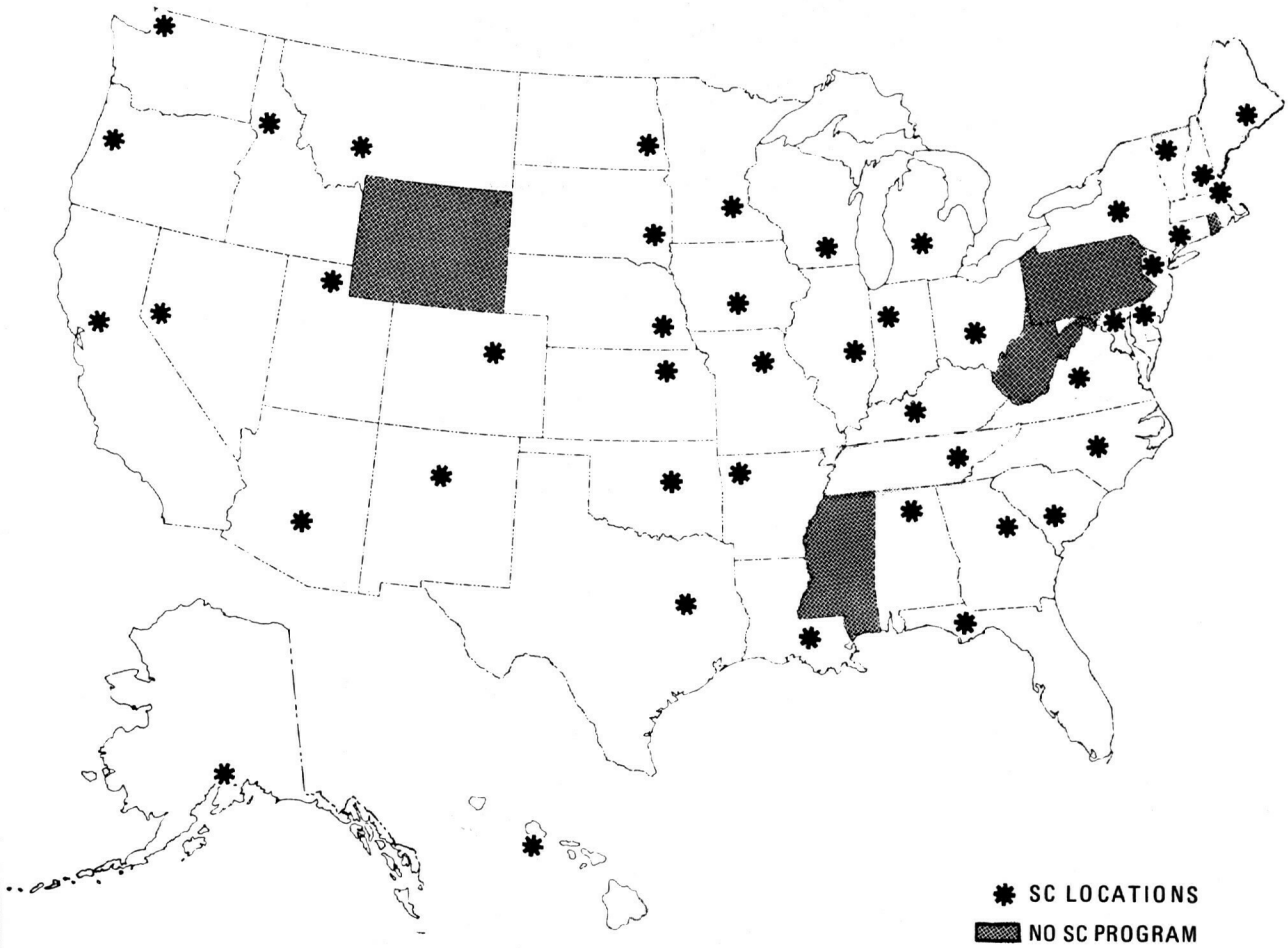
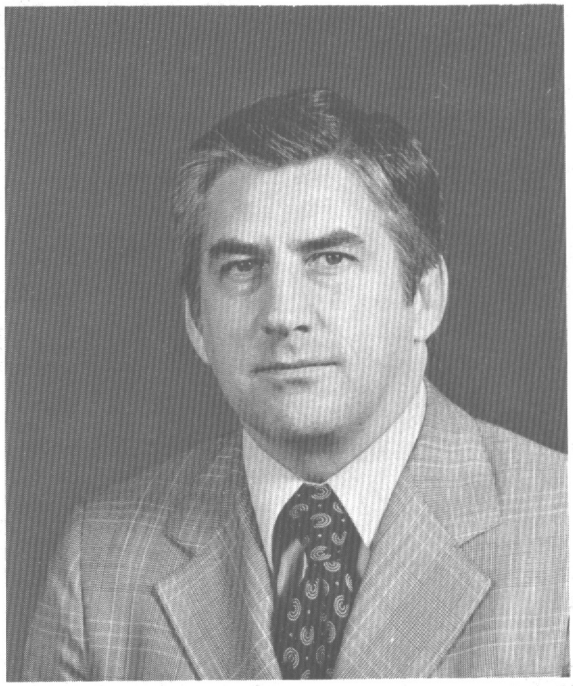
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
ENVIRONMENTAL DATA AND INFORMATION SERVICE
NATIONAL CLIMATIC CENTER

THE STATE CLIMATOLOGIST

IN COOPERATION WITH THE
AMERICAN ASSOCIATION OF STATE CLIMATOLOGISTS



VOLUME 6 NUMBER 2 APRIL 1982
PUBLISHED QUARTERLY AT THE NATIONAL CLIMATIC CENTER, ASHEVILLE N.C.



THOMAS D. POTTER

Environmental Data and Information Service said farewell to Dr. Thomas D. Potter on March 12, 1982. Dr. Potter, who has served as Director of EDIS since January 1980, departed to join the World Meteorological Organization in Geneva, Switzerland as Director of the World Climate Program. He joined NOAA in 1975 as Director of the National Climatic Center. He served NCC as its Director until August 1976 when he became Deputy Director of EDIS and its Acting Director in July 1979. Prior to coming to NCC Dr. Potter served on the faculty of St. Louis University, St. Louis, Missouri after retiring from the U. S. Air Force with 23 years of service. Just prior to his retirement from the military, he served as Vice Commander of the Air Weather Service, which provided weather services to the U. S. Air Force, U. S. Army and other Federal agencies.

The National Climatic Center and the American Association of State Climatologists wish Dr. Potter much success with the World Climate Program.

Dr. Potter's Geneva address:

Dr. Thomas D. Potter
Director, World Climate Program
World Meteorological Organization
Case Postal No. 5
CH 1211 Geneva
SWITZERLAND

NCC BRIEFS

The NCC and AASC are pleased to welcome Dr. Wayne M. Wendland as the new State Climatologist for Illinois. Dr. Wendland's appointment will be effective May 1, 1982. NCC and the AASC look forward to working with Wayne. However, in welcoming Wayne we are forced to say goodbye to a friend - Stanley A. Changnon. Stan has given a number of years to the SC program and has done a fine job. He served the AASC as its 1981 president and was instrumental in helping to make the AASC the fine organization it is today. We offer our sincere thanks to Stan for the work that he has done in supporting the State Climatologist program during the past few years, and we look forward to continuing our strong working relationship with the State of Illinois.

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CORRECTION: The article entitled "The Climate Program at the Illinois State Water Survey" published in the January 1982 issue of The State Climatologist should have stated (page 9) that the recently initiated Regional Climate Coordinating Office was funded by the National Climate Program Office, and will coordinate services and research projects for the 12 states in the North Central - 94 region."

****

CHANGE IN NCC CUSTOMER SERVICE TELEPHONE NUMBER: Data and information from the National Climatic Center may be obtained by calling Commercial 704-258-2850, extension 682 or FTS 672-0682. Extension 682 is on an eight line rotary system. The newly reorganized Climatological Services Section will handle all requests for data regardless of the desired output (i.e., microform, digital, paper copies, etc.).

****

PRICE OF PUBLICATIONS: For years the cost of printing our climatological bulletins was subsidized through Congressional appropriations. The nominal fees charged did not cover expenses of printing, handling and mailing.

New fiscal policies now require us to recover nearly all of the costs associated with the production of these publications. The increased prices beginning November 1, 1981 reflect these new policies and are based on a detailed costs analysis.

To further reduce costs some bulletins were discontinued or combined with other publications. The goal in this effort was to retain the basic climatological information even though the format or method of presentation might be different. We are faced with either increasing charges or discontinuing most of our publications.

The NCC is striving to produce its publications as economically as possible so that further price increases may be kept to a minimum.

****

EDIS Acting Director: Ms. Margaret E. Courain has been appointed Acting Director of Environmental Data and Information Service. Ms. Courain has been with EDIS since January 1981 as its Deputy Director. Before taking a position with NOAA, Ms. Courain was senior program manager with Merck & Company, Inc. of Rahway, New Jersey, a multinational corporation in the human, animal and environmental health field.

NEW COOPERATIVE DATA PROCESSING SYSTEM

A new Cooperative Data processing system was implemented with the January 1982 data by the National Climatic Center (NCC). The major emphasis of this new system is to objectively edit and validate the data in order to provide a more uniform and thorough review.

The data are checked-in and keyed as in the past. The data are then subjected to internal consistency checks such as insuring that the maximum temperature exceeds the minimum temperature. A statistical analysis of the data is then performed using time and space correlations. This analysis is not restricted by division or state boundaries. Predicted values are substituted in instances where the data are missing or are flagged as incorrect by either the internal consistency checks or the statistical analysis. The automated system substitutes up to eight values for any given data month. The meteorological technicians then review the output and examine the predicted values for validity if they differ substantially from the original values sent to NCC.

Starting with the January data, NCC's data base will contain: original data as received, flags describing errors in the original data, predicted data values, and flags for the predicted values. A review of the January data indicates that approximately two percent of the data will be predicted values.

February 12, 1982

SUBJECT: REORGANIZATION

Since my appointment as Administrator of NOAA, I have given a great deal of thought to our missions, priorities, budget, and organization. I have concluded that a reorganization of the agency will enable us to serve the Nation more effectively.

I soon will send to the Secretary a formal proposal to organize NOAA's varying functions more logically, widen communication and coordination throughout the agency, reflect more accurately budget priorities, and reduce administrative overhead.

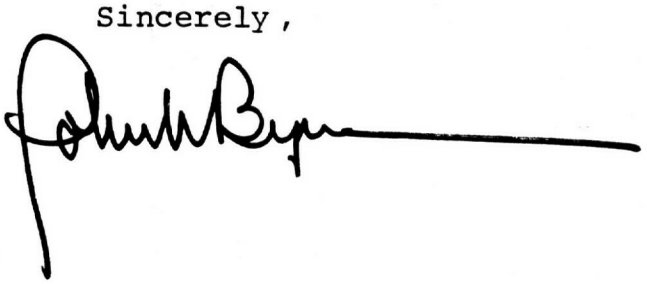
I am confident the result will lead to improved products and services, and a more efficient operation.

The changes I propose will be undertaken as a continuing process rather than a single event. I anticipate no significant dislocation and extensive consultation with those concerned will continue until changes are effected.

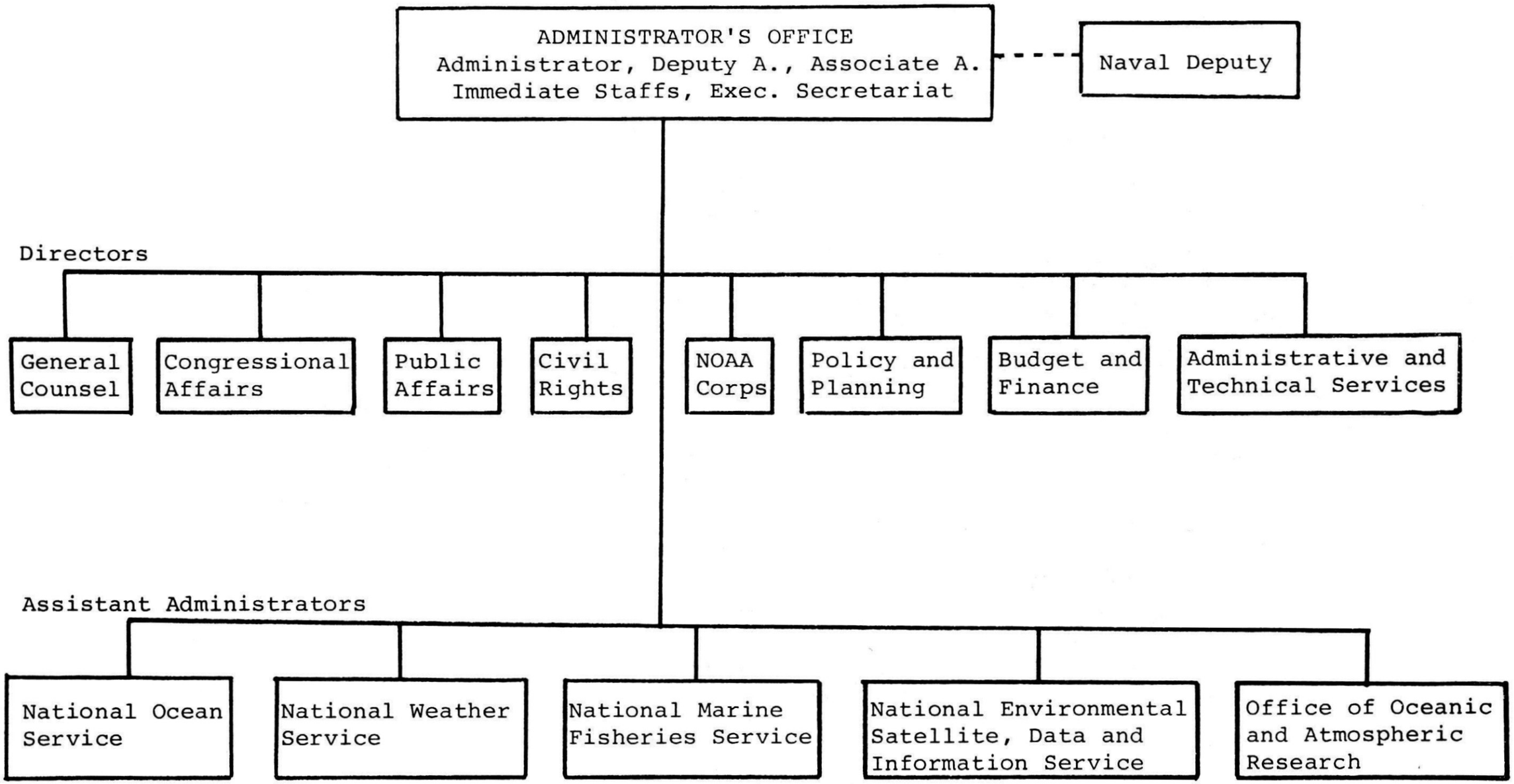
The major elements of this proposal are outlined in the attached material. The design of the final structure will require substantial contributions from all levels of NOAA. Many of you will be asked for advice, information and assistance along the way.

I have often stated my admiration for the talent and dedication of NOAA's employees. I believe management has a responsibility to create an organizational structure which will allow you to do your best work. I ask your active support and participation as we go forward.

Sincerely,



Attachments


ADMINISTRATOR'S OFFICE
Administrator, Deputy A., Associate A.
Immediate Staffs, Exec. Secretariat
Naval Deputy
Directors
General Counsel
Congressional Affairs
Public Affairs
Civil Rights
NOAA Corps
Policy and Planning
Budget and Finance
Administrative and Technical Services
Assistant Administrators
National Ocean Service
National Weather Service
National Marine Fisheries Service
National Environmental Satellite, Data and Information Service
Office of Oceanic and Atmospheric Research

REORGANIZATION

The proposed NOAA reorganization, shown on the accompanying chart, establishes eight staff offices, each of which will be headed by a director. The functions and responsibilities of five of these offices -- the NOAA Corps, General Counsel, Congressional Affairs, Public Affairs, and Civil Rights -- remain unchanged under the proposed reorganization.

The remaining three staff offices will assume some different responsibilities. They include:

- Office of Policy and Planning. This office will provide specialized staff support to the Office of the Administrator, and to the Main Line Components. Its functions will include continued responsibilities for policy analysis, long-term planning, international and interagency liaison, and ecology and conservation coordination.

- Office of Budget and Finance. Budget and finance are important tools in the overall management of NOAA's activities. This office will provide staff support for NOAA's budget formulation and execution activities and be the focus for management of NOAA's financial resources. The office will encompass the functions now assigned to the Office of Budget Resources and Management as well as the Office of Finance.

- Office of Administrative and Technical Services. This office will provide staff support in the areas of personnel, facilities, computing, management systems, and administrative operations and will provide day-to-day support to the Main Line Components in these areas.

The proposed reorganization also establishes five Main Line Components, each headed by an assistant administrator.

- National Ocean Service. This office will provide a focus for the development of a comprehensive strategy within NOAA that will address the increasing uses and opportunities of the oceans. The office will group most of NOAA's ocean-related activities, except those dealing with living marine resources carried out by the National Marine Fisheries Service. Its functions will include NOAA's mapping, charting, geodesy, marine pollution, ocean mining and energy, and coastal management responsibilities. Supporting activities will include those areas related to marine operations, ocean engineering, and technology development.

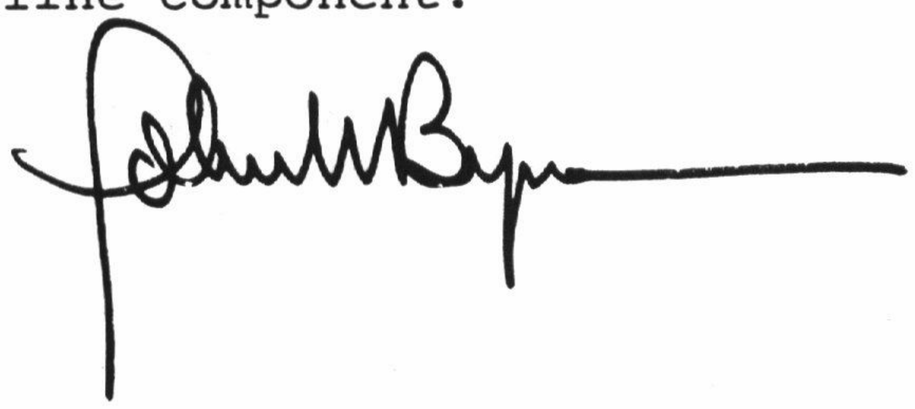
- National Weather Service. In recognition of the importance and size of the Weather Service, this component will report directly to the Administrator. Its basic functions will remain the same. Supporting services will include NOAA data buoy activities.

- National Marine Fisheries Service. The basic functions of NMFS will remain unchanged.

- National Environmental Satellite, Data, and Information Service. Much of the work NOAA performs involves providing data and information services to users both inside and outside the agency. In recognition of the close relationship between the satellite data gathering capabilities of the agency (NESS) and NOAA's data and information processing and dissemination functions (EDIS), these two activities will be brought together. This new component will eventually include climate activities.

- Office of Oceanic and Atmospheric Research. This component will conduct long-term and fundamental research through ERL and extramural programs to support NOAA missions. In addition, this office will ensure closer and more direct coordination with the applied research and development work located within the four service-oriented line components.

NOAA's responsibilities for the coordination of national programs will be assigned to the appropriate main line component.



UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
ENVIRONMENTAL DATA AND INFORMATION SERVICE
National Climatic Center
Federal Building
Asheville, N.C. 28801

March 12, 1982 OA/D5x5

TO: Users

Daniel B. Mitchell

FROM: OA/D5 - Daniel Mitchell

SUBJECT: Environmental Digital Data Base

The National Climatic Center of the Environmental Data and Information Service is in the process of reorganizing the environmental digital data base.

A common data structure is being implemented to provide data which are compatible with current data processing systems. This structure is based on individual "elements" being stored in their own logical records. (An element is an environmental variable such as Maximum Temperature, Daily Precipitation, Wind Speed, etc.) Reduction of data to the element level will provide for more efficient storage and accessibility. This structure will eliminate redundant data found in the current record structure and overpunches (alphabetic characters) from numeric data elements. Use of the common data structure should provide long term cost savings in software design, implementation, and maintenance. The removal of overpunches will provide relief to users who have had to implement special software routines to process these data forms.

The Summary of Daily Co-operative Observations data set is currently available in the defined structure. Other data sets will be converted as resources permit. A summary of the data sets included in the current conversion plan appears in Attachment 2. Target dates will be communicated to users as they become available.

Current data structures will be maintained temporarily for your convenience. By Target Date 1 (New Data Conversion), newly received data will be maintained only in the new data structure. In the transition period between the target dates, customers can request historical data in the new or old data structures. After Target Date 2 (Implementation Date), NCC will provide data in the new structure unless requested otherwise. Data requested in the old format after Target Date 2 will be considered as a special request and any additional charges will be a function of retrieval cost and the tailoring of the product to customer specifications.

Cost estimates may be obtained prior to ordering by calling or writing to:

National Climatic Center
User Services Branch
Federal Building
Asheville, NC 28801

(704-258-2850, ext 682; FTS 672-0682)

If you wish to obtain any additional information on this subject, please write or call:

National Climatic Center
Data Base Administrator
Federal Building
Asheville, NC 28801

(704-258-2850, ext 385; FTS 672-0385)

Attachments

There are different Element Archive data sets corresponding to different families of data, such as Daily Data (Summary of the day) or Monthly Data. Information about the arrangement of records within a file is contained in the documentation supplied with each of the different element data sets. However, all of the Element Archive files share the same record structure.

****

RECORD INFORMATION:

Each logical record contains a station's data for a specific meteorological element (such as maximum daily temperature), over a specific time interval (such as a month). Each record within the data set has the following structure:

ID PORTION (30 characters)

RECORD -TYPE	STATION -ID	ELEMENT -TYPE	ELEMENT -UNITS	YEAR	MONTH	DAY	NUM-VALUES
X(3)	X(8)	X(4)	X(2)	9(4)	9(2)	9(4)	9(3)

DATA PORTION (12 characters repeated NUM-VALUES times)

TIME-OF -VALUE	DATA-VALUE SIGN	DATA-VALUE VALUE	FLAG-1	FLAG-2
9(4)	X(1)	9(5)	X(1)	X(1)

The first eight fields, the ID PORTION of the record, describe the characteristics of the entire record (station, time interval, element type). The last five fields, the DATA PORTION of the record, contain information about each element value reported. This portion is repeated for as many values as occur in the given time interval. As an example, one record might contain one month of daily maximum temperatures, or one day of hourly temperatures, etc.

Attachment 1

****

FIELD INFORMATION:

RECORD-TYPE: The type of data stored in this record.
HLY = one day's worth of hourly element values
DLY = one month's worth of daily element values
MLY = one year's worth of monthly element values
LTM = one year's worth of long term monthly means of element values
U-A = element values for a single upper air sounding

STATION-ID: 8 character station identifier assigned by the National Climatic Center. The meanings of the individual characters vary between data sets. This is explained in the documentation supplied with each data set.

ELEMENT-TYPE: The type of data element stored in this record.

ELEMENT-UNITS: The units and decimal position of the data value for this record.

YEAR: Year of the record.

MONTH: Month of the record when applicable. See the documentation for each file for the exact meaning.

DAY: Day of the record when applicable. See the documentation for each file for the exact meaning.

NUM-VALUES: The actual number of data entries in the record.

TIME-OF-VALUE: Actual time or level of the data value. See the documentation for each file for the exact meaning.

DATA-VALUE: Actual data value including leading sign position. The SIGN portion of the field contains either a blank or a minus sign. The VALUE portion of the field is a five digit integer. Units and decimal position are indicated in the ELEMENT-UNITS field description above.

FLAG-1: Data measurement flag. See the documentation for each data set for details.

FLAG-2: Data quality flag. See the documentation for each data set for details.

Old Format Number	Description	Target Date 1 (New Data Conversion)	Target Date 2 (Implementation Date)	New Record Type
TD1440	Surface airways obs			HLY
TD5300	Winds aloft			U-A
TD5600	U/A Rawinsonde,all levels			U-A
TD9618	Global daily summary			DLY
TD9640	Division averages of temp and precip	1/1982	12/1982	MLY
TD9641	30 year normals of T & P	1/1982	12/1982	MLY
TD9657	Hourly Precip			HLY
TD9727	Daily Summary Obs (COOP)	1/1982	12/1982	DLY
TD9729	Daily Evaporation	1/1982	12/1982	DLY
TD9750	Daily Summary Obs (1st)			DLY
TD9924	Monthly Summary Obs (COOP)	1/1982	12/1982	MLY
TD9927	Hourly Precip			HLY

Attachment 2

****

The following statements may be used to read a logical record
in COBOL or FORTRAN.

Typical ANSI COBOL Data Description.

```
FD  INDATA
    LABEL RECORDS ARE STANDARD
    RECORDING MODE D
    BLOCK CONTAINS 12000 CHARACTERS
    DATA RECORD IS DATA-RECORD.
01  DATA-RECORD.
02 RECORD-TYPE                 PIC X(3).
02 STATION-ID                  PIC X(8).
02 ELEMENT-TYPE                PIC X(4).
02 ELEMENT-UNITS               PIC XX.
02 YEAR                        PIC 9(4).
02 MONTH                       PIC 99.
02 DAY                         PIC 9(4).
02 NUM-VALUES                  PIC 9(3).
02 DAILY-ENTRY

   04 TIME-OF-VALUE            PIC 9(4).
   04 DATA-VALUE               PIC S9(5) SIGN LEADING SEPARATE.
   04 FLAG-1                   PIC X.
   04 FLAG-2                   PIC X.
```

Typical FORTRAN 77 Data and File Description.

```
      DEFINE FILE 10(ANSI,VB,1230,12000)
      CHARACTER*3 RECTYP
      CHARACTER*8 STNID
      CHARACTER*4 ELMTYP
      CHARACTER*2 EUNITS
      CHARACTER*1 FLAG1, FLAG2
      DIMENSION ITIME(100), IVALUE(100), FLAG1(100), FLAG2(100)

      READ(10,20,END=999) RECTYP,STNID,ELMTYP,EUNITS,IYEAR,IMON,IDAY,NUMVAL,
     +                    (ITIME(J),IVALUE(J),FLAG1(J),FLAG2(J), J=1,NUMVAL)
   20 FORMAT(A3,A8,A4,A2,I4,I2,I4,I3,100(I4,I6,2A1))
```

DEPARTMENT OF ENVIRONMENTAL SCIENCES
CLARK HALL . UNIVERSITY OF VIRGINIA . CHARLOTTESVILLE . VIRGINIA . 22903
(804) 924-7761

THE STATE CLIMATOLOGY PROGRAM FOR VIRGINIA

Andrew W. Serell
Research Assistant
State Climatology Office

The Office of the State Climatologist of Virginia is located at Clark Hall on the grounds of the University of Virginia. It is affiliated with the Department of Environmental Sciences in the College of Arts and Sciences. The Office is currently headed by State Climatologist Dr. Patrick Michaels, and staffed by two full-time research assistants, Richard Foster and Andrew Serell, as well as six part-time research assistants.

STATE CLIMATOLOGIST PAT MICHAELS (C)
RESEARCH ASSISTANTS RICH FOSTER (L)
AND ANDREW SERELL (R)

The principal objective of the Office is to establish and maintain the programs needed to satisfy the information needs of the state in the areas of weather and climate. This objective is accomplished through three related areas of involvement:

1. conducting climate-related research in economically important areas.

2. providing long-range climatic forecasting services to the citizens of Virginia and various state agencies.

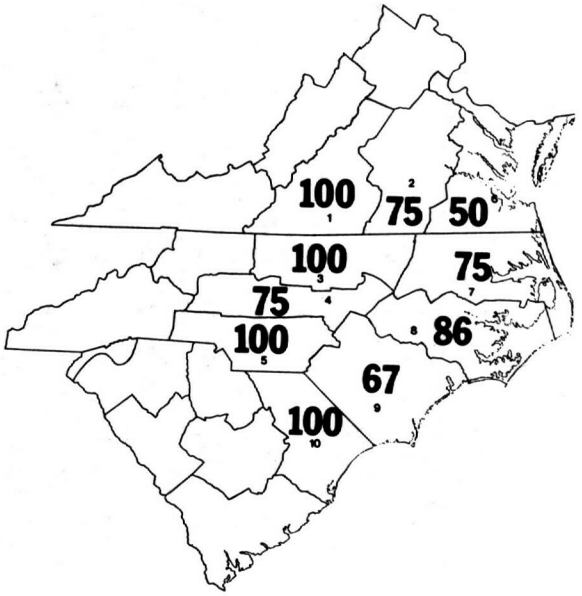
3. instructing students at the University of Virginia in three courses designed to use data from the Office for educational purposes and individual research.

RESEARCH

An important function of the Office is to conduct climate-related research in areas which seem to have particular significance for the economy of Virginia. The process first involves conducting background studies to determine what particular avenues of inquiry will yield the greatest benefits to the citizens of Virginia. Careful consideration is given to the data available to the office and its potential for application to the various concerns of our citizens. Close contact is maintained with those state and federal agencies which are responsible for research support. Currently, research is being concentrated on three main projects: the development of multivariate statistical models designed to anticipate significant changes in outbreak severity of the Southern Pine Beetle, the determination of the impact of climate on Virginia soybean and corn yields, and the development of high-resolution forecasts for the Chesapeake Bay and estuarine Virginia areas. Other research efforts, usually to answer specific inquiries, are of a lesser nature.

Research on the Southern Pine Beetle (SPB), which has been called the "most economically destructive pest in our southeastern forests", is being conducted by Dr. Michaels and research assistants Richard Foster and Andrew Serell. The program's chief objectives are to identify the climatic sequences associated with SPB outbreaks, to develop general models with large-area applicability, and then to generate probability statements on the likelihood of outbreak severity. The climate data was obtained from the National Climatic Center while SPB data was abstracted from county surveys by Terry Price of the Georgia State Forestry Commission. Modes of variation in regional temperature and precipitation were objectively determined by a principal component analysis, using January - June data for each year. These climatic components were then related to SPB population changes by least-squares multiple regression. SPB levels are expressed as the change from the previous year in percent of the total district affected, to minimize some of the problems associated with long-term population dynamics. Our preliminary results indicate the regression equation successfully predicts the sign (+ or -) of significant SPB population changes from year to year. The results appear to be most reliable in the Atlantic Coast piedmont and coastal plain areas, although positive skill has been obtained in most districts of the range of the beetle. Figure 1 shows the percent of years in which the model correctly predicted the sign of the change for a change of $\pm$25%, for the piedmont and coastal plain areas.

The total economic impact of these outbreaks is between 50 and 100 million dollars. By being able to anticipate outbreaks, which this work helps us to do, considerable savings can be achieved. The cost-benefit ratio is certainly encouraging: By using the computer, each SPB forecast costs about 50 cents.



PERCENT OF THE TIME THAT THE SOUTHERN PINE BEETLE MODEL CORRECTLY ESTIMATES A MAJOR POPULATION CHANGE. IT COSTS 50 CENTS TO RUN A MODEL THAT SIMULATES A PEST THAT CAUSES MILLIONS OF DOLLARS OF DAMAGE. (Fig. 1)

The soybean and corn yield project is being conducted by Dr. Michaels, research assistants Andrew Serell and Thomas Smith, and graduate student Richard McDaniel. The objectives of this work include development of statistical regression models to forecast soybean and corn yields utilizing weather and climate data. These models are then evaluated under criteria established in the U.S. Department of Agriculture's AgRISTARS Yield Model Development Project. The improvement over previous work stems from a new dynamic component, as opposed to a purely statistical one, that magnifies the importance of extreme climatic events. The model also takes into account changes in the intensity of fertilizer application and its effectiveness as influenced by climatic factors. Although research on this project is still in the preliminary stages, the model appears to predict yields with somewhat more accuracy than traditional statistical approaches.

Dr. Michaels and Dr. Roger Pielke, of Colorado State University, head the research staff involved with the production of high-resolution weather forecasts for the Chesapeake Bay and vicinity, aided by research assistants Robert Gerzoff and Carol McIvor and students Martha Buffum and Skip Glenn. The two complimentary approaches to this project are multivariate statistics and dynamic mesoscale modeling. Principal component analysis will again be used to determine the main modes of variation in severe storm tracks. Then, Roger Piekle's University of Virginia Mesoscale Model is used to take account of land and sea interactions and boundary layer problems. These are used, along with the satellite and radar data available to the office, to provide important information on the development of mesoscale meteorological systems. Their resolution should be far greater than that of any operational forecast model, including the LFM-II. All three of these projects should significantly benefit the citizens of Virginia and additional research is anticipated for the future.

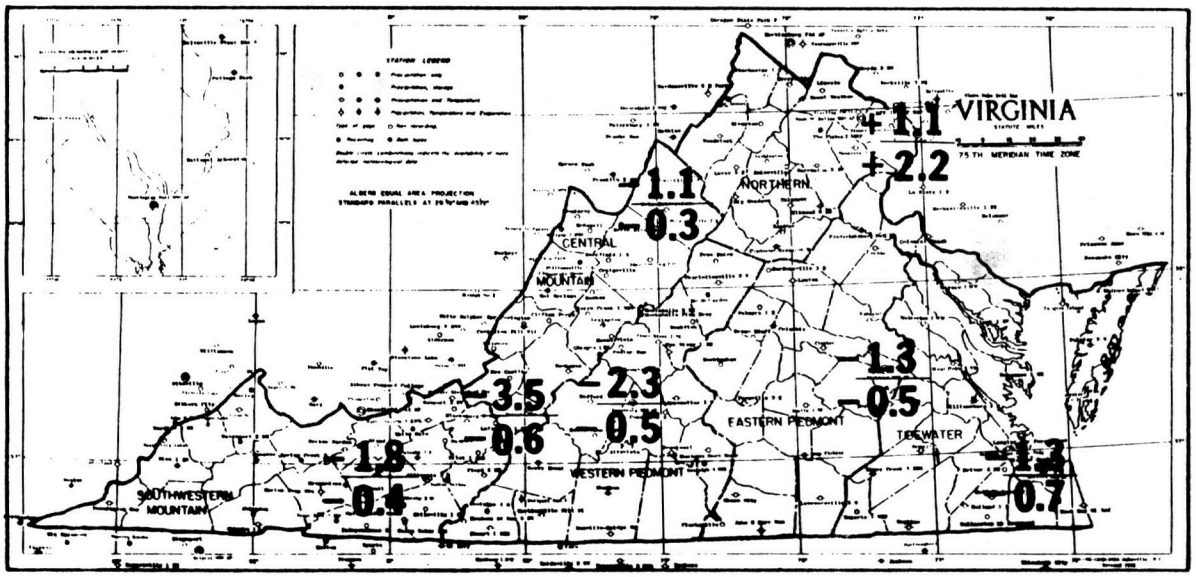
RICH McDANIEL, ANDY SERELL AND TOM SMITH STATE CLIMATOLOGY CROP YIELD MODELING TEAM.

CLIMATIC FORECASTING

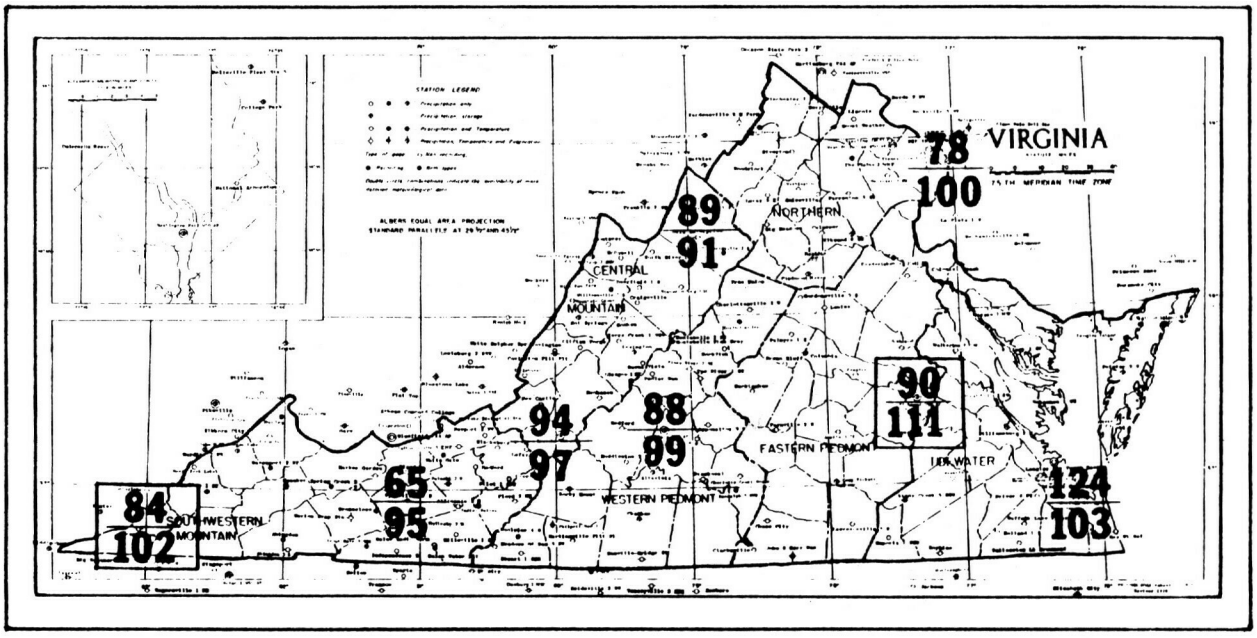
Another activity of the Office centers around the preparation of long-range forecasts and the communication of this information to concerned parties. The ability to accurately predict climatic anomalies in the future can have a significant economic impact on a wide variety of activities. For example, accurately forecasting an unusually wet spring can influence Virginia farmers' choice of varieties or option for soybeans vs. corn. Predicted temperature anomalies can also be used to develop more judicious fuel and energy allocation plans.

The principal tool used by Dr. Michaels in formulating climatic forecasts is a model specifically tailored for Virginia, developed by Dr. Bruce Hayden of the Department of Environmental Sciences. The model predicts mean temperature departure from normal and the percent of normal precipitation for the next two three-month periods. This computer model is based on a multi-variate analysis of the large-scale circulation patterns of the atmosphere for the previous century. First, all of the cyclones that have occurred east of the Rocky Mountains for that period are inventoried. Then, a series of sophisticated computer models sort the data by month, analyzing individual seasonal patterns. The storm pattern for the previous season is then examined to determine what multivariant modes of variation are operating. Then, using the 100-year data base as "memory", the succeeding season's temperature and precipitation patterns are predicted.

These forecasts can be used as guidelines and are applicable for energy use and water supply estimation, as well as for other areas. A typical forecast and verification is illustrated in Figures 2 and 3, with the observed value on top and the predicted on bottom. The numbers in Figure 2 refer to the temperature departure from normal while the numbers in Figure 3 represent an index of the percent of normal precipitation. This verification is for the most recent forecast period, October 1 - December 31, 1981. Figure 4 gives an overall indication of the model's performance to date, throughout its operational history. This summary refers to all forecasts released in our quarterly magazine.



OBSERVED (TOP) AND PREDICTED (BOTTOM) TEMPERATURE DEPARTURE FROM NORMAL, PREDICTED FOR OCTOBER THROUGH DECEMBER 1981. THE SIGN OF THE ANOMALLY WAS CORRECTLY PREDICTED AT ALL OF OUR TEST LOCATIONS. FORECAST MADE JUNE 20, 1981, RELEASED IN THE WINTER VIRGINIA CLIMATE ADVISORY. (Fig. 2)



SAME AS FIGURE 2., EXCEPT FOR PERCENT OF NORMAL PRECIPITATION. THE SIGN OF THE DEPARTURE IS INCORRECT AT TWO LOCATIONS. (Fig. 3)

FORECAST VERIFICATION SUMMARY

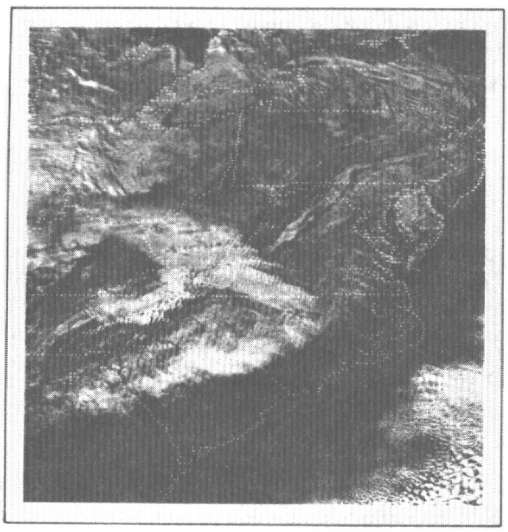
FORECAST	#CORRECT/ #TESTS	%CORRECT SIGN	ERROR LOCATIONS
Oct 1-Dec 31, 1981			
Temperature	7/7	100	none
Precipitation	5/7	71	Penn. Gap, Richmond
Previously Released Forecasts			
Temperature	21/29	72	See Advisories
Precipitation	18/27	66	See Advisories
Total			
Temperature	28/36	78	
Precipitation	23/34	68	
COMBINED TOTAL	51/70	73	

OVERALL VERIFICATION STATISTICS FOR ALL FORECASTS RELEASED TO DATE IN THE ADVISORY. (Fig.4)

SKIP GLENN, BOB GERZOFF, AND CAROL McIVOR STATE CLIMATOLOGY SEVERE WEATHER TEAM.

VIRGINIA CLIMATE ADVISORY

Volume 5/ Number 4/ Winter 1982



Office of the State Climatologist/Clark Hall/The University of Virginia
Charlottesville VA 22903

VIRGINIA CLIMATE ADVISORY

ADVISORY STAFF

Dr. Patrick J. Michaels, State Climatologist

Richard J. Foster and Andrew W. Serell, Research Assistants
Chris Meyer, Department of Environmental Sciences

Chris Meyer joined the Advisory to research the 1899 snowstorm, which makes our current tribulations seem minor by comparison. That storm left almost four feet of snow near Upperville, accompanied by temperatures of almost -20°.

To set the stage for the 1899 storm, we have temporarily moved our Satellite Climatology section forward, where we use the GOES system to show a good example of the development and decay of a "typical" Atlantic Coast cyclone. This should provide some guidance for reading about the 1899 storm (page 10).

Our Current Conditions section takes a brief look at two of Virginia's coldest night's--January 10 and 17, 1982. Many areas of the western Piedmont experienced their coldest temperatures of the century on the 17th. Ironically, some places broke records that they had set just a week earlier. Our recent snowstorms helped to contribute to these very cold temperatures, while at the same time improving our moisture picture.

The late winter and spring forecast seems like the same old story... cooler and drier than normal. Combined with above normal winter precipitation so far,we hope that the planting situation may yet turn out favorably. We also introduce a new way of looking at the precipitation forecast, called the Forecast Precipitation Index, that provides a measure of our confidence in each local estimate.

IN YOUR ADVISORY

COVER: GOES views Virginia at Noon, January 15, following a statewide snowfall the day before. Areas of snow are clearly delineated, as are the Shenandoah Valley (with Massanutten Mountain's twin ridges quite apparent), and the Allegheny Highlands.

The utility of the forecasts is determined chiefly by the characteristics of the user: the cost of a bad forecast, its probability of occurrence, and the amount of backing that can absorb losses. With respect to this, Dr. Michaels has recently adjusted the precipitatin forecast to combine two important factors: the confidence of the forecaster and the magnitude of expected departure from normal. All temperature and precipitation forecasts are printed regularly as part of the Virginia Climate Advisory, a quarterly journal published by the Office.

In addition to publication in the VCA, these forecasts are made available to the public through other means. An important avenue of communicatin is a series of regular presentations by Dr. Michaels to various groups and organizaitons throughout the state, particularly local farming cooperatives and extension meetings organized by Virginia Polytechnic Institute and State University. Through these meetings, more Virginians are made aware of the forecasting services of the Office, as well as the capability for data analysis. Close contact is also maintained with state agencies who use these forecasts for a wide variety of purposes. These agencies include the Department of Energy and Emergency Services, the State Water Control Board, the Department of Agriculture and Consumer Services, and the Virginia Crop Reporting Service. Finally, the Office deals directly with individual inquiries, which enable us to make specific suggestions based on specific concerns.

The Virginia Climate Advisory also contains useful information on a wide variety of additional topics. Dr. Michaels assumed the responsibilities of editor of the Advisory in 1980 and substantially revised its direction, with more emphasis being placed on basic and applied science. The publication tends to concentrate on areas of economic importance to the citizens of Virginia. Presently, circulation is over 2200, most of which is to Virginians.

Each Advisory contains regular departments as well as a series of feature articles. One department highlights weather conditions around the state for the preceeding quarter. Emphasis is placed on unusual events, climatic interactions with energy consumption rates, or agricultural impacts. Topics include moisture status, hurricane tracking, and winter storm development. The "forecast" department presents temperature and precipitation predictions generated by Dr. Hayden's model as well as an analysis of their applicability to Virginia commerce by the Office. There is also a forecast verification department which gives an indication of the performance of the forecast model in the preceeding period and to date.

Feature articles tend to focus on research being conducted by the Office of the State Cliamtologist, severe weather, and various forecasting tools. Recent articles have focused on topics such as acid rainfall in Virginia, satellite climatology and its application to forecasting, winter severity in Virginia, hurricane formation, and coastal cyclogenesis.

INSTRUCTION

In addition to Dr. Michaels' other responsibilities, he is the instructor for three courses in the Department of Environmental Sciences. EVSC 493, "Climate of Virginia", is designed to give students an introduction into large-scale dynamic features that produce local mesoscale climatologies. Individual research projects by students are encouraged, and some have been edited for use in the Advisory. EVSC 447, "Applied Climatology", instructs students in the methods used to analyze climatic variables with respect to their application to a variety of economic and social concerns. "Introduction to Weather forecasting", is a 1-credit course whose purpose is to initiate students into the basics of facsimile map reading and satellite photo analysis.

Much of the climatological coursework is oriented towards statistical analysis using computer models, particularly multiple regression. Emphasis is placed on previous research in the meteorological and climatological literature, with an eye towards integrating that with data vailable to the Office. For example, published work on the history of severe weather in Virginia ties in closely with our project to develop higher resolution forecasts for Chesapeake Bay. Other work has been the development of new types of crop yield models. Additional class projects include the synoptic climatology of major Virginia snowstorms, a dynamic analysis of the Camille (1969) storm, and dispersion patterns of radioactive plumes from power generation accidents.

"Introduction to Weather Forecasting", focuses on basic interpretation and analysis of weather data, with the goal of making correct forecasts. Data include surface and upper-air maps and LFM analyses supplied by the National Weather Service. Satellite photos are available to the Office every half hour and can also be used as an effective tool in weather prediction. Forecast

discussions are held twice each week where "tips" are provided on map interpretation and local orographic influences, as well as discussions of the basic dynamics involved in forecasting. Two forecasts are made each week for three-day periods and later scored. As expected, forecast scores improve significantly throughout the semester.

DATA ACQUISITION AND ANALYSIS

A final area of involvement for the Office is the collection of standardized, reliable climatic data and the development of a user-oriented access system geared towards scientific research. Substantial climatic data is often required for many other research programs in the Department of Environmental Sciences and other University departments, as well as various public and private organizations. Dr. Michaels has obtained from the National Climatic Center a series of computer tapes containing monthly temperature and precipitation for 250 stations in Virginia, hourly precipitation and daily climate data for 25 stations, and hourly, synthesized solar radiation data for four primary stations within the state. Computer programs have been developed to access this data.

In addition to computer tapes, climatological data, published by the National Oceanic and Atmospheric Administration (NOAA), is available to the Office in hard-copy and microfiche form, dating back to 1896 for selected stations throughout the state. Similar data is available for the other Atlantic Coast states in hard-copy form back to 1969. The Office also maintains a file of detailed local hourly and three-hourly climatological data for approximately 25 stations in Virginia and nearby, dating back to 1948. On a large scale, the Office possesses hard-copy national summaries of cliamtological data (1984-present) and monthly climatological data for selected stations throughout the world (1955-present).

For research involving large-scale atmospheric patterns, synoptic surface weather maps are available in hard-copy form dating back to 1899. A very detailed record of synoptic data is available for the last three years. This data includes surface weather maps (printed every three hours), upper-air maps, radar analyses, and precipitable water analyses. Also available are teletyped printouts providing constant weather data from the National Weather Service and the Federal Aviation Administration. Satellite photos of Eastern U.S., the entire country, and the entire hemisphere, which come into he Office over our GOES satellite receiver every half-hour, are also archived. Data can be used to make in-depth analyses of recent meteorological events including winter storms and hurricanes.

Since much of our contact with the public is concerned with agriculture, we have considerable data pertaining to this area. Solar-geophysical reports, published by NOAA, provide detailed information on sunlight and heating. Soil temperatures for six stations throughout Virginia are maintained on an hourly basis. This network is administered by VPI&SU. Finally, crop-weather and livestock reports, published monthly for most states, are received by the Office, as well as an annual summary of crop statistics for important agricultural states.

Much of the research with which this Office is involved, concerns severe weather. Storm Data, published monthly by NOAA, is available for the entire country dating back to 1955. Also on hand are extensive publications on severe weather throughout the world including hurricanes, tornadoes, typhoons, and winter storms. The Office also contains hundreds of books and periodicals on a wide variety of topics from atmospheric physics to plant structure and function. Data which is not immediately available through the Office can be easily located in the many catalogues on hand.

Our activities indicate that the interaction between research, service, and instruction is at the heart of the Virginia State Climate Program. As our program grows and expands in response to increasing user demand, we expect to continue our service to the citizens of the Commonwealth of Virginia.

WATER: THE LIFE BLOOD OF PLANTS

By
E. Arlo Richardson
Utah State Climatologist

It has been estimated that the average man can survive over 40 days without food but a mere three days without water will place him under serious stress. Plants, on the other hand, have a much more varied capability of responding to moisture deficits. Each species seems to have developed its own response patterns depending upon the climatic conditions under which the species evolved.

The plant's needs for water are due to several facts. First, much of the basic materials which make up the biomass of any plant is water or a combination of water with other substances. Water from the soil is used to transport vitally needed nutrients from the soil to the furtherest portion of the plant's living elements. Water is also used to control the temperature environment of a plant. As the temperature of the leaf surfaces begins to rise under the force of incoming solar radiation, evaporation from these growing surfaces reduces the temperature of these surfaces. At the same time, the force set up by this evaporative process pulls additional moisture from the roots up to the leaf surfaces transporting additional needed nutrients. This same water is also a vital part of the chemical activity which produces the increasing biomass of the growing plants. From this brief summary, it is evident that water is indeed the life blood of plants since, like blood in the case of man and animals, the water is vital to all of these living processes.

In reality, there is not that much difference between man and plants, an estimated 98% of man's biomass is also made up of water. Plants depend upon either man or nature to supply this needed moisture and improper application of this vital substance probably kills more plants than all sorts of abuse.

According to Lee Taylor, Extension horticulturist at Michigan State University, there is only one hard and fast rule about when to water and how much to apply and that is "to give plants water when they need it." The difficulty is that a plant's needs are so species specific and site specific that this general rule like most general rules is very difficult to follow.

Almost every home now has many plants actively growing within the home in many types of containers. Some homes have humidifiers to increase the humidity, others are dependent upon only the atmospheric moisture which is emitted by the activities within the home and that which is already in the atmosphere. These environmental differences all modify the moisture requirements of plants grown in different homes. Let's look at some of the other factors involved.

Some plants, such as cacti, thrive on very small amounts of water; amounts that would leave more succulent varieties in a severe stress situation. If one waters a cactus in the same manner one waters an African violet, for example, the cactus would soon be nothing more than a rotted mushy mass. Some plants require the addition of water every day; others, such as the cactus, can survive a month or more with no additional water.

The type of container in which the plant is being grown is another important variable. Clay pots are porous and lose water much more rapidly than glass or plastic containers. Most people tend to give their plants too much water if they have been successful with clay pots and then switch over to ceramic containers. Overwatering kills plants by driving oxygen out of the soil. Plant roots need both oxygen and water to function. Deprived of oxygen, the roots can't take up water and the above ground parts of the plant wilt as though the plant were under stress from lack of moisture.

The character of the soil is another critical variable in terms of the moisture needs of the plant. Soils with many large particles tend to be more porous--contain more large air spaces--and dry out faster than soils composed primarily of small particles. The amount of organic material in the soil is also of importance.

The best time to water plants is when they need it. Such a statement may seem a little ridiculous; but in reality, such a program is very critical to good plant growth and development in the home during winter days. Just as we take a drink when we are thirsty so do our plants. However, there is a difference. Our plants cannot go to the sink and turn on the water when they need a drink. It is up to us to carry the water to them.

Since every plant species has its own set of moisture requirements and since the pot in which the plants are growing, as well as the character of the soil in the pot all modify the moisture requirements, one must make a careful check on what the plants and the soil have to tell us about their water needs.

A few suggestions from a Michigan horticulturist are:

1. LOOK AT THE COLOR OF THE SOIL SURFACE. The surface of a moist soil is usually dark if the soil is moist; light if its on the dry side. Dry on top, of course, doesn't mean that the soil is dry where the roots are.

2. THEREFORE, FEEL THE SOIL about a half inch below the surface. If the soil feels dry, the plant probably needs water.

3. LOOK AT THE SOIL. A soil mix that contains some clay will shrink away from the sides of the pot as it dries out. This may not occur with many of the soil mixes sold in stores. Each soil mix may have a different feel and look as it dries out.

4. LOOK AT AND FEEL THE PLANT. If the plant looks wilted and droopy, its leaves feel limp and flabby and it hasn't been overwatered, then it probably has gone too long without watering. Some plants will recover from such a stage of water stress but others will not so it is best to not allow your personal plants to undergo such intense moisture stress. It may be well to emphasize that plants which have been overwatered may show similar signs of stress, so check the soil as well as the plant before making the decision that the plant needs water.

5. As a final step in our observation of the plants and soil to determine their water needs, we can REMOVE THE PLANT FROM THE POT and inspect the soil. This step should not be taken as a regular routine, however. To remove the plant from a pot place one hand over the soil surface, rap the pot

gently against the edge of a table and shake the soil ball into your hand. After inspecting the soil in the ball, place it back into the pot. This same method applies to removing the plant for repotting when it has become too large for the container in which it is growing.

6. Another method of checking the soil moisture is to purchase a soil moisture meter from your garden store and use this regularly to check the moisture needs of your plants. These are now available for less than 10 dollars and are a welcome addition to the indoor gardener's tools.

Again, however, let me emphasize that each plant species has its own set of moisture requirements. In spite of the danger of too much repetition: (1) Some plant species should be allowed to dry out quite well between irrigations; (2) Other species must receive fresh water nearly every day; and (3) There are even a few plants which do best when their feet are resting in water continually.

There is only one way to really solve this problem of when to water and that is by studying the needs of the plant species that you have in your home. Study the available literature, study the plants themselves and then GOOD LUCK.

Fortunately, most house plants are quite tolerant to man's mistreatment and can undergo many days and even months of improper handling and still survive. However, to keep our favorites blooming year after year, careful observance of the plant's needs for all of its environmental factors is important.

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
Washington, D.C. 20230
OFFICE OF THE ADMINISTRATOR

UNIVERSITY AFFAIRS LETTER
Washington, DC, January/February 1982

Dear Colleague:

The new NOAA leadership . . . under Administrator John Byrne . . . is picking up the pace. Anthony J. (Tony) Calio, an expert in space science management, has been appointed Deputy Administrator. Before joining NOAA, he was with the National Aeronautics and Space Administration for 18 years, where he was NASA associate administrator for space and terrestrial applications and acting deputy director of the agency. The new NOAA Associate Administrator is James W. Winchester, a meteorologist and engineer. From 1972 to 1977 he was Director of the NOAA Data Buoy Office, and since then has been Consultant-Owner of Business and Engineering Consultants, Inc., Pass Christian, Mississippi.

More on NOAA leadership . . . William G. (Bill) Gordon has been appointed Assistant Administrator for Fisheries, and John H. McElroy will be on board February 8 as Assistant Administrator for Satellites. Bill Gordon moved up the ranks in Fisheries, and John McElroy comes to NOAA from NASA where he was Deputy Director of the Goddard Space Flight Center. Elbert W. (Joe) Friday was appointed Deputy Director of the National Weather Services, and William D. Bonner was named Director of the National Meteorological Center. Congratulations and best wishes to each and all.

Pre-proposals . . . no more than five typewritten pages. . . are being solicited by NOAA's Office of Marine Pollution Assessment (OMPA). Current priorities call for R&D on several areas of human activity that change the character of the marine ecosystem including: marine waste disposal, accidental discharges, marine energy and transportation, deep-sea mining, coastal land non-point sources and hazardous waste disposal. Pre-proposals may be submitted at any time to OMPA, and will be reviewed regulary during the year. For the brief pre-proposal package write to Dr. Robert L. Burns, Office of Marine Pollution Assessment, NOAA, Building 264, 7600 Sand Point Way, N.E., Seattle, WA 98115; telephone (206) 442-1964.

An announcement . . . of NOAA Postdoctoral Research Awards . . . can be found on the reverse side, and will be published soon in the Federal Register. Up to six awards are planned for 1982, the third year of the NOAA grants program. Please post, duplicate and circulate the announcement.

NOAA's budget . . . for the present year, FY 1982, NOAA is still operating under a continuing resolution of the Congress, instead of the usual annual appropriation. This year's budget should be clarified in March when further action is necessary on the resolution. Meanwhile the FY 1983 budget has marched forward to the Congress from the Administration, and NOAA's total was pegged at $792.5 million compared to an expected $864.3 million FY 1982 level. Looking ahead, we see three slim budget years in planning for any additional NOAA financial support of university R&D.

The NOAA Office of University Affairs . . . is located in Main Commerce Building, room 5810 in downtown Washington. Please drop in for a visit or telephone (202) 377-5020.

Sincerely yours,

Earl G. Droessler
Office of University Affairs

10TH ANNIVERSARY 1970-1980
National Oceanic and Atmospheric Administration
A young agency with an historic tradition of service to the Nation

ANNOUNCEMENT
Post/Circulate

NOAA RECENT POSTDOCTORAL RESEARCH AWARDS

in *Atmospheric, Fisheries, Oceanic, Satellite Sciences* and *Related Fields*

Application Deadline: *June 10, 1982* Award Date: *September 1, 1982*

In 1982 NOAA plans to award up to six Recent Postdoctoral Research Support Grants. NOAA is seeking to fund the research on campuses of a few recent postdoctorals having outstanding records and exceptional promise in academic research; those postdoctorals engaged in frontline scientific work on atmospheric, fisheries, ocean, and satellite sciences, and related fields that undergird the mission of NOAA. Eligible postdoctorals must be United States citizens and must have received their Ph.D.'s since January 1, 1980 and before June 10, 1982.

Grants will be made for one or two years, nonrenewable, to the universities where the research would be carried out. It is estimated that total funds up to $40,000 per year for each grant will be available. The final grant amount will depend upon the nature and the estimated costs of the proposed laboratory, field or theoretical research. Successful applicants may receive a stipen up to $22,000 for 12 months along with applicable fringe benefits. Other parts of the proposed budget may include as necessary modest requests for equipment, supplies, publication, travel, and indirect costs; all within the total funds available as noted above.

As a special provision . . . each grantee would be asked to establish a visiting relationship with a suitable NOAA laboratory or facility and be in residence there a minimum of one month each year to communicate on the postdoctoral research program and results and to learn firsthand about the scientific programs and research needs of NOAA. The objective is a helpful interchange between the campus and NOAA.

Grants made to universities . . . Since the NOAA grants will be awarded to universities, formal research proposals should be prepared and processed on campus in the usual way through the university administration with signatures of appropriate campus officers. An original and eight (8) copies of the proposals are required.

Those interested in applying . . . for a postdoctoral research support award can obtain further information and informal research proposal guidelines by writing to Dr. Earl G. Droessler, Director of University Affairs, NOAA, Room 5810, Department of Commerce, Washington, DC 20230.

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
Washington, D.C. 20230

OFFICE OF THE ADMINISTRATOR

UNIVERSITY AFFAIRS LETTER
Washington, DC, March/April 1982

Dear Colleague:

New NCPO Director . . . Alan D. Hecht has moved from the National Science Foundation to take on the leadership of the National Climate Program Office (NCPO). Established by the Congress in 1978, the Program includes both research and applications to improve understanding of climate processes and to make useful climate information available to industry and the public, and to Federal, State and Local governments. NCPO has limited funds for the support of university R&D and welcomes inquiries. Write to Dr. Alan D. Hecht, Director, National Climate Program, NOAA, 6010 Executive Boulevard, Rockville, Maryland 20852; telephone (301) 443-8646.

NOAA's budget . . . for the present year FY 1982 . . . is expected to total $864.3 million under a continuing resolution passed by the Congress in late March. The FY 1983 budget now being debated by Congress is pegged at the $792.2 million level. In prospect are three lean budget years ahead in planning for any additional NOAA financial support of university R&D.

The University Affairs Office . . . has underway a program aimed at bringing into NOAA each year a few top senior academicians through term or IPA appointments. This is a NOAA-wide effort to further strengthen the personal bonds between the university community and the NOAA community. The goal is to invite about seven energetic and creative academic leaders each year, at the full professor level, to take temporary appointments in the most attractive positions that can be arranged for them within NOAA. Through the program NOAA hopes to attract a variety of skills and expertise that otherwise would not be available.

NOAA hopes more faculty members . . . will want to take sabbatical leave with NOAA and be engaged in challenging, front-line mission activities. Each appointment aims for a minimum of one calendar year, or any period between one year and two years, which is probably the practical limit of temporary assignments. Under a written agreement (Form 69) which records the financial arrangements, obligations, and responsibilities of the parties, NOAA normally would reimburse the university for the appointee's services. Out-of-pocket costs involved in relocation and carrying out the term assignment are included in the financial negotiations. NOAA costs are shared 50/50 by the Office of University Affairs and the NOAA unit employing the services of the appointee.

The selection process envisions . . . the following steps: (1) an announcement within NOAA and within the university community (this letter); (2) letters of inquiry and application received from academicians; (3) a matching of applicant's interest and expertise with the interest and needs of a NOAA unit; (4) discussions/negotiations with applicants, their universities, the University Affairs Office and the NOAA unit to work out the appointment; and (5) invitations extended and appointments made. Write to the office of University Affairs, NOAA, Department of Commerce, Washington, DC 20230 or telephone (202) 377-5020 for more information on the senior academician program.

Sincerely yours,

Earl G. Droessler
Director of University Affairs

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