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UNITED STATES DEPARTMENT OF COMMERCE
WEATHER BUREAU
WASHINGTON

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IN REPLY, PLEASE ADDRESS
CHIEF, U. S. WEATHER BUREAU
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FILE: 922 MEMO (Climatological Services Memorandum No. 62) WASHINGTON, D. C. 11-5-57

MEMORANDUM

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 Services Memorandum No. 62

GENERAL

1. MEETING OF INTERNATIONAL ASSOCIATION OF METEOROLOGY, TORONTO, CANADA: The following is taken from my report on the September meetings in Toronto. "The International Association of Meteorology is one of the eight constituent bodies of the International Union of Geodesy and Geophysics. It had its trienial meeting at Toronto, Canada, September 2-13, 1957. The late Dr. C.G. Rossby had been President of the Association. His place was filled by Dr. Van Mieghem (Belgium) who was also elected President for the next three years. Other elected officers are 1st Vice-President Dr. Horace Byers (U.S.A.), 2nd Vice-President Dr. A. M. Oboukhov (U.S.S.R.); Secretary Dr. R. C. Sutcliffe (U.K.). The next meeting of the Association will take place in Helsinki, Finland, in 1960.

"Some highlights of the scientific sessions follow: The Joint Symposium on the Water Balance of the Earth (with IAPO and IASH) stressed -- among many other things -- the importance of precipitation observations over oceans. It was decided to ask for CIMO-WMO cooperation to initiate measurements of this important element. An unsolved problem is also the question of condensation of water vapor from the air on oceanic water surfaces. Experiments to assess the order of magnitude of this effect are highly desirable. A very important new technique for study of the hydrologic cycle is the measurement of the deuterium concentration (Friedman & Redfield), which is lowest in snow, followed in ascending order by rain, river water, lake water, and sea water.

"The symposium on Diffusion and Convection brought out the importance of microscale phenomena in the atmosphere for those on the meso- and macro scale. In particular, it seems essential to include the surface heat flux in numerical calculations of atmospheric motions. The possibility of obtaining better insight into microscale phenomena by development of theoretical models which can be calculated on the electronic computers offers new opportunities for systematic studies. A start in this direction has been made in the analysis of a convection bubble. Fundamental solutions of the Diffusion Equations have also been developed.

"The symposium on Numerical and Graphical Methods of Dynamical Weather Prediction brought forth an encouraging review of the state of the art and some vigorous discussion. After several years of rapid progress there will have to be "some slow painful efforts" (Charney), which promise, however, solutions of problems of frontogenesis, jetogenesis, new applications to the numerical prediction of hurricane motions and, on a large scale, the development of a dynamic climatology and long-range predictions. The introduction of topography radiative and convective processes of friction, of evaporation and condensation processes into the models will have to be tackled. The electronic computers, however, will soon be capable to solve within reasonable time the fundamental Richardson equations. Further development will also have to concern itself with problems of the station network. Considerable discussion centered around the questions whether the network should be doubled, as some provocative studies suggest for optimal accuracy of forecasts or the frequency of observations at existing stations be increased by making use of time series properties, or whether redistribution in space might yield better results without prohibitive cost increases.

"The symposium on radiation brought forth new facts, among them calculations of the radiation balance of the atmosphere for various synoptic situations. Particularly interesting were spectrometer observations from aircraft at 45,000 feet of the water vapor bands (1-3 micron area), indicating still 20 microns of precipitable water vapor, an amount which could exercise an important influence on the stratospheric heat balance. In the discussions it appeared that there exists still considerable divergence of opinion on the role of vertical stability on the heat transfer from the surface to the atmosphere. The fact that over 700 stations will make radiation measurements during IGY is very encouraging but more work is needed on measurements of radiation balance from representative stations to determine the storage and release of radiative energy which might enter into the dynamic processes of the atmosphere. The assessment of the non-adiabatic effects is very important for the development of improved dynamic models. The seasonal heating and storage value on a hemispheric or even global basis are becoming better known and it appears that all seasonal excesses of heat are becoming stored in the oceans. The maximum heat transport in winter takes place at 30° and in summer at 50° on the northern hemisphere, even though some of the absolute values of the heat budget are still in doubt. Considerable progress is being made in the theoretical treatment of spectral distribution of atmospheric radiation and the scattering problems. Quite aside from the importance for the thermodynamics and optics of the atmosphere, the practical value of radiation information is gaining in countries where solar energy can be profitably exploited.

"The symposium on Fronts, Jet Streams, and Airmasses attempted to reconcile some of the classical concepts of airmasses and synoptic analyses with the newer dynamical concepts of the atmospheric circulation. Considerable evidence can now be advanced for extension of frontal zones into the stratosphere with a model where the warm surface of the front joins the mid-latitude tropopause and the cold side continues into the polar tropopause. Both

conventional, detailed analysis and evidence obtained by special flights indicate rather dry air in the upper troposphere above surface discontinuities, with the suggestion that stratospheric air is injected into the troposphere. The creation of frontal zones through the vorticity dynamics of the jet stream above can be envisaged. The synoptic data also support in the moderate latitude the existence of 3-front and 4-airmass systems over moderate latitudes. In some areas of the Asiatic high plateaus the climatological features can contribute to the creation of jet streams. In these fields streamline and trajectory techniques will help in the analyses of atmospheric systems and lead to a better understanding of the synoptic patterns.

"The Symposium of Mesometeorology dealt with the weather systems that are too small to be followed in detail by present synoptic networks. They include, however, some of the most remarkable phenomena. Although there is no universally agreed upon definition of mesometeorology agreement exists that problems of large thunderstorms, tornadoes and squall lines are included. From study in the U.S. midwest it was shown that the low-level thicknesses show a maximum (warm air) in tornado areas. Above thunderstorms a warm ridge of high pressure with strong lateral divergence was found at 300 and 200 millibars above thunderstorms. In Sweden, based on dense network of observations, the effects of even small hills and wooded areas on rainfall and wind patterns, are quite noticeable. The possibility of the heavier precipitation on tops of hills by accretion of water from cloud caps on these hills was suggested. The Mediterranean region also shows pronounced meso scale effects. The pressure and divergence patterns are strongly influenced by the distribution of land and sea. Convergence is pronounced along the coasts, especially in winter.

"The joint symposium on Atmospheric Ozone and Problems of the Upper Atmosphere - - gratifying progress was reported on ozone sondes for direct measurements of the vertical distribution. One is based on optical principles, the other on chemical absorption. In some of the early results the decrease of upper atmospheric ozone from spring to summer in the moderate latitudes have been confirmed. The fine structure of vertical soundings showed secondary and tertiary maxima, in addition to the well-known primary maximum around 24 kilometers. The other higher concentrations were found around 12-13 kilometers and 4 to 5 kilometers. Sometimes these maxima are very sharp peaks, at other times they are gradual increases. There are significient statistical relations between these various maxima and their shape, presumably caused by the airmass transport and diffusion. The existence of considerable troposheric ozone can be attributed to production near the surface of photolysis of nitrous oxide. Some of this is produced by biological, volcanic, electrical natural phenomena; some of it is also due to industrial and other authropogenic sources. Tropospheric ozone has now been measured in several parts of the world, including low latitudes. The diffusion of surface-produced ozone can explain many of the inconsistencies observed in ozone distribution. Observations of water vapor in the stratosphere show very low values. Over England at 48,000 feet they also indicate a very pronounced mode of the frost point at -116° F.

"The symposium on Physics and Dynamics of Clouds showed that in many parts of the world determined efforts are underway to replace the haphazard methods of field experimentation by carefully designed laboratory and field studies. Strong evidence has been found that droplets capture particles and create a dust free space around themselves. This leads to the distinction of a primary and secondary aerosol. The laboratory experiments suggest that "over-seeding" is an entirely unlikely event. It is also now quite evident that the crystal structure of freezing nuclei is of little importance for their mode of action. The surface conditions of the nuclei substance is the governing element. The surface atoms must be so arranged as to correspond to the oxygen molecules in the ice lattice. Chemisorption on various nucleating substances of low solubility is an important phase of the process. Field observations show that the naturally present freezing nuclei which act at temperatures above -30°C show a trend similar to those of the large condensation nuclei above 0.2 micron diameter. Measurements at the surface and in the middle troposphere (10,000 ft.) indicate convective influences on the particle transport. Small Aitken nuclei show little correlation to the large and freezing nuclei frequencies. They may, however, become important for freezing at temperatures below -32°C. The importance of the size of nuclei as active freezing center is also indicated by the higher rate of inactivation among the smaller silver iodide particles compared with larger ones. The possibility of using controlled burning, at least in tropical regions, for the production of condensation with the liberated heat of condensation acting as further heat source for lifting air parcels to the cumulo nimbus level was shown. Notable rain in the dry season ensued. The question of statistical tests to indicate the possibility of increased precipitation in non-orographic situations by silver-iodide seeding from the ground was also raised. The discussion indicated that the majority of non-commercial scientists in this field believe that only randomized operations can furnish an acceptable answer.

"The Symposium on Atmospheric Chemistry, Radioactivity and Pollution discussed problems which have become of major concern in the last decade. The problems of elimination of contaminants from the atmosphere by meteorological processes have placed new responsibilities on meteorologists. On the other hand radio active substances have placed at his disposal new tools to study atmospheric circulations by tracer techniques. Not all of the useful tracer substances are caused by nuclear explosions. Others result from cosmic radiation in the high atmosphere. Surface produced radon is also a valuable tool in distinguishing between exchange of air over land and sea. Better studies of the hydrologic cycle, in particular the elusive evaporation process, may become possible through the tritium studies. The residence time of water vapor in the atmosphere has been estimated at from 2 to 10 days. The question of ground water storage is still problematical. Some estimates have given residence time as high as 10 years but 1 to 2 years is likely to be more realistic. Contaminants from nuclear explosions in the troposphere show an approximate half-life of 20 days in the natural fall-out or wash-out speed. Fall-out of long-lived radioactive substances from thermo-nuclear tests from the stratosphere have shown in England a 20 to 30 time increase in strontium-90 activity since 1954. There is a notable seasonable variation

with late spring maxima. The total fallout seems to indicate lower values in equatorial regions and higher values in the moderate latitudes of both hemispheres. This is assumed to be connected with the ascending air currents in the equatorial air currents and general descent in the areas of the moderate latitude jets. Analyses of rainfall over the United States seem to indicate that the soil is the major source for the nitrogen compounds found. The chlorine concentration drops off rapidly with distance from the ocean. A 4-day half-live value of the residence of contaminants is indicated. Except locally, industrial contamination does not as yet account for a major fraction of the aerosol. The local exceptions, such as the Los Angeles area, have great practical importance. As industrialization and traffic increase, in areas of west-coast inversions with sunshine meteorological conditions favorable to smog formation will be tied to the surface ozone production process.

"The last shrouds of mystery are lifting from Polar Meteorology, which was the theme of the final symposium. With 195 surface and 100 upper air stations in the arctic and 42 surface and 20 upper air stations in the antarctic during IGY more adequate information than heretofore is becoming available. The conditions in the two areas, however, and their effect on the general atmospheric circulation--are entirely dissimilar. This introduces a feature of assymetry into the global flow patterns. The coupling of the antarctic continent with middle latitude oceans and the arctic ocean with mid-latitude continents causes quite notable differences. Among them are different reactions to solar radiation (and its possible changes) and heat balances. The southern circulation, for example, is as strong throughout the year as the northern circulation in winter. The vertical temperature structure of the antarctic is quite different from that noted in the arctic. Although the data are still sparse it appears that the southern regions south of 40° latitude except East Antarctica very rarely have anticyclones. In the arctic upper air data have now become so plentiful that many details have become known. In the mid-troposphere there is a distinct variation from a three-trough system in winter to a five-trough system in summer. Some of the upper air patterns, although quite different from one year to another show considerable persistence or recurrence tendency of large-scale features. Also there is good evidence of a stratospheric jet at the 300 millibar level north of 70° latitude on many occasions. In toto, there is not too much difference of meteorological conditions of the arctic and the middle latitudes of the northern hemisphere. Whether this holds for the stratospheric levels is yet to be explored. However, analysis of ascents to 30 millibars show temperature waves of 10 to 20 days. It is interesting to note also cases of very rapid stratospheric warming in the layers above 300 millibars in late winter. At times this warming rapidly penetrates from the high levels to the 100 or even 300 millibar levels, while in others it takes several days to penetrate. In one case a rise of 34°C in 24 hours was noted. The explanation is still open."

2. RESPONSIBILITY TO COOPERATIVE OBSERVERS: Responsibilities towards co-operative climatological observers are divided among Central Office units as follows:

(1) Personnel Management Division is responsible for personal recognition of observers. Included are items such as:

(a) Administration of the length of service awards program and the distribution of emblems to the WRPCs for redistribution to observers.

(b) Preparation of letters from Chief of Bureau and Secretary of Commerce to observers serving 40 or more years, to long service observers who retire, to observers performing exceptional service, and to families of long service observers who die.

(c) Preparation of scrolls or special recognitions, such as a letter from the President, to 60 year observers and for other exceptional occasions.

(2) O&SF Division (including the Substation Management Units, when established) is responsible for:

(a) Selection and training of observers. This includes correspondence with observers from the Management Units (or WRPCs until the units are established), preparation of the Cooperative Newsletter, preparation of Circular B and other training material.

(b) Protecting observers from excess demands by private interests.

(c) Arranging for supplying observers with instruments, forms, etc.

(d) Purchase of "Weatherwise" subscriptions for cooperative observers.

(e) Representing the Bureau to the observer, partly by correspondence, but mainly by personal contact through the Substation Inspectors.

(3) The Public Information Coordinator is responsible for:

(a) Arranging for press releases and appropriate publicity for co-operators with unusual and noteworthy service records. Basic background and factual material to be provided by Office of Climatology, Personnel Management Division or others involved.

(b) Assisting writers in preparing stories on cooperative observers for press, radio, television and other information media.

(4) The Office of Climatology is interested primarily in obtaining good records from cooperative observers, not in taking part in substation management. The Office of Climatology is responsible for:

(a) Designing of observational forms and instructions, in cooperation with O&SF Division.

(b) Collecting of data from observers.

(c) Making quality control information available to the proper places, O&SF Division, Substation Management Unit (when established); Substation inspectors, etc., observers (until the Substation Management Unit is established).

3. DISCONTINUANCE OF NARRATIVE WEATHER STORY IN C.D. (COMEMO, File C-3.1, DATED OCTOBER 2, 1957). Decision to discontinue the narrative weather story in the monthly and annual issues of Climatological Data, except in cases of unusual or outstanding weather, was based on the following justification.

Of the total questionnaires mailed to paid subscribers only 17% indicated that an abbreviated summary, included only when unusual or outstanding weather occurred, would not meet their requirements. It is quite probable that a number of these subscribers who answered in the negative will be satisfied with the brief table of extremes that will be furnished each month and year.

Our evaluation of only the paid subscriber list in this matter was based on their prime interest in the publication - they are paying for it. However, a cursory review of the replies from the "free" recipients and from cooperative observers are not too different from those who pay.

Also, there are other reviews of the weather readily available. On a national basis they appear in the Monthly Weather Review and the C. D. National Summary. On a weekly basis the various State Weekly Weather and Crop Bulletins and the National issue furnish ready reference material to which those having needs for surveys of this type can be referred.

4. COOPERATIVE STORM REPORTS BY STATE CLIMATOLOGISTS WHILE ON LEAVE: The following is taken from a memorandum from the Northeastern Area Climatologist:

Mr. Lautzenheiser and his family were driving through Bryan, Ohio on July 5-6 about the time that a possible tornado struck the area. He visited the storm site and sent Mr. Pierce a report along with newspaper clippings.

Mr. Lautzenheiser's vacation adventures with the weather continued when he reached Illinois. He drove to Barrington, Ill. and investigated a severe storm report there, and sent Mr. Joos summaries of eyewitness reports and a rough sketch of the storm damage.

It is considered that these activities of Mr. Lautzenheiser while on leave represent a very real interest in his work and that his reports were helpful to the State Climatologists involved. It is possible that some publicizing of his activities may cause Weather Bureau people in general to

pay more attention to severe local storms and thus result in better reporting of them.

5. PUBLICATION OF 25-YEAR MEANS OF TEMPERATURE AND PRECIPITATION: To date these station and division means have been published as Letter Supplements for 31 states. These states, and the Letter Supplement number ascribed to each are:

Alabama	L.S. 5726	New Jersey	L.S. 5714
Arizona	L.S. 5730	New Mexico	L.S. 5728
Arkansas	L.S. 5722	New York	L.S. 5704
Colorado	L.S. 5731	North Carolina	L.S. 5709
Florida	L.S. 5701	North Dakota	L.S. 5724
Georgia	L S. 5710	Ohio	L.S. 5719
Illinois	L.S. 5739	Oklahoma	L.S. 5712
Iowa	L.S. 5732	Oregon	L.S. 5736
Kansas	L.S. 5718	South Carolina	L.S. 5729
Kentucky	L.S. 5727	South Dakota	L.S. 5725
Louisiana	L.S. 5734	Tennessee	L.S. 5733
Maryland-Delaware	L.S. 5713	Virginia	L S. 5715
Michigan	L.S. 5723	Washington	L.S. 5737
Minnesota	L.S. 5721	Wisconsin	L.S. 5720
Montana	L.S. 5735	Wyoming	L.S. 5738
Nebraska	L.S. 5740		

6. INTERACTION BETWEEN THE SOIL AND ATMOSPHERE A CONCERN OF THE METEOROLOGIST: Sometimes meteorologists get so involved with events occurring between the level of the instrument shelter and the cloud tops that they forget the importance of events taking place at their feet. A large percentage of solar radiation is converted to heat at the ground surface. The nature of that surface and the moisture content play a very important role in the heat balance of the earth and atmosphere. There are recognized difficulties in obtaining realistic measurements of temperature at the surface of a soil because of the complications of direct radiation, but there are some likely methods of approach.

For example, the Science section of TIME Magazine carried an article in its September 23, 1957 issue concerning an infra-red photographic technique for determining the temperature contrasts along the ground by means of the radiation emitted by the various surfaces. It seems reasonable to suspect that such devices might enable the meteorologist to measure and map the "heat sinks" and "heat sources" of the earth's surface under various synoptic conditions.

Field methods for measurement of soil moisture have proved rather cumbersome. But here too advances in nuclear soil moisture meters hold good prospect.

Our lives are spent in the climate near the ground and our food supplies are grown in that same environment. Rate of heating and cooling during day and night are directly related to the moisture content at the surface. As meteorologists we should recognize the importance of the earth-atmosphere boundary zone in meteorology and attempt to obtain direct measurement or establish indirect relations of the environment to meteorological parameters.

7. SUBSTATION CLIMATOLOGICAL SUMMARIES. The question has come up as to whether a cooperator in the preparation of these summaries may reprint from year to year and add the additional data to the temperature and precipitation sequential tables each year. Although this is not in strict conformance with the instructions given in paragraphs C-0543(c) and C-0543(d), we cannot be arbitrary in the matter.

We would suggest, however, that for the years not included in the record covered by the "means" table, a one-line space be allowed at the bottom of the sequential tables (following the same period of record as shown in the "means" table) before the extra year(s) of temperature and precipitation are added. We further suggest that this method be used only up to a decadal year, after which it may be feasible to prepare an entirely new summary.

8. WESTERN REGIONAL PROJECT W-48. The following is taken from the Northwestern Area Climatologist's Report on the Western Regional Project W-48, which was activated last year.

Organizational details of W-48 are somewhat similar to the NC-26 in the midwest and NE-35 in the northeast. The title of the western project is "Association of Climatic Elements with Crop Production".

The following objectives have been drawn up:

1. Find the association between crop production and climate as indicated by long-term weather and production records now in existence.

2. Determine the frequency and probability of climatic conditions that may influence crop production.

3. Isolate individual climatic elements that contribute to or hinder plant development.

Only one project is now underway with regional funds. This is the phenological survey which was organized a year ago for the 11 western states. This survey will be run again in 1958. The plan of action calls for the solicitation of only those cooperative observers who responded to the 1957 questionnaire (over 1100 in number). Due to the shortage of funds and lack of area-wide participation, the survey cannot be decentralized -- as I had proposed

a year ago.

As yet, a report on the 1957 survey is not available but one can be expected prior to the 1958 season. Montana State College has spent some time and effort to develop methods and techniques for the analysis. Some interesting developments have resulted in the Montana portion of the survey where Dightman, State Climatologist, and Caprio, Montana State College, have collaborated in the extension of this survey work. For that State, they have expanded the reporting network three-fold by soliciting outside of the cooperative network. Through interested county agents, several micro nets have been developed in a couple of important agricultural valleys. This had led to a micro-analysis which showed pertinent variations due to elevation as well as anomalies due to the local climate (warm and cold pockets). In one small valley, plant development and response showed variations that would be of the same magnitude as across the entire state of Montana. We as climatologists are aware of these possibilities but I am certain that many agronomists, for example, are not aware of this fact when recommending specific varieties of small grain for different sections of their state.

The technical committee exhibited considerable interest in the concept of a regional climatological atlas (under objective 2). More planning along this line will be done in the future. Since weather data on punched cards will be necessary for such an undertaking, it can be expected that some interest can be generated in our non-cooperating states.

9. IGY NORTHERN HEMISPHERE CHARTS TO BE PREPARED AT NWRC. As a research product of IGY, plans are well advanced for the preparation of a World Weather Map Series for the 18 months of intensified data collection. The series to be published in three parts, will include a Northern Hemisphere Section (Pole to 20° N), a Tropical Section (25° N to 25° S), and a Southern Hemisphere Section (20° S to Pole). The basic analysis will consist of Sea-level and 500 millibar charts at 1200Z to be prepared by the United States, the Federal Republic of Germany, and the Union of South Africa respectively.

DR. Martin Rodewald, who will head the Tropical Zone analysis, recently visited NWRC to discuss some of the many mutual problems of plotting, analysis, and analysis coordination.

The U.S. Portion of the series will be plotted and analyzed in the Synoptic Climatology Section of NWRC, using the same personnel who are now employed in the preparation of the Northern Hemisphere Map Series. Since no teletype data will be used in the preparation of the World Charts, and July 1957 data on microcards may be delayed until well into 1958, the interim will be used to fill the final war-years gap (July 1939 through December 1941) in the "current" series which will then extend from 1899 through June 1957.

10. IGY WORLD DATA CENTER-A METEOROLOGY AT NWRC. In connection with the International Geophysical Year, A World Data Center in the Discipline of Meteorology is now functioning at NWRC. With two similar centers (one at the WMO Secretariat in Geneva and the other in Novosibirsk, USSR) WDC-A in Asheville will be responsible, in general terms, for the safe-keeping, reproduction, and catalogue preparation of all incoming data, as well as the usual functions of data exchange and the satisfaction of requests. Individual projects under the discipline of Meteorology include, in addition to surface synoptic and upper air reports, radiation, ozone, atmospherics, and atmospheric electricity, chemistry and nuclear radiation.

While data from foreign countries have not been received in quantity, as yet, some data have been received from The Netherlands, Luxembourg, Austria, Italy, Korea, Libya, Argentina, Philippines, Ice Float "A" and Central America. It is hoped that a recently received mimeographed letter from USSR to all World Data Centers will pave the way for data exchange with Russia.

NWRC personnel are also responsible for U.S. and Canada participation in the IGY in so far as the two countries are committed to supply meteorological data to WMO for reproduction on microcards.

11. RECENT VISTORS. Dr. I. Sestof, head of the Climatological Division of the Danish Meteorological Service, visited NWRC at Asheville and the Office of Climatology in Suitland in early October. He was particularly interested in our records from Greenland Stations and in work underway in Agricultural Climatology. He inspected the cooperative irrigation experiment site at University of Maryland Tobacco Farm.

Dr. Martin Rodewald of the Deutscher Wetterdienst, visited the Office of Climatology and the NWRC September 25-28. While in Washington he delivered two lectures on "Some Aspects of the Present State of Climatic Development" and "Recent Variations of Sea Surface Temperature of the North Atlantic and Pacific Oceans". Each of these talks indicated the importance of the use of standard periods for construction of Atlases and the continuance of unchanged observational sites for long period records, as they dealt principally with the observation of climatic changes. Dr. Rodewald is on the WMO-CMI working group on Marine Atlases, and is in charge of the tropical map analysis program under IGY.

Dr. Wilfried Portig, Director of the Synoptic Division of the Meteorological Service of San Salvador, was a recent visitor in the office of Climatology. While here Dr. Portig gave a talk on pressure waves in the upper air traveling at high speeds over hemispheric areas. His talk demonstrated a series of large area pressure waves moving at 40° of longitude per day westward around the Northern Hemisphere in September 1955 and other selected months. Certain rainfall data appeared to show similar features in other months. The discussion afterwards indicated that there are likely to be atmospheric resonance phenomena which appear occassionally.

12. VISITORS TO SAN FRANCISCO WRPC: The San Francisco WRPC was visited by a group of officer students from the U.S. Naval Postgraduate School at Monterey, California on July 9, 1957 for a tour of the installation. These visits (a similar one was made last year) have proved very helpful to the students.

13. STATE CLIMATOLOGISTS ON ANNUAL LEAVE: It would be well, whenever a State Climatologist plans to be on annual leave for more than a week, to advise the Area Climatologist and Office of Climatology of his proposed absence.

14. INDEX FOR CSM. An index, covering CSMs 53 through 61 was issued under date of August 5, 1957.

FOR WRPCs

15. AMENDMENTS TO PROCEDURES. The following instructions have been issued to the WRPCs:

Paragraph 1009.694. Add to the second paragraph:

"Where appropriate, depressions in the isohyetal pattern should be shown by the use of an additional line (dotted) for a smaller increment."

Paragraph 1009.8265. Add the following:

"If extremes are from once daily observations, a note at the end of the table should indicate this."

The following changes will be effective with data for January 1958:

Paragraph 1009.523(b): change the word "first" to read "last".

Paragraph 1009.62 should read: "Text. A narrative weather summary will be included only upon occasions of unusual or outstanding weather during the month. They will be written by the State Climatologist and submitted to the WRPC in time to reach there not later than the 20th of the following month. Where a story is not required a statement to that effect will be furnished the WRPC, also not later than the 20th of the following month."

Paragraph 1009.621 should read: "When a textual summary is required it should be placed on the inside of the cover page. The section (or state), month and year should be typed on the first line in capital letters. Capitals and lower case letters should be used for the text. The name, office, city, and state, of the person preparing the weather summary should be carried at the end of the story, e.g. ---

John Doe
State Climatologist
U.S. Weather Bureau
Champaign, Illinois

The right-hand margin of the text need not be justified."

Add the following: "Paragraph 1009.622. Whether a textual summary is included or not, a simple table of extremes, similar to the one below, should be prepared at the WRPC and carried in a convenient place in the C.D. each month:

Highest Temperature _____ on the _____ at _____
Lowest Temperature _____ on the _____ at _____
Greatest Total Precipitation _____inches at _____
Least Total Precipitation _____inches at _____
Greatest one-day precipitation _____inches on the _____at _____

Greatest Total Snowfall _____inches at _____
Deepest Snow on Ground _____inches on the _____at _____
Omit the last two lines when not appropriate)

Paragraph 1009.623. About once each year, the note given below should be printed in each monthly C.D. Preferably it should be placed on the inside of the cover page. However, the note may be inserted on any page where there is suitable space. It should be typed in block style and should have a greater margin on the printed page than the data tables.

PREPARATION AND PUBLICATION OF THIS BULLETIN

Much of the data presented in this publication comes from observations taken by volunteer cooperative observers. These observations are mailed after the close of the month to a Weather Records Processing Center, where they are placed on punch cards and checked for accuracy and completeness. These cards are used to prepare copy for the various tables. Printing and mailing is done at the National Weather Records Center at Asheville, North Carolina.

The various steps all take time. Records for any state cannot be checked by machine until nearly all of them for that state have been received. Printing can not be done until all the tables for an issue are completed and assembled.

Constant effort is made to speed up publication and still maintain high quality of the data. A realistic deadline for mailing the printed Climatological Data has been set as the 15th of the second following month (45 days after the end of the month for which data are published). If any recipient's copy is unduly delayed, the Director, National Weather Records Center, Asheville, North Carolina should be advised.

Paragraph 1009.6375. The following should be added just before the last paragraph:

"When some daily readings are missing the monthly average should be

carried as outlined below:

"(a) For depth of less than 8" the monthly average should be carried if less than 10 days record is missing.

"(b) For depths of from 8" to 18" a monthly average (the mean of the daily values) should be carried whenever less than 10 days are missing. When 10 or more days record are missing a monthly mean should be published whenever there are at least 2 readings per week. The monthly average in this case should be obtained by using the mean of the weekly averages, and a reference note should explain how the monthly mean was obtained.

"(c) For depths below 18", the same criteria as in (b) above should apply, except that the number of readings per week should be at least 1."

Paragraph 1009.6381. Delete entire paragraph and substitute: "Recorder stations should be indicated by the letter 'C' in the column sub-headed 'Special' under the heading 'Observation Times and Tables'."

Paragraph 1009.6382. Delete the first sentence.

Paragraph 1009.672. Delete the words "Refer to tables column" and substitute "in 'Special' column under the heading 'Observation Times and Tables'."

In paragraph 1009.69511, after the word "Alaska" add the following: "only upon the occurrence of unusual or outstanding weather."

Paragraph 1009.652. Insert attached pages 15 and 15a to replace the present page 15 and upper half of page 16. (Note: Copies of these pages have been furnished to all State and Area Climatologists).

Substitute "Climatological Data Table" for "Table 2" in:

paragraph 1009.6131 (near bottom of page 1)
paragraph 1009.6137, line 1
paragraph 1009.632, lines 1, 8, 14
paragraph 1009.6331, line 4
paragraph 1009. 637, line 4
paragraph 1009.652, last sentence on page 14
paragraph 1009.69512, line 1
paragraph 1009.69522, line 1
paragraph 1009.69532, lines 1, 2
paragraph 1009.69541, line 1

Substitute "Daily Precipitation Table" for "Table 3" in:

paragraph 1009.6137, line 1

paragraph 1009.633, line 1
paragraph 1009.6331, line 4
paragraph 1009.6343, line 7
paragraph 1009.6347, line 4
paragraph 1009.671, line 2
paragraph 1009.673, line 4
paragraph 1009.683, lines 1, 4, 5
paragraph 1009.69513, line 1
paragraph 1009.69523, line 1
paragraph 1009.69533, line 1

Substitute "Daily Temperature Table" for "Table 5" in:

paragraph 1009.6137, line 1
paragraph 1009.635, twice on line 1
paragraph 1009.674, line 6
paragraph 1009.683, line 6
paragraph 1009.69515, lines 1, 3
paragraph 1009.69525, line 1
paragraph 1009.69533, line 1

Substitute "Daily Evaporation Table: for "Table 6" in:

paragraph 1009.636, lines 1, 8, 11, 12, 19 and 20
paragraph 1009.6375, line 4
paragraph 1009.683, line 6
paragraph 1009.69526, line 1

Substitute "Snowfall and Snow on Ground Table" for "Table 7" in:

paragraph 1009.637, line 1
paragraph 1009.6372, line 1
paragraph 1009.6375, lines 3, 4
paragraph 1009.683, lines 1, 5
paragraph 1009.69517, line 1

In the "Instructions for Preparation of Annual Climatological Data" delete the present paragraphs 1009.817 and 1009.818, and insert a new paragraph 1009.817 to read: "A weather story will not be carried in the annual. When unusual or outstanding weather has been described in any monthly issues, a note in the annual should refer to those issues.

H. E. LANDSBERG
Director, Office of Climatology

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GENERAL

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