research. In this regard, the last mile marker was a paper appearing in the March 1977 edition of Journal of Applied Meteorology, entitled "Time of Observation Temperature Bias and Climatic Change." Dr. Robert F. Dale worked with the SC on the paper after a student did the ground work. Some of the state climatologists will remember Bob as a former area or regional climatologist who decided on Purdue University. The joint paper confirms the biases resulting from varying time of daily observation among stations. A series of observations taken at 7 a.m. will average 1.30°F colder in March than those at midnight for the same period. The main culprit is the carry-over of a low minimum temperature to the second morning. In Indiana, the evening observation stations belonging to the climate network have gradually become morning observation time stations as the agricultural and river rainfall network expanded resulting from need for morning data for morning forecasts. Some principal and possibly "benchwork" stations in central Indiana suffered this fracture of the long-term period. Rather than "row against the stream" we now favor a.m. observations for uniformity over the State until midnight data is more universal from automated records.

The second oldest formal publication is with the tornado research team led by Ernest Agee in the Atmospheric Science Section of the Geosciences Department at Purdue University. The paper appeared in Monthly Weather Review, July 1977, and was entitled "An Observational Study of the West Lafayette, Indiana, Tornado of 20 March 1976." The main envolvement was piloting the airplane with observers aboard investigating damage paths.

Older publications are: Cooling Degree Days in Indiana, Soil Temperatures in Indiana, and The Temperature Factor in Corn Production in Tippecanoe County, Indiana. All published in Proceedings of the Indiana Academy of Science. This avenue for publishing and obtaining copies for public distribution has worked out rather well in past years in Indiana.

In recent years a complete climatological office would have accomplished a complete summary of soil temperature in the State, a revised research paper on spring and fall frost, and normals of growing degree days. These studies are on hold for the present. Additional work could be done for other meteorological elements as collected by the Environmental Study Services Center.

During the past year this climatologist went operational for a while. The project was to forecast for the Indiana Farm Bureau (Fee basis) the onset of anhydrous ammonia fertilizing in the spring. This involved using the 5-day forecast of weather coupled with the company's report of sales of anhydrous ammonia. The operation begins quickly when field conditions develop enabling the farmers to get into their fields after a rain. The SC is presently evolving a forecast scheme, the modern term is "model," which will use day-to-day reports, county by county, of field activity which Earl Parks, the Agricultural Statistician for Indiana has furnished. Daily precipitation and calculation of evaporation rates from available data will undoubtedly be part of the model.

While the office becomes richer and richer in data, available at moment of inception, its availability deteriorates rapidly. It could be saved, summarized appropriately, and used if the climatology office operated full-time with staff. (The commercial.)

An interesting aspect of the last four years in operating at half-time shows the differences in people, companies, and organizations in their seeking data relating to cost involved. The other half-time is available for consultant activities. Some people who need help aren't getting it because of the difficulty, lack of funds or desire to use them, and are exposed to the run-around on the referral system that we use at one time or another to pass off the problem. People and organizations are often saprophytes -- live on one another. A library isn't constructed because Departments don't want to share, and put together funds for the job. Likewise, applied climatology involves the disciplines of many sciences, but is sponsored by only a few.

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MINNESOTA STATE CLIMATOLOGY OPERATION

By Earl L. Kuehnast
SC, Minnesota

The Minnesota State Climatology Office first started in 1954 under Joseph H. Strub, followed by Donald Haines in 1965, and Earl Kuehnast in 1968. The National Weather Service, NOAA closed the State Climatology Office in May 1973. The State of Minnesota, Department of Natural Resources, Division of Waters set up in November 1973, a Climatology position within the State Climatology Office. Earl Kuehnast became the first State Climatologist working for the State of Minnesota and continues to this date. The State Climatology Office is presently located on the St. Paul Campus of the University of Minnesota, Room 119, Old Vet. Anatomy Building. Staff: one Climatologist and one para-professional Meteorologist (30 hour week).

The State Climatologist manages the State of Minnesota Climatological program in collection, compilation, analysis, and filing of all weather data observed in Minnesota for use and discussion with State, Federal, and local agencies and the public. Provides climatological consultation and coordination with these agencies plus university, private researchers and the general public. Represents the State on matters concerning climatic occurrences. In this capacity the Climatologist must be able to meet with and discuss a wide range of climatological subjects and problems with a variety of parties ranging from technical experts to the general public.

Services provided:

A. Collect climate data from various networks within the State.

1. Department of Natural Resources Rain Gage Network - 75 stations
2. National Weather Service Coop Network - 200 stations
3. Metropolitan Mosquito Control Network - 35 stations
4. Backyard Rain Gage Network (Metro Area) - 180 stations
5. Future Farmers of America Rain Gage Project - 1200 stations
6. KSTP (TV) Rain Gage Network - 20 stations
7. State Soil & Water Conservation District Network* - 70 stations
8. Miscellaneous - 100 stations

B. Process, computerize and store rain gage data. A cooperative computer project between the State Climatology Office and the Department of Soil Science, University of Minnesota was developed. The computer program summarizes the precipitation data and also has a mapping system that will plot the data by the township, range, and section number. For example, precipitation data can be summarized and plotted for any period of record such as June 5 to August 22 and further plotted for any area or size of map.

*This network may expand to 400 during 1978.

C. Provide for State agencies expertise on climatology and meteorology matters to include data and/or analysis.

D. Keep Minnesota agencies or public abreast of the effects of weather past, present, or future as applicable, such as flash floods, drought, and forest fire danger.

E. Represent the State at meetings, conferences, etc., on matters concerning climatology.

Publications published in the last few years:

Baker, D. G. and E. L. Kuehnast 1973. Part VII. Areal Distribution and Probabilities of Precipitation in Minneapolis-St. Paul Metropolitan Area. Minn. Agr. Exp. Stn. Tech. Bull. 293.

Kuehnast, E. L., D. G. Baker and J. W. Enz. 1975. Part VIII. Precipitation Patterns in the Minneapolis-St. Paul Metropolitan Area and Surrounding Counties. Minn. Agr. Exp. Stn. Tech. Bull. 301.

Baker, D. G. and E. L. Kuehnast 1977. The 1976 Drought in Minnesota. Soil Series 98. Dept. of Soil Sci., Univ. of Minn.

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THE WASHINGTON STATE CLIMATOLOGIST PROGRAM - 1977

By Howard J. Critchfield
SC, Washington

The current State Climatologist Program in Washington began in 1976 as a volunteer response to increasing needs for climatic data at the State level. An agreement among the Director of the National Climatic Center, the Director of the National Weather Service Western Region, and the President of Western Washington University, Bellingham, recognized Howard J. Critchfield as the official State Climatologist effective January 1977. Several categories of climatic records were transferred from the former SC office, which had been housed with the National Weather Service in Seattle prior to 1973. NCC has provided monthly arrays, summaries, and microfiche, and copies of various forms of data have been obtained from other sources. All acquisitions are filed in a separate office in the Department of Geography and Regional Planning at Western Washington University. Future transfer of original paper records from Asheville to the Washington State Archives Regional Depository on the Western campus has been negotiated with the NCC Archivist.

The SC office has functioned thus far primarily as a data service. In addition to filing accessions, the office logged 80 personal visits, approximately 200 telephone calls, 35 mail requests, and 14 media interviews during its first year of operation. Data have been furnished to a wide

range of users, including Federal and State agencies, power companies, manufacturers, law firms, businesses, engineers, construction companies, research groups, and a professional football team. In some cases it has been possible to provide elementary statistical analyses. Two special data studies were completed under contract in October 1977.

Requests for agricultural applications have been sparse. The Cooperative Extension Service and associated research units generally meet these needs. Weather records relating to air pollution monitoring are maintained by the State Department of Ecology at Olympia and by regional air pollution authorities. The SC is exploring the potential for adding the records of both State agencies and private companies to office files. Under an informal arrangement with the Atmospheric Environment Service of Canada, Pacific Region, data for the adjacent Province of British Columbia can be obtained.

In support of expanding services Western Washington University has allocated funds for a half-time secretary and limited office expenses in the 1977-79 biennium. For the present the position of State Climatologist is funded neither as a separate budget item nor in the form of released time. Funding does not permit an ambitious publishing program. A 16-page "Guide to Climatic Information - Washington State," duplicated in May 1977, has proven useful in conveying basic information on publications and agency sources of data for the State. A revision scheduled for 1978 will include a comprehensive bibliography of climatic studies that deal with the State and adjacent areas.

Also in progress are a brief summary of solar radiation records and a general descriptive survey of Washington Climate, which will be published if funding can be arranged at a future date.

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