

UNITED STATES DEPARTMENT OF COMMERCE
WEATHER BUREAU
WASHINGTON

December 17, 1956

IN REPLY, PLEASE ADDRESS
CHIEF, U. S. WEATHER BUREAU
WASHINGTON 25, D. C.
AND REFER TO

MEMORANDUM

C-3.1

TO: Area and State Climatologists, Substation Inspectors, Field Aides, WRPCs, River District Offices, and Area Engineers.
(With copies to Regional Offices for information)

FROM: Office of Climatology

SUBJECT: Climatological Service Memorandum No. 57

SEASONS GREETINGS

The Office of Climatology extends seasons greetings and best wishes to all recipients of this CSM.

GENERAL

1. DISTRIBUTION OF CSM

Material in CSMs is not restricted in any way and may be freely shown or discussed with outsiders. However, since it is in effect a house organ, we have no authority to distribute it generally outside the Bureau. An exception is CSM #50 which outlines the climatological program, and which may be freely distributed.

2. INFORMAL MINUTES OF THE 4TH MEETING OF THE ADVISORY COMMITTEE ON CLIMATOLOGY: The meeting was held on November 1 and 2, 1956, at the NWRC, Asheville, N.C., following the 148th National Meeting of the AMS held in the same city. Present were: Dr. Thomas F. Malone (Chairman); Dr. Werner Baum, Dr. Phil Church and Dr. Al Kuhn (members); and Dr. H. E. Landsberg (by invitation).

The Committee discussed in executive session its formal report to be rendered to the Chief of the Weather Bureau in the near future. A draft of this report had been prepared by the Chairman.

In following the agenda issued for the meeting Dr. Landsberg briefed the Committee on the organizational changes that had taken place at the NWRC since the Committee met there a year ago. He also briefly touched on the highlights of recent developments in the Office of Climatology. In particular, he brought the Committee up-to-date on the status of FOSDIC and other plans to automatize procedures.

The Committee then entered into an extensive discussion of three items which had been submitted by the Weather Bureau for specific advice.

The first concerned the type of observations and the network desirable for agrometeorological and agroclimatological work. The Committee followed in essence the recommendations which had been arrived at by the Subcommittee on Weather Observations of the North Central group of Agricultural Experiment Stations (Chairman, Dr. Vern Suomi). These foresee observations at "representative places" with a recommended network of approximately 10 per state. The Committee recognized, however, that this figure should remain flexible according to topography and agricultural diversification of the various states. The recommended observations comprise daily extremes of temperature and dew point, the total wind movement (during daylight and night hours separately), the maximum wind speed, the daily extremes of soil temperature in the top 10 centimeters, the daily rainfall and rates of rainfall, measurements of the solar or net radiation or both, the duration of dew and a measure of soil moisture. With respect to the last element the Committee recognized that more research is needed for the development of methods satisfactory for routine station use. Where feasible it should be considered to measure temperature and wind at two levels in the lower 30 ft. to establish the vertical gradient of these elements in the layer near the ground. It was also the Committee's opinion that where stations are already in existence with proper exposure their equipment should be expanded to include the above measurements so that only where essential should new stations be established.

The problem of measurements of radiation led to a more general discussion on this problem and the Committee voiced the opinion that a much denser network of radiation stations in the U. S. is needed. Greater use will be made in future years of solar energy and, while practical engineering problems in this connection may be a decade or more away, the ground work for an adequate climatology of this element should be laid now. In particular, measurements on a horizontal surface are not adequate and should be supplemented by measurements on slopes and vertical surface at many localities. The Committee is aware of the inadequacy of present instrumentation and feels that development work along this line is needed. The Committee suggested in addition that the Weather Bureau look into the feasibility of publishing hourly data of solar radiation from the now existing network.

The discussion then turned to supplements to physical observations in agroclimatology by biological ones. The question of whether the Weather Bureau should undertake or cooperate with the Department of Agriculture in the collection of phenological data was raised. It was suggested that a survey of the results of the long years of British and German observations and their use and usage be made. The question of standard plant material for insuring comparability of phenological observations was also raised. Another question that arose in this connection is the comparability of various types of plants but Dr. Kuhn suggested that in the agricultural regions alfalfa is rather ubiquitous and might serve as one of the plants used for such phenological observations.

As second major item the Committee discussed the gap in the Northern Hemisphere Historical Synoptic Map Series. Mr. McMurray of NWRC had presented a paper on the status of this project at the AMS meeting. The gap which will exist after the end of this fiscal year will comprise the war years second half of 1939 through 1943. The Committee felt that there should be no distraction from the effort to keep this series current. However, it was the Committee's opinion that special funds should be secured to close the war time gap as soon as possible. Synoptic climatology studies for longer periods of time will be detrimentally affected without these years and a strong recommendation to accomplish this task will be contained in the Committee's formal report.

The third major item of discussion centered around current procedures in which weather anomalies are generally characterized by departures from normal. In case of precipitation this is a rather doubtful practice and the question was raised whether or not at the time of change-over to new normals in 1961 a change in practice should be instituted. In view of the long lead time needed to arrive at any figures and to re-educate users of these figures it seemed desirable to discuss this problem now. The Committee felt that it would be very desirable in case of precipitation values to use departures from median rather than means and suggested to look into the feasibility of using quintile values in U.S. CD publications such as are already used in the Monthly Climatic Data for the World.

The Committee also discussed a number of miscellaneous items primarily for comments in their report. Among them were the question of climatic publications. These seem to require continuous attention as to their adequacy and particularly whether material published now is useful to a sufficiently large number of people to warrant publication.

The desirability of expanding the contract research effort in climatology both for its own intrinsic value and for the training of graduate students was stressed.

The practice of hiring student aides during the summer was favorably commented upon and the suggestion was made that this might perhaps be extended to faculty members of some Meteorology Departments, in particular for summer work at the NWRC.

The liaison at various echelons of the climatological service to the Department of Agriculture was discussed and the policy limits of service by State Climatologists to private interests was briefly touched upon.

3. TABULATIONS OF FREEZE DATES: Recent discussions with area and state climatologists indicate that many are not aware of a series of tabulations already prepared with regard to average dates of first and last temperatures of 32°, 28°, 24°, 20° and 16°. Such data were used in preparation of the article on Minnesota presented in the Weekly Weather and Crop Bulletin of October 8, 1956.

Any state climatologist desiring these data is encouraged to write directly to the National Weather Records Center at Asheville and request a duplicate of Job #1013 with standard deviations as prepared for his state.

4. COVERAGE OF SEVERE STORMS, HURRICANES, ETC. IN STATE CD'S: When there is a weather disaster in a state, the appropriate issue of the State Climatological Data should contain a brief description of the effect of the storm on that state. A statement will be included that the storm will be described more fully in the CDNS. The appropriate issue of the National Summary will carry a description of the weather disaster and its effect on the states influenced. The story for the National Summary will be compiled in the Office of Climatology using reports submitted by the State Climatologist of each state affected.

If there is a special need within a particular state or group of states for a report different from that included in the State Climatological Data or the National Climatological Data a special bulletin or release for use in the areas directly concerned can be prepared in the Office of Climatology using material furnished by the State Climatologist if several states are affected, or can be prepared by the State Climatologist in the single state involved if there is only one.

Major disasters affecting large areas will periodically be the subject for preliminary reports as special weather summaries for the Weekly Weather and Crop Bulletin. These will ordinarily be assembled within one week of the date of the disaster and will be compiled in the Office of Climatology using material furnished especially for that purpose by the State Climatologist of the states involved. These will not replace the articles in the respective State or National Climatological Data, but will be issued as preliminary reports as promptly as possible to provide information for public distribution on these disasters prior to the completion of the more detailed reports in the State and National CD's.

5. FROST DEPTH DATA: By memorandum dated February 7, 1947, the Division of Hydrologic and Climatological Services requested Regional Directors to "make arrangements wherever possible to secure daily measurements of frost depth". Lists of the observation stations which were established were to have been forwarded to the Central Office. Item #3 of CSM #10, dated January 27, 1950, however, indicated that the frost depth data were being collected and that they had been filed in the Regional Engineer's Office. This item asked that these data be transferred from the Engineer offices to the files of the Section Centers.

Then, under item #3, CSM #49, dated 11/3/55, State Climatologists were asked to report on the available soil temperature data. This request was renewed by Item #8, CSM #52, dated 2/17/56. As a result of these later CSM items reports on the availability of soil temperature data or such were received from nearly all of the states.

It is unfortunate that a report on the frost depth data was not requested at the time the soil temperature survey was made. It is unlikely that we will undertake any extensive program of collecting frost depth data, as such, in the future. It will, however, be appreciated if each State Climatologist will make a survey as to what frost depth data are now found in his files as a result of the instructions mentioned in the first paragraph, and forward a report of his finding, to this office within 30 days. The actual data, however, should be retained in the office files until further instructions are issued.

6. SEMI-ANNUAL OPERATIONAL REPORT: Replies to queries about the value of the semi-annual operational report (showing the number of stations with incomplete or missing data) indicate that this report is not widely used.

Instructions have therefore been issued to the WRPC's to discontinue the preparation of this report.

7. DISTRIBUTION OF INSTRUCTIONS FOR PREPARATION OF COPY FOR MONTHLY AND ANNUAL CD's: A copy of the above instructions, dated October 1 and November 1, 1956 has been distributed to each State Climatologist for information only. Changes to these instructions are sent directly to the WRPC's and are then repeated in the WRPC section of the CSM. It is not necessary that State Climatologists keep their copies of these WRPC working instructions up to date.

8. OBSERVATIONS ON AGRICULTURAL CLIMATOLOGY IN WESTERN EUROPE: Because of the general interest we are quoting the following comments by Dr. P. E. Church of the University of Washington following a trip to western Europe this summer.

Places visited where agricultural climatology is pursued.

Quickborn, Germany (Branch of Deutcher Wetterdienst), Hannover (Technical Hochschule), University of Munich, Heidelberg-Granzhof (Deutcher Wetterdienst), Geisenheim/Rhine (Deutcher Wetterdienst), Giessen (Deutcher Wetterdienst), de Bilt (Netherlands Meteorological Institute), Wageningen, Netherlands (Plant Pathology Experiment Station).

Soil Temperatures.

At all the Deutcher Wetterdienst Agricultural Experiment Stations observations of soil temperatures are made daily at various depths down to one meter. The standard depths are 5, 10, 20, 50, and 100 centimeters and at Giessen down to three meters. The temperatures are observed by mercurial thermometers which are placed in a vertical position. At depths greater than 20 centimeters the thermometers are mounted on sticks which are inserted inside metal pipes down to the respective depths. It was gratifying to note that the German workers are not satisfied with the method they are using to measure soil temperatures, but their budgets do not permit purchasing more suitable equipment.

Numerous publications have resulted from these observations, some of the papers appearing in standard journals of meteorology (example is Zeit für ang Meteor) and some in agricultural journals (example is Umschau in Wissenschaft und Technik). The emphasis of most papers is on penetration of frost though other phases of soil temperatures occupy some attention.

At Giessen several mercurial thermometers have been inserted at various depths in a slab of concrete whose thickness is that of a concrete highway; this is to determine temperature gradients through the slab, maximum surface temperature and depth of frost penetration.

At the National Weather Institut in Uccle, Belgium, soil temperatures are being observed by the same method as in Germany but at depths of 1, 2, 5, 10, 15, 25, 50, 75, 100 centimeters and at 2 1/2 meters both under a grass cover and under bare soil.

In the Netherlands the Meteorological Institute at De Bilt is measuring the soil temperature at 1, 10, 25, 50, 75 and 100 centimeters. No real work in analyzing the data or in expanding the number of observational points is contemplated; the reason offered was that the soil varies greatly from place to place so that representative temperatures are virtually impossible. The thermometers are usually read three times daily.

Soil Moisture:

At each German Agricultural Experiment Station observations are made of "soil humidities" using the Popoff method. This method employs cylindrical pots 25 centimeters in diameter and 25 centimeters deep; a pair of pots is required to obtain observation data. One pot has a screen bottom the shape of which conforms to the natural soil immediately below and when the pot is placed in position there can be water transfer from natural soil to the pot. The other pot has a metal bottom with a hole in the center so that water drainage through the soil in the pot may be collected in a measuring cup beneath the pot. Each day the pots are weighed and each day their positions are reversed. By this method the amount of drainage of rain water through the soil or the loss of water by evaporation can be measured. The number of pairs of pots varied from station to station depending upon the number of types of soil whose "humidity characteristics" were being investigated. Usually three pairs were installed containing sand, loam, and humus or clay.

Comments: It seems to me that this method cannot be considered as a measurement of soil moisture. The pots are in contact with the natural soil only every other day and on alternate days are measuring infiltration. The measurement may be a useful one of evaporation from a bare soil surface but it does not seem to me that it would give a measurement of soil moisture in the natural soil. Apparently it is limited to one measurement which integrates conditions over a 25 - centimeter profile.

Milton L. Blanc
Chief, Investigations Branch,
Office of Climatology

Lysimeters:

At Giessen there were eight non-weighing lysimeters of cubical shape two meters on a side. The water penetration through four types of soil (loam, sand, sandy loam, and humus) was measured in four lysimeters the surfaces of which were kept free of plants. The other four lysimeters had the same types of soil but with grass growing on the surfaces. These were the only lysimeters seen though there are some in the Netherlands where reforestation of dunes is being tried. Four lysimeters are used each with a different species of trees being grown on each lysimeter. In the Netherlands this experiment is in co-operation with the Water Supply Department.

At Rothamsted (England) Penman and Monteith have designed a lysimeter in which they expect to be able to measure the daily gain of weight of growing potatoes. The lysimeter had been designed and the excavation for the equipment had been made but the lysimeter was still being fabricated.

Insect warnings:

At each of the German experiment stations was a small screened cage in which Colorado beetles were kept. The phenological development of the beetle was carefully watched and farmers are warned by radio when the beetle had reached the stage or stages where spraying of potatoes in that section was most effective. At some of the German stations observations are made with respect to the development of a Peach Fly and farmers are warned by radio when spraying would be effective against this insect.

Precipitation Interception:

At one station, Heidelberg-Grenzhof, two plots of growing barley, each about four meters square had 15 evenly-spaced plastic funnel-type rain gauges, about five centimeters above the surface, each of which drained into individual measuring cylinders. One plot was surrounded by closely spaced reeds about one-meter high to shelter the growing barley from wind. The other plot was unsheltered. The object was to see how much rain reached the surface compared to the amount that was measured by a standard gauge and penetrated into the soil as the barley grew and whether or not shielding from the wind produced any change.

9. RECEIPT OF ARRAYS BY STATE CLIMATOLOGISTS: State Climatologists should continue to receive the arrays for the following reasons:

- (a) to help their own "insight" into the data and network they're supposed to be expert on;
- (b) they serve as a good professional check on what could easily become mechanical practices at WRPC;
- (c) the data in array form (synoptic form) may on occasion be very useful in their public service.

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10. U. S. WORLD CENTER FOR METEOROLOGY: The U. S. National Committee of IGY has indicated its intention to designate the NWRC as the U. S. World Center for Meteorology for IGY data. Another World Center, possibly in Russia, will also be designated.

Responsibilities of the World Center are:

(a) To collect a complete set of IGY data for the whole world.

(b) To make the data available at cost to users.

11. CORRECTION: Pages 2 and 3 of CSM #56 are incorrectly headed CSM #57.

FOR WRPCs

12. AMENDMENTS TO PROCEDURES: The following amendments to instructions have been issued to WRPC's.

Paragraph 1009.637. Change the 4th sentence by deleting the word "Measurable".

Paragraph 1009.652. Add the following 2 notes in the appropriate places:

#Thermometers are generally exposed in a shelter located a few feet above sod-covered ground; however, the reference indicates that the thermometers are exposed in a shelter located on the roof of a building.

SS This entry in time of observation column in Station Index means observation made near sunset.

Eliminate the second note, the one explaining how the four digit identification numbers are assigned.

Eliminate the note "Observation times given in the Station Index are in local standard time". Change the note beginning with Data in Tables 3, 5, and 6 etc. to read, "Data in Tables 3, 5, and 6 and snowfall in Table 7, when published,

are for the 24 hours ending at time of observation". The Station Index lists observation times in local standard time.

Change the note about dimensional units to read: "Unless otherwise indicated dimensional units used in this bulletin are: Temperature in °F, precipitation and evaporation in inches, and wind movement in miles. Monthly degree day totals are the sums of the negative departures of average daily temperatures from 65° F.

Eliminate the note, "Amounts in Table 3 are from non-recording gage, unless otherwise noted".

Paragraph 1009.67. Add the following as the last sentence in the referenced paragraph. "The first entry for each station for each year should be the date of the last preceding observation."

Add to paragraph 1009.822 - Division temperatures and departures from normal should be carried at the end of this table.

Add to paragraph 1009.823 - Division averages and departures from normal should be carried at the end of this table. Data should be separated from the preceding values by 2 or 3 spaces and should be headed "Division averages".

Paragraph 1009.83. Please delete the reference letter 'D' and the explanation following it. The reference letter 'D' should not be used in the annual.



H. E. Landsberg
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